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PEGASUS GOLD AUSTRALIA LTD.

E.L. 11/84 BORRIL CREEK

ANNUAL REPORT - YEAR 6

28/9/1989 TO 27/9/1990

~~PARTIAL RELINQUISHMENT REPORT~~

90-3166

90-3166. c/f

K.C. MORRISON
AUGUST 1990

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TENEMENT INFORMATION

E.L. 11/84 is located in the lower Weld Valley, South West Tasmania (Fig. 1, Plan 1). It originally covered 21 km2 but 2.5 km2 were removed in March 1990 when the World Heritage Area encroached on the south west corner of the E.L. The remaining 18.5 km2 lies entirely within the South West Conservation Area.

The E.L. was granted to M.C. Forster on the 28th September 1984. An option agreement between M.C. Forster and Metals Exploration Ltd. existed between the 5th January 1987 and the end of licence year three. In August 1989 an option agreement was reached between M.C. Forster and Pegasus Gold Australia Ltd., for the exploration of the licence. This agreement has been registered with the Mines Department and Pegasus is the operator.

A one year postponement to the 50% compulsory relinquishment was offered by the Department of Mines in July 1989, as a result of the uncertainty over the final position of the World Heritage Area boundary relative to E.L. 11/84. The area to be relinquished at the current renewal is shown on Plan 1 Appendix 1.

SUMMARY OF PREVIOUS EXPLORATION

In 1987-88 an 18.2 line km grid was established in the southeast of the E.L. to cover a suite of rocks known to include deformed ultramafics, carbonates and undifferentiated rocks showing intensive and pervasive secondary silica.

A programme of mapping, stream sediment and rock chip sampling, ground magnetics and bedrock geochemistry using a Wacker drill produced two main findings.

1) Anomalous chrome and nickel, and possibly platinum group metals are associated with a talc hematite magnetite schist. This unit correlated with a magnetic high.

2) Anomalous gold and arsenic was encountered in a brecciated, silicified, and in part cherty lithology of unestablished origin. Part of this unit may correlate with a magnetic low immediately east of the talc schist.

During Year 5, interpretation of the geochemical and magnetic data, together with some preliminary fluid inclusion and petrographic work produced the following conclusions.

1) The rocks in the southern part of the target area were probably originally both siliceous sediments and ultramafics. They have been tectonically deformed and pervasively replaced, in part by silica and in part by carbonate.

2) The fluid inclusion data provides evidence of hydrothermal alteration probably related to metamorphism. Secondary silification occured at temperatures of around 380oC.

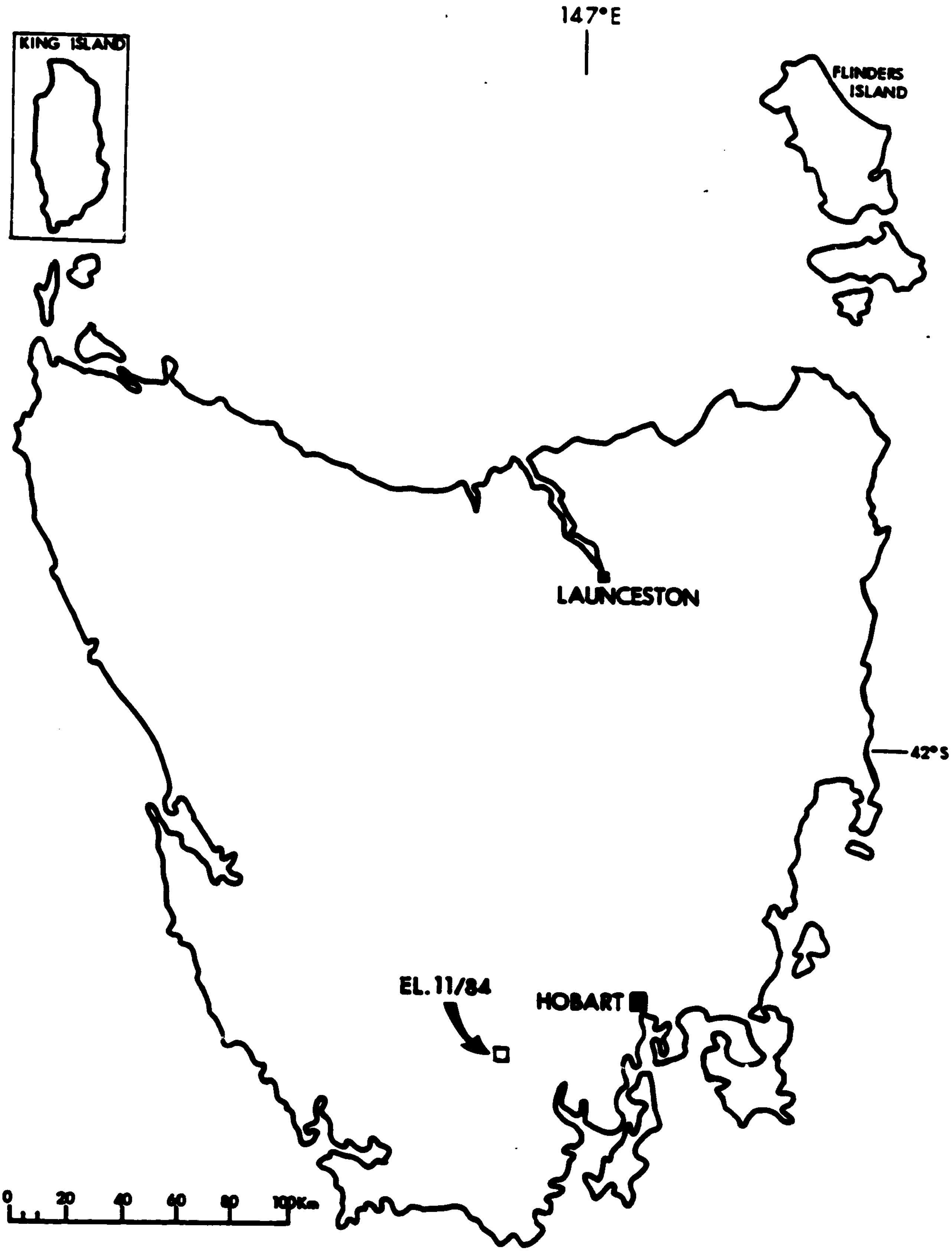


Fig. 1. E.L. 11/84 Location Map

3) A North-South trending zone of anomalous gold and arsenic mineralisation hosted by a lithology composed almost entirely of replacement quartz has been recognised by work to date. This anomalous zone is considered to be a gold target and a preliminary round of drilling to test the subsurface extent of mineralisation was proposed for the 1989-90 summer.

SUMMARY OF WORK COMPLETED IN YEAR 6

Between January and March 1990, 14 reverse circulation percussion drill holes and one cored diamond drill hole were drilled on the gold target previously identified. Drilling statistics are summarised in Table 1.

Table 1 Summary of Year 6 Drilling - Borril Creek

HOLE	TYPE	GRID COLLAR CO-ORD	AZIM (mag)	DECLIN.	T.D.(M)	MAJOR GOLD INTERSECTIONS
BC-1	R.C.	10,302N, 10,518E	270	-50	34	13 metres at 0.20 ppm
BC-2	R.C.	10,500N, 10,540E	270	-50	69	7 metres at 0.42 ppm
BC-3	R.C.	10,601N, 10,624E	270	-50	36	-
BC-4	R.C.	10,598N, 10,574E	090	-50	10	-
BC-5	R.C.	10,302N, 10,439E	090	-50	99	10 metres at 0.34 ppm 10 metres at 0.21 ppm
BC-6	R.C.	10,502N, 10,446E	090	-50	29	-
BC-7	R.C.	10,600N, 10,442E	270	-50	25	19 metres at 0.84 ppm
BC-8	R.C.	10,598N, 10,397E	090	-50	24	5 metres at 0.20 ppm
BC-9	R.C.	11,800N, 10,442E	100	-50	47	5 metres at 0.35 ppm
BC-10	R.C.	11,800N, 10,506E	270	-50	10	-
BC-11	R.C.	12,003N, 10,316E	090	-50	45	3 metres at 0.20 ppm
BC-12	R.C.	11,998N, 10,367E	090	-50	40	11 metres at 0.22 ppm
BC-13	R.C.	11,999N, 10,426E	090	-50	21	5 metres at 0.20 ppm
BC-14	R.C.	12,000N, 10,504E	270	-50	66	3 metres at 0.20 ppm
BC-15	DDH	10,302N, 10,514E	270	-50	34	3.23 metres at 0.34 ppm 2.5 metres at 0.74 ppm
					589 m	

DETAILS OF YEAR 6 EXPLORATION

The North-South trending Borril Creek Au/As anomalous zone, was drilled in the January-March period, 1990. Fourteen 4.2 inch diameter reverse circulation holes and one NQ diamond core hole were drilled to test the major gold anomalies identified by the previous bedrock Wacker drill sampling.

All holes were drilled by a track mounted H13 Gemcodril, operated by Ark No.2 Pty. Ltd., Wynyard Tasmania. This machine (Fig. 2) was used because of its capacity to drill in both down hole hammer and diamond core modes from a tracked vehicle which carries a 350 p.s.i. compressor and can be walked from site to site without the need for earthworks as environmentally intrusive as those required for truck mounted or skid mounted drills and compressors.

Drill hole locations are shown on Plan 2 Appendix 2 and the collar co-ordinates (exploration grid) are listed in Table 1. Drill logs, core photos, cross sections and drill sample assay data are enclosed in Appendices 3 - 6.

Fig. 2. Gemco track-mounted drill on site B.C.-2, showing minimal environmental disturbance. View looking north, across the Weld Valley

The ground proved very difficult to drill due to frequent alternations of clay (both kaolinitic and smectitic) and hard but intensively fractured and broken replacement type quartzite, quartz breecia and chalcedony-rich rocks. Wet clays continually blocked the ports in the reverse circulation hammer assemblage and the siliceous rocks were too hard for blade or tricone roller bits, but too broken and unstable to hammer properly. As a result of these difficulties the programme took much longer that anticipated and sample recovery was poor in the most prospective lithologies. Eleven of the fifteen holes drilled were abandoned above their prognosed depths because of ground conditions. Sample quality and recovery were only marginally improved , and at much greater cost, by BC-15, the only diamond drill hole in programme.

Based on the lithologies encountered by the fifteen holes (shown graphically on the sections in Appendix 5) the prospect geology is interpretated as a roughly north-south striking association of; deeply weathered, altered ultramafic/basic rocks, fresh, probably karsted, recrystallised (marble) limestones, and siliceous clastic sedimentary rocks, all in part replaced by a suite of very fine grained siliceous lithologies consisting of quartzite, quartz breccia, quartz vein stockwork and chalcedony.

The rocks have been intruded by ? Jurassic dolerite which was encountered at shallow depth in holes BC-3, 4, 11, 12, 14. The dolerite appears to close off the northern end of the prospect on grid line 12000 N, and forms the topographic high on the eastern side of line 10,600N, despite a surprising absence of dolerite outcrop in the area. To the south the prospective rocks are uncomformably overlain by a wedge of Permian glacio-marine sedimentary rocks which thicken south wards from approximately grid 10,250N. Much of the prospect area is covered with talus and slope deposit material rich in fragments of the secondary siliceous rock types. The irregular thickness of this slope material is interpreted to be in part due to karst weathering and sink hole development in the carbonate rocks.

The statigraphic and structural relationships between the different rock units are largely unknown but by analogy with similar rocks elsewhere in western Tasmania it is likely that the ultramafics are EoCambrian-Cambrian in age.

Limestone marble was intersected in two holes. BC-2 with a westerly azimuth encountered a 27 metre marble unit and BC-2 (easterly azimuth) drilled 54 metres of marble and was still in marble at T.D. 99 metres. Assuming that both holes intersected the same marble unit and that karsting has not produced a major thickness difference between the two sites, then the marble unit is interpreted as having an easterly dip and 27 metres is the maximum true thickness of the unit at site BC-2.

The occurrence of replacement quartz and its apparent relationship to gold mineralisation is a major feature of the prospectivity of this target. Photos of some of the textures encountered in BC-15 core are shown in Figs. 3, 4 and 5.

Fig. 3. Breccia zone within very fine grained replacement quartzite. B.C.-15, 6.40 metres.

Petrological work by The Division of Mines and Mineral Resources Consultancy Services (Appendix 7) shows remnants of carbonate minerals as inclusions in the replacement quartz from BC-15 core. This is interpreted as evidence that the rocks were probably originally carbonates and that the marble drilled in BC-2 and BC-5 may be a recrystallised but non silicified equivalent to the replacement quartz. In BC-11 several examples of replacement quartz drill cuttings with euhedral disseminated spinel were observed in a section which included ultramafic lithologies, indicating that quartz replacement was not restricted to very reactive rocks such as carbonates.

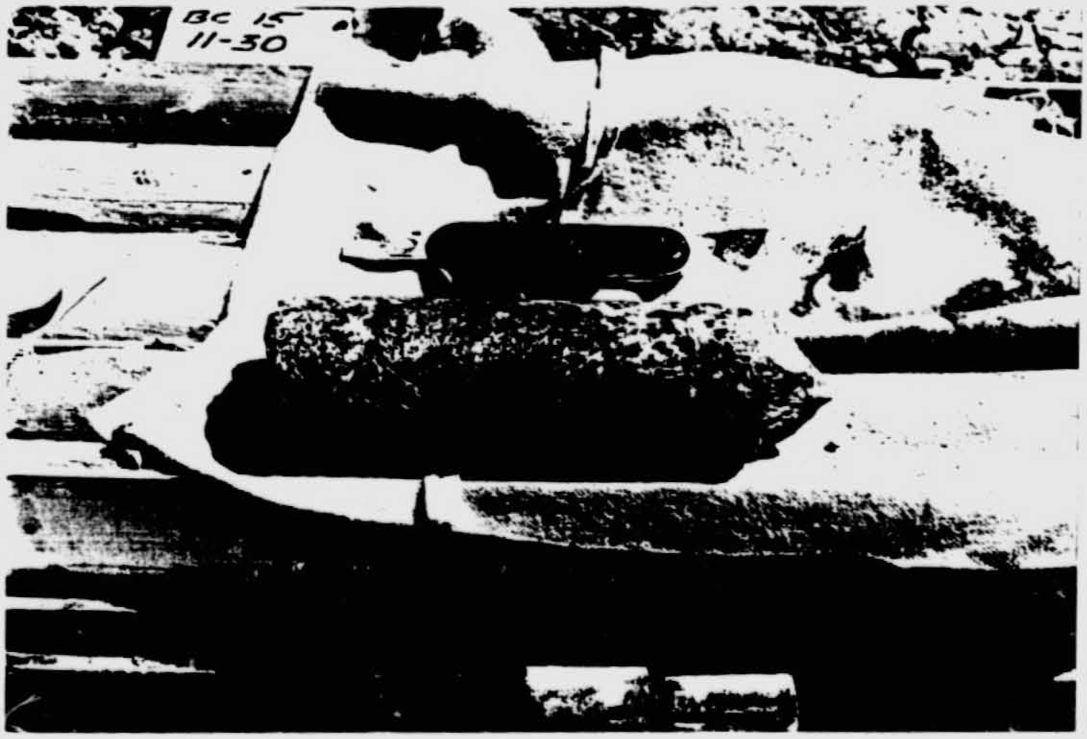


Fig. 4. Replacement quartzite showing fragmental texture, abundant angular pits and vugs with iron oxide and clay coatings. Fine white veinlets are locally developed into a stockwork texture. BC-15, 8.50 metres.

Fig. 5. Fractured, partly decomposed replacement quartzite/quartz breccia with kaolinite clay filling open spaces. BC-15, 15.30-16.20 metres.

Preliminary fluid inclusion work on surface lag material conducted during Year 5, indicated quartz crystallisation temperatures of 380oC. During Year 6

Dr J. Taheri, Division of Mines and Mineral Resources carried out further fluid inclusion work, as well as petrographic, oxygen isotope and clay minerology studies on core and float fragments. A report on this work is enclosed in Appendix 7. The main findings were as follows:

a) Petrographic textures indicate several phases of silicification, with early fine grained oherty silicification followed by later veining and coarser quartz crystals. The rocks studied appear to have originally been carbonates.

b) Liquid and vapour fluid inclusions consistently produced homogenisation temperatures ranging from 254 to 281oC and low salinities (analyses 1 per cent NaCl equivalent).

c) Oxygen analsys gave values around +10 per mill suggesting that hydrothermal/meteoric fluids rather than magmatic fluids were involved in the silicification.

d) XRD work on clavs from BC-15 shows a down hole trend of increasing illite: kaolinite. None of the clays indicative of hydrothermal environment were present and the conclusion is that the clays are either ground water sedimentation or insitu weathering products.

Petrographic work was also carried out on chips of an altered basaltic rock encouneterd in BC-8. Dr Tony Crawford, Department of Geology, University of Tasmania described the rock as a low titanium basaltic lava, typical of those assocaited with Cambrian ophiolite complexes in Western Tasmania (Appendix 7).

Despite the problems in developing a satisfactory drilling method, the programme successfully confirmed the zone of anomalous gold mineralisation indicated by the previous bedrock sampling. Several intersections of significant sub ore grade gold mineralisation were encountered both in the replacement quartz and in quartz-free ultramafic rocks. Table 1, shows the major mineralised zones with average grade >0.2 ppm, at a cut off grade of 0.1 ppm Au. eleven holes recorded intersections ranging from 2.5 to 19 metres with average grades ranging from 0.20 to 0.84 ppm. The best intersection was in BC-7; 19 metres (3-22) at 0.84 ppm, hosted in ultramafic/mafic rocks, approximately half of which have been replaced by secondary quartzite and chalcedony. BC-7 has a westerly azimuth and a declination of -50o so if the dip of these mineralised rocks is steeply to the east, as is postulated for the marble unit east of BC-7 then the 19 metre intersection of mineralisation may be almost a true thickness.

In BC-1 and BC-15 zones of significant gold mineralisation occur in replacement quartz/kaolinite clay units which appear, on the basis of solid inclusions and an absence of spinel in drill cuttings to have originally been carbonate rocks.

The intersections of clean, multicoloured limestone marble in BC-2 and BC-5 demonstrates the possibility of viable a marble resource. The licence holder is currently conducting a trenching programme at the southern end of the gold prospect, with the aim to expose the marble for mapping and sampling. This work, together with a search for talc in the altered ultramafics, is on going and will be reported in the Year 7 Annual Report.

CONCLUSIONS

The general conclusion on mineralisation control is that the north-south trending belt of high temperature replacement quartz is associated with anomalous gold, but in detail, the major intersections occur erratically in either replacement quartz and associated kaolinitic clay, or decomposed ultramafic/matic rocks. Within the mineralised quartz zones the associated clays appear to carry similar gold grades to the quartz (eg BC-15, 20.20 - 27.92).

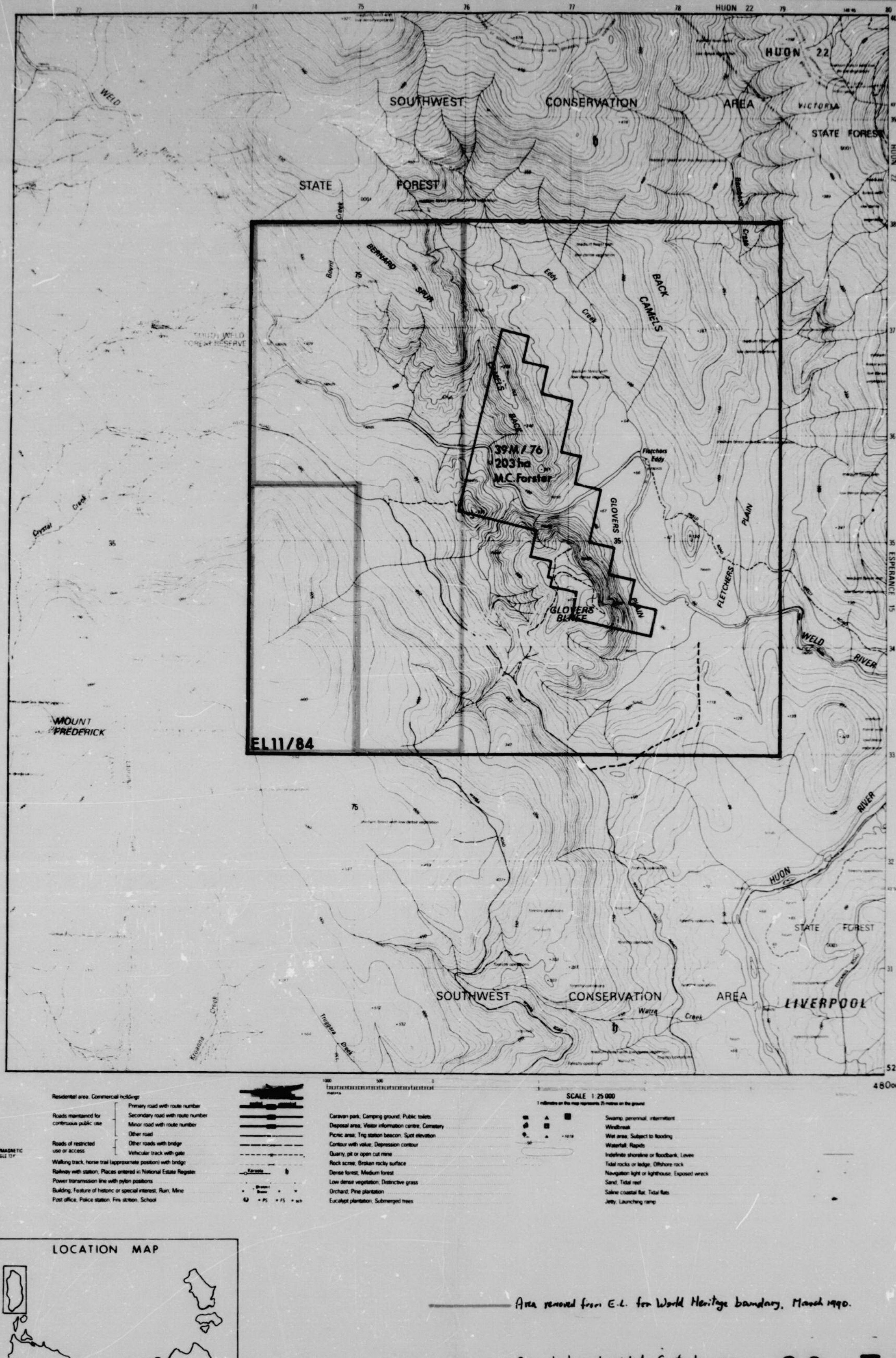
Much work remains to be done on the geology of this gold occurrence. It is a style of mineralisation not recognised elsewhere in Tasmania and a good example of the need to explore areas and concepts outside the established mineralised provinces in Tasmania.

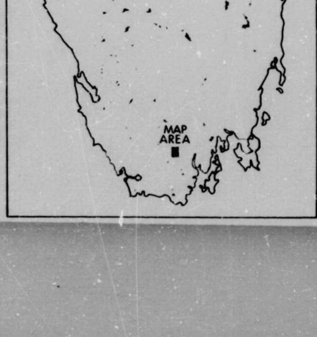
PARTIAL RELINQUISHMENT

E.L. 11/84 originally covered a 25 km2 area which included the 203 Ha 39M/76 over the Glovers Bluff silica prospect and a buffer zone covering the flood plains of the Weld River. Of the residual 21 km2, 50% was due for relinquishment in September 1989 but as the World Heritage Area boundary had not been finalised at that time, permission to postpone the partial relinquishment for one year was granted by the Department of Mines.

In November 1989 the World Heritage Area boundary was defined in the Weld Valley and consequently 2.5 km2 was taken from the S.W. corner of E.L. 11/84. At the current renewal 7.5 km2 on the western side of the E.L. is submitted for relinquishment. The area is shown on the Plan 1 in Appendix 1.

All exploration work to date has centred on the gold and marble targets east of Glovers Bluff therefore the prospectivity of the western portion of the E.L. is unknown.



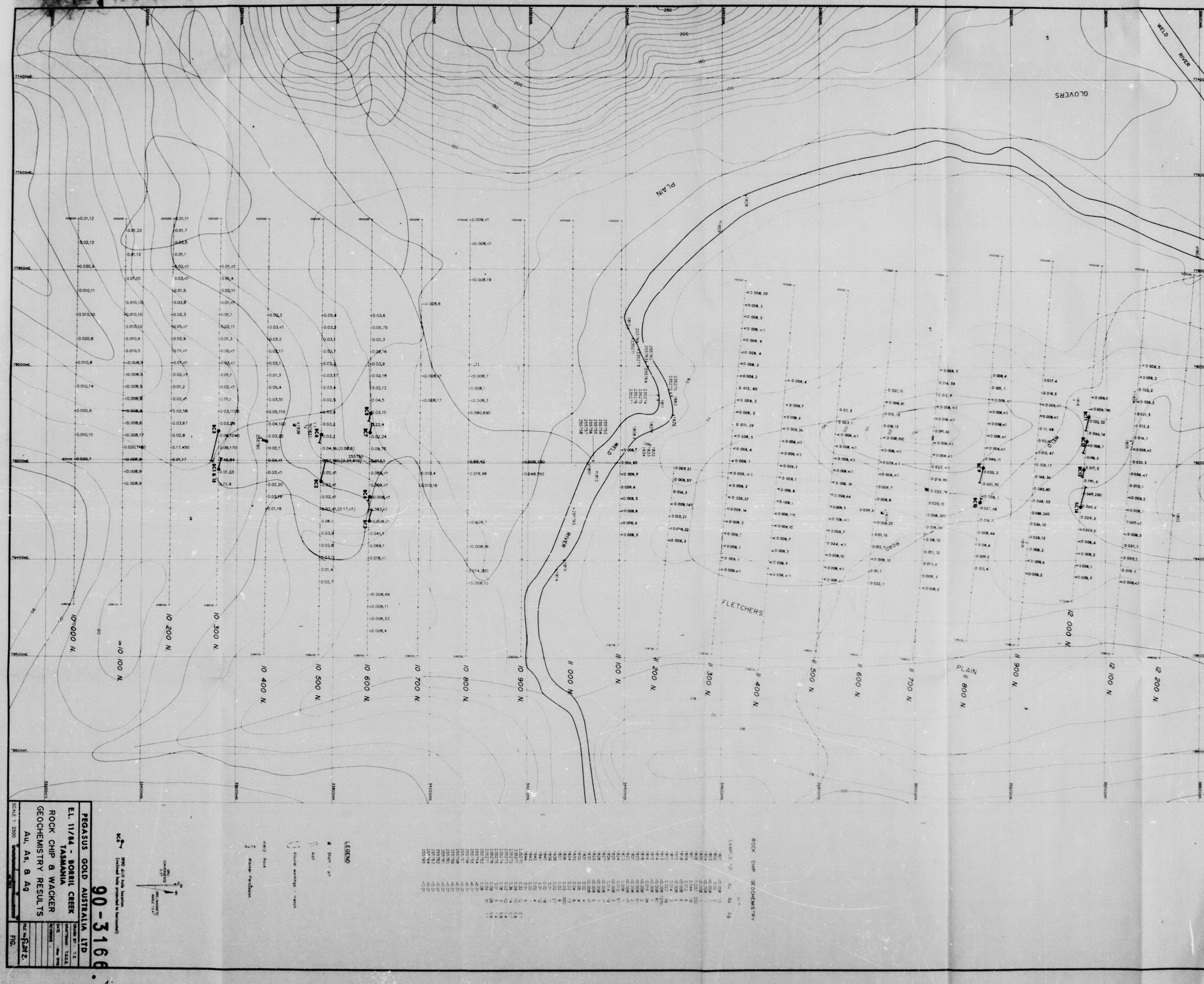


Area removed from E.L. for World Heritage boundary, March 1990.

Area to be relinquished, September 1990

90-3166.

PEGASUS GOLD AUSTRALIA LTD	PLAN 1.	
E.L. 11/84 - BORRIL CREEK, TASMANIA	COMPILED	KM
	DRAWN	JMT
BASE MAP	DATE	JULY 1989
	SCALE	1:25,000
	FIGURE	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PEGASUS GOLD AUSTRALIA LTD
E.L. 11/84 - BORRIL CREEK
TASMANIA
ROCK CHIP & WACKER
GEOCHEMISTRY RESULTS
Au, As, & Ag
SCALE 1: 2500
METRES
DRAWN BY: T.S.
DRAFTSMAN: T.G.D.S.
DATE: May 1990
REVISIONS:
FIG.
1990 drill hole location
(inclined hole projected to horizontal)
GRID CONVERGENCE 0.3°
GRID/MAGNETIC ANGLE 13.4°
LEGEND
ROCK CHIP GEOCHEMISTRY
WELD RIVER
GLOVERS
PLAIN
FLETCHERS
ROAD
10 000 N.
10 100 N.
10 200 N.
10 300 N.
10 400 N.
10 500 N.
10 600 N.
10 700 N.
10 800 N.
10 900 N.
11 000 N.
11 100 N.
11 200 N.
11 300 N.
11 400 N.
11 500 N.
11 600 N.
11 700 N.
11 800 N.
11 900 N.
12 000 N.
12 100 N.
12 200 N.

