

RIO ALGOM EXPLORATION INC.

DIAMOND DRILL LOG

PROPERTY: GULLBRIDGE

HOLE No.: GB-149

Collar Eastings: 500.00

Collar Northings: 6550.00

Collar Elevation: 0.00

Collar Inclination: -59.90

Grid Bearing: 85.00

Final Depth: 498.66 metres

Logged by: S.M.PUDIFIN

Date: MARCH 10, 1991

Down-hole Survey: TROPARI

FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)
0.00	13.30	ICE, POND AND OVERBURDEN							
13.30	156.05	FOLIATED RHYOLITE/BRECCIATED RHYOLITE	27450	14.79	15.29	0.50	2	20	36
			27451	55.17	55.67	0.50	4	12	34
			27452	101.91	102.41	0.50	6	16	22
			27453	110.00	110.50	0.50	7	12	36
		Light-medium grey to light greenish to pink-orange, fine-grained, sporadically parallel with up to 5% whitish feldspar phenocrysts 1-2 mm long and possibly grey quartz phenocrysts (e.g. 26.00 m, 28.00-29.00 m, 38.50-42.00 m, 66.80 m, 70.90 m, 89.36 m, 92.80-94.00 m, 94.80-103.00 m, 102.75 m, 105.90-109.18 m, 120.85 m - many parallel zones may actually be feeder dykes - note they are also generally foliated and commonly cut by quartz veins. Generally strongly foliated @ 30-45° CA average, but can be contorted (e.g. 19.85 m, 35.25 m, 66.25 m - note folded quartz veins & foliation parallel to CA, 71.35 m, 114.00 m, 114.85 m, 117.00 m parallel to CA. Foliation may parallel relict flow banding - note colour (and possibly compositional) banding. Brittle and hard, fractures cross foliation (hornfelsed). Non-magnetic. Core commonly rubbly and broken, possibly associated with faults - 33.50 m. Fault brecciation @ 34.40-36.73 m (rubbly, 4 rhyolite fragments up to 3 cm long in matrix of sericite-quartz:carbonate, upper contact sharp @ 25° CA, lower contact abrupt though blocky), 128.30 m (25 cm, light pink-orange, 4 fragments of rhyolite, frag-supported, matrix sericite-quartz). From about 79.00 m, commonly has fragmental appearance - likely autobreccia. Note possible flow "contacts" (frag boundaries?) @ 84.05 m, 87.38 m (note truncation of quartz patch), 109.18 m, 120.72 m, 125.60 m.							
		Moderate sericite:chlorite alteration, particularly in zones of strong foliation, e.g. 22.00-24.17 m, 60.80 m (35 cm), buff-pink @ 121.30 m (35 cm), with abundant ep stringers and few quartz veins. Pink-orange zones likely due to hematite alteration of feldspar; e.g. sporadically from 36.70-59.22 m (rubbly at 59.20 m - possibly faulted), 87.75 m (also carbonate, epidote, quartz veins). Early generation of light-grey to white quartz veining/patches cut by later veins/veinlets/stringers of quartz-sericite:carbonate, white quartz veins generally late, note grey veins appear early and commonly deformed (boudinaged); note pink-red Fe-carb veinlets also associated with later veins. Significant veining @:							

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						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)
		20.20-20.90 m (patchy quartz veins), 22.45-23.35 m (4 cm wide brecciation zone with sericitized rhyolite fragments in quartz matrix, quartz veins, sericite-quartz-Fe carb veins), 29.10-33.50 m (quartz veins/patches 3-4/m), 41.00-42.89 m (numerous quartz veins, 4 cm wide epidote-quartz-sericite vein, hairline sericite fracture fillings), 46 m (30 cm intense quartz veining), 51.50-53.50 m (10% quartz veins, also few narrow black chlorite veinlets and pink-orange Fe-carb veins/veinlets), 67.00 m (15 cm - note how sharp quartz veining contacts with foliated rhyolite @ 30° CA, quartz veins all at angles to this contact - also possibly spotted on upper contact), 72.00-73.10 m (abundant quartz veining all at steep angles to CA, note that this zone of quartz veining in sharp contact with foliated rhyolite @ 30° CA), 81.55-83.00 m, 90.66-94.68 m (15% white qz veins mainly at high angles to CA, also epidote fracture fillings), 100.50-104.35 m (10% quartz veins and Fe-carb, epidote veinlets/stringers), 119.10 m (30 cm of white quartz veins at high angles to CA), 122.70-130.85 m (few quartz-Fe carbonate-chlorite veins, numerous sericite-epidote stringers, note patchy pink-orange alteration of feldspar).							
		131.43-136.10 m: homogeneous brownish-pink rhyolite; weak foliation defined by lighter pink bands @ 50° CA; intensely fractured (brittle) from 134.00 m (rubble to pieces of core 10 cm long); hairline calcite coated fractures.							
		136.10-145.00 m: brownish grey, purplish green with pink to salmon-colour; sheared (some sections show weak foliation, i.e. 31° CA @ 137.70 m and 55° CA @ 140.60 m), brecciated rhyolite cut by numerous folded quartz veins as well as yellowish quartz-calcite-clay veinlets and quartz-calcite-epidote veinlets; core breakage; rubble to 30 cm.							
		141.50-156.06 m: brecciated pinkish rhyolite with local sericite and some chlorite along fracture surfaces particularly from 145.65-148.80 m where core is rubbly due to faulting. Numerous quartz veins; fractures commonly coated with clay-carbonate gouge.							
		Very minor finely disseminated pyrite.							

