PROPERTY : GOATFELL 842386 BEARING: 265°
HOLE # DDH-88-1 AZIMUTH: -50°

From	To*	Description	
0	5	Casing	
5	53	Quartzite, grey to greenish colour, medium to thick bedded, beds average 30 cm to meter thick; some grading, recognizable beds have coarser bases with sand sized grains and probably minor feldspar; tops of beds are silty; grading indicates beds right way up; locally some silicification bedding / core axis angle: 60° @ 15' - 6" of thin bedded, silty laminae - from 17.1, fractured with some fractures filled with calcite; along other fractures pale green bleaching @ 28' - quartz vein, a few cm thick - pyrrhotite @ 22.9' in silty bed which also contains small black shale chips; @ 25.5' filling fractures & @ 51', finely disseminated	
53	58	Thin bedded quartz wacke / siltstone layers; beds (quartz wacke/siltstone pairs) average 1 cm thick; beds quite disrupted - small offsets are common, possibly syn-sedimentary in nature - also some syn sedimentary folding - minor disseminated pyrrhotite throughout	
58	69.3	Predominantly thick bedded quartzites - some very thick (1.5m) sections of massive whitish micaceous (sericitic) quartzite locally displaying some grading @ 61' some small (2 1/2 cm) black, shaley chips @ 64' some thin bedded, silty portions - very minor disseminated pyrrhotite @ 62', 67-67.5' & 69'	
69.3	11	Predominantly thin bedded, laminated siltstones and quartz wackes; beds, on average, are a	

* measured in feet

		few mm to a few cm thick; siltstones dominate; - fine disseminated pyrrhotite throughout, also, pyrrhotite locally present in calcite veins - core axis / bedding angle is 80° - locally small shaley chips present in quartz wacke layers, also very rarely, small pyrrhotite chips	
77	100	Very thick bedded quartzites (micaceous) with an overall light grey to greenish colour; locally mottled and silicified; some parts very light grey to white in colour (ie. very clean quartzites or quartz arenites); some quartz wackes - they are darker grey in colour with visible grains; - pyrrhotite along fractures and in clots @ 85.3' - extremely fractured @ 89	
100	110	Predominantly medium to thin bedded quartz wackes and siltstones; some small scale channel crossbedding (2-3 cm deep channels) - tourmalinite chip @107; ◁; 1-1.5cm long - abundant calcite filled tension gashes 107-110 abundand (1-2%) disseminated pyrrhotite	
110	124.5	Massive quartzites; thick bedded; white to greenish to grey; locally banded and very mottled, silicified; only very minor silty material; abundant fracturing and light green bleaching along fractures 110-112, & @ 115 greenish-white, fine grained, silicified, mottled quartzite with abundant (2-5%) disseminated pyrrhotite, in roundish spots - some chlorite along fractures @ 124	

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124.5	133.5	Laminated to thin bedded siltstones and quartz wackes, some thin (<10cm) very hard silicified quartzite beds; overall medium grey colour with lighter greenish quartzose portions - basal 10 cm, dark grey in colour and very hard, possibly tourmalinized	
133.5	176	Thick bedded, fine grained quartzites, commonly silicified; locally some feldspar and white mica (sericite) grains visible; dominantly light grey to white to pale green in colour; mottled; some fracturing with pale green bleaching along fractures; locally, chlorite seams present - rounded, brown weathering sandy dolostone clasts @ 169-170 & 147.5 - pyrrhotite filling fractures @ 136 & 146-147; in later interval accompanied by minor coinc'ed sphalerite - disseminated pyrrhotite @ 142-143; 160.5-161; 169-171.5 & 174-176.	
176	211.5	Thin bedded grey quartz wackes; abundant silty layers; quartz wackes are very granular, quite feldspathic; locally 10-20 cm thick layers of light grey to white quartz arenites; some light green bleaching along fractures in quartz arenites - some hard, very dark grey portions, 3-5 cm thick, possibly tourmalinite @ 192 & 201. - large shale chip (3mm x 3cm) @ 189 - pyrrhotite disseminated and along fractures @ 179.5; 186.5-194 & 210-211.5; - fairly abundant pyrrhotite (2-4%) from 196 - trace of sphalerite @ 193.	

