MS 7305

DEAD FRIARS
BOREHOLE NO.1
WEARDALE

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London
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DEAD FRIARS
BOREHOLE NO. 1
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The purpose and siting of Borehole No. 1 (DH1) at Dead Friars, Weardale, were described in paragraphs 18 to 22 of our report MS 7218, "ACMIN Weardale Project, Progress Report, October 1972."

2. The site as surveyed was selected to intersect any strike extension of the Boltsburn Vein at mid-depth in the Great Limestone, 400 feet from the eastern end of known workings on the vein, with a bore-hole inclination of 70°. In practice, the site was moved 40 feet back towards the workings, to avoid a patch of peat bog at surface.

3. Mobilisation of the drill started on 30th November 1972, and drilling started on 6th December. Drilling was completed at 1,140 feet on 30th January 1973 and the cement grouting required by the Water Authority on 5th February. The exceptionally long time taken was due mainly to:-

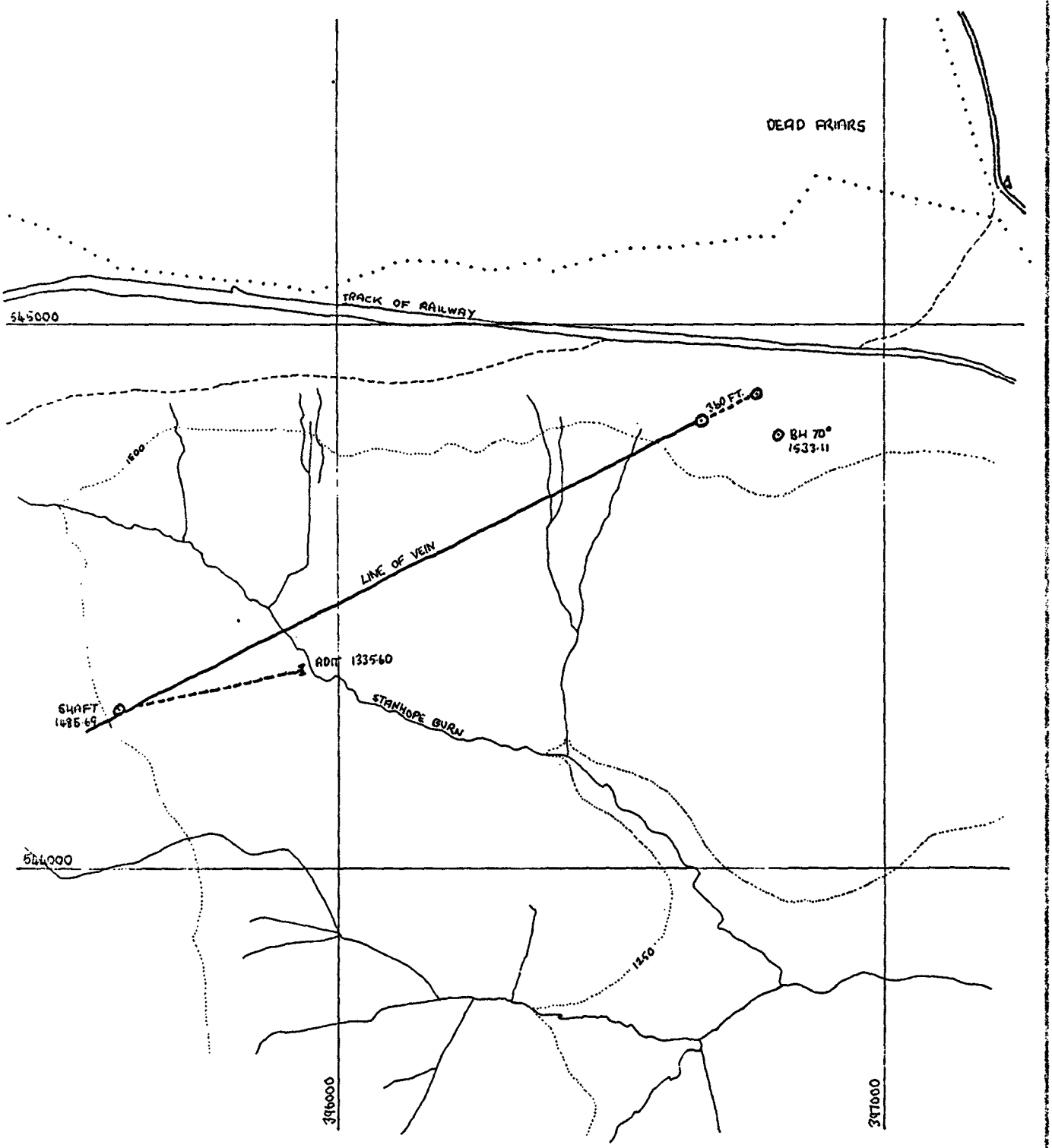
(a) Severe winter weather conditions at times.

(b) Attempts to correct steepening of the hole, presumably due to deflection at interfaces between near-horizontal strata of very different hardness, i.e. mudstones, hard grits, and well-consolidated limestones.

(c) Loss of equipment down the hole after wedging.

4. Weather Conditions. All available water supplies were frozen on the night 8/9 December, and drilling was impossible the following day. Gale-force winds prevented the drillers going up the derrick on the night 11/12 December. Dense fog prevented a wedge being sighted in on 20th December. Water supplies were again frozen on 12th January, and ice formed on derrick, drill pipes and engines during the night 12/13 January. Formation of ice on these during the night 16/17 January could not be prevented even with braziers burning diesel oil, and these conditions continued into the following night, constantly interrupting drilling by freezing the water

Location of inclined borehole ,BH1, on Boltsburn Vein Acmin Exploration (UK)Ltd



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FEBRUARY 1973

supply. All water was frozen on 20th January, and snow prevented the drillers reaching the site, even on foot, on the night 21/22 January, and only 5.6 feet could be drilled the following day after clearing snow from the site. Freak gusts of gale-force wind repeatedly blew drill rod stands off the derrick on the night 26/27 January.