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: K.M. (Date) 1/1990	Assay Specifications
Project: BORRK CREEK	B.C. -1 10,702N, 10,518E	R.C. DRILL CUTTINGS 2 Kg. SPLITS	Logged by: K.M. (Date)	A.L.S. P.L. Au(ppb) PM209 As (ppm) G004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	SOIL/CLAY	rd brn		common f.c. blck non mag heavies.	tr. quartzite frags, small sample (Hammer)!	.08	85		
1-2	CLAY	"		tr. f. blck heavies	A/A, minor soil	.34	60		
2-3	"	"		"	A/A (change Sub.)	.23	55		
3-4	"	"		"	A/A. slightly larger sample (still too small).	.05	160		
4-5	CLAY	rdbrn/yellbrn		"	100% clay.	.04	175		
5-6	"	yell brn		comm. black heavies (?spinel)	minor Fe oxide, ferricrete frags	.01	270		
6-7	"	yellbrn/ltgrn.			minor lt grn silty clay (decomp. rock)	.02	120		
7-8	"	ltbrn/siltyyell			minor f-m qutz sand, siliceous rock frags	.04	100		
8-9	"	"			minor f. grained qutzite, siliceous rock frags.	.05	135		
9-10	"	rd brn		minor f. blck ?spinel	silty clay. tr. f. silic. rock frags.	.07	270		
10-11	"	"		tr. f. blck heavies	minor silt, siliceous rock frags, minor haematitic frags.	.04	155		
11-12	"	rdbrn, yellbrn		tr f. blck ?spinel	minor silty cly. tr. ltgrn silic. frags. Ferrug. rock frags	.02	165		
12-13	"	"		"	A/A common Fe oxide (ferricrete type) frags.	.08	420		
13-14	"	"			A/A, no heavies, minor lt gry qutzite.	.06	490		
14-15	"	"			A/A minor lt grngry clay.	.06	300		
15-16	"	yellbrn		tr. f. blck ?spinel	minor silty clay, minor ltgry - rdbrn silic. rock frags. WATER AT 16 mts (damp)	.04	100		
16-17	"	"			A/A	.05	220		
17-18	"	"			A/A	.08	240		
18-19	"	yellbrn, rdbrn		tr. f. blck ?spinel	A/A. minor grn-lt blu stain in clay coating on silic. rock frags.	.04	195		
19-20	QUARTZITE/CLAY	ltgry/grn			50/50 angular frags, v.f. grained qutzite, no structures, no heavies. Clay heavily coloured (?Ni, Cu)	.07	135		

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-1		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
20-21	CLAY/QUTZITE	yellbrn/gry		tr. m-c blck spinel	broken ground with cavities, Qutzite, angular, broken, abund ferrug. staining. clay wht - lt grn, minor amorphous wht. rock frags.	.16	240		
21-22	CLAY	wht, blu-gry, yellbrn.		tr. c. blck. spinel	minor silty clay, rock frags. damp sample	.32	120		
22-23	QUTZITE/CLAY	grybrn/yellbrn-wht		tr. c blck spinel tr ?Cu (?bit gasket)	broken ground. puggy clay with angular rock frags — small sample.	.12	165		
23-24	CLAY	off wht		tr Cu euhedral blck spinel	minor sandy qutzite, hard grn ?Kaolin clayey frags with mineral stain (?Ni, Co, Cu)	.04	24		
24-25	QUTZITE/QUARTZ BRECCIA	gryblk-grywht		tr. blck heavies	breccia - qutz vein stockwork texture (replacement type), broken ground, minor gry clay. good sample size	.12	8		
25-26	"	"		tr. v.f. sulph.	fragmental texture, minor chalcedonic to crystalline qutz. damp sample	.14	6		
26-27	QUARTZITE/clay	grey/grey-lt grn		com. f-c spinel	50/50 QUARTZITE fine grained replacement type, minor fragmental clay in part grn stained, Kaolinitic.	.26	10		
27-28	QUARTZITE/CHALCEDONY	grey, blue blck/ blu grn yell		comm. blck spinel tr. v.f. sulph.	angular mixed frags - abund steel filings.	.21	9		
28-29	"	"		"	100% Qutzite/Chalc. with minor ferrug. staining	.09	5		
29-30	QUARTZITE	blu-gray-lt gry			abund glassy qutz, minor chalcedony, comm. lt blu grn clay coatings on qutzite. wet sample, broken ground difficult drilling	.14	7		
30-31	CLAY/QUARTZITE	yellbrn/grybrn-wht.		com. Cu, steel shards from drill	Rock roller small sample. 50/50 clay in damp balls. Qutzite broken (not drilled) with minor chalced. crystalline qutz.	.35	19		
31-32	"	"		abund steel shards	A/A	.39	16		
32-33	"	"		"	A/A tr. grn clayey frags.	.26	22		
33-34	QUARTZITE	lt-dk gry			part oxidised, broken, minor lt brn clay, difficult drilling (small sample EOH 33.8 mts)	5.30	24		

EOH

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: K.M. (Date) 1/1990	Assay Specifications
Project: BERRIL CREEK	B.C. - 2. 10500N, 10540E	R.C. DRILL CUTTINGS 2kg. SPLITS	Logged by: K.M. (Date)	A.L.S. P/L. Au (ppm) PM209 As (ppm) G004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	SOIL/SAND	grey, wht		Com. f. blk heavies 1 grain f. GOLD	mixed soil, f-m qutz sand, minor qutzite chalced. frags.	<.01	1		
1-2	SAND	"		abund mixed f-vf heavies (blk, pink, brn)	A/A. well sorted, sub angular qutz.	.04	2		
2-3	"	"		"	A/A 50% glassy crystalline qutz, some cemented into aggregates, no chalced.	.07	2		
3-4	SAND/CLAY	wht/brn.		"	70/30, sand A/A. clay with heavy humic stain. - small samples.	.01	5		
4-5	SANDSTONE	lt grey		abund f. mixed heavies (beach sand type)	Com. qutz sand. SST veined in part, some quartzite with replacement texture.	.01	3		
5-6	SAND/QUARTZITE	wht/lt grey		tr. mixed heavies	70/30. minor brn humic staining	.01	<1		
6-7	SST/CLAY	wht/grey/brn		minor mixed heavies	50% humic clay small sample WATER	.62	4		
7-8	SST/QUTZITE	"		tr. mixed heavies	50/50 f-m qutz sand, replacement type quartzite. abund. humic staining.	.77	2		
8-9	SANDSTONE	grey wht			f-m qutz A/A, minor glassy secondary qutz, abund. humic ppt, staining (too dark to see heavies) (try black bit)	.57	3		
9-10	"	"			A/A (Hammer) minor chalcedony.	.28	3		
10-11	"	"			A/A rock dk brn - black with Humic ppt.	.37	16		
11-12	SST/CLAY	grey/brn			50/50 SST A/A. Clay with heavy humic stain, ppt.	.10	26		
12-13	SANDSTONE	grey-brn			A/A, heavy humic staining on 30%	.21	17		
13-14	"	"			A/A, abund glassy qutz, chalcedony	.02	7		
14-15	"	"		Common f-m mixed heavies	A/A (SST only 30%), v. wet sample	<.01	6		
15-16	QUARTZ/CLAY	clear/brn.		tr. f-m mixed heavies	mixed glassy qutz, chalced, qutzite frags. 10% humic clay. - wet. small sample	.12	6		
16-17	"	"			A/A with 10% SST.	<.01	5		
17-18	SST/QUARTZ	"		tr. f-m mixed heavies	qutz SST A/A, mixed chalc. glassy qutz quartzite frags.	<.01	3		

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	B.C.-2.		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
18-19	SST/CLAY	gry/brn.		tr. f. mixed heavies	f. qutz SST, humic clay, wet sample	<.01	3		
19-20	"	"		"	A/A	.03	15		
20-21	"	"		"	A/A. 10% lt gry. qutzite	.05	11		
21-22	CLAY/SST/QUARTZITE/SILICA	"		abund f. blck. non mag. heavies.	50% brn humic clay 25% f. qutz SST. 25% gry blu pink chalced – flinty qutz, gry qutzite.	.03	12		
22-23	"	"		"	A/A large damp sample	.03	12		
23-24	"	"		"	A/A	.13	28		
24-25	"	"		"	A/A	.13	320		
25-26	"	multicoloured		tr. f. blck heavies tr. v. f. sulph.	grn gry puggy clay, tr. f. qutz sst. abund. chalced, qutzite, flinty qutz	.08	230		
	"	"							
26-27	"	"		"	A/A.	.14	155		
27-28	"	gry/brn/multicoloured chalc.		tr. v. f blck heavies	grn gry clay, 50% chalc. silica, 25% f. qutz SST.	.09	75		
28-29	"			tr v. f. sulph.	A/A.	.10	170		
29-30	"	"		"	50% chalced. 45% grn brn humic clay. 5% f. qutz SST.	.03	240		
30-31	"	"		tr. f. mixed heavies	A/A	.04	200		
31-32	"	"		"	A/A. , higher proportion chalced (70%)	.08	195		
32-33	"	"		comm c. blck ? spinel	A/A 50% chalc. 30% clay 20% SST.	.16	390		
33-34	"	"		"	A/A 60% chalced. 20% clay 20% SST, small sample.	.27	690		
34-35	"	"		"	A/A very small wet sample – bit blockages	.27	650		
35-36	"			"	A/A	.33	670		
36-37	CLAY/QUARTZITE	brn/gry/wht			excess grn gry slimes, minor large broken (not drilling) frags qutzite	.08	250		
37-38	CLAY/QUARTZITE/SST	brn/gry/multicoloured		com. f-m blck heavies	50% grn gry humic clay, mud, 25% multi coloured chalcedonic silica, 25% f. qutz SST.	.04	360		
38-39	MARBLE/SST	blu gry/wht gry		tr. f. blck. heavies	large dry sample, no clay	.03	60		
39-40	"	wht blue gry		"	A/A	.01	65		
40-41	MARBLE	wht.			f grained, uniform limst- marble, no heavies, no insol. residue.	.02	30		

PEGASUS GOLD AUSTRALIA | **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	B.C. - 2.		Logged by: (Date)	

Sample Number	Lith-ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
41-42	MARBLE	wht, grn gry			tr. v.f. sand (?silica/carbonate)	<.01	30		
42-43	"	wht		tr. f. blck heavies. (?contam.)	uniform, large dry samples of lust marble.	.04	55		
43-44	MARBLE/QUARTZ	grn gry, wht / clear waxy			30% vein qtz in marble.	.01	26		
44-45	MARBLE	wht blu gry, grn.			uniform marble A/A. large sample	<.01	28		
45-46	"	wht blu gry		tr. f. blck. heavies	A/A.	.01	26		
46-47	"	wht			A/A. no heavies, no residues.	<.01	<1		
47-48	"	lt gry wht blu grn			A/A. minor waxy ?silic. marble	<.01	15		
48-49	"	wht, lt blu grn			100% lust marble, no heavies	<.01	<1		
49-50	"	"			A/A	<.01	<1		
50-51	"	wht lt gry			A/A	<.01	<1		
51-52	"	"			A/A	<.01	<1		
52-53	"	wht, lt grn, blu gry			A/A	<.01	<1		
53-54	"	"			A/A	<.01	<1		
54-55	"	"			A/A	<.01	2		
55-56	"	mainly wht			A/A	<.01	<1		
56-57	"	"			A/A	<.01	<1		
57-58	"	wht, lt blu gry			A/A	<.01	<1		
58-59	"	"			A/A	<.01	<1		
59-60	"	"			A/A	<.01	<1		
60-61	"	wht			A/A	<.01	<1		
61-62	"	wht			A/A	<.01	<1		
62-63	"	"			A/A	<.01	<1		
63-64	"	wht, yell brn			A/A	<.01	<1		
64-65	"	"			Marble A/A. 2% waxy chalcedonic qtz.	<.01	<1		
65-66	CHALCED/MARBLE	clear/wht/brn.			abund. humic mud, poor returns, wet sample	<.01	8		
66-67	"	"			A/A. very small sample.	.01	24		
67-68	CLAY/CHALCED	mainly dk brn/multicoloured		tr. f. blck. heavies	Heavy humic mud, difficult drilling	NO	SAMPLE		RECOVERED
68-69	"	"		"	A/A - very poor sample return.	.02	85		

EOH!

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: K.M. (Date) 1/1990	Assay Specifications
Project: BORRIL CREEK	B.C. - 3 10601N / 10624E	R.C. DRILL CUTTINGS 2 kg. SPLITS.	Logged by: K.M. (Date)	A.L.S. P/L. Au (ppm) PM209 As (ppm) G-004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	SANDSTONE	lt gry			m. qutz, well sorted, minor clay matrix minor euhedral glassy qutz, no heavies	<.01	4		
1-2	"	"			A/A, c. qutz sand, minor chalcedony.	<.01	2		
2-3	"	"			A/A	.01	<1		
3-4	"	"		comm. v.f. sulph.	A/A tr. grn quatzite.	<.01	2		
4-5	SST/CLAY	lt gry/yell brn.		tr. v.f.-f. blck heavies	50% clay, SST f-m clean qutz, in part cemented, abund. secondary qutz.	<.01	7		
5-6	CLAY	yell brn		tr. f. blck heavies (non mag.)	minor f. qutz sd. qutzite.	.02	16		
6-7	"	cream yell		"	A/A	.01	16		
7-8	"	"		"	A/A	<.01	34		
8-9	"	"		"	A/A	<.01	40		
9-10	"	creamyell/rd brn		com. f. black heavies	minor qutz sd. frags qutzite.	<.01	34		
10-11	"	rd brn		"	A/A larger sample.	<.01	38		
11-12	"	"		"	A/A (Hammer blocking)	<.01	65		
12-13	"	yell brn		"	minor frags dk blu gry - lt gry qutzite	<.01	90		
13-14	"	yell brn/rd brn		"	A/A. Slow drilling, clay blocking Hammer	<.01	260		
14-15	"	"		"	A/A frags Fe oxide	<.01	1150		
15-16	"	"		"	A/A	<.01	125		
16-17	"	rd brn		abund f. black non mag. ? ilmenite.	minor weathered Dolerite, Fe oxide frags abund. clay causing blockages	<.01	60		
17-18	DOLERITE/CLAY	gry/rd brn		"	med. grained ophitic, reasonably fresh cores with common ferrug coating	<.01	18		
18-19	DOLERITE	blu grey/rd brn.		com. f. black ilmen	50% weathered, oxidised.	<.01	11		
19-20	"	"		"	A/A 80% fresh.	<.01	4		
20-21	"	"		tr. v.f. ? ilmenite	A/A	<.01	7		
21-22	"	blu grey		tr. v.f. sulph. comm f-v.f. blck ilmen, magnet.	med. grained fresh ophitic. large sample	<.01	7		
22-23	"	"		"	A/A	<.01	7		
23-24	"	"		"	A/A opaques mainly magnetite.	<.01	10		

PEGASUS GOLD AUSTRALIA | **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-3		Logged by: (Date)	

Sample Number	Lith-ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
24-25	DOLERITE	blu gry-grn			no heavies, 10% Dolerite oxidised.	<.01	10		
25-26	"	"			A/A. no heavies, 100% fresh.	<.01	5		
26-27	"	grn gry		tr. v.f. ?ilmen.	A/A.	<.01	4		
27-28.	"	"		"	A/A - abund steel shards, less opaques	<.01	4		
28-29	"	"		tr. v.f. sulph, ilm.	A/A	<.01	3		
29-30	"	"		tr. v.f. sulph (?pyr).	A/A - (no ilmen/magnetite)	<.01	2		
30-31	"	"		tr. v.f. ilm, pyr	A/A	<.01	2		
31-32	"	"		"	A/A	<.01	1		
32-33	"	"		tr. v.f. ?ilmenit	A/A.	<.01	3		
33-34	DOLERITE/QUARTZ	gry/gry/white/bn.		tr. v.f. black non mag ?ilmenite	Dol 80% A/A with minor wht altered. Dol 20% vlingats, qutzite. (Fracture making WATER at 33 mts).	<.01	620		
34-35	DOLERITE	bluegrn gray		tr. v.f. pyr., v.f. black heavies	med-grained Dol. (? Jurassic) minor grn alt. colour.	<.01	24		
35-36	"	"		tr. v.f. magnetite, ilmenite	A/A - fresh Dolerite	<.01	15		
EOH.									

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL 11/84	Location/Site B.C.-4	Sample Type R.C. DRILL CUTTINGS	Sampled by: K.M. (Date) 1/1990	Assay Specifications A.L.S. A/c. Au (ppm) [illegible]4209 As (ppm) G004
Project: BORRIK CREEK.	10,598N 10574E	2kg. SPLITS.	Logged by: K.M. (Date)	

Sample Number	Lith-ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	SAND	clear, wht			m-f. clean qutz sand, sub angular, minor glassy euhedral second. qutz.	.08	3		
1-2	"	"			A/A, minor qutzite frags, small sample	.01	2		
2-3	"	"			A/A. unconsolidated, v. small sample	.09	2		
3-4	"	"			A/A	.01	2		
4-5	"	"			A/A	<.01	2		
5-6	"	"			A/A large frags SST, qutzite (replacement type), v. small sample.	<.01	2		
6-7	CHALCEDONY QUARTZITE	lt gry brn, wht. chalcgry			Mixed quartzite, chalcedony, qutz sand tr. dolerite frags, no heavies.	.08	75		
7-8	DOLERITE	gry grn		tr. v.f. pyr.	f. mainly fresh, minor bleached frags, minor ferrug. oxid. frags.	.02	22		
8-9	"	"		"	A/A	<.01	12		
9-10	"	"			Dol. A/A. 50% fresh, no heavies	<.01	12		

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PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84	Location/Site: B.C. 5, 10,302N, 10,434E	Sample Type: R.C. DRILL CUTTINGS, 2 Kg. SPLITS.	Sampled by: K.M. (Date) 1/1990	Assay Specifications: A.L.S. P/L. Au(ppm) PM209, As(ppm) G004
Project: BORRIL CREEK			Logged by: K.M. (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	CLAY	rd brn		abund c-m. black non mag spinel	frags. quartzite, qutz breccia small sample	.06	400		
1-2	"	"		"	A/A.	.05	1750		
2-3	CLAY/[illegible]	rd brn/gry wht		"	50/50, abund. ferricrete frags.	.03	1150		
3-4	"	"		"	" " " "	.04	1000		
4-5	"	yell brn/blu gry		"	A/A. no qutz sand, large sample	.03	290		
5-6	"	"		"	A/A comm Fe oxide staining	.02	220		
6-7	"	rd brn/blu gry		tr. of black heavies	A/A. some black spinel in quartzite.	.01	110		
7-8	"	"		"	A/A	.01	250		
8-9	"	yell brn/blu gry		abund f-c black spinel	dissem. spinels in silicified rock (Quartzite)	.01	730		
9-10	"	"		"	A/A tr. blue green clayey frags.	.02	1100		
10-11	"	rd brn/blu gry		"	A/A, (no green clay), Haemat. stain.	<.01	870		
11-12	"	"		excess v.c-f spinel.	black spinel ~10% of fines, sample 50% clay. (Quartzite may be silic. U/M)	.02	800		
12-13	SERPENT U/M / CLAY	gry grn/rd brn		abund blck spinel	dissem spinel in silicitic ? Dunite. rock hard brittle, abund Haem. clay.	.03	310		
13-14	"	"		"	A/A 5% spinel	.07	870		
14-15	"	"		"	A/A. WATER AT 15 MTS.	.08	1100		
15-16	"	"		"	A/A [illegible] clay, small sample.	.68	5200		
16-17	"	"		"	A/A. euhedral spinel to granule size	1.05	5550		
17-18	"	"		"	A/A small sample, difficult drilling try water injection.	.53	4100		
18-19	CLAY	Rd brn.			no heavies abund ferricrete.	.34	2450		
19-20	"	"			A/A large sample.	.16	780		
20-21	"	"			A/A	.09	460		
21-22	"	"		min. c. black spinel	frags haemat. shale, ferricrete.	.21	1200		
22-23	"	"		abund m-v.c. black spinel	minor Fe oxide (ferricrete) frags. minor dk grey hard rock frags, small sample, wet, poor return.	.07	70		
23-24	CLAY	Rd brn/wht		abund c-m blck spinel	50% non carbonate fine wht decomp rock	.15	420		

PEGASUS GOLD AUSTRALIA — SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-5		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
24-25	CLAY	rd brn/wht		abund m-c blk spinel	up to 10% spinel, minor chalked frags. wht clay may be talc. common wht, brn chalced. poor sample return	.11	80		
25-26	CLAY/CHALCED.	wht/brn yell		min f.c blk spinel	clay in part mottled. Chalced with qtz veining	.07	110		
26-27	"	rd/brn yell wht		tr. blk spinel	70% clay - Kaolin type.	.04	13		
27-28	"	"		"	A/A small sample	.09	145		
28-29	"	"		"	A/A abund MnO2 fe oxide frags.	.06	55		
29-30	"	"		"	A/A minor wht Kaolin. Small sample	.10	65		
30-31	"	"		"	A/A small wet muddy sample.	.07	22		
31-32	"	"		common f.c. spinel	A/A, minor fe oxide frags. - very small sample (detergent in hole).	.13	145		
32-33	"	"		tr. f-m spinel	A/A. minor haematite flakes, v small wet sample.	.11	80		
33-34	"	"		"	A/A	.02	14		
34-35	"	"		"	A/A	.01	6		
35-36	"	"			A/A no heavies, MnO2 in Kaolin.	.10	34		
36-37	"	brn wht/grey wht			A/A.	.15	14		
37-38	"	"		tr. f. black spinel	A/A	.20	13		
38-39	"	wht, lt grey			A/A no heavies.	.14	10		
39-40	"	"			A/A	.23	32		
40-41	"	brn wht/grey yell			A/A	.20	22		
41-42	"	"			A/A, minor blue grey banded chalc.	.22	22		
42-43	"	"			A/A minor U/M frags with dissem spinel	.38	26		
43-44	"	"			A/A.	.28	20		
44-45	"	"			A/A - no U/M. large sample	.21	40		
45-46	MARBLE	blu grey lt grn			translucent, hard moderate effervescence in 10% HCl (impure) no insol. residue in acid, no heavies	.03	180		
46-47	"	wht, lt blu, lt grn.			A/A, very little streaking of colour.	.04	135		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	B.C.-5		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
47-48	MARBLE	pink, brn yell.			A/A minor wht lt gry chalcedony. (marble siliceous in part?).	.02	95		
48-49	"	multicoloured			A/A	.01	80		
49-50	"	wht, lt blu gry			A/A	.02	100		
50-51	"	lt blue gry, rd brn			A/A. minor [illegible]	.01	90		
51-52	"	gry rd, lt grn gry			A/A	.03	240		
52-53	"	lt blu gry			A/A	.01	50		
53-54	"	wht, lt blu gry			A/A	<.01	65		
54-55	"	"			A/A	.01	310		
55-56	"	lt blu gry rd gry lt grn			A/A	.07	125		
56-57	"	lt blu gry dk gry			A/A	.08	34		
57-58	"	lt blu gry - blu grn			A/A very wet sample.	.03	70		
58-59	"	"			A/A "	<.01	11		
59-60	"	lt blu gry, blu grn			A/A	<.01	12		
60-61	"	"			A/A	<.01	19		
61-62	"	"			A/A	.01	6		
62-63	"	"			A/A	.11	20		
63-64	"	lt blue wht			A/A	.01	32		
64-65	"	lt blue			A/A	<.01	3		
65-66	"	lt blu gry blu wht			A/A	<.01	8		
66-67	"	lt gry blue			A/A	<.01	16		
67-68	"	lt-dk gry blue			A/A	.55	460		
68-69	"	lt blu gry			A/A	.03	50		
69-70	"	lt blu gry wht gry			A/A	<.01	28		
70-71	"	lt-dk gry blu, lt grn			A/A	.04	65		
71-72	"	lt-rd gry yell grn			A/A	.04	44		
72-73	"	lt-rd gry, gry blu, grn			A/A	.08	60		
73-74	"	gry, blue, wht gry			A/A	.05	49		
74-75	"	red gry, dk blu lt wht grn			A/A	.13	100		
75-76	"	blu wht, lt gry grn			A/A	.04	72		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	B.C.-5		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
76-77	MARBLE	lt grn, lt yell wht			uniform grading in part ?siliceous, hard, no insol. residue, no heavies.	<.01	14		
77-78	"	lt gry wht dk gry yell blue			A/A	.01	84		
78-79	"	wht lt yell lt gry			A/A	<.01	10		
79-80	"	wht gry yell, lt gry			A/A	<.01	8		
80-81	"	"			A/A	<.01	7		
81-82	"	wht, lt gry lt yell			A/A	<.01	3		
82-83	"	lt brn lt yell wht			A/A	<.01	15		
83-84	"	wht lt blu, yell			A/A	<.01	8		
84-85	-	wht lt yell			A/A	<.01	22		
85-86	"	"			A/A	<.01	10		
86-87	"	"			A/A	<.01	20		
87-88	"	wht, gry brn			A/A	.01	57		
88-89	"	wht lt gry			A/A	<.01	20		
89-90	"	wht			A/A	<.01	6		
90-91	"	wht lt grn			A/A	.01	7		
91-92	"	wht lt gry, lt grn			A/A	<.01	7		
92-93	"	wht lt gry			A/A	<.01	8		
93-94	"	"			A/A	<.01	19		
94-95	"	"			A/A	<.01	23		
95-96	"	wht			A/A	<.01	16		
96-97	"	wht lt gry lt yell			A/A	<.01	16		
97-98	"	wht, lt yell grn			A/A	<.01	17		
98-99	"	"			A/A	<.01	19		
EOH.									

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: K.M. (Date) 1/1990	Assay Specifications
Project: BERRAL CREEK	B.C.-6. 10,502N 10,446E	R.C. DRILL CUTTINGS 2 Kg. SPLITS.	Logged by: K.M. (Date)	A.A.S. P/C. Au(ppm) PM209 As(ppm) GOO4

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1		NO	SAMPLE	RETURNS.					
1-2	SANDSTONE	wht-lt gry.			Mixed orthoqtzite, qtz sand, secondary qtz, fragment of replacement style qtz. (Hunker) no heavies.	<.01	15		
2-3	"	"			A/A. comm. glassy euhedral qtz.	<.01	14		
3-4	QUARTZ SAND	"			f-m. sub-rounded clear qtz sd. minor qtzite, secondary fragmental silica.	<.01	16		
4-5	"	"			A/A.	.01	16		
5-6	"	"			A/A, minor lt grey qtzite, secondary silica.	<.01	15		
6-7	QUARTZITE/QTZ SAND	lt-dk gry			partly fragmental texture, common qtz sand, glassy euhedral qtz. v. small sample.	.01	15		
7-8	"	"			A/A v. small sample.	<.01	16		
8-9	"	"			50/50 Qtzite/Sand. v. poor sample	<.01	17		
9-10.	"	"			A/A	<.01	17		
10-11	"	"			Abund. humic staining porous, low density silica, minor vein qtz, chalcedony no heavies. v. small sample	.01	15		
11-12	"	"			A/A more vein qtz.	<.01	17		
12-13	"	"			A/A. Humic stained, 20% vein qtz.	<.01	18		
					v. small sample WATER AT 13 mts.	<.01	18		
13-14	QUARTZITE/SANDSTONE	lt gry-wht			Qtz sand aggregates, f-m qtz, 30% grey-wht vein qtz. Poor sample return.				
14-15		NO	SAMPLE	RETURN.					
15-16	"	lt gry. brn.	Heavy Humic Staining		Humic mud with qtz SST, quartzite, minor chalc. frags no heavies.	<.01	19		
16-17	"	"	"		A/A, abund Chalcedony.	.01	19		
17-18	SANDSTONE	lt gry-wht			partly replaced with quartzite, qtz veining, common chalced. abund Humic staining H.A.P. v small sample	.01	49		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	B.C. 6.		Logged by: (Date)	

Sample Number	Lith-ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
18-19	SANDSTONE	Brown Humic	Stained		A/A. no heavies, small wet sample	<.01	44		
19-20	CHALCEDONY	multicoloured			minor qutz Sd., sandstone, v. qutz. no heavies, v. small sample.	<.01	66		
20-21	"	gry brn wht			Heavy humic clay, abund qutz sand Small sample.	<.01	65		
21-22	"	"			A/A. v. poor sample.	.01	75		
22-23	"	"			A/A	.01	64		
23-24	"	"			A/A Change to tricone roller	.04	95		
24-25	"	"			A/A. slightly larger sample.	<.01	150		
25-26	"	blk gry brn wht			Chalc. frags in Humic mud, minor vein qutz, flinty qutz, no fines (?roller) no heavies.	<.01	62		
26-27	"	"			A/A. v. small sample.	.01	64		
27-28	Humic mud.	dk brn			minor frags Chalcedony, flinty qutz, no fines. no heavies, small sample.	.01	46		
28-29	"	"			increased chalc. rock frag recovery, v. small poor quality sample. (constant bit blockage)	<.01	28		
EOH.									

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: K.M. (Date) 1/1990.	Assay Specifications
Project: BORRIL CREEK	BC-7 10600N, 10,442E	R.C. DRILL CUTTINGS 2 Kg. SPLITS.	Logged by: K.M. (Date)	A.A.S. P.K. Au(ppm) PM209 AS (ppm) G004.

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	QUARTZ/QUARTZITE	gry, wht			very small sample. mixed siliceous rock frags coarse glassy qutz.	0.01	29		
1-2	CLAY/SILICA	grn brn/wht. blu gry			very small sample, qutzite, chalced, vein qutz, tr. qutz sand with grn brn clay	.01	25		
2-3	NO SAMPLE RETURN.					—	—		
3-4	SILICA	wht gry grn.		min. m. blck spinel	low density spongy silica minor chalced. (multicoloured) minor glassy qutz sand	.18	24		
4-5	CLAY/SILICA	grn/multicol.		com. f.c blck spinel	mixed qutz silica types A/A. very small	.29	13		
5-6	CHALCED/[illegible]	brn gry wht/brn grn.		tr. blck spinel	multi coloured low density chalc. in part coated with wht spongy silica.	.18	6		
6-7	QUARTZITE/QUARTZ	lt-dk gry, wht.		tr. blck heavies.	minor brn grn clayey u/m. frags. minor chalc. A/A.	.62	28		
7-8	"	"		tr. v.f. sulph.	common qutz sand, no clay, minor vein qutz with oxid. staining, pitting	.66	26		
8-9	"	"		tr. m-c blck spinel.	minor brn chalc. wht spongy silica, pellets grn clay, qutz sand. minor oxid. stain on qutzite.	.39	22		
9-10	"	"		com. m-c blck spinel	A/A.	.99	175		
10-11	"	dk gry, lt gry		tr. f-m blck heavies	A/A.	1.31	120		
11-12	ULTRAMAFIC Rock/Clay.	dk gry		abund f.c spinel	blck veinlets in u/m. rock, foliation decomp abund. grn gry clay, minor qutzite, chalc. vein qutz, qutz sand.	.85	105		
12-13	"	"		"	A/A small sample.	2.89	85		
13-14	"	"		"	tr. siliceous rock frags A/A.	2.18	150		
14-15	"	"		"	A/A	1.58	175		
15-16	"	"		"	100% u/m rock, clay	1.46	310		
16-17	U.M./CHALC	dk grn/gry brn		"	50% chalcedony with wht spongy silica. small sample	.82	600		
17-18	"	"		tr. black heavies	70/30 chalc/U.M. clay, decomp rock.	.39	290		
18-19	"	"		"	A/A	.57	135		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-7		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
19-20	U.M./SILICA	grn/wht ltgry		Comm. f.-c. black heavies (3 spinel)	U.M. mainly clay. Silica mainly flinty low density spongy rock. Small sample	·14	36		
20-21	SILICA	lt gry			A/A, no clay, no heavies, minor dk. brn chalced. very small sample	·09	32		
21-22	SILICA/U.M. CLAY	blk brn, grn.		Comm. black spinel	very wet muddy sample. poor return	·35	70		
22-23	QUARTZITE/ CHALCEDONY	ltgry ltbrn		"	80% Quartzite 20% grn U/M Claystone Quartzite mainly flinty.	·10	46		
23-24	"	"			no heavies, no U/M clay very wet muddy Small sample. (change to tricone roller)	·04	36		
24-25	"	"			very small sample, mixed Quartzite, multicoloured chalced., qtz sand.	·07	42		
EOH.									