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211.5	220.5	White to light grey to greenish, mottled, micaceous quartzites or quartz arenites, thick bedded -pyrrhotite finely disseminated in quartzite @ 214-214.5; 215; 216.5; 217-219.5 - some thin laminated mud zones @ 215-216 these consist of grey laminated mudstones with thin, green, chloritic layers; the basal 6 inches consist of thin (average 3 mm) distinctly graded beds comprising ~2 mm of light grey quartz wacke and 1 mm of dark grey siltstone or mudstone with abundant pyrrhotite (up to 10% of silty layer); these beds are distinctly graded and indicate right-way up stratigraphy; core axis bedding angle is 75°.	
220.5	233	Mixed quartz wackes and siltstones; some quartz arenite or quartzite; overall medium grey colour; quartz wackes quite silty, locally silicified -core axis / bedding angle ~60°-65° -finely disseminated pyrrhotite, comprising on average, trace to 2 or 3% @ 220.5-223 & 224-233	
233	~~238~~ 267	Massive, thick bedded white/light green/light grey quartzites or quartz arenites, locally micaceous; beds average 1m thick; locally fractured with green bleaching along fractures, locally silicified -quartzite beds sometimes separated by well bedded quartz wackes. 5-30 cm thick, silty material not common -quartz wackes are medium grey colour. With visible quartz and feldspar grains @ 257-264 dark grey, silty quartz wacke with minor quartzite -abundant disseminated pyrrhotite @ 249,	

		in a silty layer; 253; 253.5-254.5; 255-256; 258.5-260.5; @ 266.5 pyrrhotite comprises 2-3%	
267	290.5	Well bedded (thin to medium bedded) quartz wackes, some siltstones 267-270 thin, silty, pyrrhotite-rich beds in grey quartz wackes 270-271.5 randomly disseminated pyrrhotite in quartz wackes 271.5-272.5 bedded silty layers in quartz wackes with abundant pyrrhotite (30%) in silty layers which are 1-2 mm thick 272.5-273.5 abundant (2-4%) disseminated pyrrhotite 273.5-275 silty, pyrrhotite rich beds in quartzite 275-288.5 medium to thin bedded quartz wackes with abundant 1-2cm thick beds graded from quartz wacke bases to silty tops; abundant disseminated pyrrhotite (2-4%) throughout and in quartz veins and cooling fractures 288.5-290.5 medium bedded (5-6 cm) quartz wackes with pyrrhotite in siltier portions	
290.5	388	Thick bedded white/light green/light grey massive quartzites (as found in 233-267), locally fractured, bleached, silicified; some quartz wacke layers; only very minor fine grained (silty) material -sulphides not abundant 330.5-332.5 darker, more silty, thinner beds, more pyrrhotite	
388	402.5	Thin bedded, very fine grained quartz wackes and siltstones; overall dark grey colour with some greenish chloritic layers (seams?)	

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		-beds 1-2 cm thick, on average; local silicification associated with more quartz rich layers - Core axis / bedding angle - 70° - Some soft sediment slump folding -abundant pyrrhotite (1-2%) throughout, disseminated, some along fractures, some bedded, in silty layers	
402	413	Mixed quartz wackes with somewhat cleaner quartzites and minor siltite; overall medium to light grey colour; some green bleaching along fractures	
413	418	Laminated siltstones and fine grained quartz wackes; medium to dark grey in colour - Some very dark, very hard zones, generally 1cm thick and apparently lensoid or irregular → probable tourmalinite	
418	508.5	Mostly very thick bedded, very white, very clean quartzites, locally sericitic and locally containing small pink garnets - thick, massive quartzite beds average 1m, and are separated by impure, thin bedded quartz wackes and graded wacke/mudstone layers - Some of the wacke/mudstone layers are bedded on the ½ to 1cm scale and contain pyrrhotite, either disseminated or concentrated in silty beds 423.9-425 disseminated pyrrhotite in massive quartz wacke. 438-438.4 disseminated pyrrhotite in massive quartz wacke 439.4-442 laminated quartz wacke & thin siltite layers with disseminated pyrrhotite in siltite; some chlorite seams 452-455 minor disseminated pyrrhotite in quartz wackes; also at 458-460.2	

