

RIO ALGOM EXPLORATION INC.

DIAMOND DRILL LOG

PROPERTY: Gullbridge

HOLE No.: GB-141

Collar Eastings: 0.00

Collar Northings: 2850.00

Collar Elevation: 0.00

Grid: Main

Collar Inclination: -65.00

~~Collar~~ Bearing: 100.00

Final Depth: 467.56 metres

Logged by: S.Sears/M.H.Lenters

Date: September 4 to 18, 1990

Down-hole Survey: Tropari

Purpose: Test Gullbridge Mineralized Horizon between Mineral Point Deposit and SW Shaft Occurrence

FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
0	5.79	OVERBORER								
5.79	7.00	MAFIC METAVOLCANIC (DYKE?)								
		- medium to dark green to grey green; fine to medium-grained; massive and highly fractured; also has a weak "vuggy" appearance (i.e. open spaced fractures) - unit has a very grainy appearance in most sections - possibly saussuritized feldspar in a f.g. quartz-feldspar-mafic matrix - unit is weak to moderately magnetic - weak hematite alteration along fractures; probably weakly silicified and chloritized - 2-5% calcite quartz veinlets, thin (1-3 mm), discontinuous; few thin chloritic fractures (hairline) - trace pyrite associated with carbonate veinlets - fractured and robbly core - lower contact with rhyolite is sharp @ $\approx 15-20^\circ$ CA but the core is broken at this contact and the angle is approximated from 2 well fitted pieces of core.								
7.00	167.30	BRECCIATED AND SHEAR FOLIATED RHYOLITE AND MINOR RED CHERT								
		- the rhyolite ranges from pinkish orange to light to medium grey; the sheared rhyolite is generally light to med grey with mottled reddish patches due to hematized cordierite spots; the cherts are reddish - the unit is fine-grained except for the schistose sections where medium-grained muscovite occurs - the mineral composition for the sheared rhyolite is generally quartz and sericite and some form of altered cordierite which occurs as porphyroblasts; the cordierites occur as variably elongate crystals parallel to the local foliation - the rock is variably foliated (locally wavy foliated); the foliation ranges from an infrequent minimum of $\approx 30^\circ$ CA to a more frequent 70-75° CA with average of $\approx 50-60^\circ$ CA - locally there are a few thin (generally 5-10 cm, but locally discontinuous over 30-60 cm) reddish chert horizons within								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		the rhyolitic unit; from = 72.10-70 m there is = 5% reddish chert with the lower 50-60 cm being mostly reddish chert; the cherts are ferruginous and are non-magnetic; they occur @ = 50-75° CA and parallel the local foliation; @ 92.20 m there is an = 25-30 cm section of probable red chert fragments and thin discontinuous cherty bands parallel to the local foliation (@ = 40-50° CA); @ = 98.75-99.40 m there is = 80-90% reddish chert; the apparent thickness is due to the low (= 20-25° CA) angle to CA at which the chert occurs; this chert is also non-magnetic - there are also a few local thin cherty bands found between the zones mentioned above - the overall unit can be grossly divided into dominantly rhyolite sections (i.e. $\pm$ 80% rhyolite) or dominantly sheared rhyolite sections (i.e. $\pm$ 80% qtz-ser cordierite schist) - dominantly rhyolite sections: 7.00-39 m; 80.50-102 m; 120.5-124 m; 140-150 m - dominantly sheared rhyolite sections: 39-80.50 m; 102-120.5 m; 124-140 m; 160-157.10 m - the schist unit from = 39-80.30 m contains 10-15% cordierite porphyroblasts with local concentrations of 20-30% over 5-7 m; the cordierites are round to variably stretched parallel to the foliation; they are red in colour (very similar to the cherty horizons) and are apparently partially to complete hematized; they range in size up to 2-3 cm; where the higher concentrations of porphyroblasts occur there is generally a strong ser alt; locally within this schist there is weak chlorite alteration; - no visible sulphides in this section - the lower sheared sections contain no visible cordierite alt although there is still a strong ser alt and a very local weak chlorite alt, no visible sulphides - the intensely rubbly nature of the rhyolites makes it difficult to estimate the veining; some large pieces contain up to 20-30% qtz veins (which probably act as a cementing agent keeping rhyolite intact) and overall, there is probably 5-15% total qtz veining - veins are irregular and up to 1-2 cm wide; there is also thin (1-3 mm) minor ep veining - the sheared rhyolite contain only = 1-2% total qtz veining and very minor 1-2 mm ep veinlets - there is minor carbonate associated with some qtz veins and there are also a few thin (1-5 mm) dominantly calcite veins present throughout the unit - fault and fault gouge zones are difficult to find due to the highly brecciated and rubbly state of the core; the more								