5. Steepening of Hole. The horizontal and vertical courses of Dill are shown on the diagram in the pocket on the back cover of this report. The inclination varied as follows, ignoring the 60 feet abandoned after back-filling and wedging to bypass equipment lost down the hole:

Depth, feet	Inclination, degrees
100	71
200	72
300	73
400	74
500	76
Wedges set at 506 and 583 feet	
600	78
Wedge set at 656 feet	
700	78
800	76
900	77
1,000	78
1,100	78

Final depth, 1,140 feet.

6. Loss of Equipment. In addition to the wedges listed above, a retrievable Clappison wedge was set at 575 feet 6 inches on 21st December, but the locking piece was left in the hole when the wedge was retrieved. Drilling was due to stop from Christmas to the New Year, which was likely to cause difficulty in getting back into the hole anyway, and instructions were therefore given to close the site after the day shift on that day, involving only the loss of one night shift.

7. Work was resumed on the night shift 1/2 January 1973. An attempt was made to drill away the locking piece on that day and the following day shift without success. A magnet run down the hole on 3rd January bought up steel cuttings but failed to clear the obstruction, and cement was therefore run into the hole to enable drilling to be deflected past the lost locking piece. This cement failed to set,

and a rapid-hardening cement was therefore obtained and placed down the hole, but this also failed to set. Samples of the water and cement were tested at a nearby cement works, but no reason for the failure to set could be identified. A retrievable wedge was therefore set 5 feet 6 inches above the lost locking piece on 5th January. When pulling back after drilling 6 feet beyond the wedge, the rods twisted off behind the reamer, leaving it, 5 feet of rod and the bullnosed bit down the hole.

8. An attempt was made on 6th January to set rapid-hardening cement over the lost equipment, but the cement flowed away from the hole. It was therefore back-filled for about 60 feet with gravel, and a conventional Hallrow wedge set at 505 feet 10 inches during the night shift 8/9 January, and the hole was drilled past this with some difficulty.

9. Another conventional wedge was set at 583 feet on 11th January, but the drill ran very roughly when opening out the hole, and another twist-off was suspected when it began to run freely at 563 feet 3 inches. Severe weather conditions hampered work until the night 12/13 January, when efforts were made to fish for the reamer body, 5 feet of rod, and bullnose bit that had been twisted off. They were successfuly retrieved on 15th January, and drilling continued without further serious interruptions, except those due to the weather, until completion of the hole.

10. Results. The hole reached the Great Limestone about 60 feet horizontally from its target at the level of the High Flat, the flat that was the main source of ore at this end of the Boltsburn Vein. More definite signs of mineralisation might have been expected in flats at about half that distance from the Vein, but the following favourable results were none-the-less obtained:

(a) The Great Limestone is overlain by about 20 feet of mudstone (see core log appended), the thickness of which is generally regarded as favourable to mineralisation in the limestone, as it tends to restrict upward movement of the mineralising solutions.

(b) The observed replacement of the Four-Fathom Limestone, below the Great Limestone, can be assumed to be associated with nearby mineralisation.

(c) The observed carbonate development in the Little Whin Sill below the Four-Fathom Limestone, giving "White Sill", is also generally considered to indicate proximity of a mineral vein.

(d) Judging from its position, the fault zone intersected between 1075 and 1,106 feet is probably the Boltsburn Vein, although in country rocks that were not favourable to economic mineralisation.

11. The stratigraphy revealed by BH1 above the Great Limestone (see core log appended) is generally similar to that in the Ruth Shaft at the Ramshaw Mine (see Progress Report for August 1971), and similar to that in the Rookhope Borehole from the Great Limestone downwards, except that the Little Whin Sill is higher and thicker in BH1 (20 feet compared with 6 feet in the Rookhope Borehole).

12. Sampling. No obviously important mineralisation was intersected by BH1; sampling and assaying, which could be expected to produce only interesting supplementary information, has therefore been deferred until the results of BH2 are available.

13. Borehole No. 2. On instructions from Mr. R.H. Jack of ACMIM, who visited the site and conferred with the M & S site geologist, BH2 was started from a site almost identical with that of BH1 at a lesser inclination in the expectation that it would steepen to reach a target a short distance horizontally beyond the Great Limestone, on the side where the flats were apparently more strongly developed in the latest Boltsburn workings. At the time of writing, this had flattened instead of steepening, but had been successfuly wedged downwards and was inclined 69° at 400 feet, 71° at 500 feet, 73° at 600 feet, which appeared to aim the hole directly at its target.

London
February 1973

F.H. Fitch
Mackay & Schnellmann Ltd.

CKAY & SCHNELLMANN LTD CLIENT NCB PROJECT WEARDALE

396816E
544695N

Elevation 1533' Inclination 70°-79° Drill BBS 20 Geologist Neil Scott- Date Started 6.12.72 Hole No. 1

Bearing 337° Final Depth 1140-0 Drillers Colin Beardsley, Charles Reily & Mick Brown. Date Stopped 30.1.73 Sheet No. 1

Depth From	Depth To	Bit Size/ Type	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%	REMARKS
0	15-0	NX	Nil	Open hole								Bedding angle to core axis 70°-80° throughout
15-0	56-9		95	Hard, weathered, generally medium to coarse grained, micaceous, feldspathic sandstone with occasional micaceous or carbonaceous partings. Iron stained, particulary in the upper part. Fractures iron stained, fracture angle to core axis (FA) about 25°.								First Millstone Crit.
56-9	64-6		85	Firm, dark grey, micaceous mudstone greenish, soft and weathered at the base, fossiliferous at 63-0 with fireclay and plant debris 63-0 to 64-6. Mudstone passes into								
64-6	67-0		100	Rather hard, greenish, weathered, micaceous siltstone with occasional micaceous partings, near vertical fractures iron stained.								
67-0	69-3		100	Firm, greenish, weathered, generally silty micaceous mudstone, passing into								