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL. 11/84	Location/Site	Sample Type	Sampled by: KM (Date) 8/1990	Assay Specifications
Project: BERRIL CREEK	BC-8 10598N, 10397E	R.C. DRILL CUTTINGS 2kg. SPLITS.	Logged by: KM. (Date)	A.L.S. P/K Au(ppm) PM209 As(ppm) G004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	CLAY/QUARTZITE	yell/brn/gry/dk		abund m-c blck spinel	minor glassy qutz grained, minor v.qutz, secondary silica. (Blade Bit).	.09	70		
1-2	CLAY	yell/brn.		com. f.c. subhed. blck non mag spinel.	minor soft gry brn fisile claystone c black spinel (u/m?) tr. qutzite frags	.33	175		
2-3	CLAY	brn gry.		"	foliated clayey rock with spinel, u/m?	.30	360		
3-4	SERPENT.	grnbrn-purple		"	partly oxid. serpent. u.m. rock.	.11	300		
4-5	"	"		"	A/A. in part talcose	.12	230		
5-6	"	"		"	A/A small sample (WATER AT 6m)	.12	140		
6-7	"	grnbrn, pik blk		"	A/A mottled minor qutzite, v.qutz (contam. or replacement?)	.08	150		
7-8	"	"		"	A/A (use foam)	.04	165		
8-9	"	"		"	A/A. minor hard basaltic frags.	.02	95		
9-10	"	"		"	A/A very small sample.	.03	18		
10-11	"	"		"	A/A. several large basaltic frags	<.01	30		
11-12	"	dkgrn. ltgry		com. f.-c. blck. spinel tr. v.f. pyr.	A/A. poor returns, difficult drilling	.02	38		
12-13	"	"		com. f.-c. blckspinel	A/A.	.03	46		
13-14	"	"		"	A/A. very small returns, abund water	.02	55		
14-15	U/m/LMST.	grngry/dkgry		com. f.c. blck spinel com. v.f. pyr.	lmst. blocky brittle, with dissem. pyr.	.02	80		
15-16	"	"		"	A/A very small sample.	.02	85		
16-17	LIMESTONE	ltgry. dkblugry		abund v.f. pyr. minor blck spinel.	Fragmental texture in part with wispy flaser-like frags. in part blck. minor serpent. frags, tr. qutz.	.39	130		
17-18	"	"		"	A/A very small sample	.03	110		
18-19	"	Gry, blck ltbrn		abund blck spinel, pyrite.	A/A abnt pyrite, minor serp. u/m frags.	.04	155		
19-20	CHERT BRECCIA	blck, dk.ltgry gry.		com. blck spinel, pyr.	Chert, minor u/m breccia, pyrite, banded, layered, flattened texture. Change to Hammer.	<.01	85		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-8		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni	
20-21	QUARTZITE/[illegible]	lt.-dk gry		com. v.f. pyr. f.-c blck spinel	mainly massive, minor fragmental. ~10% brn grn. serpent. minor [illegible]	<.01	48			
21-22	QUARTZITE	grey wht		minor v.f. sulph.	marbled with vein qutz., abund f. qutz sand (rounded, ? detrital)	.01	12			
22-23	"	"		Comm. v.f. pyr	no opaques. Large sample, minor grn clay.	<.01	10			
23-24	"	"		tr. v.f. pyr.	Com. vein qutz c grn colour (?Chlorite) (Hammer blocked again)	<.01	24			
EOH.										

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: KM (Date) 2/1990	Assay Specifications
Project: BERRIL CREEK	BC-9 11800N 10442E	R.C. DRILL CUTTINGS 2kg. SPLITS	Logged by: K.M. (Date)	ALS. P/C. Au(ppm) PM209 As(ppm) G004 Cr, Ni(ppm) G001

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	QUARTZITE/CLAY		VERY SMALL SAMPLE - CONTAMINATED.			·01	16	540	320
1-2	QUARTZITE/CLAY	blgry-whtbrn. ltbrnclay	part oxid.	tr. c. subhedral blckspinel (non mag).		·14	8	970	25
2-3	QUARTZITE	blu gry/whtbrn		abund. c. spinel	minor qtz silt, f.sand, ltbrn silty clay	·01	3	1650	10
3-4	QUARTZITE	bluegry-grywht		abund m-f blck spinel	com. glassy qtz sd. spinel detrital	·01	4	1650	5
4-5	"	"		"	A/A (good samplesize with Heavies)	·01	4	1550	10
5-6	"	"		abund f-v.c. blckspinel, mixed heavies (f)	A/A spinels rounded, detrital f. heavies angular, fractured.	<·01	3	1200	<5
6-7	QUARTZITE	grywht, brngry	Humic staining.	abund f-v.c. spinel	qtz sand, qtzite frags.	·01	2	1500	5
7-8	"	"	"		minor grn clayey frags, no qtz sd. no heavies	·01	2	530	15
8-9	CLAY/SILT	lt brn.	Humic staining	tr. f-c blackspinel	minor qtzite frags, mainly medium suspension	·07	2	190	20
9-10	"	"	"		A/A, no heavies, minor qtz sand.	·01	3	95	25
10-11	QUARTZITE	grywht-ltbrn		" "	spinel in qtzite, minor ltbrnclay, com qtzite sand	·02	2	95	25
11-12	CLAY/QUARTZITE	ltbrn/gry.			no heavies	·03	5	95	60
12-13	CLAY	gry			poggy clay, minor grn soft rock frags (u/m?)	·02	5	50	55
13-14	CLAY/QUARTZITE	ltbrn/grn			no heavies, minor ? vein qtz.	·03	4	90	70
14-15	"	"			no heavies minor grn ? serpent frags. (possible contamin.)	·04	3	45	45
15-16	CLAY	ltgrybrn.		tr. black heavies	serpent frags, qtz sand, qtzite frags.	·03	5	45	35
16-17	SAND/CLAY	lt grybrn.			f. qtz sd., minor qtzite, no heavies.	·02	32	35	135
17-18	"	"			com. grn ? u/m frags (possible contam.)	·01	36	30	195
18-19	QUARTZITE/CLAY	grywht/ltbrn		tr. black heavies, com. pyr. aggregates	com. qtz sd. Tr. v.fm. frags.	·01	36	95	100
19-20	"	"		"	A/A Br. on some qtzite frags.	·01	95	45	150
20-21	"	"		"	A/A	·01	85	40	135
21-22	"	"		"	A/A	·01	70	35	180
22-23	SAND/CLAY	"		tr. f. pyr.	constant level grn u/m frags.	·01	50	35	110
23-24	CLAY	gry		"	tr. f. qtz sd. abund grn brn u/m frags	·01	40	45	350

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-9		Logged by: (Date)	

Sample Number	Lith-ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
24-25	QUARTZ/clay	gry wht/lt gry		Com. pyr.	tr. u/m. frags, f. qutz sand	<.01	44	45	430
25-26	"	"		tr. f. black heavies tr. c. pyr.	no. u/m. frags.	.63	46	45	170
26-27	"	"		"	A/A	.03	85	60	120
27-28	"	"		tr. f.-m non mag. black heavies, com. c. pyr.	com. f. qutz sd. no u/m.	.07	53	65	105
28-29	CLAY/QUARTZ	lt gry/gry wht		"	A/A.	<.01	60	130	320
29-30	CLAY	gry.		Com. c. blck spinel tr. pyr.	tr. qutz sand.	.05	100	350	1650
30-31	CLAY	gry grn.		c. blck non mag. subhedral spinel	minor decomp. u/m frags.	<.01	200	1000	2250
31-32	CLAY	grn brn.		"	A/A	.01	14	105	760
32-33	"	"		"	A/A	.01	6	810	270
33-34	"	"		"	A/A clay smectitic	.03	4	320	2200
34-35	"	grn brn, rd brn	abund. Fe stain	"	A/A. com. Fe oxide frags	.16	19	1250	1050
35-36	"	yell brn grn gry		Com. c.-f black heavies.	minor grn gry basic rock frags.	.46	44	510	720
36-37	"	"		"	A/A Small Sample	.68	100	430	400
37-38	"	"	minor Fe stain	abund c.-f blck spinel	A/A. Fe oxide frags	.24	50	470	970
38-39	QUARTZ/clay	rd brn/gry grn-yell brn	"	tr. f. blck heavies.	dolerite heavily oxid. abund Fe oxide frags large sample.	.26	60	470	165
39-40	QUARTZ/clay	rd brn, yell brn		min. f. blck heavies	Ferrug. quartzite, clay is sandy.	.09	42	75	105
40-41	"	"			no heavies. abund. Ferrug. stain. com. qutz sand.	.07	30	170	70
41-42	"	" "			A/A	.07	270	110	55
42-43	CLAY	yell brn			no heavies. abund Fe oxide frags, sandy clay	.38	1000	50	95
43-44	"	"			A/A	.05	120	30	115
44-45	"	"			A/A. minor ferricrete, minor clayey rock frags	.04	105	20	75
45-46	"	"		tr. blck heavies	abund ferricrete, Fe oxide, com lt gry dolerite	.04	80	25	115
46-47	"	"			no heavies. minor ferricrete, no sand	.03	17	15	150
EOH.									

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84	Location/Site: BC-10, 11,800N, 10,506E	Sample Type: R.C. DRILL CUTTINGS 2Kg. SPLITS.	Sampled by: K.M (Date) 2/1990	Assay Specifications: A.L.S. P/L Au (ppm) PM209, As (ppm) G004
Project: BERRA CREEK			Logged by: K.M. (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	SAND	wht			Replace O-rings in Hammer NO SAMPLE RETURN.				
1-2	SAND	wht			f. qutz sd. subrounded, in part polycryst. minor frags orthoqutzite, no heavies	.01	5		
2-3	QUARTZITE	lt gry. wht			clean well sorted f.-v.f. qutzite, sand.	<.01	5		
3-4	"	"			A/A, 50% Humic staining	.02	9		
4-5	QUARTZITE/Clay	lt gry/yell brn.			70% qztite /30% clay. heavy humic stain. (Hammer blocked)	.02	22		
5-6	QUARTZITE	lt gry. wht			com. f. qutz sand, minor yell brn clay. abund humic stain.	.10	95		
6-7	"	dk gry.-lt gry. wht			com. f. qutz sand, abund. humic stain	.06	30		
7-8	"	"			A/A Hammer blocked, small sample	.04	75		
8-9	"	"			A/A (using Tricone roller bit	.03	70		
9-10	"	"			A/A Hole unstable, collapsing, probable contam. - Hole abandoned.	.02	32		
EOH.									

~~PEGASUS~~ GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL11/84	Location/Site	Sample Type	Sampled by: KM (Date) 3/1990	Assay Specifications
Project: GORRIL CREEK	BC-11 12003N, 10,316E	R.C. DRILL CUTTINGS 2Kg. SPLITS.	Logged by: K.M. (Date)	A.L.S. P/L Au (ppm) PM204 As (ppm) G004 Ni (ppm) G001 Cr (ppm) G001

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	CLAY/QUARTZITE	yellbrn/whitgry		min. m-c black heavies		.20	400	1050	1900
1-2	"	"		"	small sample	.10	240	250	85
2-3	"	"		tr. v.f. pyr. com. f.c. spinel		.09	195	550	60
3-4	"	yellbrn/blugry		abund f-v.c. spinel	euhedral spinel (talus from U. mafics)	.07	130	1300	85
4-5	"	"		(non mag) "	A/A	.04	70	1400	175
5-6	"	"		"	spinels mainly c. Some spinel in qtzite.	.04	44	1850	105
6-7	"	"		"	A/A	.03	22	3650	480
7-8	CLAY	grngry/yellbrn		"	Clay puggy Tr. small qtz rockfrag	.05	70	7950	2050
8-9	CLAY/QUARTZITE	yellbrn/blugry		"	A/A blade bit	.06	120	3150	1450
9-10	" "	grygrn/bluegry		"	A/A	.07	320	4500	6750
10-11	" "	brn-grnyell/dk blu gry		excessive f.v.c. spinel, com. f. pyr.	dk gry laths (fragmental texture) in quartzite. Small sample.	.14	570	5750	[illegible]
11-12	CLAY	olivgrn-yellbrn		abund f.v.c. black spinel (non mag) tr. c. pyr.	Clay very puggy. tr. qtzite frags. very small sample	.05	530	4850	6650
12-13	"	"		"	A/A very small sample	[illegible]	420	2150	6100
13-14	"	"		"	minor frags grn basic rock, glassy qtz, lt blu gry qtzite. med. sample size	.06 .10	370	3150	4300
14-15	CLAY	olivgrn-yellbrn		abund f-v.c. black spinel com. f. pyr.	abund frags blu gry qtzite, minor chalcedonic qtz. large sample	.10	420	2750	3550
15-16	?u/m ROCK	ltgry gry		tr. v.f. pyr. min f-c black non mag spinel	Rock soft, weathered, no silica. minor clay. blu gry qtzite. large sample	.26	150		
16-17	?CLAY	grn gry		" "	large sample	.18	95		
17-18	CLAY	lt brn		tr. black heavies excess pyr. ?arspy	puggy clay, minor frags claystone, qtzite A/A	.17	115		
18-19	QUARTZITE	ltgry. brnwht		tr. f-m black spinel abund aggregates pyr.		.03	70		
19-20	"	"		minor f-c spinel, minor f-c pyr.		.04	65		
20-21	CLAY	olivgry		minor pyr tr. spinel A/A	Tr. quartzite frags.	.01	65		

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC - 11		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
21-22	Clay	olive gry		tr. black spinel, f-c, min f.c. pyr.	tr. qtzite frags	.01	75		
22-23	"	grn gry		tr. f. blck spinel, tr f. pyr.	tr. dk ?graphitic frags, lt gry grn clayey ? u/m rock. large sample.	<.01	50		
23-24	"	"		"	tr. clayey ? u/m rock frags	.01	36		
24-25	"	"		"	A/A, tr. dk gry qtzite.	.01	95		
25-26	"	"		com. pyrite	tr. unident. hard rock frags (no spinel)	<.01	95		
26-27	"	"		"	A/A	.01	65		
27-28	"	"		"	A/A	.01	60		
28-29	"	"		"	com. brt. grn earthy frags (?Ni mins.) no spinel. no silica	<.01	36		
29-30	"	"		"	A/A.	<.01	28		
30-31	DOLERITE	gry grn.	abund br-dk grn alt.	abund pyrite (no opaques)	f-m, dk, heavily altered	<.01	16		
31-32	"	"	"	"	A/A, large dry sample. Pyr in rock	<.01	9		
32-33	"	"	"	"	A/A (Hammer on). rock harder	<.01	4		
33-34	"	"		abund f. pyr.	Decreased grn alt, abund px sand. harder rock.	.01	2		
34-35	"	"		"	A/A	<.01	12		
35-36	"	"		"	A/A	.01	6		
36-37	DOL/QUARTZ	"		tr. v.f. pyr.	30% lt gry qtz (replacement type) 70% A/A	<.01	32		
37-38	DOLERITE	grn gry		"	fresher, f. dolerite, no opaques tr. v. qtz.	<.01	18		
38-39	"	"		"	A/A.	.01	13		
39-40	"	"		"	A/A. WATER AT 40 m.	<.01	3		
40-41	"	"		"	A/A. fresher, more ophitic, little grn alt.	<.01	18		
41-42	"	"		"	A/A	<.01	10		
42-43	"	"		"	A/A very wet.	.03	9		
43-44	"	"		"	A/A. minor grn. alt.	<.01	4		
44-45	"	"		"	A/A. tr. v. qtz	<.01	14		
EOH.									

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: KM (Date) 3/1990	Assay Specifications
Project: BERRIL CREEK	BC-12 1199 8N, 10367E	R.C. DRILL CUTTINGS 2 Kg. SPLITS	Logged by: KM (Date)	AAS. P/C Au(ppm) PM209 As(ppm) G004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	SOIL	gry, yell brn			loamy soil, qutz sand, yell brn clay	0.03	15		
1-2	CLAY	yell brn		com. f-c black spinel	frags fresh dolerite (contam:?)	0.04	80		
2-3	"	"		tr " "	A/A	0.04	110		
3-4	"	rd. brn, yell brn			tr. dol. frags, common hemat. ferricrete	0.10	145		
4-5	"	"			A/A	0.07	60		
5-6	"	rd brn		tr. f. black heavies	hemat. frags, minor platey clayey frags.	0.11	70		
6-7	"	"		"	A/A	0.25	80		
7-8	"	"		tr. f-m black heavie	A/A. tr. dol. contam? small sample	0.27	290		
					Change to black at 8 mts				
8-9	CLAY	yell brn.		com. f-c black spinel	tr. ferrug. frags, small sample	0.38	230		
9-10	"	yell brn-rd brn, wht		tr. f-c " "	clay mottled, tr. dol. contam.?	0.21	70		
10-11	"	"		"	A/A - small sample	0.22	60		
11-12	"	rd brn			mottled clay with hemat. ochre.	0.24	135		
12-13	"	"		tr. v.f. pyr, f. black heavies.	Abund. contam. from cyclone	0.13	85		
					small sample, WATER AT 13 mts.				
13-14	CLAY	rd brn		tr. f black spinel	wet, small sample abund. dol. contam	0.24	90		
					tr. lt grn wht soft clayey plates.				
14-15	"	yell.			com. lt grn soft, soapy ~~mica~~ frags,	0.20	450		
					com. ferricrete, very wet, poor return				
15-16	"	"			A/A. several weathered frags? Dol.	0.15	370		
16-17	CLAY/DOLERITE	yell brn, blu grey		tr. f-c. black heavies	50% Dol. weathered to fairly fresh	0.08	190		
					tr. hemat. ochre, Change to Hammer				
17-18	DOLERITE	gry grn		tr. v.f. sulph. (? pyr)	fresh, f-m (Jurass. type) ophitic, large dry sample	0.03	24		
18-19	"	"		"	A/A	0.02	8		
19-20	"	"		"	A/A	<0.01	3		
20-21	"	grn gry		tr. v.f. pyr.	m. fresh, large sample, uniform	<0.01	1		
21-22	"	"		"	A/A	<0.01	3		
22-23	"	"		"	A/A. tr. grn min. on fractures.	<0.01	2		
23-24	"	"		"	A/A	<0.01	2		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-12		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
24-25	Dolerite	grn gry		tr. v. f. pyr.	fresh, uniform m. ophitic, large sample	<.01	1		
25-26	"	"		"	f-m, A/A	<.01	1		
26-27	"	"		"	A/A	0.01	4		
27-28	"	"		"	A/A, tr. clay, v. qutz.	0.01	15		
28-29	"	"		"	fresh uniform f-m dol.	<.01	2		
					slower drilling - bit wear?				
29-30	"	"		abund. v.f. pyr.	Dol. A/A, com. milky wht. v. qtz.	<.01	3		
30-31	"	"		"	70% f. Dol. 30% wht v. qtz, lt grn gry	<.01	1		
					hornfels type qutz.				
31-32	"	"		abund. v.f. pyr.	A/A, 10% v. qtz, no hornfels type	<.01	2		
32-33	"	"		com. v.f. pyr.	m. Dol. fresh A/A, tr. v. qutz	<.01	8		
33-34	"	"		"	Dol. A/A. no qutz.	<.01	4		
34-35	"	"		minor. v.f. pyr.	A/A	<.01	3		
35-36	"	"		tr. v.f. pyr.	A/A	0.01	3		
36-37	"	"		"	Dol. A/A, 10% milky wht v. qtz.	0.01	4		
37-38	"	"		"	f-m. fresh Dol. - slow drilling	0.01	4		
38-39	"	"		"	A/A, cuttings smaller (bitwear?)	<.01	5		
39-40	"	"		"	A/A, bit metal in sample	0.03	9		
EOH.		Abandon	Hole 39.5	- Worn Bit					

PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: KM (Date) 3/1990	Assay Specifications
Project: BEARIE CREEK	BC-13 11999N, 10426E	R.C. DRILL CUTTINGS 2 kg. SPLITS.	Logged by: KM (Date)	ALS P/C Au (ppm) PM209 As (ppm) G004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1	QUARTZITE	wht, abund. humic staining		Tr. v.c.-f black heavies.	abund f. qutz sand, minor second. qutz.	NR	NR		
1-2	"	"	"	Common v.f.-v.c. black heavies	(lighter than chromite), minor v. qutz sand.	0.07	10		
2-3	"	wht-brn	"	tr. v.f. pyr., black heavies	Humic cement, f qutz. sand	0.25	22		
3-4	SAND	Humic Stained		tr. v.f. black heavies	f. qutz sand, minor qutzite, clay small sample.	0.31	34		
4-5	CLAY	Humic stained			f. wht. qutz. sand, abund dol. contam.	0.17	46		
5-6	"	"			A/A (very small samples)	0.14	75		
6-7	"	"			A/A	0.12	85		
7-8	"	"			A/A, heavy Humic acid ppt.	0.09	34		
8-9	"	"			A/A	0.10	36		
9-10	"				A/A, abund. dol. contam. minor f. qutz sand	0.17	150		
10-11	"	"			A/A	0.08	80		
11-12	"	"			A/A - very little qutz sand.	0.12	135		
12-13	"	"			A/A, abund dol. contam.	0.08	70		
13-14	"	"			A/A very small sample	0.12	90		
14-15	"	"			Heavy H.A.P. minor qutzite frags minor dol. contam.	0.14	19[illegible]		
15-16	[illegible]	mixed	humic staining		angular-sub round mixed silic. lithologies	0.02	46		
16-17	"	"	"	tr. v.f. pyr.	qutzite, crystalline qutz, chalc. abund HAP. minor qutz sand, dol. contam.	0.02	170		
17-18	MIXED SILICA/CLAY	"	"	abund pyr (authigenic?).	Abund. Humic mud. Some spongy low density silica + chalc. WATER at 17 metres.	0.02	150		
18-19	"	off wht	humic staining	abund v.f. pyr	A/A	0.02	195		
19-20	"	"	"	com. f-v.f pyr.	(New blade bit, sub). common low density v.f. spongy silica chalc., abund humic clay, minor dol. contam.	0.04	220		
20-21	"	off wht - Humic staining		abun v.c-f. pyr.	A/A -	0.02	140		
EOH	Hole Abandoned due to Constant blocking.				poor circulation				

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement: EL 11/84	Location/Site	Sample Type	Sampled by: K.M. (Date) 3/1990	Assay Specifications
Project: BORRIL CREEK	BC-14 1200N, 10504E	R.C. DRILL CUTTINGS 2 Kg. SPLIT	Logged by: K.M. (Date)	ALS A/L Au (ppm) PM209 AS (ppm) G004

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0-1 MTS.	CLAY	yell. brn, humic			small sample, rock frags, chalc-qutite, dol.	.02	105		
1-2	"	yell. brn			small sample, minor dolerite frags. (contam?)	.09	26		
2-3	"	"			A/A (no heavies 0-3)	.13	19		
3-4	"	yell brn, rd brn			damp, no heavies, no rock frags.	.20	15		
4-5	"	" "			mottled damp, small sample	.10	13		
5-6	"	yell brn			abund. humic clay, dol. qutz frags (contam?)	.29	20		
6-7	"	"			A/A, dol. contam, sample sticking in cyclone	.04	22		
7-8	"	rd brn			mottled, abund dol. contam? small sample	.05	16		
8-9	"	"			A/A	.02	17		
9-10	"	"			A/A	.03	16		
10-11	"	"			A/A	.03	15		
11-12	"	yell.			sticky clay, ferricrete frags, dol. contam?	.01	20		
12-13	"	"			A/A with weathered dol. frags	.01	18		
13-14	"	"			A/A	.01	10		
14-15	"	yell brn			Clay + weathered Dol. small sample	.02	13		
15-16	"	"			A/A WATER AT 15 mts.	<.01	7		
16-17	"	"			A/A	<.01	8		
17-18	"	"			A/A	<.01	8		
18-19	DOLERITE	grn gry			large sample, fresh > weathered Dol, minor clay	<.01	8		
19-20	"	"		tr. v.f. pyr.	A/A, larger sample	<.01	8		
20-21	"	"		"	A/A	<.01	11		
21-22	"	gry-grn		"	fresh - mod. oxid. f-m dol. large sample	.01	9		
22-23	"	"		"	A/A	<.01	5		
23-24	"	grn gry		"	100% fresh f-m dol.	<.01	5		
24-25	"	"		"	A/A	<.01	4		
25-26	"	"		"	A/A	<.01	4		
26-27	"	"		"	A/A	<.01	4		
27-28	"	"		"	A/A	.01	5		
28-29	"	"		abund v.f. pyr.	tr. v. qutz.	.01	3		
29-30	"	"		tr. v.f. pyr	A/A (no v. qutz)	<.01	3		

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-14		Logged by: (Date)	

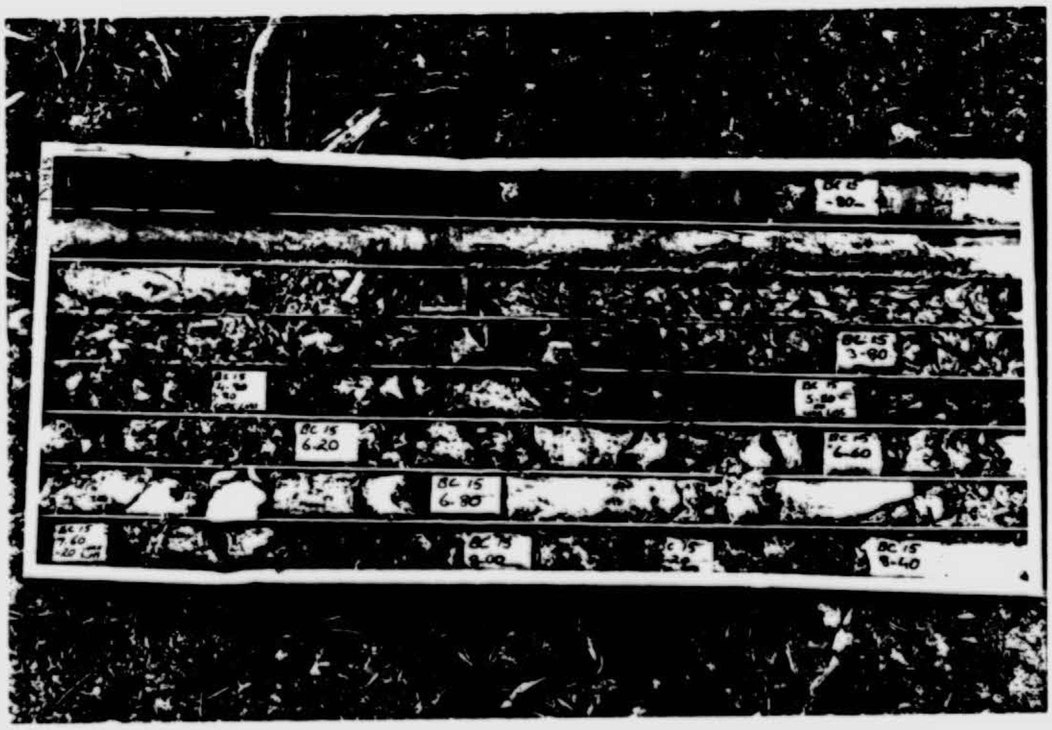
Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
30-31	DOLERITE	grn gry		tr. v.f. pyr.	fresh f-m ophitic dol (? Jurassic)	<.01	5		
31-32	"	"		"	A/A	<.01	4		
32-33	"	"		"	A/A. tr. v. qutz.	.01	4		
33-34	"	gry grn		"	fresh m. dol. A/A	<.01	5		
34-35	"	gry grn		"	fresh f-m. dol. A/A.	.01	5		
35-36	"	"		"	A/A. minor Fe oxide on fractures	.01	6		
36-37	"	"		"	A/A (no Fe oxide)	.02	5		
37-38	"	"		"	fresh f-m dol. <0% milky wht Qutz	.01	7		
38-39	"	"		"	A/A, tr. qutz. tr. Fe oxide frags.	<.01	4.		
39-40	"	"		"	A/A	<.01	4.		
40-41	"	"		"	fresh f-m. ophitic uniform.	<.01	6		
41-42	"	"		common v.f. pyr.	fresh m. dol.	<.01	6		
42-43	"	"		"	A/A. minor pyr. visible in rock chips.	<.01	5.		
43-44	"	"		tr. v.f. pyr.	fresh f-m dol! (Returns line break)	<.01	6		
44-45	"	"		"	A/A, minor Fe oxide, v. qutz. frags.	<.01	5		
45-46	"	"		"	100% fresh f-m dol.	<.01	3		
46-47	"	"		"	A/A. tr. steel frags.	.01	3		
47-48	"	"		"	A/A "	<.01	5		
48-49	"	"		"	A/A " (excess water)	<.01	5		
49-50	"	"		"	A/A minor milky wh. v. qutz.	<.01	6		
50-51	"	"		"	A/A. tr. ferricrete irregular ROP	.01	7		
51-52	"	"		"	A/A. fractured rock (difficult drilling)	.01	8		
52-53	"	"		"	A/A. tr. Steel frags	<.01	8		
53-54	"	grn gry		"	f-m dol. abund ferricrete	<.01	5		
54-55	"	"		"	fractured, Fe oxide stain f-m dol	.01	8		
55-56	"	"		"	A/A. abund. steel frags (returns line)	<.01	7		
56-57	"	"		"	A/A "	<.01	8		
57-58	"	"		"	A/A. large sample, tr. steel, minor Fe oxide	<.01	9		
58-59	"	"		"	A/A, fresh f-m dol, minor fractures	.01	6		
59-60	"	"		"	A/A tr. steel frags.	<.01	5		

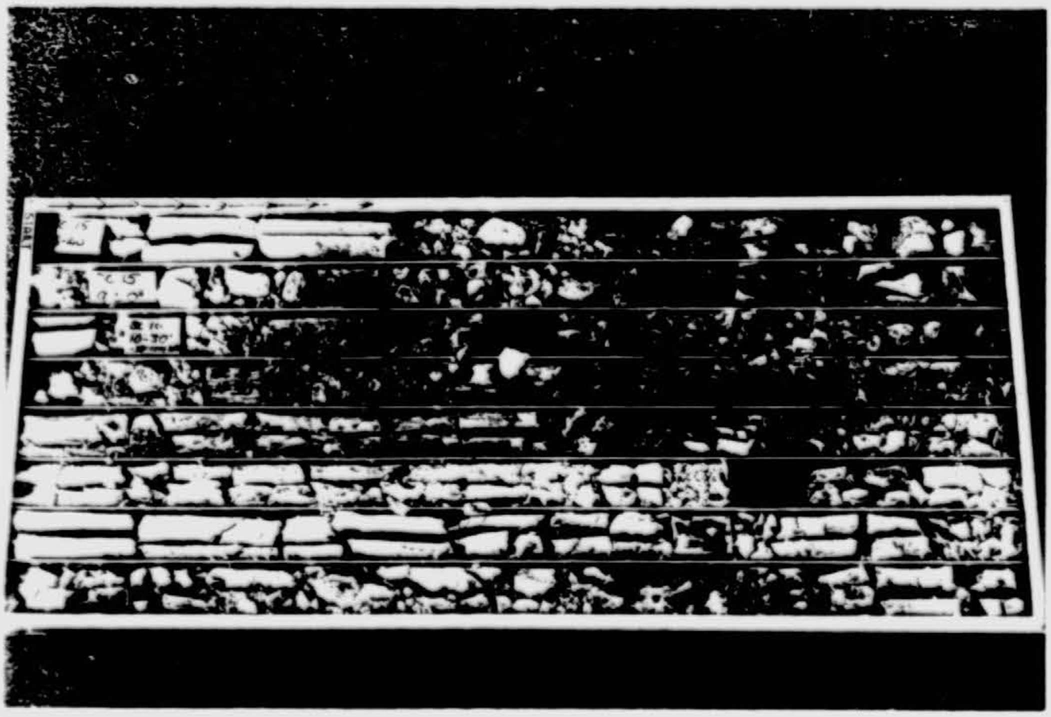
PEGASUS GOLD AUSTRALIA **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-14		Logged by: (Date)	

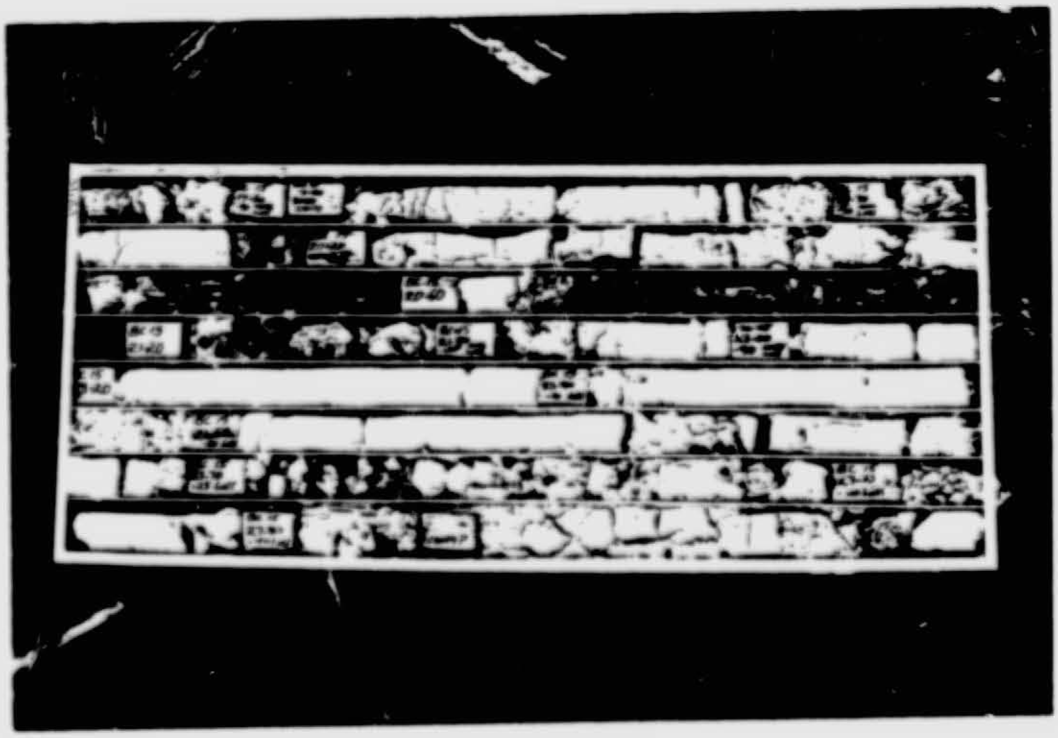
Sample Number	Lith- ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
60-61	DOLERITE	grn gry		tr. v.f. pyr.	mainly fresh, abund. steel frags.	·01	7		
61-62	"	"		"	A/A	·01	7		
62-63	"	"		"	A/A, small sample, [illegible]	·01	7		
63-64	"	"		"	A/A, less steel frags.	·01	8		
64-65	"	"		"	fresh, oxid. dol. common steel frags	·01	10		
65-66.	"	"		excess pyrite	A/A. constant hammer blocking	·01	32		
		E.O.H.	66 mts.		abandon Hole.				