156.05 204.60 CHERT/MAFIC VOLCANIC WITH MAFIC TUFF/CHERT ARGILLITE

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS				
						WIDE	Cu (ppm)	Pb (ppm)	Zn (ppm)	Ba (ppm)
		- medium-dark grey-green with minor maroon or lighter grey cherty beds. - very fine-grained to amorphous chert beds; fine-grained mafic volcanic intervals. - mafic volcanics are generally massive to weakly foliated but crosscut by numerous planar calcite veins (1-4%) 50-55° CA; and irregular quartz-calcite-epidote veins (0.5%), some which also have reddish garnet associated with them; minor reddish hematitic carbonate stain on fracture surfaces. - non-magnetic overall, but commonly hosts discontinuous massive magnetite lenses or stringers; negligible sulphides. - foliation is seen mainly in some cherts or cherty argillites @ 60-65° CA. - core breakage: 5 cm to 100 cm; average = 20 cm - strongly fractured from 170.76-171.60 m. - several irregular zones of greyish-green or maroon coloured chert and/or mafic tuffs are also present within the mafic volcanic unit and are described as follows: 156.05-160.00 m: mainly argillaceous sediments/ chloritic tuff, locally brecciated & sealed with calcite and quartz-calcite-epidote veinlets as well as finely laminated grey and maroon cherts (1 mm beds) which occur @ 156.36-156.52 m; 159.43-159.63 m; 157.99-158.09 m; 159.95-160.00 m. Note: 158.90-159.95 m: mafic volcanic; fractured upper contact and subtle foliation @ ~ 40° CA near upper contact. 160.00-167.12 m: mafic volcanic - intensely fractured with ~ 8-10% irregular and planar calcite veins and discontinuous stringers; pinkish alteration often staining carbonate; epidote/calcite veinlets common; intense light green bleaching from epidotization @ 163.90-163.30 m; lensey magnetite stringers and discontinuous veins ~ (0.5%); occasional subangular argillaceous fragments caught up in volcanic @ 166.70 m; calcite vesicles ~ 1 mm near upper contact. - irregular wavy contact with underlying cherty sediments @ ~ 40° CA. 167.12-168.00 m: strongly fractured buff - light grey cherty sediments; laminated and locally finely crenulated; cut by white quartz veinlets 2-5 mm wide; sericite-chlorite veinlets and quartz-epidote/calcite veinlets; some chlorite-calcite veinlets are ptygmatically folded along CA. - foliation @ ~ 40° CA when present.								

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			ASSAYS							
FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)	Ba (ppm)
- gradual contact into mafic unit below. 166.00-170.90 m: probably mafic volcanic but could be tuff; local irregular network of quartz-epidote-calcite veins; fractured lower contact zone. 170.80-171.60 m: light grey laminated, cherty; strongly fractured and cut by thin quartz veinlets; thin white laminations @ 60° CA. 171.60-185.12 m: fine-grained indurated mafic volcanic; weakly porphyritic (< 1% white feldspar phenocrysts to 176.60 m); from 176.60-183.12 m, 5% calcite-epidote-quartz veins with minor reddish alteration along fractures; 183.12-183.95 m is brecciated with intense carbonatization. Note: irregular intense alteration (calcite-epidote:hematite) @ 171.90-172.00 m; also hosts irregular angular fragment = 3-4 cm of mafic tuff? Lower contact sharp, planar @ 35° CA. 185.12-189.45 m: cherty units with mafic volcanic or argillaceous massive fine-grained sediments/tuffs, i.e. 185.12-186.12 m - laminated grey chert with < 10% fine-grained mafic (chl-ser) tuffs; lower contact @ 35° CA. 186.12-186.90 m - mafic tuff - fairly massive though weak foliation @ 25° CA near lower contact. 186.90-187.63 m: grey to buff-pinkish coloured chert or cherty rhyolite; intensely fractured (hairline thickness; irregular network of quartz-calcite; calcite-epidote veinlets); very irregular wavy contact with block of mafic tuffs (?) from 187.08-187.28 m and @ lower contact. 187.63-204.60 m: mafic volcanic. - upper 1.5 m is soft and looks finely granular (could be tuff or sediment but no distinct fabric); 2-3% irregular discontinuous calcite, calcite-epidote-quartz stringers; buff-pink cherty fragments @ 188.10-188.28 m and irregularly shaped lensoidal fragments 2x8 cm @ 188.45 m and @ 188.78 m and 189.37-189.45 m. - lower contact sharp @ 45° CA.										
204.60	277.20	CHERT, ARGILLACEOUS SEDIMENTS, TUFFS WITH MINOR MAFIC VOLCANICS	27495	206.25	207.36	1.11	44	16	44	290
			27496	211.32	213.00	1.68	15	48	62	650