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
69-3	82-3	NX	80	Firm, dark grey micaceous mudstone, abundant plant debris below 81-0, some harder bands.									
82-3	87-0		100	Hard, pale, fine grained, micaceous sandstone with dark, micaceous, silty mudstone laminations, passing into									
87-0	89-0		100	Rather hard, grey, micaceous siltstone with dark, micaceous, silty mudstone laminations, passing into									
89-0	91-6		100	Rather hard, dark grey, micaceous, silty mudstone with pale, micaceous siltstone laminations, passing into									
91-6	92-6		100	Rather hard, grey, micaceous siltstone, passing into									
92-6	104-3		75	Firm, dark grey mudstone with occasional harder silty micaceous sections. Fossiliferous 103-6 to 104-3, passing into									Verticality test at 100-0 : Azimuth 337° Inclination 71°
104-3	104-6		100	Rather hard, grey, fossiliferous, calcareous mudstone.									
104-6	106-3		100	Firm, dark grey mudstone with calcareous marine fossil debris.									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
106-3	110-9	NX	100	Rather crumbly, grey, oolitic mudstone. Scattered plant debris. Mudstone passes into									
110-9	112-9		100	Hard, pale, fine grained, silicified sandstone, fracture (FA 25°) iron stained with traces of pyrite. Sandstone passes into									
112-9	115-9		100	Firm, grey, micaceous oolitic, silty mudstone, passing into									
115-9	121-6		95	Firm, grey mudstone, becoming dark and carbonaceous towards the base. Some thin ironstone bands.									
121-6	122-3		100	Rather hard, dark grey, chalybitic mudstone, pyritic in parts, passing into									
122-3	123-0		100	Rather hard, grey pyritic muddy limestone with calcareous fossil debris. Partial limonitisation along vertical fracture. Muddy limestone passes into									
123-0	124-3		100	Firm, dark grey mudstone, passing into									
124-3	125 6		100	Hard, grey, bioclastic limestone. Partial limonitisation along fracture (FA 25°).									Crinoidal Limestone

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
125-9	128-6	IN	100	Firm, grey, micaceous, silty mudstone, soft and crushed in parts, passing into									
128-6	128-6		100	Hard, pale, broken, fine grained silicified sandstone, fracture surface iron stained. Sandstone passes into									
130-6	132-9		100	Hard, pale, fine grained, partially silicified sandstone with dark, carbonaceous plant debris. Fracture surfaces (FA 25°) iron stained. Sandstone passes into									
132-9	136-3		100	Rather hard, pale , micaceous, silty mudstone, passing into									
136-3	140-0		100	Hard, pale, fine grained micaceous sandstone, fracture surface (FA 30°) iron stained. Sandstone passes into									
40-0	168-6		95	Uniform, hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings, and one or two thin, mudstone bands.									Grindstone Sill
68-6	170-6		75	Firm, dark grey mudstone.									
70-6	177-6		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, irregular micaceous partings and one or two thin, dark, silty mudstone bands.									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type		Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
177-6	178-0	NX	100	Dark grey, micaceous, silty mudstone band.										
178-0	178-3		100	Hard, pale, fine grained micaceous sandstone band.										
178-3	178-6		100	Dark grey, micaceous, silty mudstone band.										
178-6	179-0		100	Hard, pale, fine grained micaceous sandstone band.										
179-0	179-6		100	Dark grey, micaceous, silty mudstone band.										
79-6	183-0		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings.										
83-0	185-0		100	Dark grey, micaceous, silty mudstone with thin, pale siltstone laminations and bands.										
85-0	186-9		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings.										
86-9	196-0		95	Dark grey, firm, micaceous, silty mudstone with occassional harder, thin, pale siltstone bands. Scattered, infrequent plant debris.										

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
196-0	197-9	NX	100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings. Some thin, dark mudstone laminations.									
197-9	198-3		100	Dark grey, micaceous, silty mudstone band.									
198-3	199-0		100	Hard, pale, fine grained, micaceous sandstone with one dark, micaceous mudstone band.									
199-0	199-3		100	Dark grey, micaceous mudstone band.									
199-3	201-6		70	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings.									
201-6	209-9		100	Firm, dark grey, micaceous mudstone with occasional harder, siltier bands. Scattered, infrequent plant debris. Mudstone passes into									Verticality test at 200-0 Azimuth 341° Inclination 72°
209-9	219-3		95	Firm, dark grey, calcareous mudstone with abundant calcareous marine fossil debris, becoming harder and increasingly calcareous towards the base.									
219-3	221-6		100	Hard, grey, biclastic limestone.									Upper Felltop Limestone.

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Hole No.

Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
'21-6	232-6	NX	100	Hard, pale, fine grained, micaceous sandstone with a canister at the top. Occasional dark, micaceous partings and mudstone laminations, Occasional fracture surface iron stained. Sandstone passes into									
232-6	235-9		100	Hard, pale, fine grained, micaceous sandstone with dark, micaceous mudstone laminations. Thin veinlet of dolomite at 334-6.									
235-9	250-3		100	Firm, dark grey, micaceous mudstone with some harder, paler, silty mudstone or siltstone laminations and bands. Black and pyritic at 245-3, with pyritic nodule at 246-3. Scattered plant debris.									
250-3	253-0		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings. Thin veinlet of dolomite at 250-9.									
253-0	253-3		100	Dark, pyritic, micaceous mudstone with pale siltstone laminations.									
253-3	256-0		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings.									
256-0	256-6		100	Dark, micaceous mudstone with pale siltstone laminations									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%	REMARKS
256-6	259-6	N	100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings.								
259-6	259-9		100	Dark grey mudstone band, crushed.								
259-9	268-0		100	Hard, pale, fine grained, micaceous sandstone with dark, micaceous partings. Some sections including micaceous partings, crushed thin veinlet of dolomite at 261-6. Sandstone with micaceous partings passes into								
268-6	293-9		100	Uniform, hard, fine to medium grained, micaceous sandstone with infrequent, dark, micaceous partings. Some coarse grained sections. Thin fracture (FA 25°) at 268-6 lined with dolomite and traces of galena, fracture (FA 30°) at 292-6 lined with pyrite.								
293-9	298-3		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings, and at the base coaly partings. One section with micaceous partings, crushed fracture (FA 30°) at 294-3, with traces of galena, fracture (FA 10°) at 295-9 with traces of pyrite.								