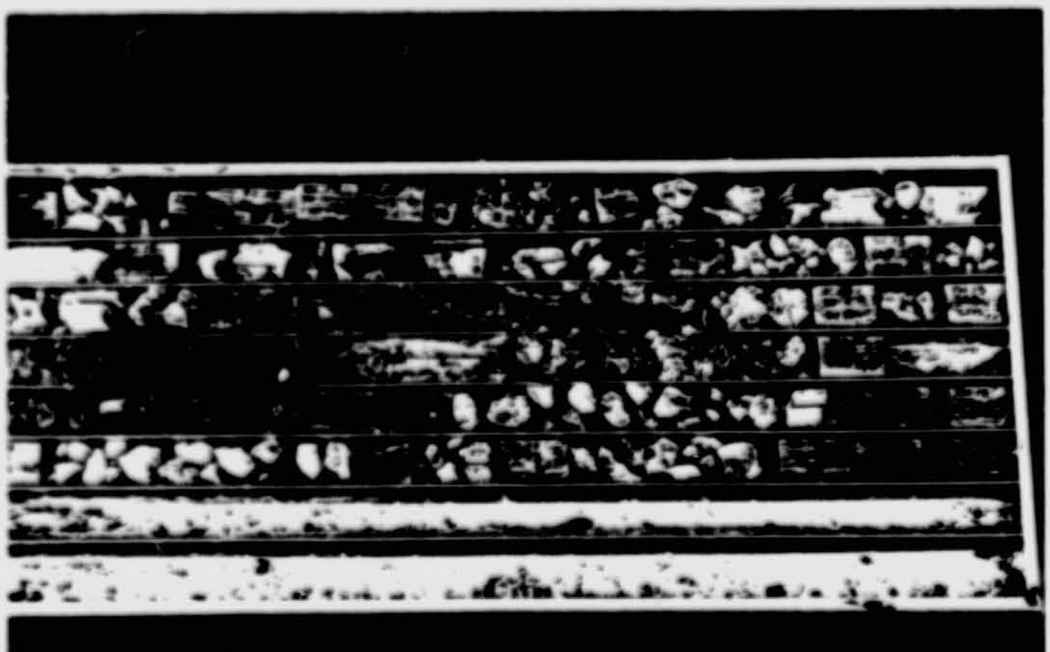
B.C.-15 DRILL CORE





B.C.-15 DRILL CORE





PEGASUS GOLD AUSTRALIA — **SAMPLE LOG SHEET**

Tenement: EL 11/84

Project: BORRIL CREEK

Location/Site: BC-13 — 10,302N, 10574E

Sample Type:

Sampled by: [redacted] (Date)

Logged by: KM (Date) 20/3 – 28/3/1990

Assay Specifications

Sample Number (mts.)	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
0 – 0.30	SOIL	black, dk brn			Clayey, humic., frags silic. rock.				
0.30 – 0.38	CLAY	grey, brn							
0.38 – 0.80	CLAY	mottled yell. brn			soil profile, minor silic. rock frags.				
0.80 – 1.65	CLAY	mottled wht yell. brn			whiter downwards, non shrinking ? kaolin				
1.65 – 2.26	QUARTZITE	grey-blu, grey-wht			in part fragmental, brecciated, marbled				
					texture, clay in fractures.				
2.26 – 3.23	CLAY	yell. brn, wht.			wet, core loss, abund silic. rock frags.				
					Clay whiter towards base.				
3.23 – 3.80	QTZ BRECCIA	lt. grey-wht			marbled with qutz, heavily fractured.				
					abund clay, Fe oxide in fractures.				
3.80 – 4.80	" "	" "			A/A, constant core loss.				
4.80 – 5.80	" "	" "			" " ", some				
					pits, vugs with second. qutz, basal 70cm				
					fract., ferrug.				
5.80 – 6.20	QTZ BRECCIA	lt grey-wht-grey			some lt grn.-wht clay (fracture fill?)				
6.20 – 6.60	" "				in part, coarse, well developed breccia texture.				
					(photo 6.40), abund Fe oxide stain.				
6.60 – 6.80	" "				" "				
6.80 – 7.60	" "				A/A, abund. pits, vugs, second. qutz.				
					possible dissolution/replacement textures,				
					abund fractures, minor clay fract-fill				
					(photo 7.22)				
7.60 – 8.00	QTZ BRECCIA				A/A				
8.00 – 8.40	" "			tr arsenopy (or steel	A/A				
8.40 – 9.60	" "	lt blu grey, cloudy grey wht.		embedded in core). 8.20	Abund streaks, cloudy marbled textures				
					range from Qtz breccia to marbled (texture)				
					Qtzite: common pits, vugs, irreg.				
					fractures, veining, Fe oxide stain				
9.60 – 9.70	BRECCIA				coarse fragmental qutz breccia				

PEGASUS GOLD AUSTRALIA — SAMPLE LOG SHEET

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-15		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
9.70-12.00	CLAY	yell brn			gritty, irregular qutz rich zones lt grey qutz breccia; Clay rich towards base				
12.00-13.02	CLAY	mottled yell brn, wht							
13.02-14.10	"	lt grn-grey wht			Kaolin? , minor mottled yell brn				
14.10-15.20	"	yell brn-yell brn			A/A				
15.20-15.80	"	grnish-yell brn			A/A				
15.80-16.70	QTZ BRECCIA	lt grey-black			fragmented abund pits, fractures with second. qutz, clay fracture fill, heavily brecciated in part (photo)				
16.70-17.60	CLAY	grn grey			mottled.				
17.60-18.80	CAVITY?				Rapid penetration, no return				
18.80-19.70	CLAY	lt grey			minor frags. qutz breccia				
19.70-20.00	CLAY	lt grey-lt grn			rare silic. rock frags increasing down.				
20.00-20.20	QTZ BRECCIA	blu grey-wht grey			abund clay in fractures, rock heavily fractured.				
20.20-20.60	QTZ BRECCIA	" "			fractured, clear fragmental texture, marked with qutz. veinlets. (54cm core gain - uphole contam. clay)				
20.60-20.67	CLAY	lt grey			Kaolin? no swelling, good recovery				
20.67-21.20	QTZ. BRECCIA	lt grey-blu grey			fractured, fragmented, brn clay in fractures				
21.20-21.80	"	" "			A/A some very coarse				
21.80-23.00	CLAY	off wht-lt brn			minor qutz rock frags, especially at top				
23.00-23.20	"	"							
23.20-23.80	"	off wht.			QTZ breccia frags at top (contam?)				
23.80-24.50	"	off wht-lt grey brn			Kaolin? concentrations of embedded silic rock frags (top 8cm, central at 24.12)				
24.50-25.70	"	" "			A/A, minor conc. qutz breccia frags				
25.70-25.93	QTZ BRECCIA	lt dk grey			abund. fractures with Fe oxide staining. Clay in fractures				

PEGASUS GOLD AUSTRALIA | **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-15		Logged by: (Date)	

Sample Number	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
25.93-27.10	CLAY	wht. brn, red			mottled, variable qutz, breccia rock frags embedded - high core loss, contam.				
27.10-27.80	QTZ BRECCIA	lt.-dk gry			fragmental texture, abund fractures, Fe oxide stain, clay deposits within fractures. Abund vugs, qutz.				
27.80-27.92	"	" "			A/A. Cavity 27.90-28.00?				
27.92-28.00	CLAY	wht-lt brn			minor ? Kaolin (contam?), mainly cavity.				
28.00-29.00	QTZ BRECCIA	lt. dk gry			Broken frags, abund Fe oxide staining, lt grn wht clay on fract. surfaces.				
29.00-29.60	QUARTZITE	wht gry-dk gry			fine grained, marbled with wht. qutz. Abund. fractures & Fe oxide clay				
29.60-30.30	QTZ BRECCIA/CLAY	A/A			Common grn wht ? Kaolin clay, fractures. Fe oxide staining				
30.30-30.40	CLAY/QTZ BRECCIA	A/A			A/A.				
30.40-30.80	QUARTZITE	dk gry-wht gry.			fine grained with wht. marbled vein qutz in part fragmental texture, some opalline qutz. Abund vugs with secondary euhedral qutz grn wht clay in fractures.				
30.80-31.30	"	" "			A/A				
31.30-31.70	"	" "			A/A				
31.70-32.10	"	" "			A/A				
32.10-32.20	CLAY	yell. brn wht			mottled ? Kaolin minor chalc. qutz frags				
32.20-32.40	QUARTZITE	gry			broken frags, core loss, minor clay on fracture surfaces.				
32.40-32.80	CLAY/QTZ BRECCIA				mottled, mixed, contaminated. yell brn-wht clay, small broken qutzite frags. less mixed wht mottled clay towards base				
32.80-32.90	"	"			A/A				
32.90-32.20	? CAVITY				zero recovery				

PEGASUS GOLD AUSTRALIA | **SAMPLE LOG SHEET**

Tenement:	Location/Site	Sample Type	Sampled by: (Date)	Assay Specifications
Project:	BC-15		Logged by: (Date)	

Sample Number	Lith- ology	Colour	Alteration	Mineral'n	Description/Comments	Au	As	Cr	Ni
33.20-33.50	CLAY/QUARTZITE				mixed lithol contamination. fall in zero penetration				
33.20-33.30	?				zero recovery				
33.30-33.50	?				" "				
33.50-33.80	Clay/Quartzite				mixed, mottled clay, broken quartzite frags				
33.80-33.85	" "				A/A - very short drill run				
33.85-34.00	" "				A/A				
34.00-34.20	? CAVITY				Zero recovery (cavities or soft, broken ground?)				
EOH									

045

PEGASUS GOLD AUSTRALIA

SAMPLE LOG SHEET

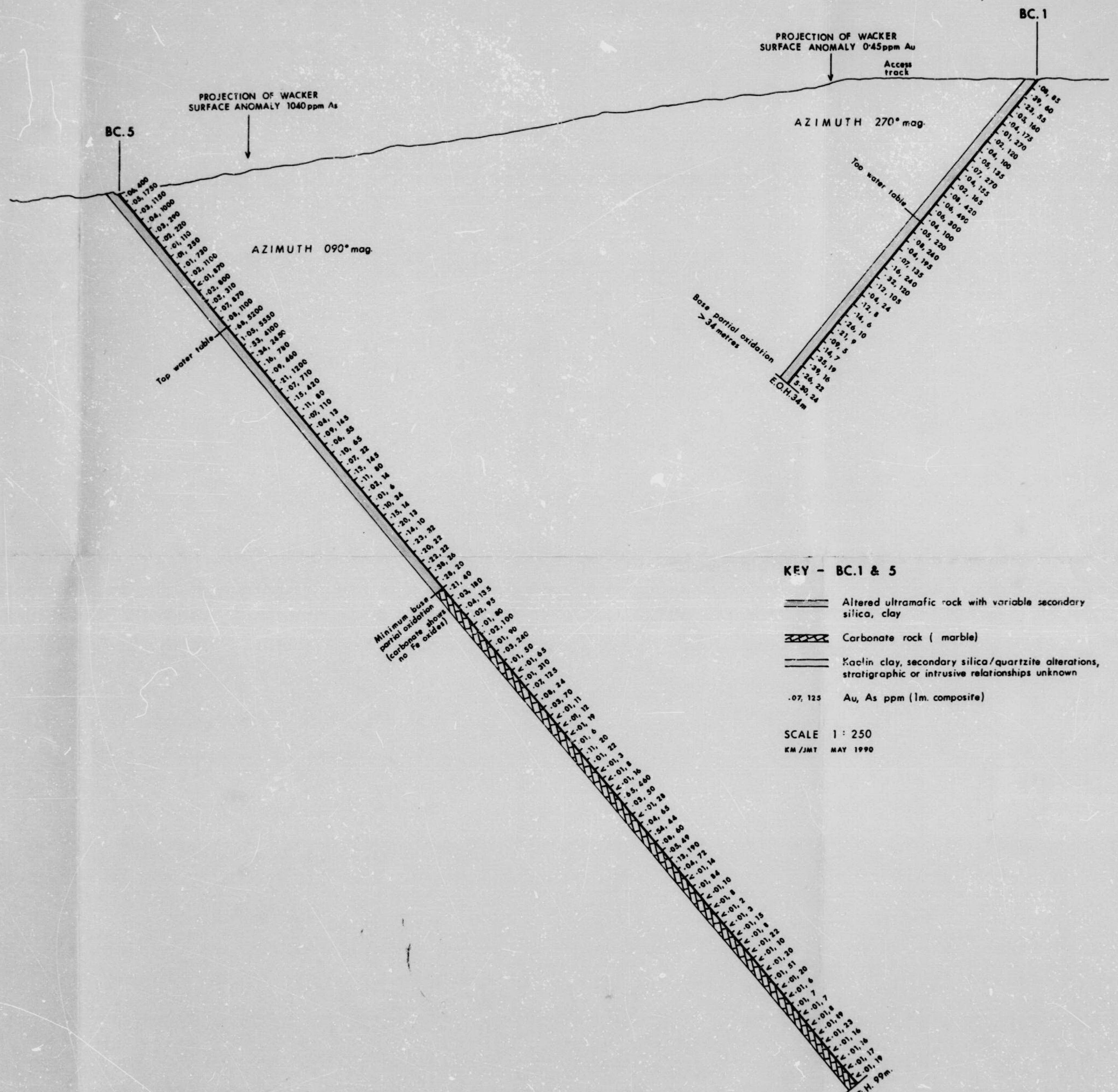
Tenement: EL 11/84	Location/Site: BC-15, 10,302N, 10,514E	Sample Type: ½ SPLIT NQ CORE	Sampled by: KM (Date)	Assay Specifications: ALS P/L Au - PM209
Project: CORRIL CREEK			Logged by: KM (Date)	

Sample Number (mts.)	Lithology	Colour	Alteration	Mineral'n	Description/Comments	Au ppm.	As	Cr	Ni
0 – 0.80					CLAY + SOIL	0.14			
0.80-1.65					CLAY, yell. brn	0.66			
1.65-2.26					QUARTZITE - QTZ. BRECCIA	0.23			
2.26-3.23					CLAY, yell. brn	0.29			
3.23-4.80					QUARTZITE - QTZ BRECCIA	0.06			
4.80-6.20					" "	0.04			
6.20-6.80					" "	0.02			
6.80-7.60					" "	0.05			
7.60-8.40					" "	0.03			
8.40-10.30					" "	<.01			
10.30-11.30					CLAY, yell. brn	0.09			
11.30-12.80					CLAY, yell, brn, wht, minor sandy Quartzite	0.22			
12.80-13.80					CLAY, yell, brn, wht	0.08			
13.80-15.86					CLAY, wht, grn, brn	0.09			
15.86-16.30					QUARTZ BRECCIA	0.05			
16.30-20.20					CLAY, GREEN, MOTTLED	0.03			
20.20-20.60					QUARTZ BRECCIA	0.10			
20.60-21.80					QUARTZ BRECCIA, QUARTZITE, MINOR CLAY	0.23			
21.80-23.80					CLAY, wht.	0.23			
23.80-25.70					CLAY, wht, minor QUARTZITE	0.10			
25.70-27.10					" " "	0.19			
27.10-27.92					QUARTZ BRECCIA	0.18			
27.92-30.40					CLAY, mixed, mottled, QUARTZITE, QUARTZ BRC.	0.04			
30.40-32.10					QUARTZ BRECCIA	0.79			
32.10-32.20					CLAY, mottled	0.36			
32.20-32.90					CLAY, mixed, mottled, QUARTZITE frags.	0.66			
32.90-34.20					QUARTZITE, QUARTZ BRECCIA fragment	0.06			
EOH									

BC 15 CORE RECOVERY TABLE

RUN (mts)		RECOVERY (mts)	RECOVERY %	COMMENTS
0.0	0.80	0.80	100	
0.80	2.30	1.42	95	
2.30	3.80	1.42	95	
3.80	4.80	0.20	20	
4.80	5.80	0.50	50	
5.80	6.20	0.40	100	
6.20	6.60	0.40	100	
6.60	6.80	0.20	100	
6.80	7.60	0.70	87	Bottom Loss
7.60	8.00	0.30	75	Bottom Loss
8.00	8.20	0.06	30	Constant Loss
8.20	8.40	0.10	50	Constant Loss
8.40	9.20	0.40	50	Bottom Loss
9.20	9.30	0.07	70	Constant Loss
9.30	9.50	0.13	65	Constant Loss
9.50	9.60	0.10	100	
9.60	9.80	0.20	100	
9.80	10.30	0.32	64	
10.30	10.70	0.30	75	Top Loss
10.70	11.30	0.55	92	Bottom Loss
11.30	12.80	1.33	89	Bottom Loss
12.80	13.80	1.00	100	
13.80	15.20	0.88	63	Top, Bottom Loss
15.20	15.80	0.32	53	Top, Bottom Loss
15.80	16.20	0.40	100	
16.20	17.60	0.42	30	Cavity
17.60	18.80	0.0	0	Cavity
18.80	19.70	0.52	58	Top, Bottom Loss
19.70	20.20	0.30	60	Mainly Top Loss
20.20	20.60	0.90	225	
20.60	21.20	0.60	100	
21.20	21.80	0.26	33	Bottom Loss
21.80	23.00	0.25	21	Mainly Top Loss
23.00	23.20	0.20	100	
23.20	23.80	0.49	82	Top Loss
23.80	24.50	0.55	79	Top, Bottom Loss
24.50	25.70	0.93	77	Bottom Loss
25.70	27.10	0.65	46	
27.10	27.80	0.24	34	
27.80	29.00	0.73	61	Bottom Loss (Cavity)
29.00	29.60	0.10	17	Cavity
29.60	30.30	0.0	0	
30.30	30.40	0.12	120	Alternating Soft
30.40	30.80	0.35	88	Clayey and Hard
30.80	31.30	0.46	92	Broken Ground with
31.30	31.70	0.10	25	Fractures and Cavities
31.70	32.10	0.25	63	(29.00 34.20 mts)
32.10	32.20	0.50	500	
32.20	32.40	0.03	15	
32.40	32.80	0.80	200	
32.80	32.90	0.30	300	
32.90	33.20	0.0	0	
33.20	33.30	0.0	0	
33.30	33.50	0.0	0	
33.50	33.80	0.30	100	
33.80	33.85	0.05	100	
33.85	34.00	0.15	100	
34.00	34.20	0.0	0	

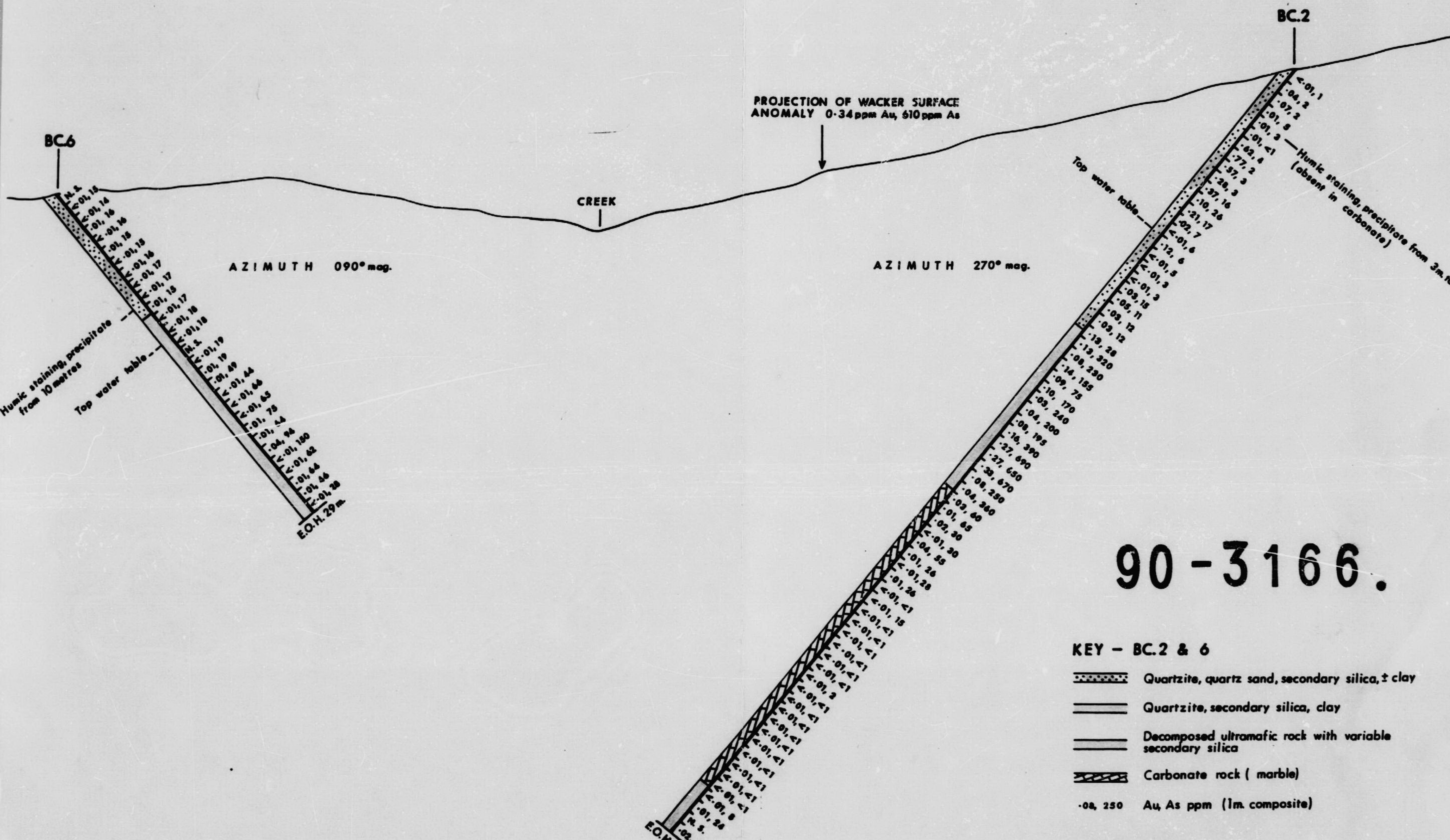
9592



BC.1
PROJECTION OF WACKER SURFACE ANOMALY 0·45ppm Au
Access track
AZIMUTH 270° mag.
Top water table
Base partial oxidation > 34 metres
E.O.H. 34m
BC.5
PROJECTION OF WACKER SURFACE ANOMALY 1040 ppm As
AZIMUTH 090° mag.
Top water table
Minimum base partial oxidation (carbonate shows no Fe oxides)
E.O.H. 99m.
KEY - BC.1 & 5
Altered ultramafic rock with variable secondary silica, clay
Carbonate rock (marble)
Kaolin clay, secondary silica/quartzite alterations, stratigraphic or intrusive relationships unknown
.07, 125 Au, As ppm (1m. composite)
SCALE 1 : 250
KM/JMT MAY 1990

90-3166.

9533



90-3166.

KEY – BC.2 & 6

Quartzite, quartz sand, secondary silica, ± clay

Quartzite, secondary silica, clay

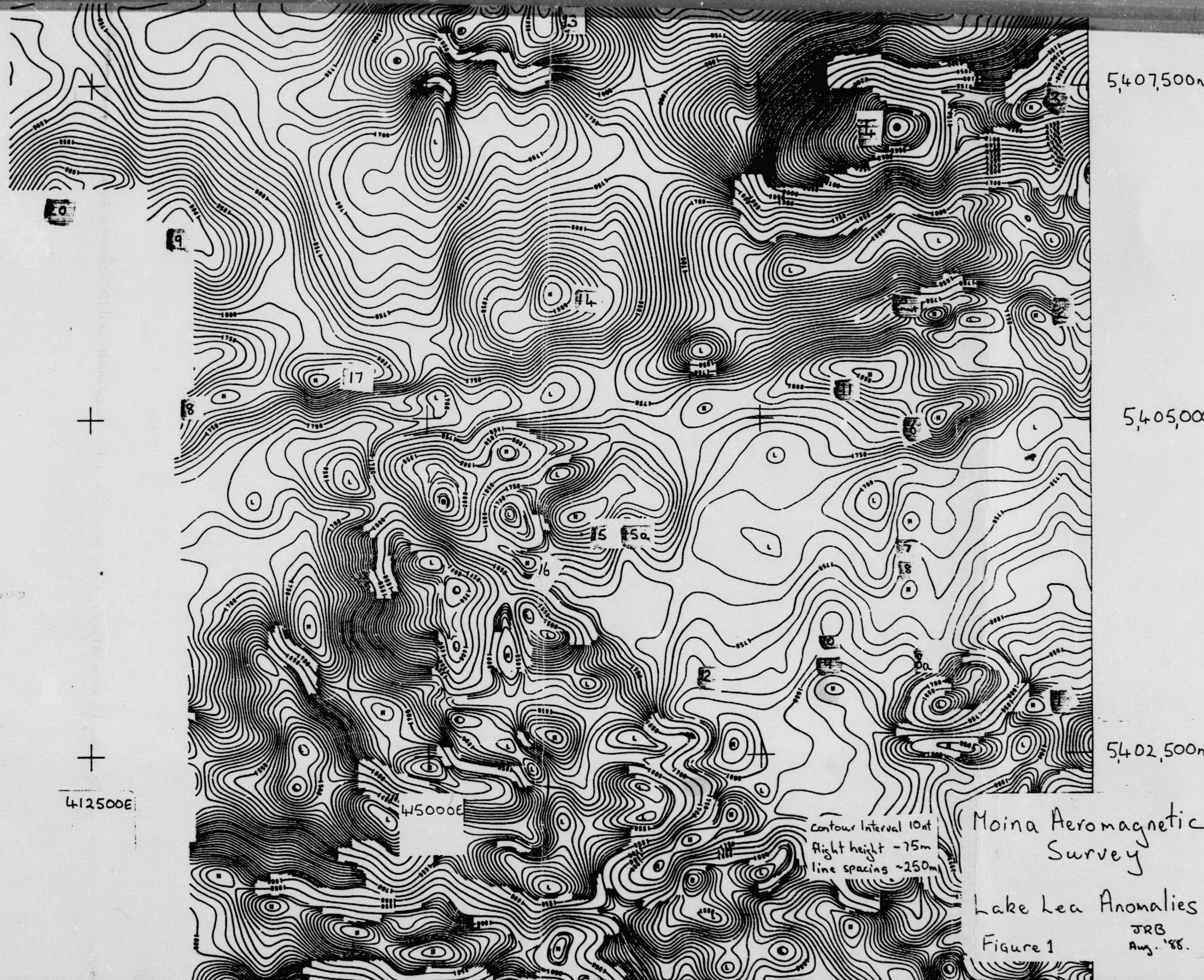
Decomposed ultramafic rock with variable secondary silica

Carbonate rock (marble)

·08, 250 Au, As ppm (1m. composite)

SCALE 1 : 250

KM / JMT MAY 1990



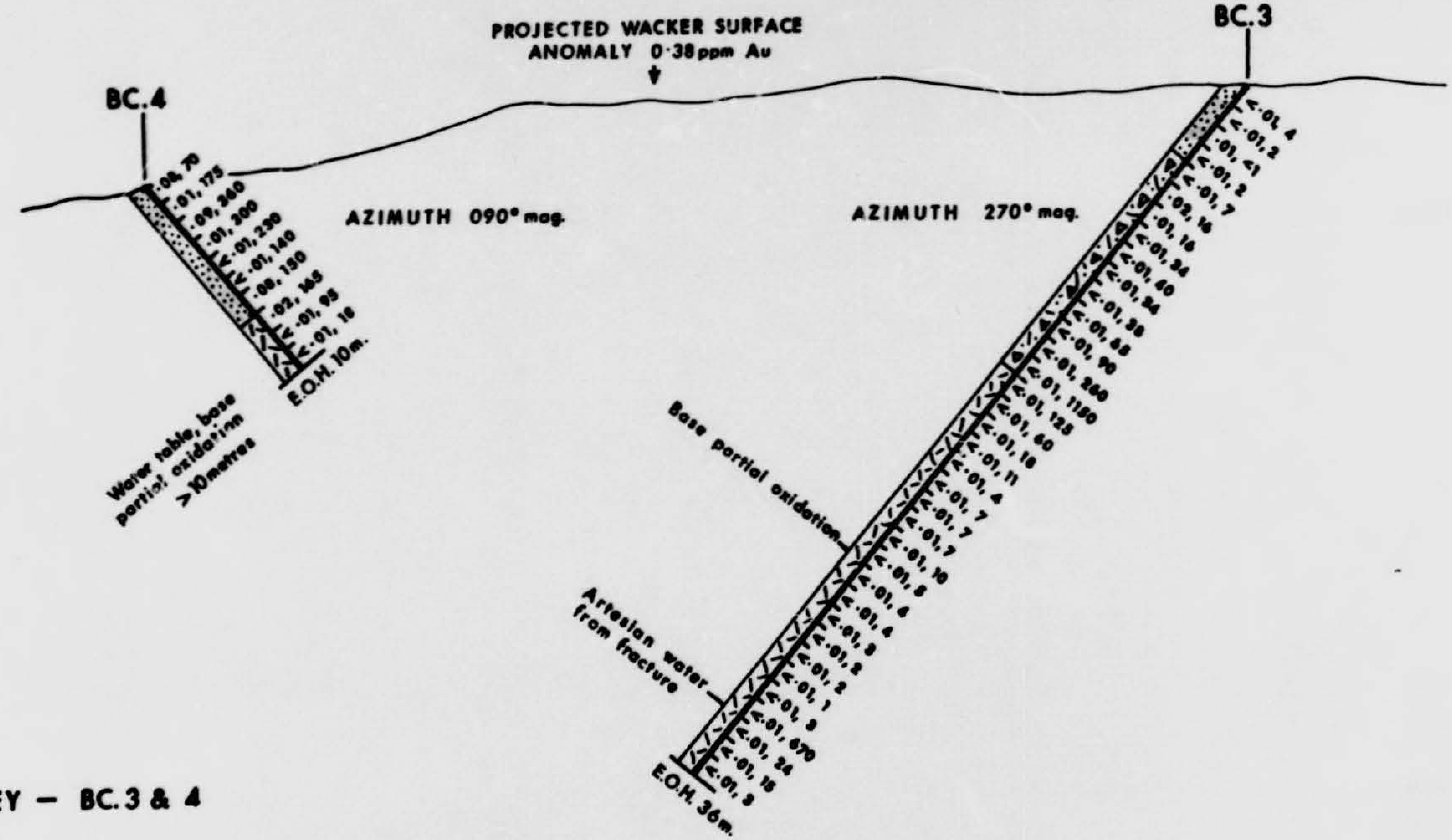
Moina Aeromagnetic Survey

Lake Lea Anomalies

Figure 1

JRB Aug. '88.