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)
		Mixed package of rocks - interbedded fine-grained-aphanitic laminated argillaceous cherts (= 5%) often cut by thin planar and discontinuous quartz veinlets or calcite veinlets of calcite-epidote veinlets; some cherty intervals are dark grey to purple.	27498	230.00	231.60	1.60	2	8	20
			27499	246.15	248.41	2.26	23	16	38
			27500	248.41	249.65	1.24	22	26	134
			27901	265.75	266.87	1.12	155	130	442
			27902	270.22	271.90	1.68	63	20	54
		Mottled light grey aphanitic-amorphous cherty rhyolite, occasionally with pink colouration; often highly fractured; thin veinlets of quartz; quartz-calcite-epidote; hematitic calcite; pyrite-sericite filled fractures; occasional local magnetism.							
		Light greenish-grey quartz-sericite schistose ash tuffs; non-magnetic.							
		- greenish-grey to medium-grey fine-grained-medium-grained light tuffs commonly host quartz eyes and cherty fragments (1-3 mm); non-magnetic.							
		- medium-dark grey fine-grained sheared argillaceous or siliceous sediments; often strongly contorted with fine siliceous fragments or quartz veins strongly deformed; non-magnetic.							
		- altered medium-dark green, very fine-grained to locally porphyritic (amphiboles) mafic volcanic; common lighter coloured chlorite and epidote alteration; weakly foliated or massive intervals; some intervals are vesicular with rounded calcite-quartz filled amygdulites; minor trace fine-grained pyrite; locally weakly magnetic.							
		Foliation varies significantly and will be described within separate intervals.							
		Core breakage = 2 cm to 80 cm; = 10-15 cm on average; several rubbly faulted zones:							
		211.76-212.25 m - strong brittle fracturing in argillaceous chert; 25-90° CA.							
		217.80-218.16 m - cherty ash tuffs - fracturing with minor calcite rich gouge @ 5° CA.							
		219.00-219.10 m - as above @ 30° CA.							
		220.31-220.98 m - irregularly fractured @ = 50° CA with brecciation-calcite-clay gouge.							
		225.80; 225.38 m - @ = 60° CA							

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)
		227.48-227.53 m - brittle fracturing @ high angle to CA. 231.00-232.00 m - intense brecciation sealed with clay-quartz-calcite gouge; loss of ~ 60 cm core; main fault @ 231.60-231.80 m. 253.60 m; 254.00 m; 254.51 m - fracturing @ 30-50° CA.							
		204.60-207.36 m: fractured cherty rhyolite and dark grey-purplish chert with massive mafic volcanic (tuff?): 204.60-205.00 m - fractured cherty rhyolite; lower contact @ 30° CA. 205.00-205.56 m - purplish epidote-veined with minor cubic py chert; lower contact @ 35° CA. 205.56-206.25 m - fine-grained mafic volcanic; lower contact @ 50° CA. 206.25-207.36 m - cherty moderately brecciated unit with local strong magnetite and up to 0.5% fine-grained-medium-grained cubic pyrite associated with quartz flooded domains.							
		207.36-209.08 m: mafic volcanic; weakly magnetic with 1% quartz-calcite-epidote veinlets; lower contact @ 60° CA.							
		209.08-211.32 m: cherty argillite (10%) quartz-sericite ash tuff which becomes slightly coarser-grained from 211.00-211.32 m; chert and ash tuff are laminated @ 40-45° CA, minor quartz flooding; lower contact with maroon cherty argillites @ 53° CA.							
		211.32-213.00 m: maroon cherty argillite (95%) with ~ 5% light-grey sericitic sediments; finely laminated @ 60-65° CA; strongly fractured with network of ~ 5% planar - anastomosing quartz & quartz-calcite veinlets; moderate local magnetite. Lower contact @ 65° CA.							
		213.00-216.69 m: cherty grey rhyolite (45%) and quartz-sericite schistose ash tuff (55%). Rhyolite is silica-flooded and strongly veined with thin quartz-epidote-calcite veinlets; salmon coloured quartz veinlets; tuff is strongly foliated @ ~ 36° CA; lower contact @ 40° CA.							
		216.69-220.00 m: ~ 25% maroon cherty argillite; 25% lithic tuff; 50% ash tuff: foliation @ 217.35 m = 25° CA; 218.45 m = 28° CA; 220.00 m = lower contact @ 11° CA; note - strong calcite-quartz veining, local brecciation between quartz eye tuff and cherty argillite @ 219.44 m.							

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						Wt%	Cu (ppm)	Pb (ppm)	Zn (ppm)
		220.00-231.94 m: mafic tuffs and argillaceous sediments with minor maroon cherty argillite fragments @ 223.75-224.05 m (upper contact @ 40° CA; lower @ 35° CA) and 230.93-231.06 m; strong fracturing due to fault @ ~ 220.50 m and @ 231.60 m; local brecciation common. 223.26-223.75 m - strong epidote veining. 224.05-229.70 m - fine-grained argillaceous sediments which are homogeneous and almost massive-looking except near lowermost 10 cm, where quartz-epidote veins are pygmatically folded; weak local magnetite. 229.70-230.00 m - strong quartz flooding causing local brecciation. 230.00-231.55 m - contorted deformed argillaceous sediments; minor fine-grained pyrite along fractures. 231.55-231.94 m - breccia-felsic fragment (2-4 mm) supported in quartz-clay-calcite matrix.							
		231.94-243.16 m: mafic volcanic: - mottled brown and lighter green; fine-grained with diffuse quartz-calcite-epidote blebs/patches (1%) and veins; fairly massive though weak foliation @ 45° CA @ 235.60 m to ~ 238.00 m; trace fine-grained pyrite. - gradual lower contact defined by discontinuous calcite veins @ 55° CA.							
		243.16-244.16 m: altered foliated mafic volcanic or greywacke?: granular; 0.5% fine-grained disseminated pyrite foliation @ ~ 30° CA; interfingering contact with rhyolite which is foliated ~ 45° CA.							
		244.16-249.65 m: light grey rhyolite; fine-grained with anastomosing network of dark grey commonly pyritized fractures; sericite and/or calcite fractures also common; biotitic, pyritiferous inclusion (irregular contact as infilled fractures) 248.63-249.10 m. - non-magnetic. - lower contact sharp @ 55° CA.							
		249.65-253.47 m: sheared argillaceous sediment/lapilli tuff; dark grey, very fine-grained matrix with felsic elongated lapilli; 6 cm x 0.5 cm to < 1 mm to very fine-grained tuff hosting no visible lapilli; strong deformation; coarser lapilli stretched and folded; ~ 5% thin quartz veins are strongly							