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		461 & 462-463: disseminated pyrrhotite in thin bedded quartz wackes/siltites 464-465 pyrrhotite disseminated and along fractures in medium bedded quartz wackes 472 ~~large~~ pink garnets in very white sandstone 473-475.5 disseminated pyrrhotite in thin to thick bedded quartz wackes; also @ ~~478.5-479~~ 478-479 479.5-482 disseminated pyrrhotite in granular silty quartz wackes; also at 482.2-483; galena @ 479.5 497.5-498 & 506.5-506.8 abundant dissemn. pyrrhotite (2-4%) in white quartzite	
508.5	514.5	Thinly bedded to laminated quartz wackes-mudstones some thin dirty sandstone layers; beds average a few mm to 2cm thick; some grading; some beds ungraded with sharp upper and lower contacts - some pyrrhotite associated with silty layers and also in veins - rare quartzite clasts - core axis/bedding angle ≈ 70°	
514.5	624.5	White to light grey, massive thick bedded quartzite to quartz arenite	
524.5	530.5	Very uniform thinly bedded unit; beds very distinct; beds have buff sandy bases (?sandy dolostone??) with sharp contacts against grey silty layers - some rounded white quartzite clasts - some pyrrhotite veining and chlorite alteration	
530.5	748	Predominantly massive, thick bedded quartzite variable in colour - light greenish, light grey and locally very white, somewhat mottled; locally quite fractured with light green bleaching along fractures	

-quartzite beds separated by thin bedded zones of quartz wacke/mudstone and some medium bedded zones of quartz wackes
-minor chlorite throughout; minor pyrrhotite
530.5-543 very fine grained greenish white to grey quartzite; some white/grey colour banding; visible sericite; pale green bleaching along fractures; minor chlorite; minor pyrrhotite in veins
543-548.5 bedded quartz wackes, more granular and siltier than quartzites; rare white, fine grained quartzite clasts; pyrrhotite commonly disseminated in siltier layers, also locally present in wackes
548.5-560 mottled siliceous quartzites with light green bleached portions and chlorite seams capped by graded quartz wacke beds; pyrrhotite present along fractures
560-560.2 garnetiferous white feldspathic sandstone; medium grained, garnets 2-4 mm size; very fine shale chips present.
560.2-565 grey quartz wacke with silty seams
565-577.5 light green to greyish siliceous quartzites, very fine grained, thin bedded with local evidence of soft sediment deformation - slump folds and disruptions individual beds have green bases and grey tops; highly fractured with local disseminated pyrrhotite (not abundant).
583-588 as above with 6-10 cm bands of bedded siltstones/wackes; traces of pyrrhotite along fracture
588-593 medium bedded grey, granular quartz wackes
593-644.5 predominantly clean greenish white to greyish white quartzites; minor grey quartz wacke interlayers; beds very thick;

-silty material is insignificant; local pods contain disseminated pyrrhotite
644.5-646 extremely fractured, as above
646-658 medium bedded quartz wackes and some quartzites; some salty seams; minor pyrrhotite and chlorite; pyrrhotite often in siltier beds; @ 637-638 & 639-644 occurs bedded
658-678 massive thick bedded. mottled to bedded grey and greenish quartzite, minor quartz wacke; discolouration variable & often bulls-eye alteration spots form 6-8 cm in diameter; dark grey cores, light grey inner ring greenish white outer ring