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							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		obvious gouge zones are located within the more competent sheared sections; few gouge zone examples: 42 m (= 5 cm wide); 56.20 m (= 2 cm @ = 55° CA); 60.95 m (= 3 cm); 89.20 m (= 5-7 cm in mafic dyke?), 90.80 m (= 5 cm), 90.95 m (= 10 cm in mafic dyke?); 92 m (= 7 cm @ = 30° CA) - mafic dyke margin?) - there is no visible sulphide mineralization within the rhyolites, schists or cherts - from = 87.51-90.75 m is a very complicated zone of mixed mafic rocks, rhyolite and some minor red chert fragmented sections; the mafic rocks range from fine-grained to med-grained; the medium-grained sections appear grainy due to moderate to strong epidote alt and weak-med chlorite alt (i.e. 1-3 mm chloritic crystals (spots) in a f.g. ep-rich matrix); the contacts between the mafics and felsics are rubbly and partially obscured by strong ep:silica alt; the mafic rocks are non-magnetic and they comprise = 65-70% of the interval; the more grainy sections may be altered felsic rocks (tuffs?) - this scenario probably represents mafic dyke coming up along fault gouge zones during the actual faulting process - the lower contact is sharp and intrusive @ = 25° CA with the underlying porphyritic intrusive dyke.								
167.30	191.12	QUARTZ FELDSPAR PORPHYRITIC FELSIC DYKE								
		- medium greyish brown; the top = 20 m has a weathered appearance whereas the lower = 5 m is more fresh (gradational from weathered look to fresher look) - both the upper and lower contacts are unchilled - contains = 10-20% reddish orange to light green to whitish feldspar crystals and 1-5% (locally) qtz crystals and 1-5% chloritic blebs, all contained in a f.g. brownish felsic matrix; the feldspar crystals are subhedral to euhedral, 1-5 mm in width and generally have ragged ends (i.e. broken crystals); the qtz crystals are 1-4 mm and rounded; the chlorite blebs are possibly pseudomorphs of previous mafic minerals (either biotite, hornblende, or pyroxene); these blebs are sometimes hematite altered - the unit is massive and non-magnetic - overall, the unit is weak to locally moderately carbonate altered with the majority of the alt within the weathered section; some minor (very weak) chl and/or ep along fractures - the range in colour for the feldspar crystals probably represent different types of alteration (i.e. pinkish-reddish								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		orange - k-spar alt; light green - muscovite; whitish - relatively unaltered) - 3-5% combined ep and carb veining with local concentrations of 10-15% vein networks; the veins are generally thin (1-2 mm) and discontinuous, cutting the CA over a wide range of angles (i.e. subparallel to subvertical); ep and calcite may occur as separate veins or they may occur together in a vein - felsic fragment (greyish chert/qtz-ser schist) over 30 cm @ 184.60 m; the fragment has an irregular contact with the dyke and the contact is partially obscured due to rubbly recovered core - trace py & cpy found in assoc with the calcite veining within the lower fresher section - the core is fairly incompetent within the weathered section but quite competent in the fresher section - lower contact sharp and unchilled @ 30-35° CA.								
191.12	197.21	MAFIC METAVOLCANIC DYKE								
		- med to dark greenish grey; fine to locally med-grained (med-grained texture appears to be brought out by local ep alt); approx 5% (locally) chloritic phenocrysts; no chill margins - the unit is massive and med to locally very weakly to weakly magnetic - the unit is weakly chlorite altered (i.e. chloritic fractures) and may be weakly silicified; there is moderate ep alt around some of the ep veinlets; also a local weak carb alt; the top 10-13 cm is strongly ep alt with minor carb, qtz and rare qt - overall there is 5-7% thin (1 mm-1 cm) wispy to planar ep veinlets and network of veinlets; also 1-2% calcite and/or calcite/epidote/Qtz stringers; minor Qtz-k-spar with some ep veinlets - traces of py visible in some ep/carb veinlets - very competent core - lower contact is sharp at 75° CA with the underlying felsic dyke; there is no apparent chill margin in the mafic rock.								
197.21	200.56	QUARTZ FELDSPAR PORPHYRITIC FELSIC DYKE								
		- same as 167.30-191.12 with exception that there is slightly more ep veining resulting in a less competent fractured rock - the lower contact is weakly chilled and partially obscured								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		due to rubble core.								
209.56	213.15	INTERBEDDED CHLORITIC FELSIC FINE LAPILLI AND ASH TUFF AND GREY CHERT	200467	209.00	210.00	1.00	5	10	48	950
		- the tuffs are dark green to grey green, fine-grained, and banded and foliated ranging from $\approx 50-70^\circ$ CA with an average of $\approx 55-60^\circ$ CA; the banding is not always present, but there is always a weak to moderate foliation developed; some of the banded sections appear rhyolitic in character (i.e. 210.40 cm), whereas the rest of the unit (except for the cherts) appear to be tuffs - the chert layers (203.25-203.65 m and 204.19-204.80 m) are dominantly med to dark greyish chert but contain 10-20% tuffaceous material interbedded with the tuff - the whole unit is non-magnetic - the unit is variably chl altered ranging from weak to mod chl within the cherty sections, to slightly chl within the rhyolitic sections, to strongly chl altered in the remainder of the unit (i.e. the tuffs); the stronger chl alt gives the rock a green colour and chl is visible along all fracture; portions of the chl section which are non-banded and weakly foliated have a mafic appearance and it is possible that they are mafic dykes; minor ep alt in the wallrock around a few epidote veinlets - the unit contains $\approx 2-4\%$ planar to irregular 1-10 mm qtz veins, 1-3% 1-4 mm irregular eptcarb veinlets - there is a strong gouge @ 209.60 m over ≈ 15 cm with its extension occurring again @ ≈ 209.85 m; the first gouge appears to be @ $\approx 50-55^\circ$ CA; the gouge consists of felsic fragments in a sericitic and pyritic matrix - the tuffs contain trace to minor fine-grained disseminated py; the grey cherts contain up to 5-10% f.g. disseminated and fine banded py - overall the core is highly fractured and rubble but the chert sections and the rhyolitic sections are more competent than the remainder of the unit - the lower contact is sharp @ $\approx 75^\circ$ CA but may be gradational; possibly represents an alteration contact with the underlying quartz-sericite schist.								
213.15	225.10	INTERBEDDED QUARTZ SERICITE SCHIST (FELSIC TUFFS) AND GREY CHERT	200468	217.93	218.93	1.00	82	36	132	1140