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						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)
		contorted; local minor magnetism. Foliation is highly variable: 249.80 m = 35° CA; 249.95 m = parallel to CA; 250.10 m = "dome and basin; could be hinge zone; 252.00 m = 15° CA; 252.70 m = 20° CA; 253.00 m = "dome and basin". Lower contact @ 30° CA.							
		253.47-257.79 m: interbedded maroon cherty argillite & grey massive cherty rhyolitic tuffs: local strong magnetite; foliation highly variable; @ 254.90 m foliation = 40° CA; 256.20 m = 0° CA; 256.96 m = 60° CA; strong quartz and quartz- calcite/epidote veins define brittle deformation; lower contact parallels foliation @ = 20° CA.							
		247.79-258.40 m: highly vesicular MAFIC DYKE(?) VOLCANIC: brownish grey with ~ 10 % subrounded white quartz; calcite filled vesicles; trace fine-grained pyrite; non- magnetic; irregular lower contact @ = 40° CA; local brecciation of ~ 1-2 cm.							
		258.40-277.20 m: mainly cherty rhyolite with pyritiferous fractures and argillaceous chert as well as minor biotitic sediments. Greywacke? due to brown colour and grainy fabric: seen @ 264.17-264.75 m (upper contact @ 30°; lower contact @ 20°), and from 265.75-266.87 m (upper contact @ 28°; lower irregular contact = 98° CA; 2-3 mm dark grey cordierite porphyroblasts @ contacts.							
		Mafic volcanics from 271.90-273.70 m (irregular upper contact almost subparallel to CA; lower contact is also irregular; @ = 15° CA with local brecciation of lower rhyolitic unit.							
		274.53-275.10 m: vesicular mafic volcanic; localized interval of ~ 15% subrounded stretched quartz- calcite/epidote vesicles @ = 15° CA; minor disseminated pyrite; irregular upper (@ = 30° CA) and lower contact (@ = 50° CA).							
		Remainder of interval shows variable foliation: 258.00- 260.00 m = parallel to foliation with "dome & basin" pattern @ = 259.20 m; @ 259.20-260.19 m, two fabric directions obvious; earlier foliation @ = 10° CA is offset by later cross- cutting fabric @ 15° CA; @ 163.30 = 40° CA; 275.90 m = 30° CA; 276.60 m = 40° CA. Lowermost contact brittly fractured ~ 40° or 50° CA.							

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu (ppm)	Pb (ppm)	Zn (ppm)	Ba (ppm)
277.20	293.20	MAFIC VOLCANIC (Tuffaceous at base of interval.) - Dark green very fine-grained - medium-fine-grained. - fairly massive homogeneous core exhibiting weak foliation locally: 278.50-279.00 m - shows a stretching of quartz-calcite vesicles @ = parallel to CA. 279.80-280.00 m - shearing with numerous calcite veinlets @ = 20° CA; subtle alignment of amphiboles @ 35-40° CA from = 281.00-287.00 m. 290.74-290.90 m - small shear @ 50° CA with minor chlorite-calcite-clay gouge. 291.05-293.20 m - sheared @ 30-40° CA. Rock is mainly composed of amphibole and feldspar; upper part to = 279.50 m is intensely carbonatized with subrounded stretched vesicles of quartz-calcite (= 3-5% ; 1 mm-2 mm) in fine-grained groundmass; = 1% calcite-quartz-epidote with some hosting brownish garnet veins and veinlets (1 mm to 2 cm (vuggy) occur @ 10° CA to 40° CA; minor very fine-grained pyrite in some calcite-quartz-epidote veinlets as well as disseminated trace pyrite in groundmass; minor reddish alteration of calcite, weak local magnetism. 290.74-293.20 m: mafic tuff showing well developed foliation and hosting diffuse felsic irregular stretched buff coloured siliceous waxy fragments = 1-2 m x 1.5 cm; up to 0.5% disseminated py along foliation as well as minor traces of brownish red sphalerite to 0.25% - minor chlorite and trace sericite. Lower contact @ 40° CA.	27903	291.70	293.20	1.50	455	250	1930	160
293.20	298.75	CHESTY RHYOLITE Light grey; amorphous to very fine-grained. Strongly fractured with pyritiferous fracture-filling locally variable foliation when laminations are present: 40° @ 293.30 m; 0° @ 294.20 m, near dome & basin; 15° @ 295.00 m, 295.55-296.00 m = 30° CA; 40° CA @ 298.55 m.	27904 27905	293.20 294.20	294.20 296.20	1.00 2.00	1055 253	28 8	406 48	150 210

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTH	Cu (ppm)	Pb (ppm)	In (ppm)

Rock is mainly composed of amorphous cherty silica with minor sericite or calcite or quartz along fractures; fractures variable and sometimes parallel foliation filled with very fine-grained pyrite comprises ~ 5-8% of interval.