- minor disseminated pyrrhotite and local chlorite seams
679-688 medium (6-10cm) to thin (cm to mm scale) bedded quartz wackes and siltstones; pyrrhotite disseminated through coarse portions of beds and very abundant (10-15%) in siltier layers
- bedding / core axis angle 65°; beds generally very planar; however, some small scale channelling is evident in this portion
@ 679-679.5 pyrrhotite is associated with chlorite seams and in quartz veins with traces of sphalerite; this zone is quite disrupted and slightly sheared
695-695.8 quartz wackes with traces of pyrrhotite
696.6-704 thin to medium bedded quartz wackes; core axis / bedding angle is 65°; disseminated pyrrhotite occurs throughout, generally as small blebs; some concentrations in siltier beds

		surrounding small clasts; pyrrhotite up to 3-4%; traces of sphalerite in chlorite seams 711.5 silty seam with pyrrhotite 714-721 medium bedded quartz wackes and quartzites; some thin bedded zones; some silty layers; dissemminated pyrrhotite throughout; @ 718 traces of chalcopyrite; traces of dissemminated sphalerite throughout - locally chloritic - some bedding disruptions; looks like bedding supparallel stylolites. - some light green bleaching along fractures 721.4-722 traces of pyrrhotite in wackes 727-728.5 pyrrhotite present in thin bedded quartz wackes to silty wackes; some fine grained chloritic mudstones; some coarse pyrrhotite segregations (or fracture-opening infills). 733-735 thin bedded quartz wackes & chloritic mudstones containing dissemminated pyrrhotite & traces of sphalerite & possibly chalcopyrite; some bedding-parallel shears 736.5-738.5 dissemminated pyrrhotite in thick bedded quartzite and quartz wacke 746.5-748 minor dissemminated pyrrhotite in quartz wackes, some chlorite seams	
748	763	Predominantly thin to medium bedded quartz wackes and siltstones; minor quartzite; overall grey to dark grey colour; significant well bedded portions; bedding/core axis angle is 60°. - some horizons contain good, cm scale graded beds with "salt and pepper" quartz wacke bases grading into very fine grained, greenish, chloritic mudstones whole bed 1cm thick, generally come in packages of graded beds 20-60 cm thick	

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		749.5 - 752.5 & 753 - 754.2 disseminated pyrrhotite in pyrrhotite rich (up to 10%) silty layers; chlorite seams abundant 755 - 763 disseminated pyrrhotite to 3%	
763	768	Fine grained massive quartzites and bedded quartz wackes; extremely fractured, broken; pyrite commonly coats fracture surfaces	
768	775	Light grey and light greenish quartzite & quartz wackes; massive, thick bedded; locally quite mottled in various shades of grey and light greenish greys - locally very white portions with minor garnet - fractured, with white calcite veining and some white bleaching along fractures - locally some chlorite seams @ 772 - 773 & 774.5 pyrrhotite disseminated in quartzite	
775	781	Predominantly thin bedded quartz wackes to siltstones; some medium bedded quartz wacke layers; locally quite fractured and broken (often parallel or subparallel to bedding); pyrite seams along fractures - minor disseminated pyrrhotite throughout also as coarse fracture opening infills - chloritic seams present - traces of disseminated <u>sphalerite</u> and very minor traces of <u>galena</u> @ 775 - quartz veining in subparallel bands with intervening chloritic seams, cumulative thickness of approximately 3cm; veins contain pyrrhotite 8-10% and <u>10-12% sphalerite</u>	

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781	786.5	Thick bedded (50-90 cm) silicified quartzites with minor quartz wacke interbeds; quartzites are greenish white to grey, mottled; local chlorite seams - minor fracturing and bleaching along fractures - minor disseminated pyrrhotite, especially @ 782.5 - trace of sphalerite in fracture @ 784.5	
786.5	791.6	Thin bedded quartz wackes/mudstones; some graded beds, beds right way up; bedding/core axis angle is 80° 788.5 - 791.6 quite fractured with some disseminated pyrrhotite; pyrite along fractures	
791.6	795.5	Extremely fractured and broken silicified quartzite; bleached completely chalky white along fractures; (fractures and bleached zones silicified - too hard and translucent to be albitized)	
795.5	806	Thick bedded, fine grained quartzites; silicified, with coarse grained, more impure non-silicified quartz wacke layers; mottled grey to greenish-white; bleaching along fractures - minor disseminated pyrrhotite in pods or layers @ 795.7; 799.7; 803-804; 805.5-806 - trace of disseminated sphalerite @ 804	
806	822	Thin to medium bedded quartz wackes; some siltstones; beds average 1-15 cm thick; some thin silicified zones 806.5 - 810 medium bedded, some thin ~~silicified~~ quartzite zones; pyrrhotite disseminated trace to 1% 810.3 - 811 thinly bedded zone; pyrrhotite disseminated, to 1 or 2%	