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
298-3	300-3	MX	100	Firm, dark grey, micaceous mudstone with occasional thin, paler, silty mudstone bands. Scattered plant debris. Fracture (FA 20°) at 302-6 with dolomite.									Verticality test at 300-0 Azimuth 333° Inclination 74°
300-3	311-0		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings at the top. Fracture (FA 30°) at 310-0 lined with dolomite.									
311-0	312-6		100	Dark grey, micaceous mudstone with paler siltstone laminations and bands showing graded bedding. Scattered plant debris.									
312-6	330-9		100	Dark grey, firm, micaceous mudstone, scattered, infrequent plant debris. Fossiliferous 320-0 to 330-9. Fracture (FA 30°) at 317-6 lined with calcite. Mudstone passes into									
330-9	333-3		100	Dark grey, rather hard, silty micaceous mudstone.									
333-3	334-0		100	Black, carbonaceous mudstone with thin coal bands.									
334-0	334-9		100	Rather hard, grey, micaceous, silty mudstone with plant debris.									
334-9	335-3		100	Firm, black, coaly, carbonaceous mudstone.									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
335-3	335-9	NX	100	Rather hard, grey, micaceous, silty mudstone with plant debris.									
335-9	336-0		100	Hard, pale, fine grained sandstone.									
336-0	336-3		100	Firm, dark grey, micaceous mudstone.									
336-3	336-6		100	Rather hard, grey, micaceous, silty mudstone.									
336-6	342-6		100	Hard, pale, fine grained sandstone with dark, micaceous partings. Some dolomite on near vertical fracture surface at 337-0.									
342-6	393-9		100	Hard, pale, generally coarse to medium grained, micaceous, feldspathic sandstone. Occasional dark carbonaceous or coaly partings, and at the base including fragments of mudstone. Fracture surfaces (FA 30°) at 345-6 with traces of pyrite, (FA 25°) at 358-0 with traces of pyrite, (FA 20°) at 371-6 with quartz (FA 25°) at 382-6 with quartz.									Verticality Test at 350-0. 833° Azimuth 74° Inclination
393-9	402-0		100	Firm, dark grey, micaceous mudstone with occasional paler, silty mudstone bands. Scattered plant debris. Mudstone passes into									Verticality test at 400-0 334° Azimuth 75° Inclination.
402-0	403-0		100	Rather hard, grey, micaceous, silty mudstone, passing into									

Project Hole No. 1 Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
[illegible]-0	407-6	[illegible]	100	Hard, pale, generally medium grained, felspathic, micaceous sandstone with occasional darker, silty mudstone bands. Vertical fracture surface at 406-0 with traces of pyrite and sphalerite.									
407-6	409-6		100	Firm, dark grey, silty, micaceous mudstone. Scattered plant debris.									
409-6	446-6		100	Hard, pale, generally medium to coarse grained, micaceous, feldspathic sandstone with occasional dark, micaceous partings. Fracture (FA 25°) at 429-9 with calcite and quartz.									
446-6	455-0		100	Dark grey, firm, occasionally pyritic, micaceous mudstone. Scattered, infrequent plant debris. Thin dolomite veinlets 454-0 to 455-0.									Verticality Test at 450-0 336° Azimuth 76° Inclination
455-0	456-9		100	Black, carbonaceous mudstone. Scattered plant debris.									
456-9	456-10		100	Coal.									
456-10	457-0		100	Dark grey, micaceous mudstone with plant debris, passing into									
457-0	459-9		100	Hard, pale, fine grained, micaceous sandstone with dark, micaceous partings.									

Project [illegible] Hole No. 3 Sheet No. [illegible]

Depth		Bit No.	Recovery %	DESCRIPTION	Sample Number and Type		Depth		Assay/Test Results					REMARKS
From	To						From	To	%	%	%	%		
130-9	461-0	HX	100	Dark grey, micaceous mudstone with coaly partings, passing into										
461-0	462-6		100	Hard, pale, micaceous sandstone with dark, micaceous partings.										
462-6	464-6		100	Dark grey, firm, micaceous mudstone scattered plant debris, passing into										
464-6	470-6		100	Hard, pale, fine grained, micaceous sandstone with dark micaceous partings and one or two thin, dark mudstone bands.										
470-6	472-0		100	Rather hard, broken, dark grey, micaceous silty mudstone with pale siltstone bands.										
472-0	506-0		90	Hard, pale, generally medium to coarse grained, fractured, micaceous, feldspathic sandstone with occasional dark, micaceous or thin mudstone partings. Some coarse grained sections. Near vertical fractures lined with dolomite, quartz, calcite, pyrite, galena and sphalerite.										Vertically test at 500-0 Azimuth 330° Inclination 76°

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
306-0	516-6		Nil	Open hole									
516-0	566-6		95	Hard, generally medium to coarse grained, fractured, micaceous, feldspathic sandstone with occasional dark, micaceous or thin mudstone partings. Conglomeratic towards the base, some sections broken. Near vertical fractures lined with dolomite, quartz, calcite, pyrite, galena and sphalerite.									Verticality Test at 550-0 Azimuth 343° Inclination 77°
566-6	566-9		100	Firm, black carbonaceous mudstone, broken.									
566-9	567-6		100	Firm, dense, ferruginous mudstone with calcareous marine fossil debris, passing into									
567-6	568-6		100	Rather hard, dense, weakly calcareous ferruginous oolitic mudstone with abundant calcareous marine fossil debris and occasional dark, thin mudstone bands, passing into									
568-6	570-0		100	Rather hard, cavitous muddy limestone with occasional dark mudstone bands.									Crag Limestone. Hole backfilled to 500-0
500-0	566-6		100	Hard, generally medium to coarse grained, micaceous, feldspathic sandstone with occasional dark micaceous or mudstone partings. Some									Verticality Test at 550 ft. Inclination 77°