293.48-293.62 m: brownish siliceous block hosting ~ 10-15% very fine-grained granular pyrite.

- non-magnetic.
- fairly competent; fractured core @ 297.70 m @ 12' CA.
- lower contact @ 50' CA.

298.75	331.12	SHEARED PELVIC VOLCANIC TUFFS (QUARTZ-SERICITE SCHIST) & CRYSTAL TUFFS	27986	310.00	311.50	1.50	7	4	32	1050
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Light grey, with darker slightly grey laminations or spots interbedded with more massive quartz eye crystal tuff. Usually very schistose with local cordierite spots which are dark grey or buff coloured and often rimmed by chlorite.

Composition: - mainly quartz and sericite with minor local chlorite along foliation planes; fractured zones have quartz-sericite-clay gouge, i.e. 301.62-302.75 m @ 45' CA; 306.60-306.65 m @ 50' CA; 307.60-307.80 m @ 60' CA; 308.00-308.16 m - rubble @ 18' CA, 309.68 m = 0' dome & basin; 311.30 m = 0' CA; 314.65-315.10 m - variable fractured core; 321.00 m = 30' CA, 323.90 m = quartz v. flooding & fractured @ 40' CA; 326.40 m = 42'; 330.25 m = 50' CA.

Cordierite spots range from 2 mm to 5 mm and occur in trace amounts to ~ generally ~ 10% (increasing to 20-25% from 318.82-319.10 m) - ghost-like cordierite in tuff from ~ 321.70-331.12 m (~ 0-3%). Minor folded & planar quartz veins & calcite occur at high angle to CA; quartz veins 1-2 mm wide comprise ~ 1-2% of core; from 321.50-331.12 m (gradual upper contact) granular appearance with brownish colouration in groundmass due to biotite?? (none seen); looks like greywacke/lapilli tuff with up to 8% quartz eyes (< 0.5 mm to 1.5 mm) - here foliation is not distinct.

- non magnetic.
- trace very fine-grained pyrite disseminated locally.

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FROM	TO		SAMPLE No.	FROM	TO	WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)	Ba (ppm)
		319.34-320.85 m: MAFIC VOLCANIC DYKE. Dark green, very fine-grained with ~ 20-25 cm siliceous cherty upper contact 60° CA and lower contact 35° CA, quartz flooding @ lower contact.								
		328.58-329.05 m: very fine-grained chloritic-sericitic block; upper contact @ ~ 40° CA and lower contact irregular @ ~ 55° CA. Lowermost contact with mafic volcanics @ 45° CA.								
331.12	339.58	MAFIC VOLCANIC								
		Massive, medium-grained dark green as described 277.28-293.20 m but not altered; looks almost intrusive with interlocking crystals. Weak foliation only seen @ upper contact zone and in sheared area; i.e. foliated @ 331.80-332.40 m @ 30-50° CA. Shear with chlorite-sericite-clay gouge @ 333.10 m @ 22° CA. Lower contact sharp @ 50° CA.								
339.58	414.70	INTERBEDDED MAFIC VOLCANICS WITH FELSIC CRYSTAL (FELDSPAR-QUARTZ EYE) TUFFS	27907	356.50	358.00	1.50	2	4	178	230
			27908	370.00	371.50	1.50	11	4	132	200
			27909	373.50	374.50	1.00	241	2	7660	230
		Mafic volcanics are dark greyish-green; massive; homogeneous; generally fine-grained and weakly porphyritic (amphiboles, < 1 mm); commonly hosts calcite veinlets and quartz:calcite veins usually ~ 3%; minor local epidote occurs with calcite; quartz veins; minor epidote:clay alteration along some fracture surfaces where there's been local shearing; quartz crystals along vuggy vein @ 350.40 m; not magnetic; minor local fine-grained disseminated pyrite.	27910	374.50	376.10	1.60	536	418	6660	70
			27911	376.10	377.60	1.50	9	14	146	530
			27912	385.30	386.80	1.50	940	70	4000	110
			27913	391.64	393.25	1.61	245	12	452	330
			27914	393.25	395.00	1.75	531	14	228	510
			27915	395.00	396.85	1.85	222	166	1525	300
			27916	410.30	412.10	1.80	321	106	240	280
		Felsic tuffs are generally light grey with 5-15% quartz eyes and broken quartz crystals as well as minor feldspar crystals in a siliceous groundmass; sericite is a common alteration mineral and occurs along foliation planes; some sections are strongly sheared and are quartz-sericite schists which locally host ghost-like darker grey cordierite porphyroblasts (2-4 mm); very minor (< 1% quartz veins (folded and planar) occur in the felsic tuffs; note from 353.10-364.00 m - ~ 15% quartz and quartz-calcite veins and flooding with local fine-grained biotite.								
		- non-magnetic.								
		- variable very fine-grained disseminated pyrite.								