		811.5-814 thin to medium bedded portion; disseminated pyrrhotite more abundant than previous sections - to 5% on average; @ 812.5 pyrrhotite rich bed (50-60% pyrrhotite) that is ~ ½ cm thick. 815-822 disseminated pyrrhotite, 1-2% on average @ 817 - 2 to 3 cm thick band of very dark grey very hard material, possible tourmalinization
822	839	Thick bedded, grey to greenish finely mottled quartzites and quartz wackes, quartzites silicified and bleached pale greenish along fractures 825-827.5 traces of disseminated pyrrhotite and <u>sphalerite</u>
839	868	Medium to thin bedded quartz wackes; minor silty material, also minor quartzite layers; overall relatively uniform in appearance medium grey to slightly darker than medium grey; bedding contacts tend to be gradational on both sides, whereas previous thin beds had at least one sharp contact; also <u>don't</u> get the packages of uniform 1cm thick beds in this zone 840-843 Finely disseminated pyrrhotite (trace to 1%) 844-865.2 disseminated pyrrhotite; trace to 2%; pyrrhotite and <u>sphalerite</u> along fracture @ 847.5 and @ 848.5 fairly significant quartz veining; both bedding sub-parallel and crosscutting, with significant amounts of pyrrhotite (15%) and <u>3-5% sphalerite, 1% galena and traces of chalcopyrite</u> -some fracturing and bleaching along fractures

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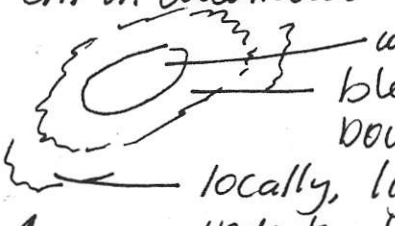
868	881	Thick bedded, massive quartzites, grey to light grey in colour with quartz wackes (medium to thin bedded) at tops of beds - fractured, with green bleaching along fractures and some mottling 871.5-873 coloured alteration spots 3-6 cm in diameter  regular light to medium grey quartzite - white cores appear to be quartzite, very hard and translucent - one alteration spot is present that is very different:  - very dark core pyrite + chlorite?? with light green bleached rim - @ 878-878.8 & 879.5-880, pyrrhotite (2-4%) disseminated through white quartzite	
881	~~900~~ 900	Thin to medium bedded quartz wackes and siltstones, minor (6-10 cm) quartzite beds; overall, medium grey in colour 882-888 & 890-892 - thin bedded wackes and siltstones with some disseminated pyrrhotite; also at 892.5-893.5 & 894-900 893.5 Garnets in thin sandstone layer - core axis / bedding angle - 70°	
900	903.5	White to greyish quartzite grading into quartz wacke; massive; somewhat mottled; fracturing with colour bleaching along fractures @ 902.5 pyrrhotite rich (15-20%) lens	

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903.5	913	Thin bedded quartz wackes and siltstones; some chlorite seams 904-906 chlorite seams and dessemminated pyrrhotite 912.5 quartz veins with weathered sulphides crosscutting bedding; garnets present also	
913	918.5	Medium bedded quartz wackes grading into quartzite; highly fractured with some bleaching along fractures; some pyrite developed along fractures	
918.5	920.5	Thin bedded quartz wackes and siltstones 920.5 - END OF BOX 51 END OF DRILLING COMPLETED BY FRIDAY, AUGUST 5, 1988.	