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		- the schistose intervals (213.15-215.62 m, 216.47-217.33 m and 217.78-225.10 m) are med grey to green grey, fine-grained with 1-3 mm wide blue qtz eyes which are most prominent within the last 2 m; the schistosity is planar at $\approx 50-60^\circ$ CA; the bedding contact between the tuffs and cherts ranges from $\approx 60-80^\circ$ CA; the upper schistose tuffs contain a few minor elongate dark green lapilli fragments (1-2 mm wide to ≈ 1 cm long) - the chert sections (215.62-216.47 m and 217.33-217.78 m) are light to med grey; the chert has a vague internal banding which parallels the bedding contacts; the chert is extensively fractured but is still competent (apparent fracturing may be a result of extensive ep veining present within the chert); the lower chert is moderately schistose and may be correctly termed a clean qtz-ser schist - the unit is non-magnetic - the rock is moderately to strongly sericite altered with the exception of the cherts which are weakly sericitic; hematite occurs along some fractures; there are up to 1 cm k-spar? alt rims around some ep veinlets; local minor cordierite porphyroblasts over 10-15 cm intervals - $\approx 2-3\%$ planar, up to 1 cm wide σ_1 veins cut the unit, generally at a high angle to CA; there is $\approx 1-3\%$ ep veinlets (up to 5-7 mm wide) cutting the tuffs - some ep veinlets have k-spar? alt rims; the upper chert section contains 2-4% 1 mm epidote veinlets, whereas the lower grey chert contains $\approx 1-2\%$ carb stringers - trace py within the schistose rocks whereas the cherty layers contain minor to $\leq 0.5\%$ py with one occurrence of cpy at the lower contact of the lower chert (i.e. 217.78 m) - the core is fairly competent with several 10-20 cm fractured zones - the lower contact is sharp and probab; conformable into the underlying interbedded package; the contact is brecciated (faulted) at $\approx 40^\circ$ CA.								
225.10	230.10	INTERBEDDED FELSIC TUFF AND RED & GREY CHERT								
		- mixed sequence of dominantly light to med green, fine to locally medium-grained felsic ash and crystal tuff and lesser massive to banded to brecciated red chert and greyish chert; $\approx 65\%$ felsic tuff and 35% chert - the unit is very rubbly and it is difficult to determine								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		internal relationships; the local banding within the cherts is up to 75-80° CA; otherwise the cherts are massive in character or brecciated and faulted (i.e. 225.60 m, 226.80 m); the whole unit appears to be caught up in a fault zone - the broken sections are moderately to strongly shear foliated @ = 65-75° CA but the foliation is wavy in some sections - the tuffs and grey cherts are non-magnetic whereas the red cherts are weak to moderately magnetic - the unit, overall, is weakly to locally moderately chl alt; the felsic tuffs are weakly to moderately (locally) chl alt and the cherts are only very weakly chl alt; there is minor local cordierite developed - the cordierite is up to 2-4 mm in width, and occurs in concentrations up to 25-30% over widths of 10-15 cm; the cordierites are partially stretched parallel to foliation and the cord ranges from unaltered to hematized; there is minor hematite along some fractures - the unit is cut by 2-4% white, irregular quartz veins up to 2-3 cm wide; also 1-2% ep-rich veining - these veins occur sometimes as networks incorporating wallrock fragments which may represent a fault zone - no visible sulphides - the core is highly fractured and rubble - the lower contact is a 5 cm fault gouge zone @ = 50° CA with the underlying chloritic rocks.								
230.10	233.00	QUARTZ SERICITE ± CHLORITE SCHIST (CRYSTAL-LITHIC TUFF) AND MINOR GREY CHERT - dark green, mottled, fine-grained with local medium-grained altered cordierite porphyroblasts; the chert is buff to light grey, fine-grained, and slightly schistose; the schist occasionally exhibit a primary crystal and/or lithic tuff character - the unit is non-magnetic - the unit is also strongly foliated at = 75-80° CA - overall, the rocks are weakly to more moderately sericitic; chlorite alt is generally weak to moderate and locally strong; local strong cordierite (now chlorite) is developed where strong chlorite alteration is present - the unit is cut by = 5% irregular quartz veins up to 5 cm wide; sometimes occurring with the quartz veins is a pinkish mineral (k-spar?) and/or carbonate - no visible sulphides in the host rock, but there is minor								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		pyrite associated with the qtz veining - the core is fractured and approximately 50% rubble recovered - the lower contact is sharp @ = 75-80' CA.								
233.00	234.20	PELSIC METAVOLCANIC								
		- dark green, fine-grained, weakly to moderately foliated @ = 70° CA but wavy near the lower contact where the foliation is ~40-45° CA - the unit is non to locally weakly magnetic - the unit is moderately to strongly pervasively chloritic with numerous chl fractures; the unit is also weakly to locally moderately ser alt (i.e. an indication that the rock was originally felsic); these sericitic zones also contain some mottled red-green chert? fragments - the rock is cut by minor ep-carb veinlets which also incorporate some felsic wallrock fragments - there are traces of py especially near the more sericite-rich sections - the core is moderately fracture and incompetent - the lower contact is sharp @ = 50° CA and is possibly a thin (5 mm) fault zone; the top 70 cm of the unit appears to be more mafic than the lower ~ 50 cm which appear to be similar to the underlying felsic rocks.								
234.20	237.50	QUARTZ SERICITE SCHIST (CRYSTAL TUFF)								
		- medium to dark grey green, fine-grained; strongly foliated subparallel to ~ 45° CA within the upper ~ 50 cm grading down into a more dominant and consistent 75-80° CA - the top ~ 2 m has a sheared rhyolitic appearance, whereas the remainder of the unit contains visible crystal fragments (i.e. crystal tuff) - the unit is non-magnetic - moderate to locally strong sericite alt is present and there is also a weak chl alt; the top ~ 1.5 m is less chloritic than the lower ~ 1.8 m; minor hematite alt along some fractures - there is 1-3% qtz ± carbonate veining and there is also ~ 1% ep-carb±pink mineral (k-spar or pink carb) - there is trace to minor py associated with chl fractures - the core is competent - the lower contact is sharp @ = 70° CA but the contact appears								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		to be conformable.								
237.50	247.92	PELSIC METAVOLCANIC - similar to 233.80-234.20 m - medium to dark green, fine-grained, weakly to moderately foliated @ = 75-80° CA; the unit is locally brecciated internally and is also brecciated near the contact (possibly suggesting that the upper and lower contacts are flow? breccias); chert frags(?) @ = 246.42 m; homogenous unit - the unit is non-magnetic - the unit contains patchy weak to moderate chlorite alt; chl can commonly be seen on fracture surfaces especially in the lower 3-4 m of the unit; the unit also contains sericite along some fractures; ep alt is also patchy and is restricted to alteration haloes around ep ± carb veinlets - the unit is cut by 5-7% planar to irregular calcite veins up to 2-3 cm wide; the veins sometimes contain epidote; most veins cut along the local foliation (i.e. high angles to CA) but some cut across the foliation @ low angles to CA; there is 1-2% thin epidote ± calcite cut by the unit - trace to minor fine grained py assoc with some calcite veins, occurring as disseminations along the vein wallrock contact - easily breakable but non-rubby core - the lower contact is partially obscured due to fractured core; the lower = 25-30 cm is brecciated whereas the underlying felsic rock is uniformly foliated; possibly angle to contact is = 40° CA (i.e. parallel to foliation in underlying tuff if the contact is conformable) - difficult to determine if this rock was originally mafic or felsic; its appearance is mafic and the brecciated contacts imply that it is a mafic flow within felsic rocks; the local sericite alteration and at least one case of chert fragments suggests that the rock is felsic and similar to the above altered felsics and cherts.	200469	239.20	240.70	1.50	81	8	88	530
247.92	261.21	QUARTZ SERICITE SCHIST (PELSIC TOPPS) - medium to dark grey; fine-grained with few elongate felsic lapilli fragments up to 1-2 cm long and 1-3 mm wide; the unit is moderately to strongly foliated @ = 45-55° CA up to = 256 m whereas below this interval the unit is much more chaotic and	200470 200471	252.54 256.92	253.96 258.35	1.42 1.43	TRACE 33	TRACE 70	86 86	240 40