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DIAMOND DRILL LOG

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						MDTA	Cu (ppm)	Pb (ppm)	Zn (ppm)
		- local brecciated intervals such as 370.90-371.40 m host semi-massive fine-grained accumulations of pyrite in fractures. - semi-massive reddish sph occurs in quartz:calcite vein @ 373.70-373.90 m with disseminated pyrite. - honey-coloured sphalerite with minor galena and granular fine-grained pyrite also fills quartz-calcite vein from 375.00-376.10 m.							
		339.58-342.60 m: fine-grained felsic crystal tuff with mafic volcanics from 340.88-340.42 m (upper contact @ 35° CA parallel foliation and lower contact @ 45° CA).							
		342.60-352.12 m: mafic volcanic: massive; locally crystalline; lower contact parallel foliation @ 46° CA.							
		352.12-354.88 m: fine-grained felsic tuff: local cordierite (= 5%) from 353.50-354.40 m. Lower contact @ 40° CA.							
		354.88-356.00 m: mafic volcanic: fine-grained with weakly developed foliation @ 40° CA - minor very fine-grained biotite; grades over 1 cm into crystal tuff; contact @ 40° CA.							
		356.00-371.61 m: crystal tuff: laminated, strongly foliated to 361.50 m with 3% ghost-like cordierite spots, pygmaic quartz veins from 356.10-356.45 m.							
		- quartz flooding from 363.10-364.00 m (80°-50° CA). - irregular pyritiferous vein from 370.90-371.40 m. - lower contact @ 30° CA.							
		371.61-376.10 m: greywacke/mafic volcanic derived tuff; fine-grained chlorite-sericite-plagioclase?/biotite groundmass with amphibole crystals (< 1 mm to 3 mm) (= 2%) and minor quartz epidote spherules; semi-massive sphalerite with disseminated pyrite in quartz vein from 373.70-373.90 m. Strong brecciation @ 15-50° CA with network of quartz:calcite veining which hosts 0.5% local sphalerite and 1% fine-grained pyrite with minor galena; chlorite-sericite also coats fractures; unclear contact @ 40° CA.							
		376.10-379.10 m: cordierite spotted crystal tuff (as described @ 356.00-371.61 m): minor very fine-grained disseminated pyrite; strongly sericitic with weak foliation @ 40° CA; lower contact is sheared with pink calcite gouge @ 25° CA.							

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)
		379.10-391.64 m: mafic volcanic: fine-grained with strong (~ 8%) quartz:calcite-epidote patches and veinlets - some with minor garnet & diopside lining fractures; 388.70-388.95 m - local brecciation due to quartz-calcite-epidote vein @ 40° CA. - localized minor fine-grained biotite; poorly developed foliation. - localized veinlets and disseminated pyrite from 385.30-386.80 m; local very weak magnetite; lower contact @ 70° CA. 391.64-401.84 m: felsic volcanic and minor argillaceous sediments: felsic units are quartz-rich with variable sericite and commonly host fine-grained disseminated pyrite and localized fine-grained and blebby cp, minor sph occurs with disseminated foliation parallel pyrite in biotite-chlorite sediments; interbedded argillaceous sediments are locally porphyroblastic and host wavy discontinuous ptygmatically folded quartz veins (~ 5%). Foliation ~ 45° CA @ 393.10 m; 50° CA @ 397.10 m; local shear @ 398.08 m = @ 60° CA. At 401.72-491.84 m - FELSIC RHYOLITIC DYKE; contacts @ ~ 90° CA. 401.84-414.70 m: mafic volcanic? & biotitic sediment: - brownish-green to dark green; very fine-grained to granular biotitic in upper ~ 3 m; homogeneous-looking rock; well developed foliation @ ~ 42° CA to ~ 405.05 m grading into more massive mafic volcanic-looking rock which appears to be somewhat siliceous with amphibole & plag and local domains which are brownish coloured; calcite-quartz:epidote:garnet veinlets comprise ~ 2-3% of interval on average except from ~ 407.15-412.40 m where core is injected with anastomosing quartz veins: calcite (20% of interval). - veins vary from hairline thicknesses to scaled breccia zones such as: 407.70-408.05 m; 411.60-412.40 m. - fracture planes commonly host sericite; 5% cordierite present from ~ 411.06-411.60 m. - core breakage is ~ 10-50 cm, generally. - non-magnetic. - up to 1% fine-grained disseminated pyrite or stringers of semi-massive granular pyrite present locally. - note: 413.47-414.20 m hosts a felsic volcanic interval which has a sharp upper contact @ 60° CA, but seems to grade into lower contact.							

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTH	Cu (ppm)	Pb (ppm)	Zn (ppm)

- lowermost contact is @ 60' CA.

414.70 442.57 ALTERED MAFIC VOLCANIC - DIABASE DYKE (FAULT ZONE)

- Fine-very fine-grained dark green; to medium-grained dark grey-green (central part and lower part exhibits "salt and pepper" texture.

- unfoliated massive core and generally competent 10-12 cm breakage except @ 415.60-415.95 m where core is rubble due to shear @ 38° CA; several strongly sheared rubble zones present @: 418.60-418.85 m; 423.85-424.75 m (poor recovery ~ 50%); 427.60-428.05 m; 428.90-429.00 m; 434.80-435.56 m; 436.51-437.09 m; 438.43-442.57 m.

- blocks of felsic volcanic present: 10 cm wide in rubble zone from 415.70-415.80 m, also from 418.37-418.58 m.

Upper part of hole to ~ 421.30 m is fine-grained and commonly hosts irregular patches quartz:calcite and light salmon coloured carbonate; minor epidote also occurs in calcite-quartz fractures.

From ~ 421.30 m, core is slightly coarser with amphiboles (to ~ 1 mm); core is massive but strongly altered due to brecciation; fracture surfaces are commonly coated with chlorite-sericite and clay gouge, often with carbonate; thin quartz-calcite-epidote veinlets present locally.

Local moderate-weak magnetism, but generally non-magnetic.
- negligible mineralization except trace fine-grained disseminated pyrite.

(This is probably the "Gullbridge" fault which was intersected in GB-147.