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
				Near vertical fracture surfaces lined with dolomite, quartz pyrite, calcite, sphalerite and chalcopyrite									
66-6	567-0	NX	100	Firm, black, carbonaceous mudstone, passing into									
67-0	568-3		100	Firm, dark, weakly calcareous mudstone with abundant marine fossil debris.									
68-3	568-9		100	Rather hard, dark dense ferruginous oolitic mudstone with dolomite veining, passing into									
68-9	570-3		100	Rather hard, grey bioclastic limestone with thin, dark mudstone bands.									Crag Limestone.
70-3	570-9		100	Firm, dark, carbonaceous mudstone with thin coal bands.									
70-9	575-9		100	Hard, pale ganister, pyrite on vertical fracture surface. Ganister passes into									
75-9	583-0		90	Hard, pale fine grained, micaceous sandstone with occasional dark, micaceous partings.									
67-0	568-3		100	Rather hard, grey, weakly calcareous mudstone with abundant calcareous fossil debris.									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
568-3	569-9	NX	100	Rather hard, dense ferruginous, oolitic mudstone with some calcareous marine fossil debris. Dolomite veining. Ironstone passes into									
568-9	570-6		100	Hard, grey, bioclastic limestone with dark mudstone bands, passing into									
570-6	571-0		100	Firm, dark, carbonaceous mudstone.									Crag Limestone
571-0	576-0		100	Hard, pale, fine grained gannister, passing into									
576-0	589-0		100	Hard, pale, fine grained, micaceous sandstone with dark, micaceous partings. Near vertical fracture lined with dolomite and pyrite.									Firestone Sill
589-0	589-6		100	Firm, dark grey, micaceous, silty mudstone, passing into									
589-6	590-3		100	Hard, pale, fine grained sandstone with darker siltstone bands. Dolomite on near vertical fracture surfaces.									
590-3	599-9		100	Firm, dark grey, micaceous mudstone with occasional siltstone bands. Fossiliferous at 593-6, 595-6 to 596-0, 598-0 and 599-0 to 599-6. Dolomite and calcite veining along fractures at some siltstone bands and fossiliferous mudstone. Slight shearing.									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
599-9	601-6	NX	100	Hard, pale, fine grained sandstone with dark, micaceous mudstone laminations and dark carbonaceous plant debris. Some calcareous fossil debris.									Verticality Test at 600 feet Inclination 72° Azimuth 343°
601-6	602-6		100	Firm, dark grey mudstone.									
602-6	615-3		100	Hard, pale, fine grained, micaceous sandstone with occasional dark, micaceous partings. Near vertical fracture at 614-0 lined with dolomite and with traces of pyrite. Sandstone passes into									
615-3	616-0		100	Firm, dark grey, micaceous silty mudstone.									
616-0	625-9		100	Firm, dark grey, micaceous, pyritic mudstone with scattered fossil debris and some fossiliferous bands. Some ironstone nodules.									
625-9	635-9		100	Hard, pale, micaceous sandstone with dark, mudstone partings, some dark, carbonaceous plant debris and infrequent calcareous marine fossil debris.									
635-9	667-9		100	Firm, dark grey, micaceous mudstone with harder, paler, silty mudstone laminations and thin bands above 650-0. Fossiliferous at 636-3. Carbonaceous plant debris. Broken 640-0 to 642-6.									

Project Hole No. Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
656-3	675-6	HK	90	Firm, dark grey, micaceous mudstone with scattered plant debris, fossiliferous at 674-6. Occasional traces of pyrite on fracture surfaces.									Wedge set at 677-9
675-6	676-6		100	Rather hard, dark, ferruginous, oolitic mudstone with calcareous marine fossil debris, passing into									
676-6	677-9		100	Hard, pale, medium grained ganister with abundant dark, carbonaceous plant debris.									
677-9	686-9		100	Firm, dark, micaceous, pyritic mudstone with scattered, infrequent marine fossil debris. Mudstone passes into									
686-9	688-0		100	Rather hard, dark, ferruginous oolitic mudstone with abundant calcareous marine fossil debris.									
688-0	688-9		100	Hard, pale, medium grained ganister with abundant dark, carbonaceous plant debris, passing into									
688-9	704-0		100	Hard, pale, generally fine grained sandstone with some dark, carbonaceous partings and laminations and scattered calcareous marine fossil debris. Sandstone becomes increasingly argillaceous below 702-6. Narrow,									

Project Hole No. 1 Sheet No. - -

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
				near vertical veining of calcite, dolomite, pyrite, quartz and sphalerite below 693-3. Siltstone passes into,									Verticality test at 700 ft. Inclination 78° Azimuth 346°
704-0	729-0	NX	100	Firm, dark grey, micaceous, pyritic mudstone with scattered, infrequent plant debris. Some hard ironstone bands. Fossiliferous at 729-0.									
729-0	731-0		100	Hard, dark ferruginous mudstone with abundant calcareous marine fossil debris. Traces of calcite, dolomite and galena on fracture surfaces.									
731-0	737-9		100	Hard, grey, bioclastic limestone. Some thin, near vertical veins of calcite, dolomite with traces of galena and fluorite. One stylolite.									Little Limestone
737-9	738-6		100	Hard, grey, micaceous sandstone with dark, micaceous partings and at the base, coaly partings.									
738-6	739-9		100	Firm, dark grey mudstone with abundant plant debris and one paler, siltier section.									
739-9	739-10		100	Coal									
739-10	743-9		100	Rather hard, grey, pyritic micaceous mudstone with dark, micaceous partings. Traces of pyrite and galena on vertical fracture.									

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
743-9	744-3	NX	100	Hard, grey, medium grained sandstone with dark, carboneceous partings.									
744-3	744-6		100	Firm, black, carbonaceous mudstone band.									
744-6	746-0		100	Hard, pale, medium grained, micaceous sandstone with occasional dark micaceous partings. Thin pyritic band at 745-6. Some quartz on fracture surfaces (FA 30°).									
746-0	746-3		100	Firm, dark, micaceous mudstone band with scattered plant debris. Mudstone passes into									
746-3	749-6		100	Hard, pale, generally fine grained, micaceous sandstone with occasional dark, micaceous mudstone laminations and bands and micaceous partings. Near vertical fracture at 747-9 lined with dolomite.									
749-6	750-6		100	Firm, dark, micaceous mudstone with harder, paler siltstone laminations and bands.									Verticality test at 750 ft. Inclination 77° Azimuth 341°
750-6	761-6		100	Hard, pale, generally fine grained, micaceous sandstone with dark, micaceous partings, some thin mudstone laminations and occasional finer grained siltstone sections. Fractured and fragmented 754-0 to 755-0 with									