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		brecciated due to intense quartz and epidote veining - within the top foliated section is a ~ 2 m section of 95% relatively clean quartz sericite schist - it is light grey in colour and more strongly foliated than the rest of the less clean qtz-sericite schists - at the lower contact are a few thin (≤ 1 cm) red chert and magnetite-rich layers over ~ 10 cm (the banding @ ~ 20° CA is cut by a qtz vein and by the underlying mafic dyke) - the unit is non-magnetic - the upper foliated section of this unit contains weak-moderate to locally strong sericite alt and there also appears to be a weak chl alt; the lower brecciated section is weakly to moderately silicified and locally epidotized due to the intense qtz and ep veining (i.e. there are ~ 35-40% qtz and/or ep veins cutting the CA at all orientations); this lower section also contains minor hematite visible along some fractures - possible trace f.g. py disseminated throughout the unit; the red chert near the lower contact contains ~ 5% py over ~ 5 cm - the unit is easily fractured (especially in the upper foliated section) but is still very competent - the lower contact is subparallel to CA and is partially obscured by quartz veining; the dyke is chilled at this contact and the felsic rock above it is rhyolitic in appearance (i.e. v.f.g. and glassy); there are a few ~ 10 cm interval of thin red chert bands at this lower contact.								

261.21	280.75	MAFIC (DIABASE) DYKE	200472	261.74	262.74	1.00	21	4	124	140
		- mottled red grey, fine-grained matrix contains 10-15% (locally 25%) white, 1-4 mm, euhedral plagioclase feldspar phenocrysts; locally there may be minor qtz phenocrysts; the matrix is dominantly f.g. plagioclase, amphibole (± pyroxene) ± quartz - there are also ~ 1% (locally 2-5%), 1-4 mm chloritic blebs which were initially probably amphibole crystals - the dyke is massive and contains well developed upper and lower chill margins - the unit is dominantly weakly magnetic except for the f.g. chill margins and a few finer-grained sections which are moderately magnetic - the dyke appears relatively fresh; only the plagioclase phenocrysts appear slightly saussuritized and the chloritic blebs were likely once amphibole phenocrysts; there is weak ep alt of some plagioclase crystals in close proximity to the								