048



KEY – BC. 3 & 4

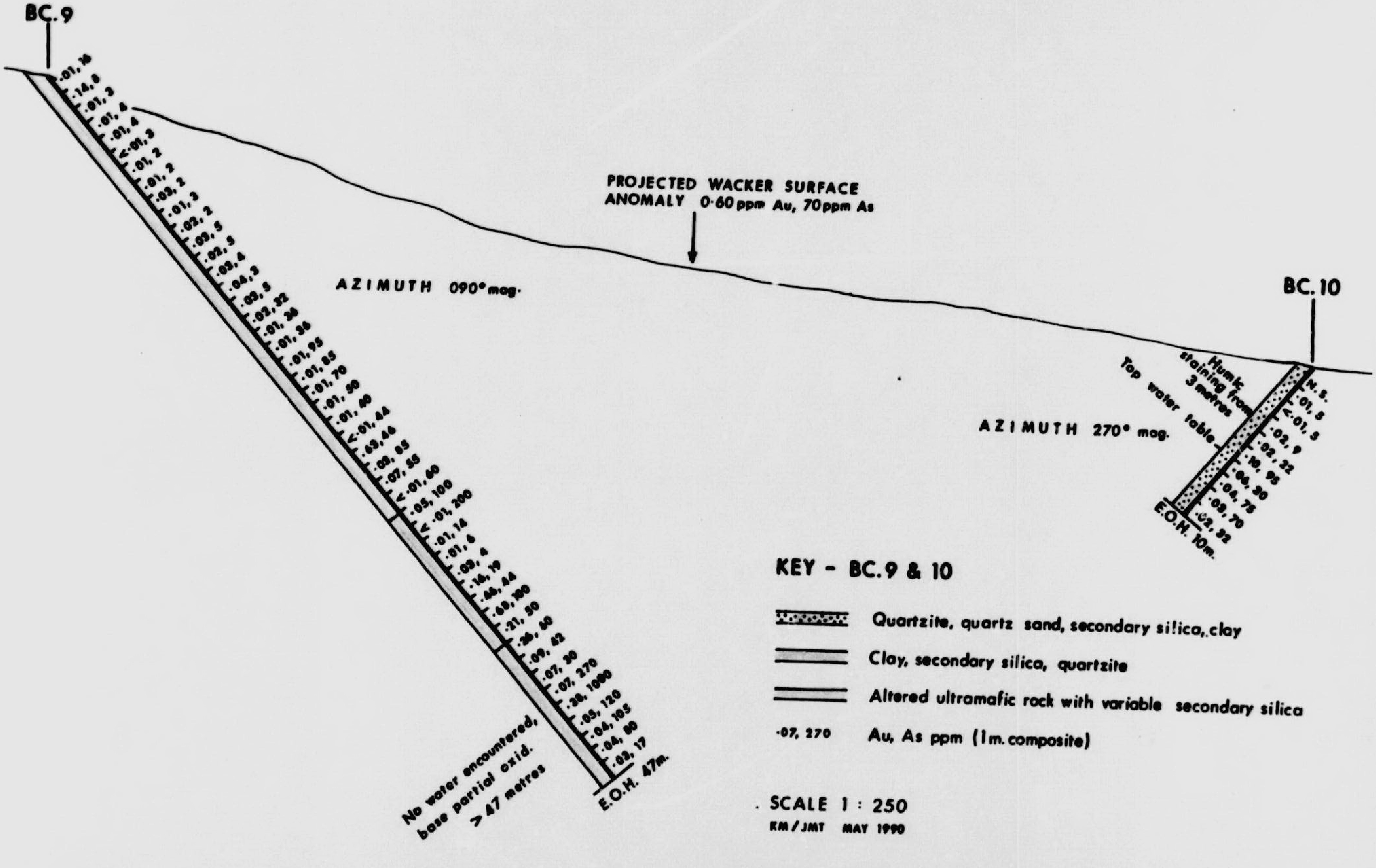
- Quartzite, quartz sand, secondary silica
- Clayey talus, minor quartzite, secondary silica
- Dolerite (?Jurassic)
- ·01, 300 — Au, As ppm (1m. composite)

SCALE 1 : 250
KM/JMT MAY 1990

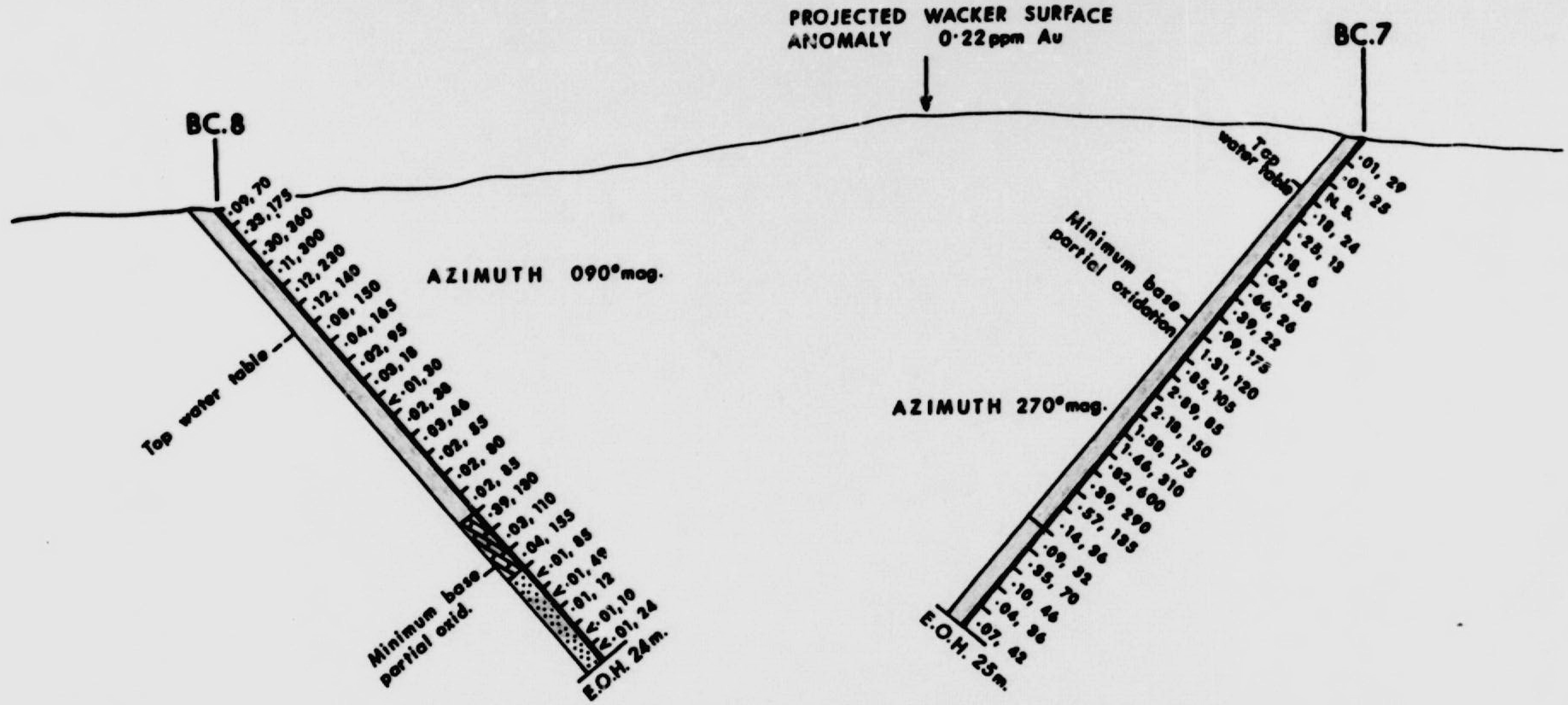
90 - 3166.

049

90-3166.


BC.9
·01,16
·14,8
·01,3
·01,6
·01,4
<·01,3
·01,2
·01,2
·03,2
·01,3
·02,2
·03,5
·02,5
·03,4
·04,3
·03,5
·02,32
·01,38
·01,36
·01,95
·01,85
·01,70
·01,50
·01,40
<·01,44
·03,46
·03,85
·07,55
<·01,60
·05,100
<·01,200
<·01,14
·01,6
·03,4
·16,19
·46,44
·60,100
·21,50
·28,60
·09,42
·07,30
·07,270
·38,1000
·05,120
·04,105
·04,80
·03,17
E.O.H. 47m.
No water encountered,
base partial oxid.
> 47 metres
PROJECTED WACKER SURFACE
ANOMALY 0·60 ppm Au, 70 ppm As
AZIMUTH 090° mag.
BC.10
Humic
staining from
3 metres
Top water table
AZIMUTH 270° mag.
N.S.
·01,5
<·01,5
·02,9
·02,22
·10,95
·06,30
·06,75
·03,70
·02,82
E.O.H. 10m.
KEY - BC.9 & 10
Quartzite, quartz sand, secondary silica, clay
Clay, secondary silica, quartzite
Altered ultramafic rock with variable secondary silica
·07, 270
Au, As ppm (1m. composite)
SCALE 1 : 250
KM / JMT MAY 1990

050



KEY - BC.7 & 8

Altered ultramafic rock with variable secondary silica

Secondary silica, quartzite, clay

Carbonate rock with secondary silica, chert

Quartzite, quartz sand, secondary silica

·04, 155 Au, As ppm (1m. composite)

SCALE 1 : 250

KM / JMT MAY 1990

90-3166.

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W 280
Phone: (063) 631 722 Fax: (063) 631 1

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446

Contact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 09/02/90

Order No.

Sample Type: PLANT

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS	Au(R) ppm CHECKS		
BC1 1		0.08				
BC1 2		0.39				
BC1 3		0.23				
BC1 4		0.05				
BC1 5		0.04				
BC1 6		0.01				
BC1 7		0.02				
BC1 8		0.04				
BC1 9		0.05				
BC1 10		0.07				
BC1 11		0.04				
BC1 12		0.02	0.03			
BC1 13		0.08				
BC1 14		0.06				
BC1 15		0.06				
BC1 16		0.04				
BC1 17		0.05				
BC1 18		0.08				
BC1 19		0.04				
BC1 20		0.07	0.07			
BC1 21		0.16				
BC1 22		0.32				
BC1 23		0.12				
BC1 24		0.04	0.05			
BC1 25		0.12				
BC1 26		0.14				
BC1 27		0.26				
BC1 28		0.21				
BC1 29		0.09				
BC1 30		0.14				
Detection Limit:		0.01				

RECEIVED
12 FEB 1990
Ans'd.

Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 25/07/90 AND SPLITS (IF ANY) ON 25/04/90

Signed: G. Dunn

FORM ALS

Australian Laboratory Services PTY LTD

CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446

Contact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 09/02/90

Order No.

Sample Type: PLANT

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS	Au(R) ppm CHECKS		
BC1 31		0.35				
BC1 32		0.39				
BC1 33		0.26				
BC1 34		5.30	3.56	5.74		
BC2 1		<0.01				
BC2 2		0.04				
BC2 3		0.07	0.01			
BC2 4		0.01				
BC2 5		0.01				
BC2 6		0.01				
BC2 7		0.62				
BC2 8		0.77				
BC2 9		0.57				
BC2 10		0.28				
BC2 11		0.37				
BC2 12		0.10				
BC2 13		0.21				
BC2 14		0.02	0.01			
BC2 15		<0.01				
BC2 16		0.12				
BC2 17		<0.01				
BC2 18		<0.01				
BC2 19		<0.01				
BC2 20		0.03				
BC2 21		0.05				
BC2 22		0.03				
BC2 23		0.03				
BC2 24		0.13	0.14			
BC2 25		0.13				
BC2 26		0.08				
Detection Limit:		0.01				

Comments:

Signed: G. Aunn

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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446

Contact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 09/02/90

Order No.

Sample Type: PLANT

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS	Au(R) ppm CHECKS		
BC2 27		0.14	0.15			
BC2 28		0.09				
BC2 29		0.10				
BC2 30		0.03				
BC2 31		0.04				
BC2 32		0.08				
BC2 33		0.16				
BC2 34		0.27				
BC2 35		0.27				
BC2 36		0.33				
BC2 37		0.08				
BC2 38		0.04				
BC2 39		0.03	0.03			
BC2 40		0.01				
BC2 41		0.02				
BC2 42		<0.01				
BC2 43		0.04				
BC2 44		0.01				
BC2 45		<0.01				
BC2 46		0.01				
BC2 47		<0.01				
BC2 48		<0.01				
BC2 49		<0.01				
BC2 50		<0.01				
BC2 51		<0.01	<0.01			
BC2 52		<0.01				
BC2 53		<0.01				
BC2 54		<0.01				
BC2 55		<0.01				
BC2 56		<0.01				
Detection Limit:		0.01				

Comments:

Signed: G. Aumann

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lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446

ontact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 09/02/90

rder No.

Sample Type: PLANT

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS	Au(R) ppm CHECKS		
BC2 57		<0.01				
BC2 58		<0.01				
BC2 59		<0.01	<0.01			
BC2 60		<0.01				
BC2 61		<0.01				
BC2 62		<0.01				
BC2 63		<0.01	<0.01			
BC2 64		<0.01				
BC2 65		<0.01				
BC2 66		<0.01				
BC2 67		0.01				
BC2 68		N/R				
BC2 69		0.02				
BC3 1		<0.01				
BC3 2		<0.01				
BC3 3		0.01				
BC3 4		<0.01				
BC3 5		<0.01				
BC3 6		0.02				
BC3 7		0.01				
BC3 8		<0.01				
BC3 9		<0.01				
BC3 10		<0.01				
BC3 11		<0.01				
BC3 12		<0.01				
BC3 13		<0.01				
BC3 14		<0.01	<0.01			
BC3 15		<0.01				
BC3 16		<0.01				
BC3 17		<0.01				
etection Limit:		0.01				

omments:

Signed: G. Dunn

FORM ALS O

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CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446

ontact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 09/02/90

rder No.

Sample Type: PLANT

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS	Au(R) ppm CHECKS		
BC3 18		<0.01				
BC3 19		<0.01				
BC3 20		<0.01				
BC3 21		<0.01				
BC3 22		<0.01				
BC3 23		<0.01				
BC3 24		<0.01				
BC3 25		<0.01				
BC3 26		<0.01				
BC3 27		<0.01				
BC3 28		<0.01				
BC3 29		<0.01				
BC3 30		<0.01				
BC3 31		<0.01	<0.01			
BC3 32		<0.01	<0.01			
BC3 33		<0.01				
BC3 34		<0.01				
BC3 35		<0.01				
BC3 36		<0.01				
BC4 1		0.08				
BC4 2		0.01				
BC4 3		0.09				
BC4 4		0.01				
BC4 5		<0.01				
BC4 6		<0.01				
BC4 7		0.08				
BC4 8		0.02				
BC4 9		<0.01				
BC4 10		<0.01	<0.01			
Detection Limit:		0.01				

Comments:

Signed: [signature]

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LABORATORY REPORT

057

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23 FEB 1990
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Page 1 of 6

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Order No.
Sample Type: P/CHIP
Date Completed: 16/02/90

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 5 1		0.06				
BC 5 2		0.05				
BC 5 3		0.03				
BC 5 4		0.04				
BC 5 5		0.03				
BC 5 6		0.02				
BC 5 7		0.01				
BC 5 8		0.01				
BC 5 9		0.01				
BC 5 10		0.02				
BC 5 11		<0.01				
BC 5 12		0.02	0.01			
BC 5 13		0.03				
BC 5 14		0.07				
BC 5 15		0.08				
BC 5 16		0.68	0.84			
BC 5 17		1.05	1.08			
BC 5 18		0.53				
BC 5 19		0.34				
BC 5 20		0.16				
BC 5 21		0.09				
BC 5 22		0.21				
BC 5 23		0.07				
BC 5 24		0.15				
BC 5 25		0.11				
BC 5 26		0.07	0.08			
BC 5 27		0.04				
BC 5 28		0.09				
BC 5 29		0.06				
BC 5 30		0.10				
Detection Limit:		0.01				

Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 05/08/90 AND SPLITS (IF ANY) ON 05/05/90

Signed: G. Ann

FORM ALS 01

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CONSULTING ANALYTICAL CHEMISTS
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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No.

Sample Type: P/CHIP

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 5 31		0.07				
BC 5 32		0.13				
BC 5 33		0.11				
BC 5 34		0.02				
BC 5 35		0.01				
BC 5 36		0.10	0.11			
BC 5 37		0.15				
BC 5 38		0.20				
BC 5 39		0.14				
BC 5 40		0.23				
BC 5 41		0.20				
BC 5 42		0.22				
BC 5 43		0.38				
BC 5 44		0.28				
BC 5 45		0.21				
BC 5 46		0.03				
BC 5 47		0.04				
BC 5 48		0.02	0.04			
BC 5 49		0.01				
BC 5 50		0.02				
BC 5 51		0.01				
BC 5 52		0.03				
BC 5 53		0.01				
BC 5 54		<0.01				
BC 5 55		0.01				
BC 5 56		0.07				
BC 5 57		0.08				
BC 5 58		0.03				
BC 5 59		<0.01				
BC 5 6[illegible]		<0.01				
Detection Limit:		0.01				

Comments:

Signed: G. Ann[illegible]

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INCORPORATED IN QUEENSLAND

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Phone: (054) 46 1390. Fax: (054) 46 138
Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone: (063) 631 722. Fax: (063) 631 18

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No.

Sample Type: P/CHIP

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 5 61		<0.01				
BC 5 62		0.01	0.01			
BC 5 63		0.11				
BC 5 64		0.01				
BC 5 65		<0.01				
BC 5 66		<0.01				
BC 5 67		<0.01				
BC 5 68		0.65	0.74			
BC 5 69		0.03				
BC 5 70		<0.01				
BC 5 71		0.04				
BC 5 72		0.04	0.03			
BC 5 73		0.08				
BC 5 74		0.05				
BC 5 75		0.13				
BC 5 76		0.04				
BC 5 77		<0.01				
BC 5 78		0.01				
BC 5 79		<0.01				
BC 5 80		<0.01				
BC 5 81		<0.01				
BC 5 82		<0.01				
BC 5 83		<0.01				
BC 5 84		<0.01				
BC 5 85		<0.01				
BC 5 86		<0.01				
BC 5 87		<0.01				
BC 5 88		0.01				
BC 5 89		<0.01				
BC 5 90		<0.01				
Detection Limit:		0.01				

Comments:

Signed: G. Aum

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Contact: MR T SUMMONS

Order No.

Sample Type: P/CHIP

Batch Number: B411
No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 5 91		0.01				
BC 5 92		<0.01				
BC 5 93		<0.01				
BC 5 94		<0.01				
BC 5 95		<0.01				
BC 5 96		<0.01				
BC 5 97		<0.01	<0.01			
BC 5 98		<0.01	<0.01			
BC 5 99		<0.01				
BC 6 1		N.R.				
BC 6 2		<0.01				
BC 6 3		<0.01				
BC 6 4		<0.01				
BC 6 5		0.01				
BC 6 6		<0.01				
BC 6 7		0.01				
BC 6 8		<0.01				
BC 6 9		<0.01				
BC 6 10		<0.01				
BC 6 11		0.01				
BC 6 12		<0.01				
BC 6 13		<0.01				
BC 6 14		<0.01				
BC 6 15		N.R.				
BC 6 16		<0.01				
BC 6 17		0.01				
BC 6 18		0.01				
BC 6 19		<0.01				
BC 6 20		<0.01	<0.01			
BC 6 21		<0.01				
Detection Limit:		0.01				

Comments:

Signed: G. Aun

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Orange Laboratory
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Phone: (063) 631 722. Fax: (063) 631 18

LABORATORY REPORT

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411

ontact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

rder No.

Sample Type: P/CHIP

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 6 22		0.01				
BC 6 23		0.01				
BC 6 24		0.04				
BC 6 25		<0.01				
BC 6 26		<0.01				
BC 6 27		0.01				
BC 6 28		0.01				
BC 6 29		<0.01	<0.01			
BC 7 1		0.01				
BC 7 2		0.01				
BC 7 3		N.R.				
BC 7 4		0.18				
BC 7 5		0.25				
BC 7 6		0.18				
BC 7 7		0.62	0.60			
BC 7 8		0.66	0.68			
BC 7 9		0.39	0.42			
BC 7 10		0.99	1.00			
BC 7 11		1.31	1.50			
BC 7 12		0.85	0.94			
BC 7 13		2.89	2.98			
BC 7 14		2.18	2.26			
BC 7 15		1.58	1.70			
BC 7 16		1.46	1.58			
BC 7 17		0.82				
BC 7 18		0.39				
BC 7 19		0.57	0.53			
BC 7 20		0.14				
BC 7 21		0.09				
BC 7 22		0.35				
Detection Limit:		0.01				

Comments:

Signed: G. Aum

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Phone: (063) 631 722. Fax: (063) 631 18

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: 8411

ontact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

rder No.

Sample Type: P/CHIP

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 7 23		0.10				
BC 7 24		0.04				
BC 7 25		0.07				
BC 8 1		0.09				
BC 8 2		0.33				
BC 8 3		0.30	0.31			
BC 8 4		0.11				
BC 8 5		0.12				
BC 8 6		0.12				
BC 8 7		0.06				
BC 8 8		0.04				
BC 8 9		0.02				
BC 8 10		0.03				
BC 8 11		<0.01				
BC 8 12		0.02				
BC 8 13		0.03				
BC 8 14		0.02				
BC 8 15		0.02				
BC 8 16		0.02				
BC 8 17		0.39				
BC 8 18		0.03				
BC 8 19		0.04				
BC 8 20		<0.01				
BC 8 21		<0.01				
BC 8 22		0.01				
BC 8 23		<0.01				
BC 8 24		<0.01				
Detection Limit:		0.01				

Comments:

Signed: G. Aunn

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Phone: (063) 631 722. Fax: (063) 631 1

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 9 1		0.01				
BC 9 2		0.14				
BC 9 3		0.01				
BC 9 4		0.01				
BC 9 5		0.01				
BC 9 6		<0.01				
BC 9 7		0.01				
BC 9 8		0.01				
BC 9 9		0.03				
BC 9 10		0.01				
BC 9 11		0.02				
BC 9 12		0.03	0.03			
BC 9 13		0.02				
BC 9 14		0.03				
BC 9 15		0.04				
BC 9 16		0.03				
BC 9 17		0.02				
BC 9 18		0.01				
BC 9 19		0.01				
BC 9 20		0.01				
BC 9 21		0.01				
BC 9 22		0.01				
BC 9 23		0.01				
BC 9 24		0.01	0.01			
BC 9 25		<0.01				
BC 9 26		0.63				
BC 9 27		0.03				
BC 9 28		0.07				
BC 9 29		<0.01				
BC 9 30		0.05				
Detection Limit		0.01				

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Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 08/09/90 AND SPLITS (IF ANY) ON 08/06/90

Signed: [signature]

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone: (063) 631 722. Fax: (063) 631 1

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 9 31		<0.01				
BC 9 32		0.01	0.01			
BC 9 33		0.01				
BC 9 34		0.03				
BC 9 35		0.16				
BC 9 36		0.46				
BC 9 37		0.68				
BC 9 38		0.21				
BC 9 39		0.26				
BC 9 40		0.09				
BC 9 41		0.07				
BC 9 42		0.07				
BC 9 43		0.38				
BC 9 44		0.05				
BC 9 45		0.04				
BC 9 46		0.04				
BC 9 47		0.03	0.03			
BC 10 1		N.R.				
BC 10 2		0.01				
BC 10 3		<0.01				
BC 10 4		0.02				
BC 10 5		0.02				
BC 10 6		0.10				
BC 10 7		0.06				
BC 10 8		0.04				
BC 10 9		0.03				
BC 10 10		0.02	0.02			
BC 11 1		0.20				
BC 11 2		0.10				
BC 11 3		0.09				
Detection Limit:		0.01				

Comments:

Signed: W. Williams

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 11 4		0.07				
BC 11 5		0.04				
BC 11 6		0.04				
BC 11 7		0.03				
BC 11 8		0.05				
BC 11 9		0.06				
BC 11 10		0.02				
BC 11 11		0.14				
BC 11 12		0.05	0.04			
BC 11 13		0.10				
BC 11 14		0.06				
BC 11 15		0.10				
BC 11 16		0.26				
BC 11 17		0.18				
BC 11 18		0.17				
BC 11 19		0.03				
BC 11 20		0.04				
BC 11 21		0.01				
BC 11 22		0.01				
BC 11 23		<0.01				
BC 11 24		0.01				
BC 11 25		0.01				
BC 11 26		<0.01				
BC 11 27		0.01				
BC 11 28		0.01				
BC 11 29		<0.01	<0.01			
BC 11 30		<0.01	<0.01			
BC 11 31		<0.01				
BC 11 32		<0.01				
BC 11 33		<0.01				
Detection Limit		0.01				

Comments:

Signed: [signature]

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Phone: (054) 46 1390. Fax: (054) 46 138
Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone: (063) 631 722. Fax: (063) 631 18

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426

ontact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

rder No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 11 34		0.01				
BC 11 35		<0.01				
BC 11 36		0.01				
BC 11 37		<0.01				
BC 11 38		<0.01				
BC 11 39		0.01				
BC 11 40		<0.01				
BC 11 41		<0.01				
BC 11 42		<0.01				
BC 11 43		0.03				
BC 11 44		<0.01				
BC 11 45		<0.01	<0.01			
BC 12 1		0.03				
BC 12 2		0.04				
BC 12 3		0.09				
BC 12 4		0.10				
BC 12 5		0.07				
BC 12 6		0.11				
BC 12 7		0.25				
BC 12 8		0.27				
BC 12 9		0.38				
BC 12 10		0.21				
BC 12 11		0.22				
BC 12 12		0.24				
BC 12 13		0.13				
BC 12 14		0.24				
BC 12 15		0.20				
BC 12 16		0.15				
BC 12 17		0.08				
BC 12 18		0.03				
Detection Limit:		0.01				

omments:

Signed: Williams

FORM ALS 01

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Phone: (063) 631 722. Fax: (063) 631 1

CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 12 19		0.02				
BC 12 20		<0.01	<0.01			
BC 12 21		<0.01	<0.01			
BC 12 22		<0.01				
BC 12 23		<0.01				
BC 12 24		<0.01				
BC 12 25		<0.01				
BC 12 26		<0.01				
BC 12 27		0.01				
BC 12 28		0.01				
BC 12 29		<0.01				
BC 12 30		<0.01				
BC 12 31		<0.01				
BC 12 32		<0.01				
BC 12 33		<0.01				
BC 12 34		<0.01	<0.01			
BC 12 35		<0.01				
BC 12 36		0.01				
BC 12 37		0.01				
BC 12 38		0.01				
BC 12 39		<0.01				
BC 12 40		0.03	0.03			
Detection Limit:		0.01				

Comments:

Signed: [signature]

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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C441

Contact: MR K MORRIS

No. of Samples: 87
Date Received: 15/03/90
Date Completed: 29/03/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 13 1		N.R.				
BC 13 2		0.07				
BC 13 3		0.25				
BC 13 4		0.31				
BC 13 5		0.17				
BC 13 6		0.14				
BC 13 7		0.12				
BC 13 8		0.09				
BC 13 9		0.10				
BC 13 10		0.17				
BC 13 11		0.08				
BC 13 12		0.12	0.12			
BC 13 13		0.08				
BC 13 14		0.12				
BC 13 15		0.14				
BC 13 16		0.02				
BC 13 17		0.02				
BC 13 18		0.02	0.03			
BC 13 19		0.02				
BC 13 20		0.04				
BC 13 21		0.02				
BC 14 1		0.02				
BC 14 2		0.09				
BC 14 3		0.13				
BC 14 4		0.20				
BC 14 5		0.10				
BC 14 6		0.29				
BC 14 7		0.04				
BC 14 8		0.05				
BC 14 9		0.02				
Detection Limit		0.01				

Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 15/09/90 AND SPLITS (IF ANY) ON 15/06/90

Signed: G. Ammon

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Bendigo Laboratory 127A Victoria Street, Eaglehawk, Vic. 35 Phone: (054) 46 1390. Fax: (054) 46 138
Orange Laboratory 10 Leewood Drive, Orange, N.S.W. 2800 Phone: (063) 631 722. Fax: (063) 631 18

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C441

Contact: MR K MORRIS

No. of Samples: 87
Date Received: 15/03/90
Date Completed: 29/03/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 14 10		0.03				
BC 14 11		0.03				
BC 14 12		0.01				
BC 14 13		0.01				
BC 14 14		0.01				
BC 14 15		0.02				
BC 14 16		<0.01	<0.01			
BC 14 17		<0.01				
BC 14 18		<0.01				
BC 14 19		<0.01				
BC 14 20		<0.01				
BC 14 21		<0.01				
BC 14 22		0.01				
BC 14 23		<0.01				
BC 14 24		<0.01				
BC 14 25		<0.01				
BC 14 26		<0.01				
BC 14 27		<0.01	<0.01			
BC 14 28		0.01				
BC 14 29		0.01				
BC 14 30		<0.01				
BC 14 31		<0.01				
BC 14 32		<0.01				
BC 14 33		0.01				
BC 14 34		<0.01	<0.01			
BC 14 35		0.01				
BC 14 36		0.01				
BC 14 37		0.02				
BC 14 38		0.01				
BC 14 39		<0.01				
Detection Limit		0.01				

Comments:

Signed: G. Ahern

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Orange Laboratory
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Phone: (063) 631 722. Fax: (063) 631 1

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C441

Contact: MR K MORRIS

No. of Samples: 87
Date Received: 15/03/90
Date Completed: 29/03/90

Order No.