Lower contact @ 30° CA.

442.57 447.95 INTERBEDDED FELSIC VOLCANICS/TUFFS AND ALTERED (CHLORITIC-SERICITIC) MAFIC? VOLCANICS

27917	442.57	443.79	1.22	43	12	78	30
27918	447.50	448.00	0.50	65	2480	1905	160
27919	448.30	448.80	0.50	94	216	280	20

Light grey - fine-grained or mottled, with minor brownish sections and fine-grained dark green intervals.
Locally moderately well developed foliation but often

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS			
						WIDTR	Cu (ppm)	Pb (ppm)	Zn (ppm)
		brecciated.							
		Gouge fault zones @ 463.00-463.70 m.							
		Local weak magnetism occurs in more chloritic sections though generally non-magnetic.							
		Fine-grained disseminated pyrite accumulation, very local up to 1% as disseminations with patches of quartz and/or calcite in both felsic siliceous intervals and mafic volcanics.							
		Core breakage = 5-12 cm on average though as high as 25-30 cm.							
		442.57-443.79 m: felsic volcanic: quartz rich, weakly brecciated sealed with silica-sericite:chlorite; up to 1% fine-grained clusters pyrite; 1% quartz veins (folded, 2 mm). Lower contact @ 40° CA.							
		443.79-447.50 m: mafic volcanic: dark grey; moderate to strong (dark chlorite; wormy felsic material to 444.30 m; 1% quartz:calcite veins; quite fractured from 444.90-445.15 m; sericite also commonly coats fracture planes with chlorite; trace to < 0.5% local disseminated pyrite. Lower contact @ 45° CA.							
		447.50-452.10 m: felsic volcanic with minor mafic volcanic: siliceous felsic volcanic is moderately brecciated quartz chlorite-sericite seal from 447.62-447.92 m (foliation/shearing @ = 45-50° CA) up to 1% localized accumulations of fine-grained pyrite.							
		- fractured chloritic mafic volcanics @ 448.00-448.30 m; 448.80-449.00 m; 449.21-449.90 m; = 2% quartz-calcite veinlets; from 451.00-451.70 m, brownish colouration, but no biotite-siliceous rock with very fine-grained pyrite traces. Lower contact @ 45° CA.							
		452.10-467.95 m: mafic volcanic: fine-grained; strongly chloritic with = 5% quartz and quartz-calcite:epidote:garnet patches and discontinuous veins.							
		- minor fine-grained disseminated pyrite accumulations.							
		- foliation poorly defined but @ 460.50 m it is = 60° CA; rock becomes highly schistose and develops "crackle"-type thin quartz-calcite veinlets towards bottom of interval which is sheared.							

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS	Cu (ppm)	Pb (ppm)	Zn (ppm)	Ba (ppm)
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- gouge present over ≈ 1 cm from 463.00-467.95 m; 463 m = 70° CA; 465.57-466.00 m = significant gouge and strongly foliated core @ 70° CA. Lower contact into more competent rock @ 88-90° CA.

467.95 481.15 FELSIC TUFFS (CRYSTAL-QUARTZ EYE) TO ASH TUFFS

Light grey, medium-grained to fine-grained; almost aphanitic towards bottom of interval.

- "grainy", massive, yet exhibits distinct foliation @ 70°.
- rock is composed mainly of siliceous groundmass with quartz eyes (0.5 mm to $\approx 1-2$ mm).
- fine-grained to aphanitic rhyolite? in the crystal tuffs @: 472.35-472.40 m; 475.21-475.22 m (siltstone fragment?); 475.74-475.79 m; 475.80-475.88 m; these occur parallel to foliation.

From $\approx 476.00-481.15$ m: unit is laminated ash tuff; minor sericite occurs along foliation planes; disseminated fine-grained pyrite occurs in minor amounts.

481.15-482.00 m: brown colouration; and lighter grey; minor cordierite very siliceous with (0.5% fine-grained pyrite disseminated along later fractures. Lower contact not very clear, but probably @ 85° CA.

482.00 497.40 FINE-GRAINED MAFIC VOLCANIC

27920	481.15	482.00	0.85	169	470	566	320
27921	497.40	498.35	0.95	79	62	830	120

Probably dyke.

Dark green to brownish green mottled patches; fine-grained to very fine-grained; non-foliated. Rock is quite massive with $\approx 1\%$ quartz-calcite:epidote:garnet veinlets except from 488.00-490.00 m where $\approx 10-12\%$ of core is cut by quartz-calcite and quartz-calcite-epidote-garnet patches and veins generally along CA.

Some sections around 490.00 m and 491.70-494.00 m look like they could be chilled contact zones of late mafic dykes.

Lower contact not very distinct @ $\approx 90^\circ$ CA.

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS
						WIDTH Cu (ppm) Pb (ppm) Zn (ppm) Ba (ppm)

497.40	498.66	PELSIC TUFF (ASH)				
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Medium grey to dark grey very fine-grained aphanitic.
- foliated into 'S' type fold; upper contact with mafic dyke
hosts discontinuous fine-grained honey-coloured sphalerite and
• 0.5% pyrite over 10 cm; unit is very siliceous with minor
cordierite spotting.