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							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		minor ep veinlets which cut the dyke; some fractures within the dyke contain chlorite so there is a probable weak chlorite alt - 1-4% ep veinlets up to 0.5-1 cm wide cut the dyke; where they cut the dyke, they enhance the phenocrystic appearance by slightly altering the plagioclase phenocrysts to a light green colour - minor dissem py overall, with 2-3% f.g. dissem py present in the f.g. chill margins - very competent core - lower contact is sharp @ 15-20° CA.								
280.75	303.86	INTERLAYERED CRYSTAL TUFF AND QUARTZ-SERICITE + CHLORITE SCHIST	200473	284.10	285.10	1.00	TRACE	18	112	190
			200474	285.20	286.20	1.00	TRACE	6	70	100
		- mottled light to medium greenish grey with local patches of medium green where significant chlorite occurs; the unit is dominantly f.g. qtz-ser schists (with remnant crystal fragments) and crystal tuff composed of 10-20% white plagioclase feldspar and qtz crystal fragments in a f.g. quartz-feldspathic matrix; thin grey chert interval from 282.10-282.20 m (10 cm)	200475	288.14	289.14	1.00	9	38	118	210
		- the rock ranges from strongly foliated @ 40-65° CA (wavy foliation) to weakly foliated within the more pristine crystal tuffs	200476	289.14	290.14	1.00	473	24	54	176
		- there is banding within the upper 2 m of the interval which parallels the foliation (i.e. 50-55° CA)	200477	290.14	291.14	1.00	34	8	26	50
		- the unit is generally non-magnetic	200478	292.83	294.38	1.47	13	6	92	150
		- the unit is quite variably altered; chlorite alt is patchy throughout but is generally limited to the upper 3-3.5 m - within this section there is weak to moderate chl alt; assoc with this chl alt is patchy cordierite alt; the cordierite occurs in banded sections with crystals up to 6-8 mm in diameter; there is also minor bi associated with the chl-cordierite alt; it is possible that the cordierite is a result of the intrusive mafic dyke locally cooking the country rock, producing cordierite; below this zone, there is weak to moderate sericite alt; weak bi alt with local strong areas of sericite alt; some f.g. intervals within the lower 3-4 m contain moderate chl alt	200479	297.79	298.79	1.00	15	8	38	70
		- the unit is cut by 5% irregular qtz veins and qtz-flooded zones								
		- overall, there is 1-2% f.g. dissem py; within the schistose sections there is up to 3% py, whereas the more pristine crystal tuff contain 1% py; there is minor to locally 2-3% (over 20 cm) cpy assoc with py in only the clean qtz-ser								

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							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		schists (from = 288.60-291 m); the grey chert contains up to 3-5% f.g. disseminated py - the core is fairly competent with a few broken sections over 10-30 cm - the lower contact is sharp @ = 40' CA								
303.06	336.06	PLUTIC METAVOLCANIC (MAFIC METAVOLCANIC?)	200480	309.60	311.25	1.57	60	TRACE	56	110
			200481	321.26	322.28	1.02	66	10	60	140
			200482	329.49	330.46	0.97	80	12	62	370
		- med green-grey, fine-grained, massive to more generally weakly to weak-mud foliated @ = 50' CA; thin (1-2 cm) fault gouge with accompanying 20-30 cm rubbly core @ = 329.20 m - the top = 4 m is brecciated and fractured; overall unit is homogenous - the top brecciated section is relatively non-magnetic; the remainder of the unit, up to = 323 m, is weak to moderately magnetic with the more foliated light grey section being moderately magnetic; from = 323 to end of unit is relatively non-magnetic - the unit is weakly to moderately chlorite altered; chl is present along all fracture surfaces yet the rock is fairly hard and competent possibly indicating that alteration is fracture controlled and is not a pervasive alteration - minor epidote alteration around some epidote veinlets - there is approximately 3-5% qtz ± carbonate, ep, chl veins and veinlets within the upper = 4 m whereas the rest of the rock contains 1-3% combined calcite-ep-qtz veins and veinlets up to 1 cm wide - the unit contains trace to minor disseminated py (± pyrrhotite); trace cpy also present - quite competent core with very few fractured zones - the lower contact is sharp and intrusive? @ = 45' CA.								
336.06	360.55	MAFIC (DIABASE) DYKE								
		- med to dark greyish green; fine to medium-grained, massive, very homogenous - very weakly developed upper chill margin; this upper chill is also weakly brecciated; there are also weakly developed chill margins internal where there is a large felsic volcanic fragment; the fragment occurs from 348.95-350.28 m and is a light to medium grey, very siliceous felsic volcanic (tuff or rhyolite); the margin of the fragment is brecciated whereas the								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	ASSAYS				
						Wt% Fe	Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		interior is somewhat uniformly coarsely foliated @ ~ 50-60° CA - the unit is moderately to locally strongly magnetic - the dyke does not appear to be very altered; there is chlorite along many fractures (! epidote) but the rock is not highly fractured and the dyke is quite hard, suggesting a weak silicification (or the rock is originally intermediate in composition) - there is ~ 1-3% 1-2 mm ep veinlets and network of veinlets cutting the dyke; where there is a network of veinlets, the rock appears bleached (i.e. weak to moderate epidote and silica alteration) - trace dissem py; moderate to strong magnetism suggest some f.g. dissem magnetite is probably present - the core is very competent - the lower contact is apparently sharp but obscured due to rubbly core recovery								
360.55	369.72	PELSIC METAVOLCANIC (CRYSTAL TOPP?)	200483	365.55	366.90	1.43	62	34	60	290
		- mottled light to med grey to greenish grey; generally fine-grained with a few sections exhibiting relict crystal fragments; the lower 1.7 m is rhyolitic in appearance - the rock is weak to moderately foliated ranging from 45-60° CA with avg ~ 55° CA - the unit is non-magnetic except for a few thin chloritic sections which are weakly magnetic - the unit is weak to moderately sericite altered with a few thin sections (up to ~ 30 cm) which contain moderate chl alt; there is sporadic weak chl alt through the remainder of the unit - ~ 1-3% irregular, thin (1-5 mm) qtz veins and there are minor thin (1-2 mm) calcite veinlets cutting the unit; ~ 10-20% qtz veining in the lower 1.7 m rhyolitic section - some of the more sericitic sections contain 2-3% f.g. dissem py over ~ 10-20 cm whereas the bulk of the rock contains only trace to minor py - the unit is competent although there are local fractured sections up to 10-20 cm long - the lower contact is sharp @ 60° CA but appears to be an alteration contact and not a lithological contact.								
369.72	379.80	QUARTZ-SERICITE-CHLORITE SCHISTS (PELSIC METAVOLCANICS)	200484	373.80	375.42	1.54	66	26	34	550
			200485	378.48	379.48	1.00	69	22	50	160