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 14 40		<0.01				
BC 14 41		<0.01				
BC 14 42		<0.01				
BC 14 43		<0.01				
BC 14 44		0.01				
BC 14 45		<0.01				
BC 14 46		<0.01				
BC 14 47		0.01				
BC 14 48		<0.01				
BC 14 49		<0.01				
BC 14 50		<0.01				
BC 14 51		0.01	<0.01			
BC 14 52		0.01	<0.01			
BC 14 53		<0.01				
BC 14 54		<0.01				
BC 14 55		0.01				
BC 14 56		<0.01				
BC 14 57		<0.01				
BC 14 58		0.01				
BC 14 59		0.01				
BC 14 60		<0.01				
BC 14 61		0.01				
BC 14 62		0.01				
BC 14 63		0.01				
BC 14 64		0.01				
BC 14 65		0.01				
BC 14 66		0.01	0.01			
Detection Limit		0.01				

Comments:

Signed: G. [signature]

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GPA ....

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Contact: MR T SUMMONS

Order No. LETTER

Sample Type: DRILL CORE

Batch Number: E423

No. of Samples: 27
Date Received: 09/05/90
Date Completed: 01/06/90

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BC 15 1		0.14				
BC 15 2		0.66				
BC 15 3		0.23				
BC 15 4		0.29				
BC 15 5		0.06				
BC 15 6		0.04				
BC 15 7		0.02				
BC 15 8		0.05				
BC 15 9		0.03				
BC 15 10		<0.01				
BC 15 11		0.09				
BC 15 12		0.22	0.22			
BC 15 13		0.08				
BC 15 14		0.09				
BC 15 15		0.05				
BC 15 16		0.03				
BC 15 17		0.10				
BC 15 18		0.23				
BC 15 19		0.23				
BC 15 20		0.10				
BC 15 21		0.19				
BC 15 22		0.18				
BC 15 23		0.04				
BC 15 24		0.79				
BC 15 25		0.36				
BC 15 26		0.66				
BC 15 27		0.06				
Detection Limit:		0.01				

Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 09/11/90 AND SPLITS (IF ANY) ON 09/08/90

Signed: [signature]

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W 2800
Phone: (063) 631 722. Fax: (063) 631 18

LABORATORY REPORT

ient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: E455

ntact: MR K MORRISON

No. of Samples: 7
Date Received: 22/05/90
Date Completed: 04/06/90

der No. LETTER

Sample Type: ROCK CHIP

SAMPLE NUMBER	Element Unit Method	Au ppm PM209	Au(R) ppm CHECKS			
BCT 1-1		0.02				
BCT 1-2		0.03				
BCT 1-3		<0.01				
BCT 1-4		0.03	0.02			
BCT 1-5		<0.01				
BCT 1-6		<0.01				
BCT 1-7		<0.01				
etection Limit:		0.01				

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CTION

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UNLESS NOTIFIED PULPS WILL BE DUMPED ON 22/11/90 AND SPLITS (IF ANY) ON 22/08/9

Signed: Williams

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Phone (063) 631 722 Fax (063) 631

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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446

Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BC1 1		<1				
BC1 2		<1				
BC1 3		<1				
BC1 4		<1				
BC1 5		<1				
BC1 6		<1				
BC1 7		<1				
BC1 8		<1				
BC1 9		<1				
BC1 10		<1				
BC1 11		<1				
BC1 12		<1				
BC1 13		<1				
BC1 14		<1				
BC1 15		<1				
BC1 16		<1				
BC1 17		<1				
BC1 18		<1				
BC1 19		<1				
BC1 20		<1				
BC1 21		<1				
BC1 22		<1				
BC1 23		<1				
BC1 24		<1				
BC1 25		<1				
BC1 26		<1				
BC1 27		<1				
BC1 28		<1				
BC1 29		<1				
BC1 30		<1				
Detection Limit:		1				

Comments:

Signed: M Williams

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Phone: (054) 46 1390. Fax (054) 46 13
Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 280
Phone: (063) 631 722. Fax: (063) 631

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446 Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BC1 31		<1				
BC1 32		<1				
BC1 33		<1				
BC1 34		<1				
BC2 1		<1				
BC2 2		<1				
BC2 3		<1				
BC2 4		<1				
BC2 5		<1				
BC2 6		<1				
BC2 7		<1				
BC2 8		<1				
BC2 9		<1				
BC2 10		<1				
BC2 11		<1				
BC2 12		<1				
BC2 13		<1				
BC2 14		<1				
BC2 15		<1				
BC2 16		<1				
BC2 17		<1				
BC2 18		<1				
BC2 19		<1				
BC2 20		<1				
BC2 21		<1				
BC2 22		<1				
BC2 23		<1				
BC2 24		<1				
BC2 25		1				
BC2 26		<1				
Detection Limit		1				

Comments:

Signed: W illiams

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Phone: (054) 46 1390. Fax: (054) 46 1
Orange Laboratory
10 Leewood Drive, Orange, N.S.W 280
Phone: (063) 631 722. Fax: (063) 631

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446
Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BC2 27		<1				
BC2 28		<1				
BC2 29		<1				
BC2 30		<1				
BC2 31		<1				
BC2 32		1				
BC2 33		1				
BC2 34		1				
BC2 35		1				
BC2 36		1				
BC2 37		<1				
BC2 38		1				
BC2 39		<1				
BC2 40		<1				
BC2 41		<1				
BC2 42		<1				
BC2 43		<1				
BC2 44		<1				
BC2 45		<1				
BC2 46		<1				
BC2 47		<1				
BC2 48		<1				
BC2 49		<1				
BC2 50		<1				
BC2 51		<1				
BC2 52		<1				
BC2 53		<1				
BC2 54		<1				
BC2 55		<1				
BC2 56		<1				
Detection Limit:		1				

Comments:

Signed: [signature]

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CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446   Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BC2 57		<1				
BC2 58		<1				
BC2 59		<1				
BC2 60		<1				
BC2 61		<1				
BC2 62		<1				
BC2 63		<1				
BC2 64		<1				
BC2 65		<1				
BC2 66		<1				
BC2 67		<1				
BC2 68		N.R.				
BC2 69		<1				
BC3 1		<1				
BC3 2		<1				
BC3 3		<1				
BC3 4		<1				
BC3 5		<1				
BC3 6		<1				
BC3 7		<1				
BC3 8		<1				
BC3 9		<1				
BC3 10		<1				
BC3 11		<1				
BC3 12		<1				
BC3 13		<1				
BC3 14		<1				
BC3 15		<1				
BC3 16		<1				
BC3 17		<1				
Detection Limit:		1				

Comments:

Signed: Williams

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Phone: (054) 46 1390. Fax: (054) 46 13
Orange Laboratory
10 Leewood Drive, Orange, N.S.W 280
Phone: (063) 631 722. Fax: (063) 631

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: 8455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH 8411&A446   Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BC3 18		<1				
BC3 19		<1				
BC3 20		<1				
BC3 21		<1				
BC3 22		<1				
BC3 23		<1				
BC3 24		<1				
BC3 25		<1				
BC3 26		<1				
BC3 27		<1				
BC3 28		<1				
BC3 29		<1				
BC3 30		<1				
BC3 31		<1				
BC3 32		<1				
BC3 33		<1				
BC3 34		<1				
BC3 35		<1				
BC3 36		<1				
BC4 1		<1				
BC4 2		<1				
BC4 3		<1				
BC4 4		<1				
BC4 5		<1				
BC4 6		1				
BC4 7		6				
BC4 8		<1				
BC4 9		1				
BC4 10		<1				
BC5 1		<1				
Detection Limit		1				

Comments:

Signed: [signature]

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 280...
Phone: (063) 631 722. Fax: (063) 631 ...

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446

Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BCS 2		<1				
BCS 3		<1				
BCS 4		<1				
BCS 5		<1				
BCS 6		<1				
BCS 7		<1				
BCS 8		<1				
BCS 9		<1				
BCS 10		<1				
BCS 11		<1				
BCS 12		<1				
BCS 13		<1				
BCS 14		<1				
BCS 15		1				
BCS 16		1				
BCS 17		1				
BCS 18		1				
BCS 19		<1				
BCS 20		<1				
BCS 21		<1				
BCS 22		1				
BCS 23		1				
BCS 24		<1				
BCS 25		<1				
BCS 26		<1				
BCS 27		<1				
BCS 28		1				
BCS 29		1				
BCS 30		1				
BCS 31		1				
Detection Limit:		1				

Comments:

Signed: Williams

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 280[illegible]
Phone: (063) 6[illegible]22. Fax: (063) 631 [illegible]

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446 Sample Type: PULP EX B411

SAMPLE NUMBER	Element / Unit / Method	Ag / ppm / G001				
BCS 32		1				
BCS 33		1				
BCS 34		1				
BCS 35		<1				
BCS 36		1				
BCS 37		<1				
BCS 38		1				
BCS 39		1				
BCS 40		<1				
BCS 41		1				
BCS 42		<1				
BCS 43		<1				
BCS 44		<1				
BCS 45		1				
BCS 46		<1				
BCS 47		<1				
BCS 48		<1				
BCS 49		<1				
BCS 50		<1				
BCS 51		<1				
BCS 52		<1				
BCS 53		<1				
BCS 54		<1				
BCS 55		<1				
BCS 56		<1				
BCS 57		<1				
BCS 58		<1				
BCS 59		<1				
BCS 60		<1				
BCS 61		<1				
Detection Limit:		1				

Comments:

Signed: [signature]

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Australian Laboratory Services PTY LTD
CONSULTING ANALYTICAL CHEMISTS
INCORPORATED IN QUEENSLAND

LABORATORY REPORT

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Townsville Laboratory
21 Bombala Street, Garbutt, Q. 4814.
Phone: (077) 79 9155. Fax: (077) 799 729.
Charters Towers Laboratory
18 Drew Street, Charters Towers Q 4
Phone: (077) 87 4155 Fax (077) 87 42
Bendigo Laboratory
12A Victoria Street, Eaglehawk, Vic
Phone: (054) 46 1390. Fax: (054) 46 13
Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 28
Phone: (063) 631 722. Fax: (063) 631

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446
Sample Type: PULP EX B411

SAMPLE NUMBER	Element / Unit / Method	Ag ppm G001				
BCS 62		<1				
BCS 63		<1				
BCS 64		<1				
BCS 65		<1				
BCS 66		<1				
BCS 67		<1				
BCS 68		<1				
BCS 69		<1				
BCS 70		<1				
BCS 71		<1				
BCS 72		1				
BCS 73		<1				
BCS 74		<1				
BCS 75		<1				
BCS 76		<1				
BCS 77		1				
BCS 78		<1				
BCS 79		<1				
BCS 80		<1				
BCS 81		<1				
BCS 82		<1				
BCS 83		<1				
BCS 84		<1				
BCS 85		<1				
BCS 86		<1				
BCS 87		<1				
BCS 88		<1				
BCS 89		<1				
BCS 90		<1				
BCS 91		<1				
Detection Limit		1				

Comments:

Signed: Williams

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CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446   Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001				
BC5 92		<1				
BC5 93		<1				
BC5 94		<1				
BC5 95		<1				
BC5 96		<1				
BC5 97		<1				
BC5 98		<1				
BC5 99		<1				
BC6 1		N.R.				
BC6 2		<1				
BC6 3		<1				
BC6 4		<1				
BC6 5		<1				
BC6 6		<1				
BC6 7		<1				
BC6 8		<1				
BC6 9		1				
BC6 10		<1				
BC6 11		<1				
BC6 12		<1				
BC6 13		<1				
BC6 14		<1				
BC6 15		N.R.				
BC6 16		<1				
BC6 17		<1				
BC6 18		<1				
BC6 19		1				
BC6 20		<1				
BC6 21		1				
BC6 22		1				
Detection Limit:		1				

Comments:

Signed: Williams

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10 Leewood Drive, Orange, N.S.W. 280
Phone: (063) 631 722. Fax: (063) 631 1

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446

Sample Type: PULP EX B411

SAMPLE NUMBER	Element Unit Method	Ag ppm G001
BC6 23		<1
BC6 24		2
BC6 25		1
BC6 26		1
BC6 27		1
BC6 28		1
BC6 29		1
BC7 1		1
BC7 2		1
BC7 3		N.R.
BC7 4		2
BC7 5		1
BC7 6		1
BC7 7		5
BC7 8		4
BC7 9		4
BC7 10		6
BC7 11		6
BC7 12		3
BC7 13		2
BC7 14		1
BC7 15		1
BC7 16		1
BC7 17		2
BC7 18		3
BC7 19		2
BC7 20		1
BC7 21		1
BC7 22		3
BC7 23		1
Detection Limit		1

Comments:

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Phone: (063) 631 722. Fax: (063) 631

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B455

Contact: MR T SUMMONS

No. of Samples: 326
Date Received: 23/02/90
Date Completed: 28/02/90

Order No. EX BATCH B411&A446 Sample Type: PULP EX B411

SAMPLE NUMBER	Element / Unit / Method	Ag ppm G001				
BC7 24		1				
BC7 25		1				
BC8 1		<1				
BC8 2		<1				
BC8 3		<1				
BC8 4		<1				
BC8 5		<1				
BC8 6		<1				
BC8 7		<1				
BC8 8		<1				
BC8 9		<1				
BC8 10		<1				
BC8 11		<1				
BC8 12		<1				
BC8 13		<1				
BC8 14		<1				
BC8 15		<1				
BC8 16		<1				
BC8 17		<1				
BC8 18		<1				
BC8 19		<1				
BC8 20		<1				
BC8 21		<1				
BC8 22		<1				
BC8 23		<1				
BC8 24		<1				
Detection Limit:		1				

Comments:

Signed: [signature]

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Phone (063) 631 722 Fax (063) 631 189

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446-1

ontact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 02/02/90

rder No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC1-1		85				
BC1-2		60				
BC1-3		55				
BC1-4		160				
BC1-5		175				
BC1-6		270				
BC1-7		120				
BC1-8		100				
BC1-9		135				
BC1-10		270				
BC1-11		155				
BC1-12		165				
BC1-13		420				
BC1-14		490				
BC1-15		300				
BC1-16		100				
BC1-17		220				
BC1-18		240				
BC1-19		195				
BC1-20		135				
BC1-21		240				
BC1-22		120				
BC1-23		165				
BC1-24		24				
BC1-25		8				
BC1-26		6				
BC1-27		10				
BC1-28		9				
BC1-29		5				
BC1-30		7				
Detection Limit:		1				

Comments:

Signed: G. Ann

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone (063) 631 722 Fax (063) 631 18

LABORATORY REPORT

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446-1

ontact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 02/02/90

rder No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC1-31		19				
BC1-32		16				
BC1-33		22				
BC1-34		24				
BC2-1		1				
BC2-2		2				
BC2-3		2				
BC2-4		5				
BC2-5		3				
BC2-6		<1				
BC2-7		[illegible]				
BC2-8		2				
BC2-9		3				
BC2-10		3				
BC2-11		16				
BC2-12		26				
BC2-13		17				
BC2-14		7				
BC2-15		6				
BC2-16		6				
BC2-17		5				
BC2-18		3				
BC2-19		3				
BC2-20		15				
BC2-21		1				
BC2-22		12				
BC2-23		12				
BC2-24		28				
BC2-25		320				
BC2-26		230				
Detection Limit:		1				

Comments:

Signed: G. Aum

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Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone (063) 631 722 Fax (063) 631 189

LABORATORY REPORT

ient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446-1

ontact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 02/02/90

rder No: LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC2-27		155				
BC2-28		75				
BC2-29		170				
BC2-30		240				
BC2-31		200				
BC2-32		195				
BC2-33		390				
BC2-34		690				
BC2-35		650				
BC2-36		670				
BC2-37		250				
BC2-38		360				
BC2-39		60				
BC2-40		65				
BC2-41		30				
BC2-42		30				
BC2-43		55				
BC2-44		26				
BC2-45		28				
BC2-46		26				
BC2-47		<1				
BC2-48		15				
BC2-49		<1				
BC2-50		<1				
BC2-51		<1				
BC2-52		<1				
BC2-53		<1				
BC2-54		<1				
BC2-55		2				
BC2-56		<1				
Detection Limit:		1				

Comments:

Signed: G. Ann...

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CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446-1

Contact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
Date Completed: 02/02/90

Order No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC2-57		<1				
BC2-58		<1				
BC2-59		<1				
BC2-60		<1				
BC2-61		<1				
BC2-62		<1				
BC2-63		<1				
BC2-64		<1				
BC2-65		<1				
BC2-66		8				
BC2-67		24				
BC2-68		N.R.				
BC2-69		85				
BC3-1		4				
BC3-2		2				
BC3-3		<1				
BC3-4		2				
BC3-5		7				
BC3-6		16				
BC3-7		16				
BC3-8		34				
BC3-9		40				
BC3-10		34				
BC3-11		38				
BC3-12		65				
BC3-13		90				
BC3-14		260				
BC3-15		1150				
BC3-16		125				
BC3-17		60				
Detection Limit:		1				

Comments:

Signed: G. Aunn

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Phone (063) 631 722 Fax (063) 631 18

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: A446-1

ontact: MR K MORRISON

No. of Samples: 149
Date Received: 25/01/90
rder No LETTER
Sample Type: PERCUSSION CHIP
Date Completed: 02/02/90

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC3-18		18				
BC3-19		11				
BC3-20		4				
BC3-21		7				
BC3-22		7				
BC3-23		7				
BC3-24		10				
BC3-25		10				
BC3-26		5				
BC3-27		4				
BC3-28		4				
BC3-29		3				
BC3-30		2				
BC3-31		2				
BC3-32		1				
BC3-33		3				
BC3-34		670				
BC3-35		24				
BC3-36		15				
BC4-1		3				
BC4-2		2				
BC4-3		2				
BC4-4		2				
BC4-5		2				
BC4-6		2				
BC4-7		75				
BC4-8		22				
BC4-9		12				
BC4-10		12				
Detection Limit:		1				

Comments:

Signed: G. Dunn

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411-1

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No: LETTER
Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC5-1		400				
BC5-2		1750				
BC5-3		1150				
BC5-4		1000				
BC5-5		290				
BC5-6		220				
BC5-7		110				
BC5-8		250				
BC5-9		730				
BC5-10		1100				
BC5-11		870				
BC5-12		800				
BC5-13		310				
BC5-14		870				
BC5-15		1100				
BC5-16		5200				
BC5-17		5550				
BC5-18		4100				
BC5-19		2450				
BC5-20		780				
BC5-21		460				
BC5-22		1200				
BC5-23		710				
BC5-24		420				
BC5-25		80				
BC5-26		110				
BC5-27		13				
BC5-28		145				
BC5-29		55				
BC5-30		65				
Detection Limit:		1				

Comments:

Signed: G. Ammm

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411-1

Contact: MR 1 SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC5-31		22				
BC5-32		145				
BC5-33		80				
BC5-34		14				
BC5-35		6				
BC5-36		34				
BC5-37		14				
BC5-38		13				
BC5-39		10				
BC5-40		32				
BC5-41		22				
BC5-42		22				
BC5-43		26				
BC5-44		20				
BC5-45		40				
BC5-46		180				
BC5-47		135				
BC5-48		95				
BC5-49		80				
BC5-50		100				
BC5-51		90				
BC5-52		240				
BC5-53		50				
BC5-54		65				
BC5-55		310				
BC5-56		125				
BC5-57		34				
BC5-58		70				
BC5-59		11				
BC5-60		12				
Detection Limit:		1				

Comments:

Signed: G. Aunn

FORM ALS O

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CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

Brisbane Head Office and Laboratory
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Fax (07) 352 5109

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Townsville Laboratory
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Bendigo Laboratory
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Phone (054) 46 1390 Fax (054) 46 138

Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone (063) 631 722 Fax (063) 531 18

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411-1

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC5-61		19				
BC5-62		6				
BC5-63		20				
BC5-64		32				
BC5-65		3				
BC5-66		8				
BC5-67		16				
BC5-68		460				
BC5-69		50				
BC5-70		28				
BC5-71		65				
BC5-72		44				
BC5-73		60				
BC5-74		49				
BC5-75		190				
BC5-76		72				
BC5-77		14				
BC5-78		84				
BC5-79		10				
BC5-80		8				
BC5-81		2				
BC5-82		3				
BC5-83		15				
BC5-84		8				
BC5-85		22				
BC5-86		10				
BC5-87		20				
BC5-88		51				
BC5-89		20				
BC5-90		6				
Detection Limit:		1				

Comments:

Signed: [signature]

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Orange Laboratory 10 Leewood Drive, Orange, N.S.W. 2800 Phone (063) 631 722 Fax (063) 631 189

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411-1

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element / Unit / Method	As ppm G004				
BC5-91		7				
BC5-92		7				
BC5-93		8				
BC5-94		19				
BC5-95		23				
BC5-96		16				
BC5-97		16				
BC5-98		17				
BC5-99		19				
BC6-1		N.R.				
BC6-2		15				
BC6-3		14				
BC6-4		16				
BC6-5		16				
BC6-6		15				
BC6-7		15				
BC6-8		16				
BC6-9		17				
BC6-10		17				
BC6-11		15				
BC6-12		17				
BC6-13		18				
BC6-14		18				
BC6-15		N.R.				
BC6-16		19				
BC5-17		19				
BC6-18		49				
BC6-19		44				
BC6-20		66				
BC6-21		65				
Detection Limit:		1				

Comments:

Signed: G. Aum

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411-1

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element / Unit / Method	As ppm G004				
BC6-22		75				
BC6-23		64				
BC6-24		95				
BC6-25		150				
BC6-26		62				
BC6-27		64				
BC6-28		46				
BC6-29		28				
BC7-1		29				
BC7-2		25				
BC7-3		N.R.				
BC7-4		24				
BC7-5		13				
BC7-6		6				
BC7-7		28				
BC7-8		26				
BC7-9		22				
BC7-10		175				
BC7-11		120				
BC7-12		105				
BC7-13		85				
BC7-14		150				
BC7-15		175				
BC7-16		310				
BC7-17		600				
BC7-18		290				
BC7-19		135				
BC7-20		36				
BC7-21		32				
BC7-22		70				
Detection Limit:		1				

Comments:

Signed: G. Aun

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: B411-1

Contact: MR T SUMMONS

No. of Samples: 177
Date Received: 05/02/90
Date Completed: 16/02/90

Order No. LETTER

Sample Type: PERCUSSION CHIP

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC7-23		46				
BC7-24		36				
BC7-25		42				
BC8-1		70				
BC8-2		175				
BC8-3		360				
BC8-4		300				
BC8-5		230				
BC8-6		140				
BC8-7		150				
BC8-8		165				
BC8-9		95				
BC8-10		18				
BC8-11		30				
BC8-12		38				
BC8-13		46				
BC8-14		55				
BC8-15		80				
BC8-16		85				
BC8-17		130				
BC8-18		110				
BC8-19		155				
BC8-20		85				
BC8-21		48				
BC8-22		12				
BC8-23		10				
BC8-24		24				
Detection Limit:		1				

Comments:

Signed: G. Aunn

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Phone (063) 631 722 Fax (063) 631 1

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426-1

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

Order No. LETTER

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	As ppm G004	Ni ppm G001	Cr ppm G001		
BC9 1		16	320	540		
BC9 2		8	25	970		
BC9 3		3	10	1650		
BC9 4		4	5	1650		
BC9 5		4	10	1550		
BC9 6		3	<5	1200		
BC9 7		2	5	1500		
BC9 8		2	15	530		
BC9 9		2	20	190		
BC9 10		3	25	95		
BC9 11		2	25	95		
BC9 12		5	60	95		
BC9 13		5	55	50		
BC9 14		4	70	90		
BC9 15		3	45	45		
BC9 16		5	35	45		
BC9 17		32	135	35		
BC9 18		36	195	30		
BC9 19		36	100	95		
BC9 20		95	150	45		
BC9 21		85	135	40		
BC9 22		70	180	35		
BC9 23		50	110	35		
BC9 24		40	350	45		
BC9 25		44	430	45		
BC9 26		46	170	45		
BC9 27		85	120	60		
BC9 28		55	105	65		
BC9 29		60	320	130		
BC9 30		100	1650	850		
Detection Limit:		1	5	5		

Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 08/09/90 AND SPLITS (IF ANY) ON 08/06/90

Signed: M Williams

FORM ALS 01

Australian Laboratory Services PTY. LTD.

CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

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10 Leewood Drive, Orange, N.S.W. 2800
Phone: (063) 631 722 Fax: (063) 631 18

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Contact: MR T SUMMONS

Order No. LETTER

Sample Type: DRILL

Batch Number: C426-1

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

SAMPLE NUMBER	Element Unit Method	As ppm G004	Ni ppm G001	Cr ppm G001		
BC9 31		200	2250	1000		
BC9 32		14	760	105		
BC9 33		6	810	270		
BC9 34		4	2200	320		
BC9 35		19	1050	1250		
BC9 36		44	720	510		
BC9 37		100	400	430		
BC9 38		50	970	470		
BC9 39		60	165	470		
BC9 40		42	105	175		
BC9 41		30	70	170		
BC9 42		270	55	110		
BC9 43		1000	95	50		
BC9 44		120	115	30		
BC9 45		105	75	20		
BC9 46		80	115	25		
BC9 47		17	150	15		
BC10 1		N.R.	N.R.	N.R.		
BC10 2		5	---	---		
BC10 3		5	---	---		
BC10 4		9	---	---		
BC10 5		22	---	---		
BC10 6		95	---	---		
BC10 7		30	---	---		
BC10 8		75	---	---		
BC10 9		70	---	---		
BC10 10		32	---	---		
BC11 1		400	190	1050		
BC11 2		240	85	250		
BC11 3		195	60	550		
Detection Limit:		1	5	5		

Comments:

Signed: W illiams

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LABORATORY REPORT

lient: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426-1

ontact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

rder No. LETTER

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	As ppm G004	Ni ppm G001	Cr ppm G001		
BC11 4		130	85	1300		
BC11 5		70	175	1400		
BC11 6		44	105	1850		
BC11 7		22	480	3650		
BC11 8		70	2050	7950		
BC11 9		120	1450	3150		
BC11 10		320	6750	4500		
BC11 11		530	9400	5750		
BC11 12		530	6650	4850		
BC11 13		420	6100	2150		
BC11 14		370	4300	3150		
BC11 15		420	3550	2750		
BC11 16		150	---	---		
BC11 17		95	---	---		
BC11 18		115	---	---		
BC11 19		70	---	---		
BC11 20		65	---	---		
BC11 21		65	---	---		
BC11 22		75	---	---		
BC11 23		50	---	---		
BC11 24		36	---	---		
BC11 25		95	---	---		
BC11 26		95	---	---	*	
BC11 27		65	---	---		
BC11 28		60	---	---		
BC11 29		36	---	---		
BC11 30		28	---	---		
BC11 31		16	---	---		
BC11 32		9	---	---		
BC11 33		4	---	---		
Detection Limit:		1	5	5		

Comments: * For BC11 16-40 refer to Batch No C474

Signed: [signature]

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Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426-1

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Date Completed: 03/04/90

Order No. LETTER
Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	As ppm G004	Ni ppm G001	Cr ppm G001		
BC11 34		2	---	---		
BC11 35		12	---	---		
BC11 36		6	---	---		
BC11 37		32	---	---		
BC11 38		18	---	---		
BC11 39		13	---	---		
BC11 40		3	---	---		
BC12 1		15	---	---		
BC12 2		80	---	---		
BC12 3		110	---	---		
BC12 4		145	---	---		
BC12 5		60	---	---		
BC12 6		70	---	---		
BC12 7		80	---	---		
BC12 8		290	---	---		
BC12 9		230	---	---		
BC12 10		70	---	---		
BC12 11		60	---	---		
BC12 12		135	---	---		
BC12 13		85	---	---		
BC12 14		90	---	---		
BC12 15		450	---	---		
BC12 16		370	---	---		
BC12 17		190	---	---		
BC12 18		24	---	---		
BC12 19		8	---	---		
BC12 20		3	---	---		
BC12 21		1	---	---		
BC12 22		3	---	---		
BC12 23		2	---	---		
Detection Limit:		1	5	5		

Comments:

Signed: M Williams

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C426-1

Contact: MR T SUMMONS

No. of Samples: 142
Date Received: 08/03/90
Order No. LETTER
Sample Type: DRILL
Date Completed: 03/04/90

SAMPLE NUMBER	Element Unit Method	As ppm G004	Ni ppm G001	Cr ppm G001		
BC12 24		2	---	---		
BC12 25		1	---	---		
BC12 26		1	---	---		
BC12 27		4	---	---		
BC12 28		15	---	---		
BC12 29		2	---	---		
BC12 30		3	---	---		
BC12 31		1	---	---		
BC12 32		2	---	---		
BC12 33		8	---	---		
BC12 34		4	---	---		
BC12 35		3	---	---		
BC12 36		3	---	---		
BC12 37		4	---	---		
BC12 38		4	---	---		
BC12 39		5	---	---		
BC12 40		9	---	---		
BC11 41		18	---	---		
BC11 42		10	---	---		
BC11 43		9	---	---		
BC11 44		4	---	---		
BC11 45		14	---	---		
Detection Limit:		1	5	5		

Comments:

Signed: [signature]

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CONSULTING ANALYTICAL CHEMISTS

INCORPORATED IN QUEENSLAND

LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C474

Contact: MR T SUMMONS

No. of Samples: 25
Date Received: 30/03/90
Date Completed: 03/04/90

Order No. EX BATCH C426

Sample Type: PULPS EX C426

SAMPLE NUMBER	Element Unit Method	Ni ppm G001	Cr ppm G001			
BC11-16		630	330			
BC11-17		400	80			
BC11-18		500	60			
BC11-19		320	70			
BC11-20		350	90			
BC11-21		650	50			
BC11-22		850	110			
BC11-23		670	35			
BC11-24		410	25			
BC11-25		830	170			
BC11-26		360	30			
BC11-27		240	20			
BC11-28		320	45			
BC11-29		190	25			
BC11-30		130	30			
BC11-31		90	40			
BC11-32		90	30			
BC11-33		70	25			
BC11-34		165	20			
BC11-35		110	15			
BC11-36		330	20			
BC11-37		185	30			
BC11-38		95	35			
BC11-39		60	15			
BC11-40		40	15			
Detection Limit:		5	5			

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Comments:

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CONSULTING ANALYTICAL CHEMISTS

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Phone: (063) 631 722. Fax: (063) 631 189

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Contact: MR K MORRIS

Order No. LETTER

Sample Type: DRILL

Batch Number: C441-1

No. of Samples: 87
Date Received: 15/03/90
Date Completed: 29/03/90

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC13 1		N.R.				
BC13 2		10				
BC13 3		22				
BC13 4		34				
BC13 5		46				
BC13 6		75				
BC13 7		85				
BC13 8		34				
BC13 9		36				
BC13 10		150				
BC13 11		80				
BC13 12		135				
BC13 13		70				
BC13 14		90				
BC13 15		195				
BC13 16		46				
BC13 17		170				
BC13 18		150				
BC13 19		195				
BC13 20		220				
BC13 21		140				
BC14 1		105				
BC14 2		26				
BC14 3		19				
BC14 4		15				
BC14 5		13				
BC14 6		20				
BC14 7		22				
BC14 8		16				
BC14 9		17				
Detection Limit:		1				

Comments:

UNLESS NOTIFIED PULPS WILL BE DUMPED ON 15/09/90 AND SPLITS (IF ANY) ON 15/06/90

Signed: G. Aum

FORM ALS 01

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32 Shand Street, Stafford, Q. 4053
P.O. Box 66, Everton Park, Q. 4053
Phone: (07) 352 5577.
Fax: (07) 352 5109.
Perth Laboratory
Lot 197 Victoria Road, Malaga, W.A. 6062.
Phone: (09) 249 2988. Fax: (09) 249 2942.
Townsville Laboratory
21 Bombala Street, Garbutt, Q. 4814.
Phone: (077) 79 9155. Fax: (077) 799 729.
Charters Towers Laboratory
18 Drew Street, Charters Towers, Q. 482
Phone: (077) 87 4155. Fax (077) 87 4220
Bendigo Laboratory
127A Victoria Street, Eaglehawk, Vic. 35
Phone: (054) 46 1390. Fax: (054) 46 13
Orange Laboratory
10 Leewood Drive, Orange, N.S.W. 2800
Phone: (063) 631 722. Fax: (063) 631 1

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C441-1

Contact: MR K MORRIS

No. of Samples: 87
Date Received: 15/03/90
Date Completed: 29/03/90

Order No. LETTER

Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC14 10		16				
BC14 11		15				
BC14 12		20				
BC14 13		18				
BC14 14		10				
BC14 15		13				
BC14 16		7				
BC14 17		8				
BC14 18		8				
BC14 19		8				
BC14 20		8				
BC14 21		11				
BC14 22		9				
BC14 23		5				
BC14 24		5				
BC14 25		4				
BC14 26		4				
BC14 27		4				
BC14 28		5				
BC14 29		3				
BC14 30		3				
BC14 31		5				
BC14 32		4				
BC14 33		4				
BC14 34		5				
BC14 35		5				
BC14 36		6				
BC14 37		5				
BC14 38		7				
BC14 39		4				
Detection Limit		1				

Comments:

Signed: G. Aun

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LABORATORY REPORT

Client: PEGASUS GOLD
Address: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: C441-1

Contact: MR K MORRIS

No. of Samples: 87
Date Received: 15/03/90
Date Completed: 29/03/90

Order No LETTER   Sample Type: DRILL

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC14 40		4				
BC14 41		6				
BC14 42		6				
BC14 43		5				
BC14 44		6				
BC14 45		5				
BC14 46		3				
BC14 47		3				
BC14 48		5				
BC14 49		5				
BC14 50		5				
BC14 51		9				
BC14 52		8				
BC14 53		8				
BC14 54		5				
BC14 55		8				
BC14 56		7				
BC14 57		8				
BC14 58		9				
BC14 59		6				
BC14 60		5				
BC14 61		7				
BC14 62		7				
BC14 63		7				
BC14 64		8				
BC14 65		10				
BC14 66		32				
Detection Limit		1				

Comments:

Signed: G. A...