498.66 EOB

Tropari Tests (corrected):

98.15 m -58° dip
234.70 m -55° dip; 111° Az
337.11 m -51° dip; 114° Az
494.09 m -48° dip; 119° Az

DOWN-HOLE SURVEY DATA

DEPTH	INCLINATION	BEARING
234.70	-55.00	91.00
337.11	-51.00	94.00
494.09	-48.00	99.00
498.66	-48.00	99.00

PROJECT: ALBERT'S APH - GULLBRIDGESampled by: Sam Pod. fin

SAMPLE NUMBER	SAMPLE INTERVAL ^(m)			Cu ppm	Pb ppm	Zn ppm	Ba ppm	SULPHIDES	DESCRIPTION
	FROM	TO	LENGTH						
27450	14.79	15.29	0.50	2	20	36	1120	- none	- medium grey, well foliated rhyolite; minor qtz veins
27451	55.17	55.67	0.50	4	12	34	860	- none	- light grey - pinkish orange foliated rhyolite; fine veins
27452	101.91	102.41	0.50	6	16	22	620	- none	- foliated rhyolite; 2-5-3.7 late qtz veins
27453	110.08	110.58	0.50	7	12	36	1010	- minor ep	- very clean, medium grey, foliated rhyolite; fracture-fill ep
27495	26.25	27.36	1.11	44	16	44	290	- 0.5% local py	- fractured cherty rhyolite; string nit; qtz flooding
27496	21.32	213.00	1.68	15	48	62	650	- none	- red cherty argillite with minor calcite and qtz inlets
27497	230.00	231.60	1.60	49	56	54	1020	- minor f.gr. py	- deformed qtz veins in argillaceous sch., minor chert. py
27498	244.15	246.15	2.00	2	8	20	190	- 0.5% f.gr. py	- light grey rhyolite with network of fracture-controlled py
27499	246.15	248.41	2.26	23	16	38	200	- 1% py	- as above with finely disseminated fracture-controlled py
27500	248.41	249.65	1.24	22	26	134	250	- 1-2% py	- 1-2% finely disseminated f.gr. fracture controlled py; py in biotite inclusion
27901	265.75	266.87	1.12	155	130	442	1060	- tr - 0.5% py	- tr - 0.5% disseminated py in greywacke
27902	270.22	271.90	1.72	63	20	54	180	- v.f.gr. py - 0.5%	- fractured cherty rhyolite with py-rich fractures
27903	291.70	293.20	1.50	455	250	1930	160	- 0.5% py; 0.25% sph	- mafic tuff with minor py + sph along foliation
27904	293.20	294.20	1.00	1055	28	406	150	- 8% v.f.gr. py	- cherty rhyolite with v.f.gr. py, including 14cm block w 20% py
27905	294.20	296.20	2.00	253	8	48	210	- 5% v.f.gr. py	- cherty rhyolite with 5% v.f.gr. fracture-controlled py
27906	310.00	311.50	1.50	7	4	32	1050	- none visible	- qtz-sericite schist with 5-8% cordierite
27907	356.50	358.00	1.50	2	4	178	230	- 3-4% v.f.gr. py	- sericitic tuff peppered with v.f.gr. dissem. py
27908	370.00	371.50	1.50	11	4	132	200	- minor v.f.gr. py	- crystal tuff hosting irregular qtz ± calcite veins 1-2cm = v.f.gr. py filling

PROJECT: ROBERT'S ARIM - GULL BRIDGESampled by: Sam Budiman

SAMPLE NUMBER	SAMPLE INTERVAL			Cu ppm	Pb ppm	Zn ppm	Ba ppm	SULPHIDES	DESCRIPTION
	FROM	TO	LENGTH						
27909	373.50	374.50	1.00	241	12	7660	230	- 1% sph - 0.5% py; tr gal?	- minor blebs sph, py in irregular glz vein
27910	374.50	376.10	1.60	536	418	6660	70	- 0.5% sph - 1% py; tr gal	- brecciated glz ± carbonate network of veins with bleb sph. + f.gr. dissem py
27911	376.10	377.60	1.50	9	11	146	530	- tr py	- cordierite - spalled crystal tuff; stringy sericite; tr fgr py.
27912	385.30	386.80	1.50	940	70	4000	110	- 0.5-1% py	- mafic volcanic with localized dissem py along glz - cc - diap. stringer.
27913	391.64	393.25	1.60	245	12	452	330	- 0.5% py; minor cp	- felsic, siliceous, hyalite tuff with f.gr. dissem. py and minor discontinuous sept. blebs
27914	393.25	395.00	1.75	531	14	228	510	- 0.5% py; minor cp	- discontinuous granular py stringers with minor local cp
27915	395.00	396.85	1.85	222	166	1525	300	- 0.5% py; minor sph	- biotitic ± chl sediment with foliation parallel py and minor associated reddish sph.
27916	410.30	412.10	1.80	321	106	240	280	- 1% py; tr sph?	- felsic, silicified block with f.gr. dissem. and fract. controlled by tr sph?
27917	442.57	443.79	1.22	43	12	78	30	- ~1% py	- felsic volcanic; up to 1% f.gr. accumulations py.
27918	447.50	448.00	0.50	65	2480	1005	160	- 1% py	- felsic volcanic; 1% dissem. py.
27919	448.30	448.80	0.50	94	216	280	20	- tr to 0.5% py	- f.gr. disseminated py increased @ lower contact
27920	481.15	482.00	0.85	169	470	566	320	- 0.5% f.gr. py	- felsic tuffs; silicified; minor cordierite; py along fractures
27921	497.40	498.35	0.95	79	62	830	120	- 0.5% f.gr. py - minor sph?	- felsic ash tuff; minor cordierite
31 samples									

31 samples