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		- variably coloured from medium to dark green within the chloritic sections to light to medium greenish grey within the more sericitic sections - the less chl section exhibits a few possible relict crystal fragments suggesting the protolith was a crystal tuff; there are also possible relict quartz crystals in the chl sections; the rock is weak to moderately wavy foliated from ~ 30-45° CA with local banding also parallelling the foliation (or vice versa) - the unit is non-magnetic - fault gouge (~ 1 cm) at 378.76 m along a carbonate vein - the unit can be divided up into 3 sections; from 369.72 to ~ 373.20 m is a chloritic section (weak-mod chl alt) with a few visible crystal and possible lapilli fragments; the uppermost ~ 70 cm of this section contains the strongest chl alt; from ~ 373.20 to ~ 375.50 m is a section of qtz-ser schist with very little chl; this section has a vague weak-moderate silicified appearance and was probably originally a felsic crystal tuff; also within this middle unit is a weak to moderate local ep alt due to local networks of thin (≤ 1 mm) ep veinlets; from ~ 375.50-379.88 m is another section of weakly chloritized and silicified felsic metavolcanic; this lower section contains 10-15% wispy to discontinuous calcite ± qtz veinlets up to ~ 5 mm wide; occasionally a pink mineral (k-spar?) is assoc with the calcite veining - the top section contains 1-3% calcite ± qtz and qtz veins combined - py is generally minor but there are a few thin sections containing ~ 1% py over 10-30 cm - competent core - the lower contact is sharp but almost invisible due to similar appearance of the rocks; contact sharp and intrusive @ ~ 45° CA (note: the fault gouge @ 378.76 m may be the actual contact - difficult to determine).								

379.88 382.96 NAPIC (DIABASE) DYKE

- dark green, fine-grained chill margins and medium-grained interior; massive
- the interior contains up to 5-10% locally white to pink, subhedral, 1-3 mm, sometimes zoned, feldspar phenocrysts and minor chloritic blebs; also rare m.g. rounded fragments; thin (2 mm) fault gouge @ ~ 25° CA @ 380.30 m
- the dyke is non-magnetic

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					ASSAYS					
FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	Wt% Fe	Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		- the dyke is relatively unaltered; the pinkish feldspar phenocrysts are generally in close proximity to veins suggesting hydrothermal alt - minor hematite along fractures - few patches of strong ep & qtz veining but otherwise only minor qtz carb veining - trace of cubic dissem py - competent core - lower contact sharp @ = 30° with underlying felsic metavolcanic.								
382.96	384.31	PELSIC METAVOLCANIC (CRYSTAL TUFF?)	200486	383.03	384.25	1.22	48	14	94	430
		- mottled medium pinkish green-grey; fine-grained with few visible plagioclase feldspar fragments (i.e. original a crystal tuff?); weakly foliated @ = 70° CA - the unit is non-magnetic - the upper margin appears rhyolitic in composition whereas the rest is apparently a crystal tuff - the unit is weakly sericitized with sericite occurring along most fractures; there is also weak chlorite alteration with some chlorite also visible along some fractures - 2-3% irregular qtz veins generally cutting the core at high angles to CA - py is minor to less than 1% generally occurring along fractures and as small concentrations around some fractures - competent core - lower contact sharp @ = 45° CA yet within the upper part of the underlying mafic dyke there is some felsic material suggesting the contact is actually subparallel to the CA.								
384.31	385.85	MAFIC METAVOLCANIC (PELSIC METAVOLCANIC?)								
		- dark greyish green, fine-grained; massive to weakly foliated @ subparallel to the CA; contains a felsic xenolith (from = 384.60-384.90 m) or the felsic is actual insitu wallrock and the contact is subparallel to the CA - the upper contact appears weakly chilled? but the lower contact is not chilled (note: the upper 30 cm chloritic section may indeed be felsic so the actual contact would be below the felsic "fragment" @ 384.90 m) - the unit is weak to locally moderately magnetic								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		- the unit is weakly to moderately chloritic with the upper = 30 cm being the most chloritic; below the felsic fragment the unit contains weaker chl alt and also patchy minor ep alt due to calcite & epidote veins - within this zone below the felsic fragment, the calcite & epidote veinlets are discontinuous and subparallel to the CA - there is minor f.g. py found along fractures - the core is very competent - the lower contact is sharp @ = 20° CA; this lower contact is not chilled.								
385.85	393.50	FELSIC METAVOLCANIC	200487	388.62	389.62	1.00	72	46	104	280
		- medium to dark purplish grey, fine-grained with a strong rhyolitic appearance but some schistose areas appear to have once been crystal tuff; generally the majority of the rock is rhyolitic in appearance; the schistose sections are weakly to moderately foliated @ = 40° CA - the unit is non-magnetic - = 1 cm fault gouge at 392.49 m; this zone is within a k-spar altered zone containing some epidote & qtz fragments - the unit contains patchy weak to moderate chlorite alt; the strongest alt is within the upper = 1 m; in this section there is also some minor cordierite porphyroblasts (now chloritized) up to 5-10% over the top = 1 m; part of the unit is weakly sericitized and the more schistose sections are moderately sericitized; some of the rhyolitic sections are non to weakly sericitized - the unit (especially the rhyolitic sections) is cut by 3-7% irregular quartz veins; minor thin (< 1 mm) ep + calcite veinlets - < 2-3% fine-grained disseminated py; most of this is within the more schistose sections - the core is = 30-40% rubble recovered whereas the remainder is quite competent - the lower contact is sharp @ 40° CA.								
393.50	394.03	MAFIC METAVOLCANIC (DY)								
		- possibly altered felsic metavolcanic - very similar to lower section in unit from 384.31-385.85 - dark green, f.g., massive to weakly foliated @ 15-20° CA;								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		non to very weakly magnetic - weak to moderately chloritic; contains ~ 5% calcite & ep veinlets which parallel the lower contact; minor hematite along some fractures - trace to minor pyrite along fractures - broken core - lower contact sharp @ ~ 25° CA.								
394.13	400.50	PELSIC METAVOLCANIC	200488	401.73	402.73	1.00	9	20	82	410