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Orange Laboratory
10 Leewood Drive, Orange, N S W 2800
Phone (063) 631 722 Fax (063) 631 189

lent: PEGASUS GOLD
ddress: 63 EXHIBITION STREET
MELBOURNE
VIC 3000

Batch Number: E423-I

ontact: MR T SUMMONS

No. of Samples: 27
Date Received: 09/05/90
Date Completed: 18/05/90

der No. LETTER

Sample Type: DRILL CORE

SAMPLE NUMBER	Element Unit Method	As ppm G004				
BC15-1		220				
BC15-2		420				
BC15-3		90				
BC15-4		380				
BC15-5		105				
BC15-6		160				
BC15-7		70				
BC15-8		40				
BC15-9		310				
BC15-10		50				
BC15-11		520				
BC15-12		680				
BC15-13		240				
BC15-14		290				
BC15-15		30				
BC15-16		<1				
BC15-17		2				
BC15-18		1				
BC15-19		<1				
BC15-20		<1				
BC15-21		1				
BC15-22		2				
BC15-23		9				
BC15-24		6				
BC15-25		340				
BC15-26		60				
BC15-27		7				
etection Limit:		1				

omments:

Signed: [signature]

FORM ALS 01(

MINES CONSULTANCY SERVICES

Petrographic, oxygen isotope and fluid inclusion studies, and the clay mineralogy of core samples from DDH BC15 and sample BCF8, Weld River area

Client: PEGASUS GOLD AUSTRALIA

Author: Dr J. TAHERI

Date: 24 AUGUST 1990

TASMANIA DEPARTMENT OF RESOUCES & ENERGY
DIVISION OF MINES AND MINERAL RESOURCES

Petrographic, oxygen isotope and fluid inclusion studies, and the clay mineralogy of core samples from DDH BC15 and sample BCF8, Weld River area

by J. TAHERI, B.Sc., M.Sc., Ph.D

SUMMARY

Brecciated silicified rocks from DDH BC15, drilled in the Weld River area, appear to have been affected by different stages of silicification and veining. The original rocks were probably carbonates which have subsequently been silicified. This is indicated by relict carbonate as inclusions in early-formed quartz crystals.

A new generation of two phase (liquid + vapour) fluid inclusions was found which exhibited consistent homogenisation temperatures ranging from 254 to 281°C and low salinity (~1 wt% NaCl equivalent). Oxygen isotope analyses of three silicified rocks gave similar and relatively light values from +9.9‰ to +10.5‰. The fluid inclusion and oxygen isotope data indicate the involvement of hydrothermal-meteoric fluids for at least some stages of silicification in the area.

The identified clay minerals from four clay samples include kaolinite, halloysite and illite, with quartz being one of the main constituents. The clay zones are considered to be of secondary (redeposited) origin.

The data are based on some 30 metres of core consisting of clay and silicified rocks. Exploration and laboratory studies are required for a better understanding of the rocks within the area.

PETROGRAPHY

Four samples from the silicified rocks in DDH BC15 were examined. The silicified rocks are massive to porous, brecciated and are grey in colour. They may also contain minor goethite and limonite. Under the microscope they almost entirely consist of quartz ranging from few microns to few millimetres. The coarser euhedral quartz crystals project into open vugs. The rocks appear to have been affected by several stages of silicification and veining (fig. 1). The early stage of silicification is fine-grained chert or jasperoid which has repeatedly been affected by later silicification and/or veining. The later silicification is characterised by coarser quartz crystals. A common feature of these rocks is the occurrence of inclusions (~5–50 μm) with strong birefringence within the earlier-formed quartz grains (fig. 2). The inclusions may represent the remnants of carbonate (i.e. the original rock) which has subsequently been silicified. The minor occurrence of carbonate was also indicated by XRD analysis. Texturally the rocks are similar to those observed to the NW of the area, which are interpreted to have been formed by the silicification of carbonate rocks (C. Calver, pers. comm.). These rocks also commonly contain carbonate? inclusions. Similar silicified rocks have been described by Wallace (1989) from the Relief Canyon gold deposit, Nevada. It should be mentioned that it is very unlikely that the silicified rocks would be of ultramafic origin, as no diagnostic inclusions such as magnetite, spinel or chromite were observed. The occurrence of vugs and lack of evidence for the quartz crystals pseudomorphing original ultramafic rock-forming minerals such as pyroxene also suggest that other rock types, probably carbonates, were the original rocks within the area.

FLUID INCLUSIONS

Five thick sections (unpolished) from the silicified rocks were used for the initial fluid inclusion petrography. Samples BCF4, BCF5 and BCF8 contained useful fluid inclusions. Two doubly-polished sections from sample BCF8 and one from sample BCF5 were prepared for this study.

Fluid Inclusion Types

There are basically three different fluid inclusion types or generations:

(1) One phase (liquid only) fluid inclusions

(2) Two phase (liquid + vapour) inclusions with variable vapour-liquid ratios. These inclusions can be classified into three sub-types on their vapour–liquid ratios, *viz:*

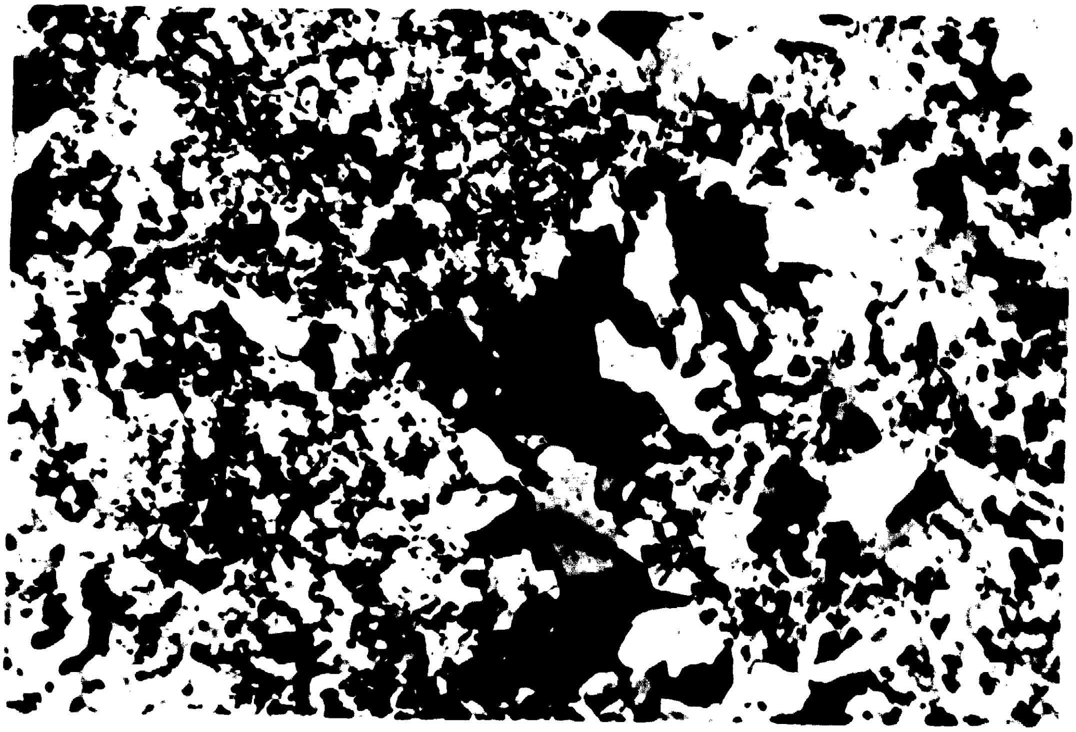

Figure 1. *Silicified rock showing the vugs and different generations of the quartz grains. Sample BCF5. Field of view 4.6 × 3 mm.*

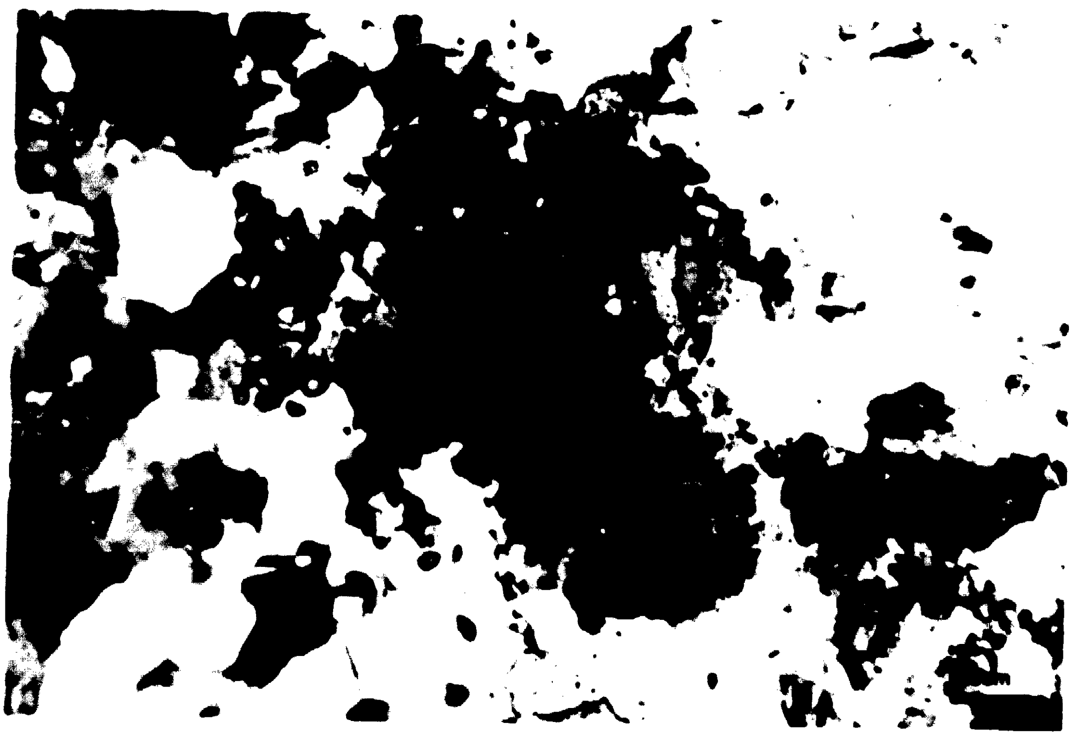

Figure 2. *Quartz crystals containing carbonate inclusions. Sample BCF4.*

(a) Inclusions with very low (~5% by volume) vapour–liquid ratios

(b) Inclusions with moderate (~20% by volume) vapour–liquid ratios

(c) Inclusions with high vapour–liquid ratios (60–85% by volume)

(3) One phase (vapour only) inclusions.

Types 1, 2a and 2c fluid inclusions have already been described in the report dated September 1989.

Type 2b fluid inclusions were only observed in sample BCF8. They were observed only in two planes and are characterised by very consistent vapour–liquid ratios, small size (~5 μm), and semi-rounded shape (fig. 3).

Type 3 (vapour only) inclusions were only observed within the euhedral quartz crystals in the cavities in sample BCF8 (fig. 4). They are relatively large (~10 to 50 μm) and vary in shape from being semi-rounded to negative crystals. The inclusions occur as individuals, in plane, and along discontinuous fractures. They are commonly associated with two Phase inclusions with high vapour–liquid ratios (Type 2c).

FREEZING EXPERIMENTS

Freezing experiments on a few necked (with small bubbles) Type 1 inclusions from sample BCF4 indicated very low salinities of around 1 wt% NaCl equivalent. No attempt was made to measure the freezing points of Type 2a inclusions.

Type 2b inclusions exhibit very low but consistent freezing points of around -0.5°C, corresponding to salinities of about 1 wt% NaCl equivalent. No CO_2 or CH_4 was detected on cooling of these fluid inclusions. The low salinity may indicate derivation from a meteoric-hydrothermal or metamorphic fluid. The freezing experiments on Type 2c fluid inclusions were unsuccessful (see previous report for explanation).

Several Type 3 inclusions were cooled below -200°C in order to investigate the possibility of the occurrence of CH_4 (triple point for CH_4 is -182.5°C). No phase changes were observed. An attempt was made to study the possible occurrence of CH_4 by using the crushing stage for the Type 3 inclusions. However no definite results were obtained by this method.

HEATING EXPERIMENTS

Type 2b inclusions were used for most of the heating experiments. These fluid inclusions show consistent homogenisation temperatures ranging from 254 to 281°C (fig. 5, Table 1). All the inclusions homogenised to liquid. These fluid inclusions clearly indicate the involvement of a dilute moderate temperature fluid for at least some of the silicification and the possible gold mineralisation within the area.

Only three homogenisation temperature measurements were made on the vapour-rich (Type 2c) inclusions. Two of the inclusions located on the same plane and in the same field of view homogenised to liquid and vapour at temperatures of around 380°C (Table 1). The third inclusion homogenised to vapour at 372°C. The significance of these fluid inclusions has already been discussed in the previous report. However, the homogenisation temperature results obtained so far from the vapour-rich fluid inclusions should be treated with caution.

This is mainly due to the absence of sufficient evidence to support an immiscibility relationship between vapour-rich (Type 2c) and vapour-only (Type 3) inclusions. A systematic fluid inclusion study on more samples from different depths and locations is required to investigate whether these inclusions have been trapped from immiscible fluids (see previous report) or whether they represent two generations of fluid inclusions, although the former interpretation is preferred. Further work may also reveal the relationships between the different types of fluid inclusions and how they can be related to the possible gold mineralisation within the area.

In summary, the reconnaissance fluid inclusion work clearly shows that the rocks within the area have at least been affected by a low salinity, moderate temperature fluid (Type 2b). A meteoric-hydrothermal or metamorphic origin is likely. The homogenisation temperatures of the vapour-rich inclusions and the composition of the vapour needs to be confirmed by further work. However, the low salinities and low CO_2 contents of the fluids are similar to those associated with gold mineralisation in jasperoid replacements of carbonates at the Relief Canyon deposit, Nevada (Wallace, 1989). Incidentally this deposit is 90% owned by Pegasus Gold Company.

OXYGEN ISOTOPE

Over recent years oxygen isotope studies have become an important contributor in resolving the problems related to ore deposition and hydrothermal alteration in a wide range of ore

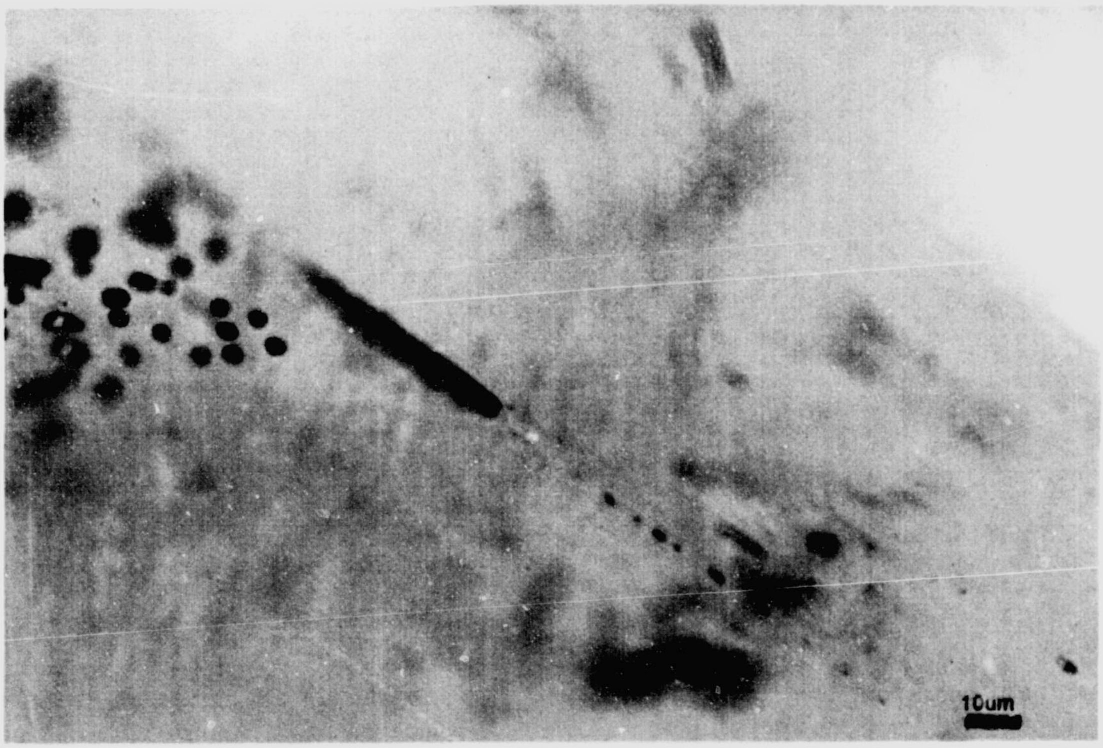

Figure 3. *Type 2b fluid inclusions. Note the consistency in their vapour-liquid ratios. Sample BCF8.*

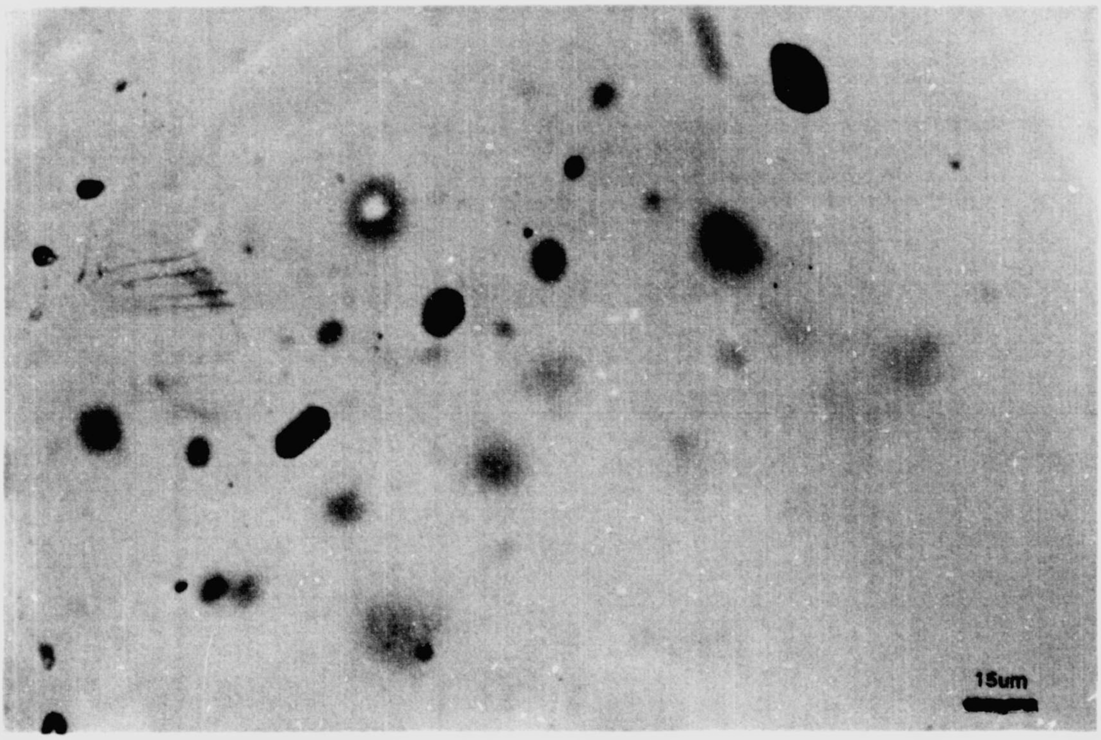

Figure 4. *Typical type 2c (vapour rich) and type 3 (vapour only) inclusions. Sample BCF8.*

Table 1. *Fluid inclusion homogenisation and freezing measurements, Weld River area.*

Sample No.	Sample Type	Inclusion type	*TH$_L$	*TH$_V$	**Tm
BCF8	Quartz in silicified rock	2b	251	-	0.5
			254	-	-
			265	-	C.4
			263	-	-
			261	-	0.3
			259	-	-
			275	-	0.5
			272	-	-
			269	-	-
			265	-	0.2
			261	-	-
			260	-	-
			281	-	0.3
			282	-	-
			261	-	0.4
			258	-	-
			253	-	-
			262	-	0.5
			270	-	-
			263	-	-
			265	-	-
			259	-	-
			266	-	-
			260	-	-
			256	-	-
		2c	382	379	-
			-	372	-

* Homogenisation temperature
V = Vapour

** Temperature of melting
L = Liquid

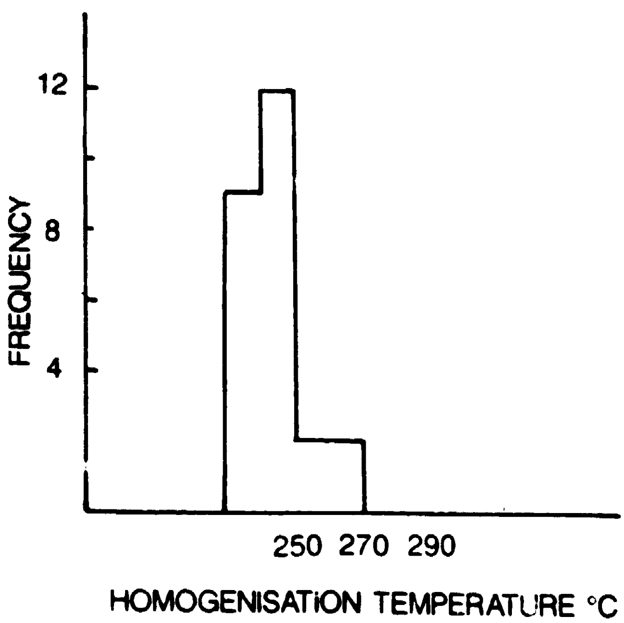

Figure 5. *Homogenisation temperature histogram for type 2b inclusions.*

Table 2. *Oxygen isotope analyses of quartz and silicified rocks, Weld River area.*

Sample	Rock type	$\delta^{18}O_{SMOW}$ (‰)	Calculated $\delta^{18}O$ of water SMOW (‰)	
			*300°C	*400°C
BCF3	silicified rock	+10.4	+3.2	+6.1
BCF8	silicified rock	+10.5	+3.3	+6.2
SW2	silicified rock (quartz)	+9.9	+2.7	+5.6

* Homogenisation temperature

deposits. The application of oxygen isotopes to hydrothermal ore deposits has been widely described in the literature (e.g. Taylor, 1974, 1979; Ohmoto, 1986). The first few sections of the paper written by Taylor (1974), describing the basics in oxygen isotope studies, are included as an Appendix to this report.

One quartz sample (euhedral crystals in vug) from a siliceous rock (SW2) and two fine-grained silicified rocks (BCF3, BCF8) were selected for oxygen isotope analysis. The oxygen isotope values are very similar for all the samples (Table 2). Assuming formation temperatures of 300 to 400°C for some stages of the silicification, then the oxygen isotope composition of water in equilibrium varies from + 2.7‰ to + 6.2‰ (from the quartz-H_2O fractionation of Clayton *et al.*, 1972). The low oxygen isotope values may indicate the involvement of meteoric water during the silicification and veining within the area. The low salinity of type 2b fluid inclusions also indicates that the fluid is ultimately of meteoric-hydrothermal derivation. It should be remembered that the actual formation temperatures for the possible different silicification stages are not known, and the mentioned formation temperature range was simply to illustrate the relatively low oxygen isotope values of the fluid. A lot more detailed work is required for more reliable interpretations and conclusions.

XRD ANALYSIS

Four clay samples from DDH BCF 15 were analysed to identify the clay minerals and to study the possible nature of their formation (i.e. weathering *vs* hydrothermal alteration). The results are shown in Table 3.

The clay zones occur within the silicified rocks and are up to few metres thick. Based on K. Morrison's field observation (pers. comm.) they appear to have been formed along pre-existing fractures. Kaolinite and quartz are the common minerals, however samples BCX-1 and BCX-2 contain halloysite whereas illite is the additional mineral in samples BCX-3 and BCX-4. Kaolinite ($Al_4(Si_4O_{10})(OH_8)$) is the most common clay mineral and can originally be formed as an alteration product of feldspars, sheet silicates, felspathoids and other silicates under hydrothermal conditions or by weathering.

However kaolinite with a hydrothermal origin appears to be associated with the alteration zoning in hydrothermally-formed deposits (e.g. Bonorino, 1959). Dickite and nacrite are the only clay minerals of hydrothermal origin. They are chemically identical to kaolinite, but are structurally different and are found in association with quartz and sulphides in hydrothermal environments.

Halloysite is an hydrated form of kaolinite and commonly occurs with kaolinite. It can either be formed from kaolinite or independent of the associated kaolinite (Brindley and Comer, 1956; Sand, 1956).

Illite is one of the clay minerals which is structurally related to the micas.

The environments under which illite can be formed include:

(a) weathering (e.g. Stoch and Sikora, 1976)

(b) sedimentary (e.g. Ireland *et al.*, 1983)

(c) diagenetic/metamorphic (e.g. Hower *et al.*, 1976), and

(d) hydrothermal (e.g. Parry *et al.*, 1984).

Most of the hydrothermally-formed illite studied so far is associated with active geothermal fields (e.g. Beaufort and Meunier, 1983*a*). Illite intersected by DDH BC 15 occurs generally at greater depths (Table 3). It is considered to be an indicator of the lower parts of weathering profiles (e.g. Stoch and Sikora, 1976; Gardner *et al.*, 1978). Quartz occurs as very fine to submicron size in all the samples. Since quartz is unaffected by weathering, the fineness of the quartz grains may indicate that quartz was deposited along with the clays, possibly by

Table 3. *Semi-quantitative XRD analysis of clay samples from DDH BC15, Weld River area.*

Sample no.	Depth (m)	Illite (%)	Kaolinite (%)	Halloysite (%)	Quartz (%)	Goethite (%)
(a) Total sample						
BCX-1	1.4	-	55	5	35	5
BCX-2	13.5	-	75	10	15	-
BCX-3	19.4	45	40	-	15	-
BCX-4	23.2	10	65	-	25	-
(b) Clay fraction						
BCX-1		-	80	10	-	10
BCX-2		-	85	15	-	-
BCX-3		55	45	-	-	-
BCX-4		10	90	-	-	-

groundwater. Therefore it is unlikely that the clay zones represent pre-existing hydrothermal minerals or different lithological units which have subsequently been kaolinised.

Goethite was detected only in sample BCX-1, and is a common mineral in weathering environments.

In general the clay zones are characterised by:

(a) fine to submicron size of quartz,

(b) restriction of illite to lower parts of the clay intervals,

(c) being formed along the fractures, and

(d) a lack of hydrothermal clay minerals (i.e. dickite and nacrite).

The above-mentioned features indicate a secondary (re-deposited) origin for the clays intersected by DDH BC 15.

Kaolinite may have been formed by the weathering of illite. The association between silicified carbonate rocks and clays along fractures is perplexing. Again, referring to the analogy between Weld River and the Relief Canyon gold deposit, a possible explanation of the relationship would be pre-mineralisation extensive solution weathering of the carbonate units, followed by collapse with carbonate rocks being surrounded by mud matrix derived from a higher stratigraphic unit (fig. 6). Deeper drilling would be needed to test this hypothesis, which is only tentatively suggested on minimal evidence.