Project Hole No. Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
781-9	781-9	NX	100	Uniform, firm, dark grey, micaceous mudstone with scattered, infrequent plant debris. Pyritic at the base.									
781-9	782-9		100	Coal.									
782-9	783-3		100	Soft, black, carbonaceous mudstone.									
783-3	784-3		100	Firm, grey mudstone.									
784-3	785-0		100	Hard, dark grey, argillaceous limestone, passing into,									)
785-0	786-0		100	Hard, clean, blue-grey, bioclastic limestone, passing into,									)
786-0	787-6		100	Hard, dark grey, calcareous mudstone with abundant marine fossil debris, passing into,									)
787-6	788-3		100	Hard, clean, blue-grey, bioclastic limestone, passing into,									)
788-3	788-6		100	Firm, dark, calcareous mudstone band with abundant marine fossil debris, passing into,									) Part of Great Limestone
788-6	795-3		100	Hard, clean blue-grey, bioclastic limestone with occasional thin, darker, argillaceous bands. Some thin, near vertical calcite veining. Limestone passes into,									)

Project

Hole No. 1

Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
795-3	796-9	NX	100	Firm, dark, calcareous mudstone with abundant marine fossil debris, passing into,									)
796-9	798-0		100	Hard, clean, blue-grey, bioclastic limestone, passing into,									)
798-0	799-0		100	Firm, dark grey, calcareous mudstone with abundant marine calcareous fossil debris, passing into,									)
799-0	802-9		100	Hard, clean, blue-grey, bioclastic limestone. One stylolite. Some thin, near vertical calcite veining and flecks of pyrite. Limestone passes into,									)
802-9	803-3		100	Firm, dark grey calcareous mudstone with abundant marine fossil debris, passing into									)Part of Great Lime-)stone.)Verticality test at)800 ft.)Inclination 76°
803-3	804-3		100	Hard, clean, blue-grey, bioclastic limestone.									)
804-3	808-3		75	Hard, dark grey, cavitous, weakly calcareous limestone. Some fluorite, dolomite and galena lining fractures and cavities.									)
808-3	816-9		100	Hard, clean, blue-grey, bioclastic limestone with occasional dark, calcareous mudstone partings. Some stylolites.									)

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
816-0	819-3	NX	100	Coral biostrome.									)
819-3	858-0		100	Hard, clean, blue-grey, bioclastic limestone with occasional dark, irregular partings. Frequent styolites. Near vertical one inch vein of dolomite, calcite, pyrite and fluorite from 821-6 to 824-0, elsewhere, scattered, thin calcite veins. Limestone. pyritic and slightly argillaceous at the base.								) Part of Great) Limestone.) Verticality test at) 850 ft.) Inclination 77°) Azimuth 344°))))
858-0	861-0		100	Hard, fine grained, micaceous sandstone with occasional dark, micaceous partings and at the base, thin mudstone bands. Dark carbonaceous plant debris at the top. Fracture (FA 20°) lined with calcite. Sandstone passes into,									
861-0	862-6		100	Rather hard, grey, micaceous siltstone with dark mudstone partings and laminations. Scattered plant debris in the mudstones. Siltstone passes into,									
862-6	863-9		100	Firm, dark grey, pyritic mudstone, scattered plant debris.									
863-9	867-0		100	Hard, pale, generally medium grained, micaceous sandstone with occasional dark micaceous partings. Fine grained and with calcareous									

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
				marine fossil debris at the base. Fracture (FA 20°) at 566-0 lined with dolomite. Fine sandstone passes into,									
867-0	868-9	NX	100	Firm, dark grey mudstone, scattered fossil debris, passing into,									
868-9	869-0		100	Firm, dark grey, ferruginous, oolitic mudstone with marine calcareous fossil debris.									
869-0	869-6		100	Hard, fine grained sandstone with dark, carbonaceous partings and calcareous marine fossil debris.									
869-6	870-3		100	Hard, pale, argillaceous limestone.									
870-3	872-0		100	Firm, dark, pyritic mudstone, passing into,									
872-0	872-6		100	Hard, pale siltstone with dark mudstone laminations, passing into,									
872-6	874-0		100	Rather hard, dark, silty mudstone with dark, micaceous mudstone bands. Abundant marine fossil debris. Silty mudstone passes into,									
874-0	876-0		100	Firm, dark grey mudstone with scattered marine fossil debris. Some pyritic nodules. Mudstone passes into,									

Project Weardale Hole No. 1 Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
876-6	876-9	NX	100	Rather hard, dark, pyritic, calcareous mudstone with abundant calcareous marine fossil debris, passing into,									
876-9	877-3		100	Hard, pale, bioclastic limestone, passing into,									
877-3	881-6		100	Firm, dark grey mudstone with scattered marine fossil debris. Thin calcareous mudstone band with calcite septaria at 879-6. Scattered, thin calcite veins. Mudstone passes into,									
881-6	882-0		100	Rather hard, dark, argillaceous, bioclastic limestone.									Iron Post Limestone.
882-0	883-6		100	Hard, pale, micaceous ganister, some thin, near vertical dolomite veining.									
883-6	887-0		100	Hard, pale, micaceous sandstone with abundant dark, carbonaceous plant material and occasional dark mudstone laminations. Fractures (FA 30°) lined with dolomite and quartz.									
887-0	907-3		100	Hard, pale, medium grained, micaceous sandstone with occasional dark, micaceous partings. Some thin, near vertical veins of dolomite.									Verticality test at 900 ft. Inclination 77° Azimuth 330°

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type		Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
907-3	908-9	TX	100	Hard, rather dark, micaceous sandstone with dark mudstone laminations and mudstone fragments.										
908-9	909-0		100	Firm, dark grey mudstone.										
909-0	909-6		100	Hard, fine grained sandstone with dark, micaceous partings, passing into,										
909-6	909-9		100	Firm, dark grey mudstone, passing into,										
909-9	910-9		100	Hard, fine grained sandstone with dark mudstone partings, passing into,										
910-9	931-6		100	Firm, dark grey, micaceous mudstone with some silty mudstone bands at the top. Scattered, infrequent plant and marine fossil debris. Occasional thin, near vertical calcite veins. Mudstone passes into,										
931-6	933-9		100	Firm, dark grey, calcareous mudstone with abundant marine fossil debris. Mudstone becomes harder and more calcareous towards the base and passes into,										
933-9	934-9		100	Hard, dark, argillaceous, bioclastic limestone, passing into,										Part of Four Fathom Limestone.