- variably coloured, mottled light greenish grey to dark green; fine-grained; contains minor massive pinkish rhyolitic section but the majority of the unit is weakly to moderately foliated @ ~ 60-70° CA

- the top ~ 30 cm is a rehealed faulted zone containing "rhyolite" fragments and qtz-rich fragments in matrix dominated by ep and qtz with lesser chl near the top of the fault zone; the zone has a sharp contact with the underlying tuff, but there are also tuff fragments in the fault zone
- the unit is non-magnetic
- overall, the unit is weakly to moderately chloritic with some of the chl section being identical in appearance to 393.50-394.03 m and the lower section in unit 384.31-385.85 m; the moderately chl zones can be either transitional into bounding weakly chl and sericitic zones or they may have a knife-edge contact
- the unit is also weakly sericitic with moderate sericite alt occurring where chlorite is least pervasive
- the more chloritic sections contain minor calcite and ep veinlets resulting in minor ep alt around some veinlets; the few rhyolitic? sections within the upper ~ 2.5 m may be strongly silicified tuff intervals as these silicified sections are gradational into the bounding tuffs
- the unit is cut by ~ 5% calcite & epidote veinlets; which are generally restricted to the more chloritic sections; minor qtz veining
- py occurs sporadically from trace amounts to ~ 1-2% over intervals of 10-20 cm
- the core is fairly competent with several sections of fractured core over 10-30 cm
- lower contact is sharp and irregular @ ~ 30-40° CA with the underlying fault zone.

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Ca(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
408.80	420.80	 felsic METAVOLCANICS - light to medium greenish grey; fine-grained with sections of cordierite porphyroblasts; the unit is weakly to moderately foliated @ = 45-60° CA with avg = 50-55° CA; there is a thin section of a very vague red chert from 410.22-410.33 m; i.e. the chert is mixed with and gradational with felsic tuff - the chert actually looks like a reddish felsic tuff; top = 35 cm is a silica rehealed fault zone with wallrock and quartz fragments - the unit is non-magnetic except for the reddish chert band which is moderately magnetic - the unit is quite complicated and variably altered; visually, chlorite and cordierite are the dominant alteration assemblage; cordierite is present only in the interval 412.50-414.70 m - within this interval there is ~ 10-15% overall cordierite with local concentrations of 30-40% over 10-20 cm; the cordierite is up to 1 cm wide and is now dominantly chlorite; chl alt is weak to locally moderate and generally present throughout the unit; some of the more chloritic sections appear quite mafic but these sections are gradational into less altered or sericite altered felsic tuffs which suggests that they are probably felsic in origin; there is a weak to locally moderate ser alt - moderate ser alt occurs where chl alt is very weak - the unit is cut by ~ 2-3% calcite ± epidote veinlets which are dominantly present in the more mafic sections; ~ 1% thin (1-2 mm) irregular qtz veins - py occurs as minor to ~ 1% locally and commonly occurs as just trace amounts - the core is fairly competent with a few 10-50 cm sections of fractured core - the lower contact is sharp @ = 40° CA but may be conformable; possibly just an alteration contact.	200489	407.60	409.07	1.47	97	40	100	260
			200490	413.70	415.24	1.46	125	102	238	750
			200491	417.04	418.04	1.00	59	4	80	570
420.80	422.42	 mafic METAVOLCANIC? - dark green, fine-grained, massive to weakly foliated @ = 35-40° CA - the unit is non-magnetic - the rock is weakly to moderately chloritic but the unit is also quite hard and probably variably silicified (or the rock was originally felsic) - alteration around some veins								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		enhances the graininess of the host-rock giving it a crystal knif appearance - the unit is cut by ~ 2-3% thin (1-5 mm) discontinuous calcite veinlets - minor hematite and calcite along fractures - trace to minor f.g. py, generally along fractures - lower contact is sharp @ ~ 45° CA; the last ~ 40 cm is a foliated and brecciated zone containing k-spar altered fragments near the contact; possibly a flow breccia?								
422.42	429.67	PELSIC METAVOLCANIC TUFFS (CRYSTAL & LITHIC TUFFS)	200492	426.61	427.61	1.00	TRACE	TRACE	74	440
		- medium to dark greenish grey; fine-grained matrix containing 5-15% white feldspar and local blue quartz eye fragments; the rock is weakly foliated @ ~ 40-50° CA with avg of ~ 45° CA - at ~ 428 m is a thin crystal tuff section which appears to be grading (fining) upwards; i.e. tops uphole - the unit is non-magnetic except for local section which are weakly magnetic - the unit contains minor weak cordierite spots and the unit as a whole is weakly chloritic and weakly sericitized - the top ~ 70-80 cm contains ~ 20-30% quartz flooding, whereas the remainder of the unit contains only 1-3% combined qtz- calcite:epidote veinlets - trace to minor f.g. disseminated py - competent but locally fractured core - lower contact is sharp @ ~ 40-45° CA with the underlying brecciated zone								
429.67	429.97	FAULT-GOUGE ZONE								
		- the upper 15 cm is a fault breccia composed of a network of veins containing chlorite, k-spar, qtz, and epidote around qtz-rich fragments; the lower 15 cm gouge is very soft clay with numerous wallrock fragments.								
429.67	432.46	PELSIC METAVOLCANIC (MAFIC METAVOLCANIC?)								
		- medium greyish green, fine-grained; weakly foliated @ ~ 40-45° CA; the unit is weakly magnetic - the unit is moderately pervasively chloritized and is hard, suggesting a possible weak silicification or a primary felsic								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		nature - minor to $\pm$ 1% calcite veins cutting the unit - trace to minor pyrite occurring along some chloritic fractures and in conjunction with some calcite veinlets - highly fractured core - lower contact is very vague and possibly gradational or conformable into the underlying mafic metavolcanic unit.								
432.46	433.00	MAFIC METAVOLCANIC (CHLORITIC FELSIC METAVOLCANIC?)	200493	433.10	434.60	1.50	24	TRACE	102	110
		- medium to dark grey-green, fine-grained with local areas of visible but vague feldspar crystals; the unit ranges from massive to weakly foliated $\theta = 40-45^\circ$ CA; $\pm$ 0.5 cm fault gouge $\theta = 437.15$ m at $\pm$ 35° CA; within the lower $\pm$ 50 cm, there are several reddish chert fragments and a few thin ($\pm$ 0.5 cm) vague reddish-green cherty bands - the unit is variably magnetic; the massive sections are generally non-magnetic and the foliated sections are generally weakly to moderately magnetic - the unit is weakly to moderately chloritic; minor ep alt in the last $\pm$ 50 cm - minor calcite $\pm$ qtz veining - minor to $\pm$ 0.5-1% f.g. disseminated py - competent but locally fractured core - lower contact is sharp $\theta = 45^\circ$ with the lower chilled dyke; the last $\pm$ 25 cm is pseudobrecciated.								
438.00	443.92	MAFIC (DIABASE) DYKE								
		- medium to dark greenish grey, fine-grained with very fine-grained moderately developed chill margins; the unit is massive and weak to moderately magnetic - the dyke is weakly chloritized with chlorite occurring along some fractures; also minor calcite and/or epidote along some fractures - there is minor to 1% epidote $\pm$ calcite veining - trace visible pyrite - competent but locally fractured core - lower contact is sharp and chilled $\theta = 30^\circ$ CA with the underlying mafic metavolcanic.								