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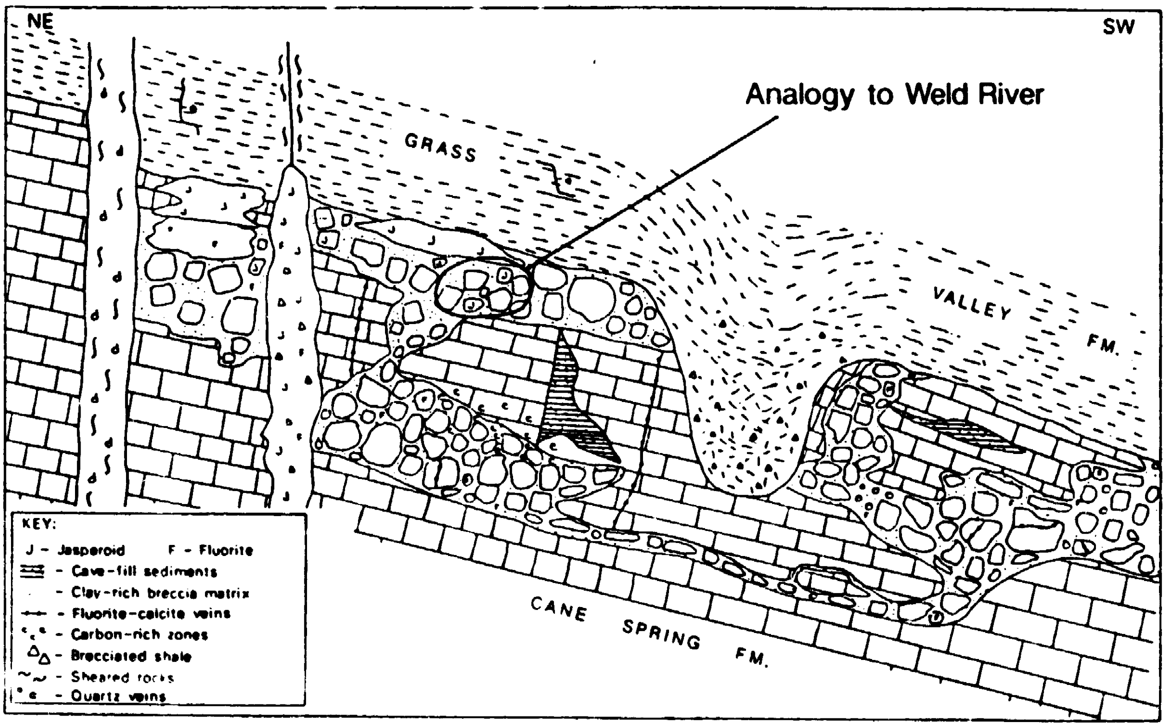

Figure 6. *Schematic cross section looking southwest through breccia zone in Cane Spring Formation. Section drawn to show general relations between host rocks, breccia, collapse structures, and veins. The breccia matrix, cave-fill sediments, jasperoids, and some of the collapsed Grass Valley shale are mineralised and contain gold. All unlabelled breccia fragments are composed of limestone. Fluorite (F), where not in breccia fragment, replaces breccia matrix or jasperoid:; d = diabase dyke. Section not drawn to scale. (from Wallace, 1989)*

APPENDIX

Economic Geology
Vol. 69, 1974, pp. 843–883

The Application of Oxygen and Hydrogen Isotope Studies to Problems of Hydrothermal Alteration and Ore Deposition*

HUGH P. TAYLOR, JR.

Abstract

$^{18}O/^{16}O$ and D/H analyses of hydrothermal minerals and fluid inclusions can provide data on temperatures and attainment of equilibrium, but they are principally useful as isotopic tracers in determining the origin of the H_2O involved in ore deposition. This results from the fact that different sources of H_2O in the earth's crust, namely primary magmatic, metamorphic, oceanic, connate, and meteoric, all exhibit characteristic δD and/or $\delta^{18}O$ values. Recent studies have provided quantitative data emphasizing the importance of meteoric H_2O in many hydrothermal fluids. Epizonal igneous intrusions emplaced into permeable country rocks (e.g., highly fractured volcanic areas) act as gigantic "heat engines" that set up long-lived hydrothermal convection systems that persist throughout the crystallization and cooling of the intrusion. The amounts of magmatic water in such systems are negligible compared with the very large amounts of heated meteoric ground water. Certain epithermal ore deposits and their associated propylitic alteration zones in volcanic terranes (western Cascades, Tonopah, Comstock, Goldfield, the San Juans) were formed by such low-^{18}O meteoric fluids; the very high water/rock ratios imply that such ore-bearing fluids are relatively dilute water. If the country rocks are less permeable, as in many porphyry copper environments, less outside water is available and dominantly magmatic-hydrothermal fluids are isotopically identified as the source of the biotite-K feldspar alteration in the core zones of the porphyry stocks. A less pronounced meteoric-hydrothermal circulation, perhaps involving Na-Ca-Cl brines in the country rocks, is set up outside the stock. Such solutions are responsible for the pyrite-sericite and hypogene clay alteration zones in the outer portions of the stock. These zones tend to collapse and encroach on the central zone with time and the Cu ore bodies commonly occur near this boundary. At a much later stage, after erosion, supergene clay formation may occur and this can also be distinguished from the hypogene clay alteration by means of $\delta^{18}O$ and δD analyses.

Introduction

THE purpose of this review paper is to examine the basic principles of hydrogen and oxygen isotope geochemistry that bear on the problems of hydrothermal alteration and ore deposition. Although isotopic analyses can, in principle, provide determinations of the temperatures of formation of hydrothermal mineral assemblages, the prevalence of isotopic disequilibrium in such assemblages severely restricts this application. At present the most useful application lies in using D/H and $^{18}O/^{16}O$ analyses as indicators of the origin and history of the H_2O in hydrothermal fluids.

Inasmuch as H_2O is the dominant constituent of ore-forming fluids, a knowledge of its origin is fundamental to any theory of ore formation. The other materials in solution also provide important evidence, but variations in dissolved salts and gases tell us principally something about the P-T history of the solution and about the types of rocks with which the fluid came into contact. The ultimate source of the H_2O can only be deciphered by studying some geochemical parameter based on the water molecules themselves. Stable isotope analyses provide just such a parameter, because natural waters of various origins exhibit systematic differences in their deuterium and oxygen-18 contents. To apply these techniques to ore deposits we first need to understand the natural isotopic variations in the various waters that conceivably could be involved in ore deposition; then we must find a way of determining the isotopic composition of the fluid that formed a given mineral deposit.

There are two ways of determining $^{18}O/^{16}O$ and D/H ratios of natural hydrothermal fluids: (1) by

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direct measurement of the fluid itself in a geothermal area or of fluid inclusions in the minerals of an ore deposit, and (2) by isotopic analysis of mineral assemblages, calculation of temperatures of formation utilizing various geothermometers, and finally, calculation of D/H and $^{18}O/^{16}O$ ratios of waters in equilibrium with the assemblages at their temperatures of formation.

Although both approaches have been utilized, there are problems involved in the actual application of either of the above techniques, particularly with respect to whether or not the isotopic ratios are preserved during subsequent cooling of the ore deposit. The water that is present in fluid inclusions of oxygen-bearing minerals, for example, undergoes exchange with the host mineral during cooling, thus changing the $^{18}O/^{16}O$ ratio of the fluid (Sugisaki and Epstein, 1968, unpub. data; Rye and O'Neil, 1968). Even nonoxygen-bearing minerals may contain secondary fluid inclusions that are not representative of the original fluid from which the mineral formed, especially if the mineral is highly fractured or full of imperfections.

The following discussions are not meant to be an exhaustive review of all the literature on this subject. Instead, the basic principles will be emphasized and the examples to be used will largely be drawn from previous work by the writer, his students, and his colleagues. The general approach is to illustrate the overwhelming amount of isotopic evidence gathered in recent years showing the importance of waters other than primary magmatic water in natural hydrothermal fluids. In particular, heated meteoric ground waters will be shown to be a very important constituent of many ore-forming fluids. The suggestion that meteoric waters might be important in hypogene ore deposition is a very old one and was, in fact, much in vogue until J. F. Kemp, W. Lindgren, and other geologists made such an apparently convincing case for the magmatic-hydrothermal theory about 1910. Early workers such as Van Hise (1902), Ransome (1909), and Lawson (1914) strongly supported the idea of deep circulation and heating of such surface waters, but it is only with the development of stable isotope geochemistry in recent years that it has become possible to supply proof for such ideas and to contradict much of the dogma that has arisen concerning magmatic-hydrothermal solutions.

Equilibrium Isotope Fractionations

Although we shall not dwell on isotope geothermometry in this paper, if we are to be able to calculate isotope ratios of hydrothermal fluids it is necessary to discuss the state of our present knowledge concerning D/H and $^{18}O/^{16}O$ fractionation factors for mineral-gas-water systems. Gas-H_2O fractionations as a function of temperature can be accurately calculated by the methods of statistical mechanics, but in general, mineral-H_2O fractionations at high temperatures must be experimentally determined in the laboratory. The latter approach is usually extremely difficult and time-consuming and a great deal of further work is necessary; successful experiments have so far been made in very few laboratories throughout the world.

First, some basic definitions: the isotope data are reported as δD or $\delta^{18}O$, where:

$$\delta = \left(\frac{R_{sample}}{R_{standard}} - 1\right) 1{,}000$$

and R_{sample} is D/H or $^{18}O/^{16}O$ in the sample and $R_{standard}$ is the corresponding ratio for the standard. We are not concerned with absolute ratios, only with relative deviations from a standard material, and the most convenient standard for both oxygen and hydrogen is ocean water. A particular set of ocean water values, designated Standard Mean Ocean Water (SMOW) by Craig (1961) is the most common standard in present-day use. Thus, a δ-value = +10 would mean that the sample is 10 per mil (10 parts per thousand) or 1 percent richer in deuterium or ^{18}O than SMOW. Negative numbers signify relative depletions in the heavy isotopes.

The accuracy of determination of δD is about an order of magnitude worse than for $\delta^{18}O$ (± 1 per mil versus ± 0.1 per mil). However, the natural variations in D/H are much greater than for $^{18}O/^{16}O$; hence, a 10 per mil variation represents a very large $\delta^{18}O$ change but only a small δD change.

Another term in common use is α, the fractionation factor or isotopic partition coefficient for two minerals or two chemical compounds (species A and species B):

$$\alpha_{AB} = R_A/R_B.$$

Note that from the definition of δ, it follows that:

$$\ln \alpha_{AB} = \ln\left(1 + \frac{\delta_A}{1{,}000}\right) - \ln\left(1 + \frac{\delta_B}{1{,}000}\right)$$

Inasmuch as $\ln(1 + \epsilon) \approx \epsilon$, if $\epsilon \ll 1$, we obtain the approximate relationship:

$$1{,}000 \ln \alpha_{AB} \approx \delta_A - \delta_B.$$

For δ-values ≤ 10, this approximate relationship holds up very well and we can treat isotopic distribution coefficients by simply subtracting

δ-values, which is very convenient. However, for larger fractionations, as typically occur in the case of D/H ratios, this can lead to errors; in such cases the fractionation factors should be divided out to insure accuracy.

If an isotopic exchange reaction is written such that only one of a set of exchangeable atoms in each compound takes part, using as an example the quartz-H_2O system:

$$H_2{}^{18}O + \tfrac{1}{2}Si^{16}O_2 = H_2{}^{16}O + \tfrac{1}{2}Si^{18}O_2,$$

then it can be shown (Urey, 1947) that $\alpha \equiv K$, the equilibrium constant for the reaction as written. Urey (1947) and Bigeleisen and Mayer (1947) showed that lnK for an isotopic exchange reaction involving perfect gases closely follows $1/T^2$ dependence over a wide temperature range and must approach zero at some very high temperature. Many mineral-H_2O fractionations also approximately follow $1/T^2$ dependence, and this is the reason for presenting the data in Figures 1, 2, 3, and 4 in the form of plots of 1,000 ln α versus $10^6/T^2$.

Some calculated $^{18}O/^{16}O$ fractionation curves of geological interest are given in Figure 1, together with an experimental determination of the liquid water-vapor water equilibrium. Three classes of curves are shown in Figure 2: (1) a summary of the available information on mineral-H_2O experimental calibration curves; (2) some recent estimates by Bottinga and Javoy (1973) of the positions of these curves, based partly on theoretical and partly on empirical considerations; and (3) some empirical estimates from data obtained on natural mineral assemblages. Also shown for comparison is a single calculated curve for calcite-H_2O, based on some of the calculated curves shown in Figure 1.

The estimates by Bottinga and Javoy (1973) agree quite well with most of the calibration curves in Figure 2, except for the quartz-H_2O curve of Clayton et al. (1972). The latter authors, however, have pointed out the experimental difficulties encountered in the quartz-H_2O system and better agreement is obtained with a set of their data that involves partial equilibration and extrapolation to complete equilibrium. This latter calibration curve, 1,000 ln $\alpha = 3.57(10^6/T^2) - 2.73$, is the one that has been used in most isotope geothermometry involving quartz (e.g., Taylor, 1967; Shieh and Taylor, 1969a and b; Taylor and Coleman, 1968). Use of the quartz-H_2O calibration equations of Clayton et al. (1972) typically gives geologically unreasonable temperatures of formation of mineral assemblages. Therefore, either their equations are in error, the other mineral-H_2O curves are wrong, or isotopic "temperatures" do not tell us much of anything about the original temperatures of formation of natural mineral assemblages. At present, it is not readily obvious which of the above possibilities we should choose. However, note that at any temperature, the scatter in the various quartz-H_2O curves shown in Figure 2 would lead to only about a 1 per mil variation in the calculated $\delta^{18}O$ values of a hydrothermal fluid in equilibrium with quartz.

There is at least one way to partially reconcile the quartz-H_2O curve of Clayton et al. (1972) with the other curves on Figure 2. The waters utilized in the experiments of Clayton et al. (1972) were not analyzed directly; they were done by the standard technique involving CO_2 equilibration at 25°C, assuming a CO_2-$H_2O(l)$ fractionation factor of 1.0407. There are some indications now that a better value for this fractionation factor might be about 1.0412 or higher, based on several recent studies. This would cause an up-

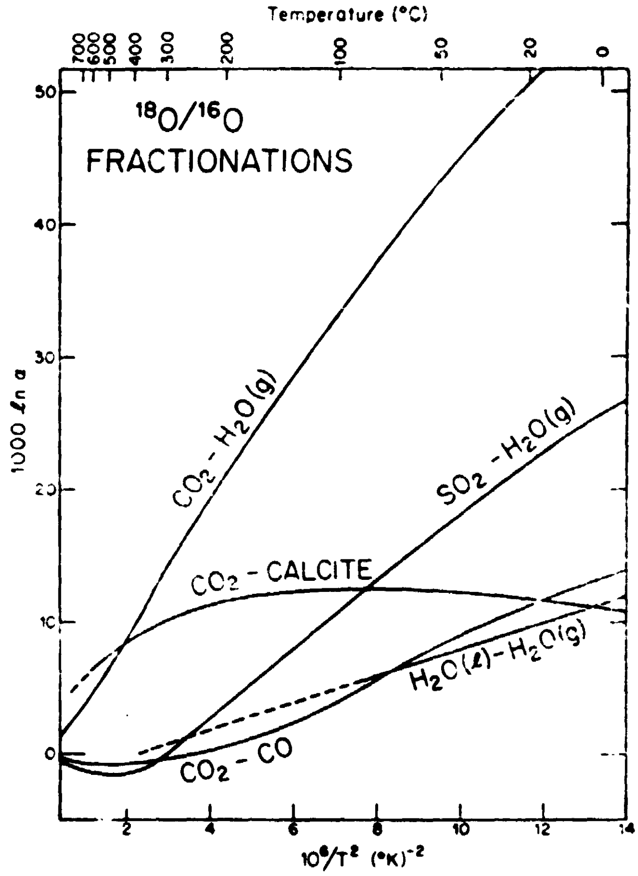

FIG. 1. Calculated equilibrium oxygen isotope fractionation factors as a function of temperature for CO_2-H_2O and CO_2-calcite (Bottinga, 1968), SO_2-H_2O and CO_2-CO (Urey, 1947), together with the experimentally determined curve for liquid water-vapor water (Horibe and Craig, in Craig, 1963, solid line; Bottinga and Craig, 1968, dashed line).

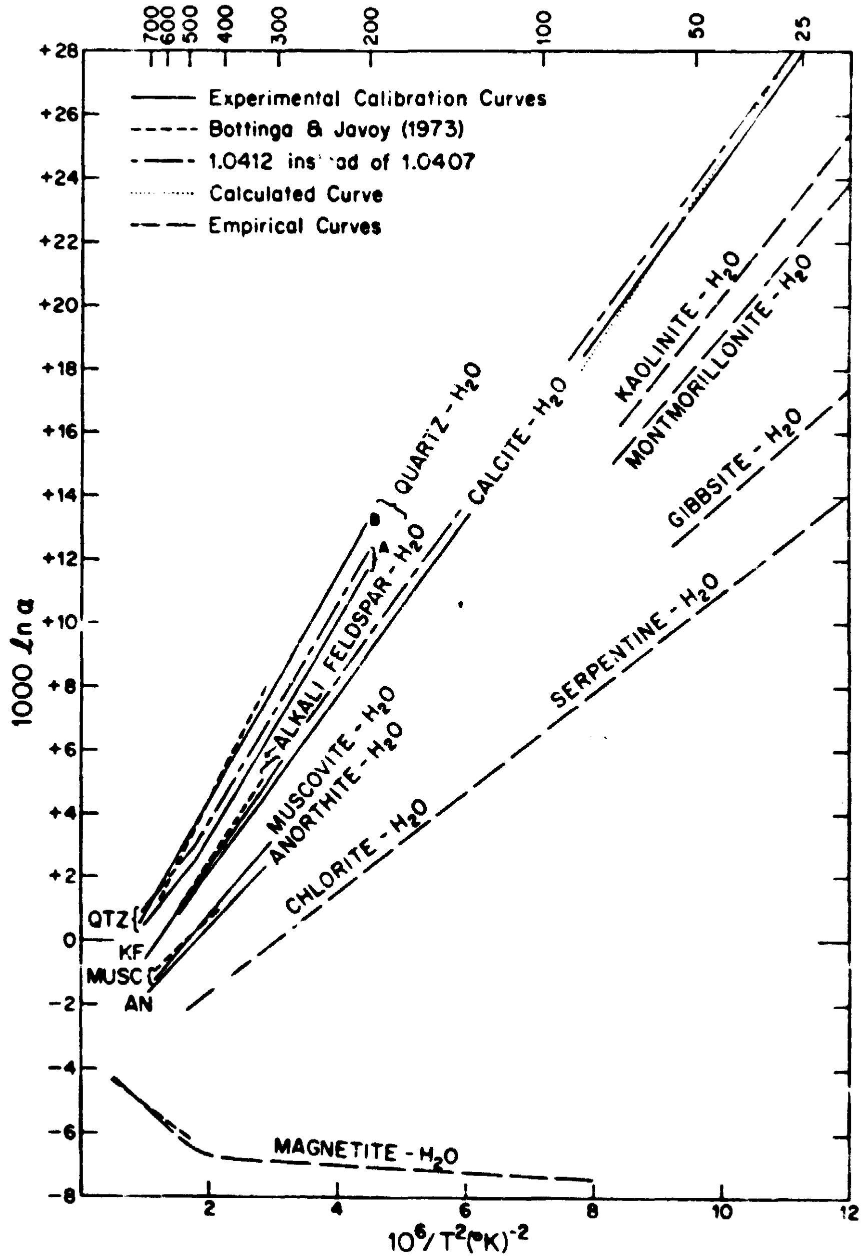

FIG. 2. Experimentally determined equilibrium oxygen isotope fractionation curves for various mineral-H_2O systems: calcite-H_2O (O'Neil et al., 1969); quartz-H_2O (B = "partial" exchange experiments, A = "complete" exchange experiments, Clayton et al., 1972); alkali feldspar (KF)-H_2O and anorthite (AN)-H_2O (O'Neil and Taylor, 1967); and muscovite-H_2O (O'Neil and Taylor, 1969). Also shown are some empirically derived curves: magnetite-H_2O (high-T portion = Anderson et al., 1971, low-T portion = Wenner and Taylor, 1971); serpentine-H_2O and chlorite-H_2O (Wenner and Taylor, 1971); kaolinite-H_2O (Savin and Epstein, 1970a); and gibbsite-H_2O (Lawrence and Taylor, 1971). In addition, some calculated curves of Bottinga and Javoy (1973) and Bottinga (1968, calcite-H_2O) are indicated, together with two readjusted experimental curves based on changing the CO_2-$H_2O(l)$ fractionation factor at 25°C from 1.0407 to 1.0412 (see text).

ward shift of the quartz-H_2O curve of Clayton et al., in Figure 2, bringing it into closer agreement with the other quartz-H_2O curves. Except for calcite-H_2O, the other curves on Figure 2 are not affected, either because the H_2O was analyzed directly (O'Neil and Taylor, 1967; 1969), or because the curves are based on empirical considerations of $^{18}O/^{16}O$ data on natural mineral assemblages.

In summary, in spite of the difficulties, the experimentally determined calibration curves on Figure 2 represent the most reliable means of calculating the $\delta^{18}O$ values of H_2O in equilibrium with a mineral assemblage at a given temperature. The other curves shown on Figure 2 are not independent; they are basically determined by these experimental curves in conjunction with data on natural mineral assemblages. Pressure is not a factor, because the equilibrium isotopic fractionations are solely temperature dependent. The composition of the aqueous fluid may, however, be important. This problem is discussed by Taylor (1967, p. 131) and recent work by Truesdell (1971) has shown that salinity variations may require adjustments to be made in calculated $\delta^{18}O$ values of hydrothermal waters. However, in view of the other variables involved, these difficulties are of second order and will be ignored in further discussions.

Some calculated D/H fractionation curves of geological interest are given in Figure 3. Note the enormously larger values of 1,000 ln α in these systems compared to the $^{18}O/^{16}O$ systems. The curves show, for example, that at equilibrium at about 400°C, H_2O will be about 400 per mil richer in deuterium than coexisting H_2 gas. This means that if equilibrium is maintained and a hydrothermal fluid encounters a strongly reducing environment, some of the H_2O will be reduced to H_2 and the latter will have a very low δD value. By material balance the remaining H_2O will have to become richer in deuterium. Therefore, reactions of this type represent possible means of changing the δD values of the H_2O in a natural hydrothermal fluid and, for the above example, the equations governing this change are given by:

$$\delta D^f_{H_2O} - \delta D^f_{H_2} \approx 400$$

$$x\delta D^f_{H_2O} + y\delta D^f_{H_2} = \text{constant} = \delta D^i_{H_2O}$$

where x and y are, respectively, the mole fractions of H_2O and H_2 in the final (f) mixture, and the initial (i) material is assumed to be 100 percent H_2O. If $\delta D^i_{H_2O}$ is -70, and as little as 5 percent of the H_2O is reduced to H_2, the δD of the H_2O in the final hydrothermal fluid will be increased by 20 per mil to $\delta D^f_{H_2O} = -50$. Any OH-bearing minerals in equilibrium with this hydrothermal fluid will therefore also be enriched in deuterium by 20 per mil (providing they constitute only a tiny part of the total hydrogen reservoir; if an appreciable fraction of the total hydrogen in the system is tied up in such minerals, the above equations become slightly more complicated).

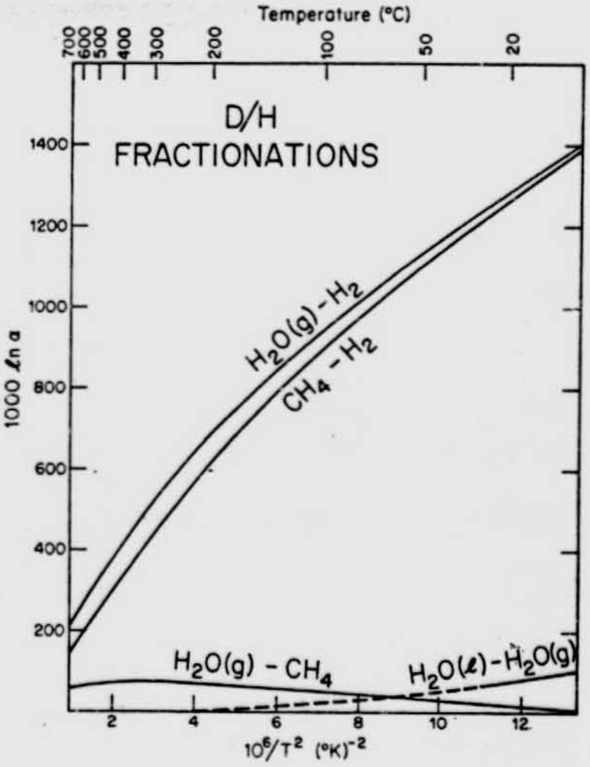

FIG. 3. Calculated equilibrium hydrogen isotope fractionation factors as a function of temperature for H_2O-H_2, CH_4-H_2, and H_2O-CH_4 (Bottinga, 1969), together with the experimental liquid water-vapor water equilibrium curve (Merlivat and Nief, unpub. data, 1965, solid line; Merlivat et al., 1963, dashed line).

The reverse of the above situation occurs if an H_2-bearing hydrothermal fluid encounters an oxidizing environment. Then the H_2O will become depleted in deuterium. Generally, all of the above effects will be small in natural hydrothermal systems because the amounts of H_2O involved are so huge and the buffering capacities of the rocks are limited. Also, at the normal oxygen fugacities encountered in natural ore-forming solutions (e.g., Meyer and Hemley, 1967; Barnes and Czamanske, 1967), only minuscule amounts of H_2 will be formed (Eugster and Skippen, 1967). In particular, if carbon is present in the system, then under reducing conditions methane generally will be an enormously more important constituent than H_2 gas and, as shown on Figure 3, the H_2O-CH_4 fractionation is never larger than 70 per mil. To produce a +20 per mil change in the H_2O analogous to the example given above would require that 30 percent of the H_2O in hydrothermal fluid react with carbon species to make methane. This could perhaps happen in a system containing abundant graphite (Eugster and Skippen, 1967), coal, or petroleum, but is unlikely in most hydrothermal environments.

Hydrogen isotope fractionation factors in silicate-H_2O systems have been investigated at high temperatures in only one laboratory study (Suzuoki and Epstein, 1970, 1974). Some of the results of Suzuoki and Epstein on biotite, muscovite, chlorite, serpentine, and kaolinite are incorporated into Figure 4, together with some empirical estimates of the low-temperature fractionation factors for some of these minerals based on data from natural mineral assemblages.

The most important results of the studies by Suzuoki and Epstein (1970, 1974) are that the D/H fractionations among silicates are mainly a function of the Mg, Al, and Fe contents in the minerals. Water concentrates deuterium relative to all OH-bearing silicates and Mg-rich and Al-rich minerals concentrate deuterium relative to Fe-rich minerals. This helps explain why muscovite in natural mineral assemblages is invariably richer in D than coexisting biotite, and why coexisting biotite and hornblende generally have similar δD values (they also generally have similar Mg/Fe ratios).

Above 400°C, the various silicate-H_2O D/H fractionation curves determined by Suzuoki and Epstein (1974) form subparallel lines on a plot of $1{,}000 \ln \alpha$ versus $10^6/T^2$ (Fig. 4). Below 400°C the positions of the curves are unknown, but if the low-temperature estimates of Savin and Epstein (1970a), Lawrence and Taylor (1971), and Wenner and Taylor (1973) are reasonably accurate, all the hydrogen isotope fractionation curves must flatten out, as shown on Figure 4.

If the curves shown in Figure 4 are approximately valid, it means that hydrogen isotope geothermometry on silicate minerals is virtually impossible. However, if one can independently estimate temperatures of formation (e.g., by $^{18}O/^{16}O$ geothermometry), the curves can be used to calculate accurately the δD values of coexisting H_2O. The major problem in applying these curves to natural mineral assemblages lies in whether or not the primary δD values in a mineral assemblage are preserved during later geological events. This is a more serious problem for D/H than for $^{18}O/^{16}O$, as discussed in more detail below.

Isotopic Variations in Natural Waters

Meteoric waters

The isotopic variations of H_2O in rain, snow, glacier ice, streams, lakes, rivers, and most low-temperature ground waters are extremely system-

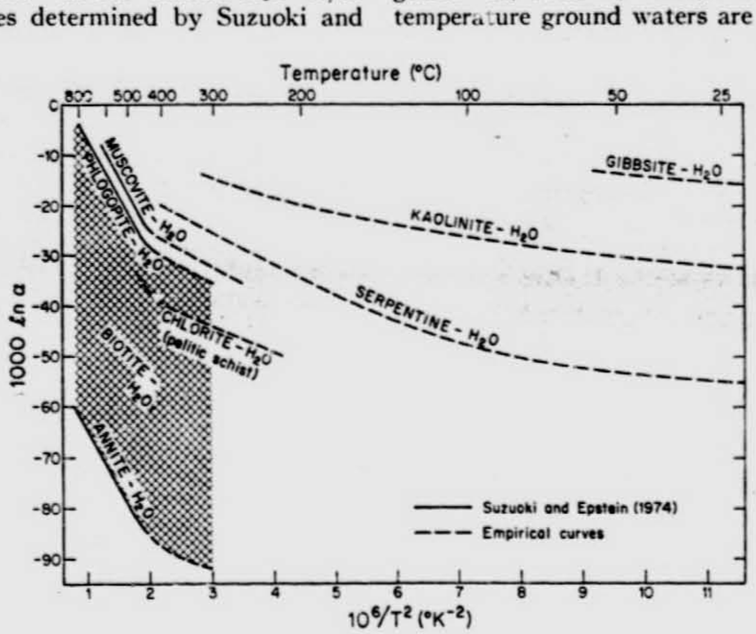

FIG. 4. Equilibrium hydrogen isotope fractionation curves for various mineral-H_2O systems. For temperatures above 400°C, the curves are based on laboratory experiments of Suzuoki and Epstein (1970, 1974). For temperatures below 400°C, the curves are based on empirical extrapolations to estimated values at earth-surface temperatures (Savin and Epstein, 1970a; Lawrence and Taylor, 1971; Wenner and Taylor, 1973) and on some preliminary laboratory experiments by Sheppard and Taylor (unpub. data, 1969) on kaolinite-H_2O at 300°C.

SAMPLE NUMBER: KM/BC-1

LOCATION: Weld Rv area

SUMMARY:

These chips are of greenschist facies aphyric or sparsely olivine+plagioclase-phyric low-Ti basaltic lavas identical to those from the lava carapace of the Cambrian ophiolites in W Tasmania except for the somewhat more abundant biotite in these chips.

HAND SPECIMEN:

These are drill chips of dark grey fine-grained metabasaltic lava.

THIN SECTION:

Three of these four chips have similar textures, but all are quite typical of the low-Ti basaltic lavas that make up much of the lava carapace of the Late Cambrian 'ophiolite' complexes in W Tasmania. They are characteristically aphyric to sparsely porphyritic, with quench textures modified by mid-greenschist facies of metamorphism. The three chips with similar textures are sparsely olivine+plagioclase-phyric lavas in which the small olivine phenocrysts have been chloritized, and the few small plagioclase phenocrysts albitized. The groundmasses of these chips are identical, being originally composed of fine-grained augite and plagioclase with intersitial glass that has altered to quartz, chlorite, tiny leucoxene globules and albite. Groundmass augite has altered to actinolite during low-grade metamorphic alteration, with minor greenish brown biotite also crystallizing with actinolite. The coarser-grained chip is mineralogically very similar to the groundmasses of the other chips, but perhaps has more biotite, and has a more subophitic texture typical of samples from further into a thick lava flow.

The presence of greenschist facies biotite in abundance in these chips relative to other Tasmanian low-Ti basaltic lavas is notable, and suggests perhaps, proximity to a granite. Although the chips are texturally unlike typical contact metamorphosed low-Ti basalts, these chips may be from the outer regions of an aureole.