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
934-9	958-0	NX	100	Hard, clean, blue-grey, bioclastic limestone. Some styolites. Occasional thin, near vertical veins of dolomite and calcite and some calcite recrystallisation. Traces of sphalerite at 958-0.									Part of Four Fathom Limestone.
958-0	962-0		100	Hard, greenish, cavitous, partially replaced limestone. Replacement mineralisation substantially of dolomite or siderite with subordinate calcite, fluorite and galena. Pyritic at the base.									
962-0	962-6		100	Hard, pale, pyritic sandstone with dark, carbonaceous plant debris. Some thin dolomite veining. Sandstone passes into,									
962-6	968-3		100	Pale grey, silty, micaceous mudstone with some harder sandstone bands passing into,									
968-3	971-6		100	Rather had, dark grey, silty mudstone with paler siltstone bands. Scattered plant debris. Some calcite veining with traces of galena and sphalerite. Mudstone passes into,									
971-6	972-0		100	Hard, baked, pyritic mudstone.									

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
972-0	999-3	MX	100	Hard, greenish, carbonatised dolerite. Calcite veining (20° to 10°) associated with slickensides at 976-6 and 997-6.									Little thin Till
999-3	1000-6		100	Pale grey, baked, silty mudstone, passing into,									Verticality test at 1000 ft. Inclination 72° Azimuth 340°
1000-6	1006-6		100	Hard, pale, generally medium grained sandstone with occasional dark, micaceous partings.									
1006-6	1008-0		100	Firm, dark grey, pyritic mudstone.									
1008-0	1025-0		100	Hard, pale, generally medium grained sandstone with occasional dark, micaceous partings, passing into,									
1025-0	1043-6		100	Hard, pale, fine grained sandstone with occasional dark grey mudstone laminations or bands. Slump structures. Fine grained sandstone passes into,									
1043-6	1055-0		100	Rather hard, grey siltstone with darker micaceous, silty mudstone partings and laminations. Fairly frequent calcareous laminations. Slump structures. Siltstone passes into,									

Project Hole No. 1 Sheet No.

Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
053-0	1063-0	NX	100	Grey, micaceous, silty mudstone with paler silty and calcareous laminations dark, micaceous partings and slump structures. Thin calcite vein (FA 20°) at 1060-0. Infrequent plant debris. Silty mudstone passes into,									
063-0	1075-3		100	Firm, dark grey, micaceous mudstone with scattered plant debris. Fragmented 1073-6 to 1075-0 with some fracturing and shearing 1074-6 to 1075-0.									
075-3	1079-3		100	Mudstone breccia, hard and well cemented with quartz mineralisation 1075-3 to 1077-6, fragmented 1077-6 to 1079-3. Subordinate dolomite with traces of galena and sphalerite minralisation.									Fault zone of Boltsburn Vein.
079-3	1099-0		100	Firm, dark grey mudstone with some fracturing and brecciation 1079-3 to 1082-6 with quartz and dolomite mineralisation. Broken throughout with widespread shearing. Dolomite and calcite septaria in calcareous ironstone nodules or bands at 1193-6 and 1196-3. Dolomite veining with traces of galena and pyrite at 1196-3.									Fault zone of Boltsburn Vein.

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Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
099-0	1104-9	NX	100	Mudstone-limestone breccia with mudstone fragments from 1099-0 to 1099-6 and at the base with limestone fragments elsewhere. Cement of quartz with traces of galena and sphalerite. Some dolomite veining.									Three yard Limestone. Verticality test at 1100 ft. Inclination 73° Azimuth 340° Fault zone of Boltsburn Vein.
1104-9	1106-3		100	Firm, dark grey mudstone with marine fossil debris. Mudstone invaded with extensive dolomite veining. Some quartz veining and traces of sphalerite on fracture (FA 15°) at 1106-3. Small scale faulting.									
1106-3	1110-3		100	Friable, grey, sheared, patchily pyritic mudstone, passing into,									
1110-3	1111-0		100	Rather hard, grey, silty mudstone with some dolomite and quartz veining.									
1111-0	1112-9		100	Firm, dark grey, occasionally pyritic, micaceous mudstone with scattered plant debris. Traces of sphalerite, pyrite and dolomite on small fracture surface. Mudstone passes into,									
1112-9	1116-3	NX	100	Rather hard, grey, micaceous siltstone with dark, micaceous mudstone laminations, partings and thin bands slump structures. Near vertical vein of dolomite and quartz at 1113-0.									