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
443.92	452.20	MAFIC METAVOLCANIC (FLOW?) - medium to dark green, fine-grained, generally massive with a weak foliation @ = 36° CA; possible relict pillow fragment @ = 447.55 m; few qtz fragments? @ = 449.20 m - the unit is weakly to locally moderately magnetic - overall the unit is weakly to moderately chloritic; there is patchy epidote alteration, near the lower contact is assoc with a network of ep-calcite veins (= 40 cm interval @ = 450.40 m) - along with the epidote-calcite veining there is also = 5-10% irregular, discontinuous calcite veining - minor to $\leq$ 0.5% py as f.g. dissems - the top = 7 m is quite competent core whereas the last = 1.5-2 m is very broken and fractured - the lower contact is a 1 cm hematized gouge zone @ = 40-45° CA.	200494	445.84	447.27	1.43	9	18	124	110
452.20	457.35	MAFIC (DIABASE) DYKE - medium to dark green, fine-grained with a well developed lower very fine-grained chill margin; the upper contact is a gouge zone with no visible chill margin (the core recovery for this section is very rubble and fractured making an upper chill margin hard to recognize); the upper = 20 cm is brecciated and calcite-veined and grades into the more uniform and fractured underlying rock - there is minor chlorite alteration and minor epidote/calcite/chlorite/hematite along fractures - trace pyrite - very poor core recovery - rubble and fractured core - lower contact is chilled and sharp @ = 15-20° CA.								
457.35	467.56	MAFIC METAVOLCANIC (FLOW?) - medium to dark green, fine to medium-grained with visible chloritic blebs (probably replacing hornblende) and few visible feldspar phenocrysts (fs common as f.g. matrix component along with f.g. hornblende) generally massive to erratically foliated @ = 35-55° CA (very vague foliation); thin reddish (interflow bed?) cherty horizon @ = 458 m (= 15-20° CA); also a thin v.f.g. mafic dyke = 5 cm wide, 15 cm below the upper contact	200495	461.35	462.85	1.50	65	10	96	50

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FROM	TO	LITHOLOGICAL DESCRIPTION	SAMPLE No.	FROM	TO	WIDTH	ASSAYS			
							Cu(ppm)	Pb(ppm)	Zn(ppm)	Ba(ppm)
		- the unit is generally weakly magnetic with few moderately magnetic sections, (i.e. in and around the cherty band) - the unit contains weak patchy chlorite and/or epidote alteration; the epidote alteration is generally vein related (i.e. epidote haloes around epidote veins) - the unit is also hard and possibly weakly silicified - minor 1-2 mm calcite & quartz veinlets and a lt epidote veinlets - minor to 0.5% combined pyrite and pyrrhotite; possible minor f.g. magnetite causing the pervasive magnetism - very competent core with few 10-30 cm fractured zone in the upper 2 m.								

467.56 BOW

CASING LEFT IN HOLE

DOWN-HOLE SURVEY DATA

DEPTH	INCLINATION	BEARING
77.11	-62.00	101.00
238.35	-60.00	116.00
331.01	-57.00	117.50
418.19	-54.00	127.00
467.56	-54.00	127.00