Project

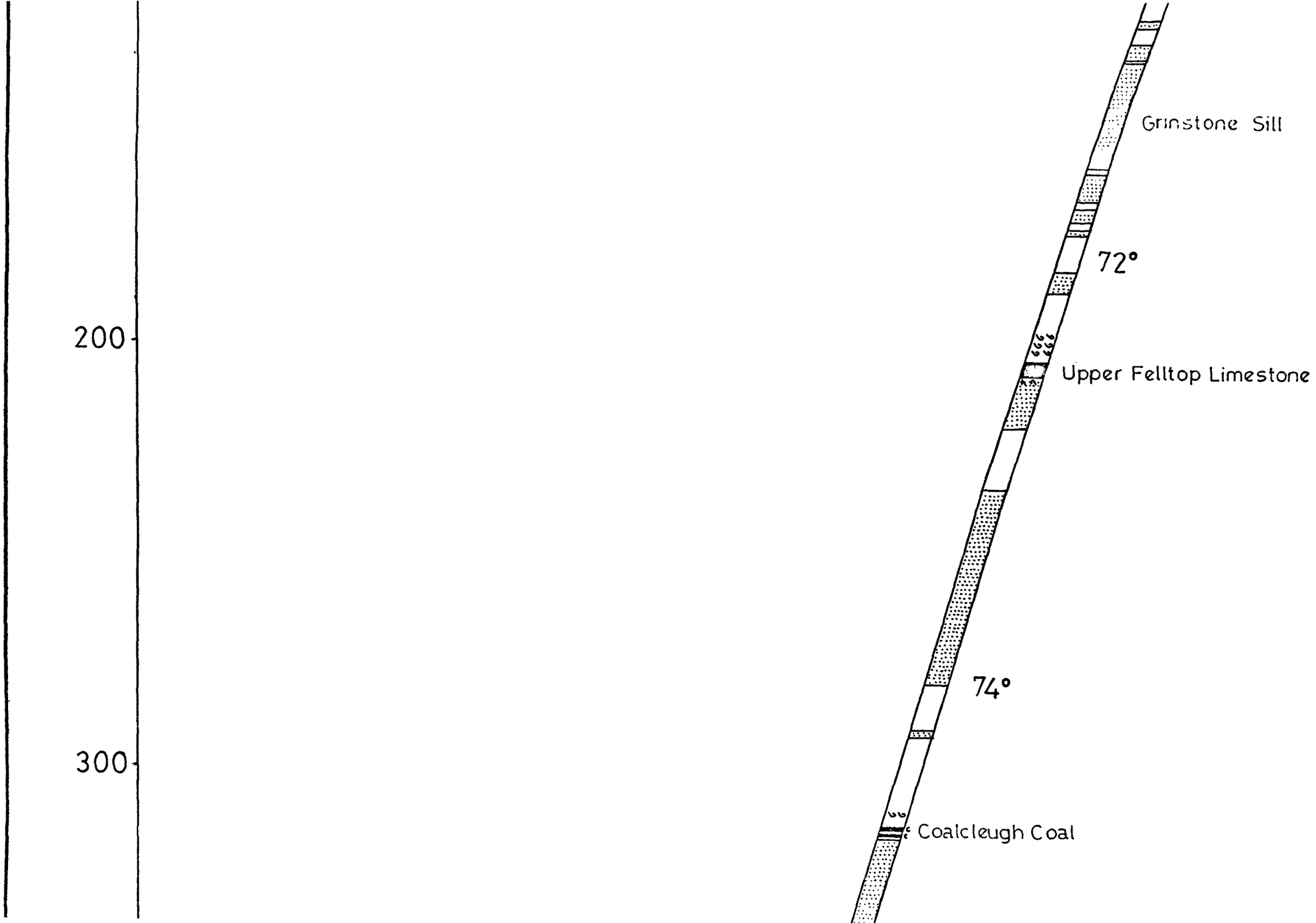
Hole No.

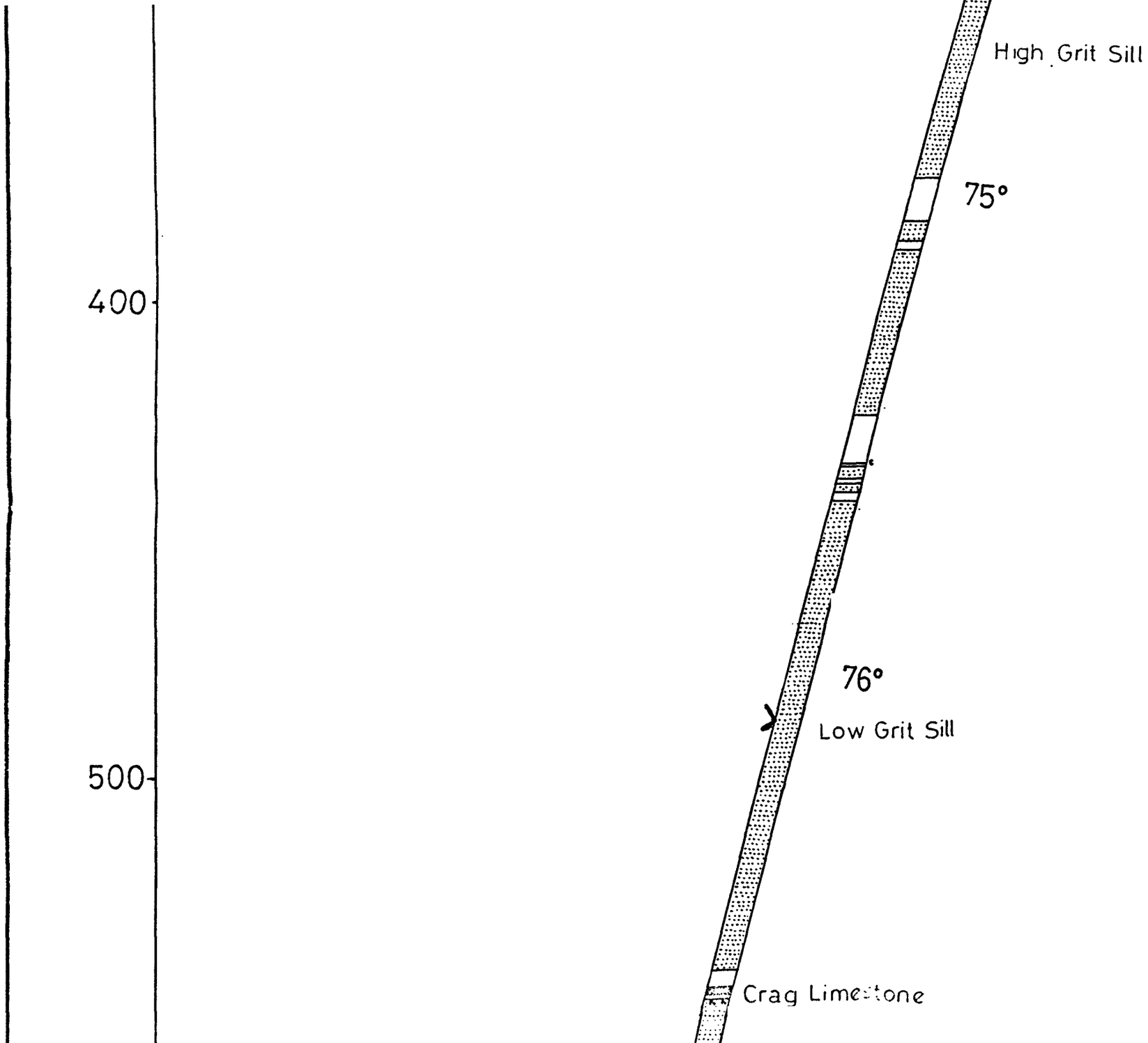
Sheet No.

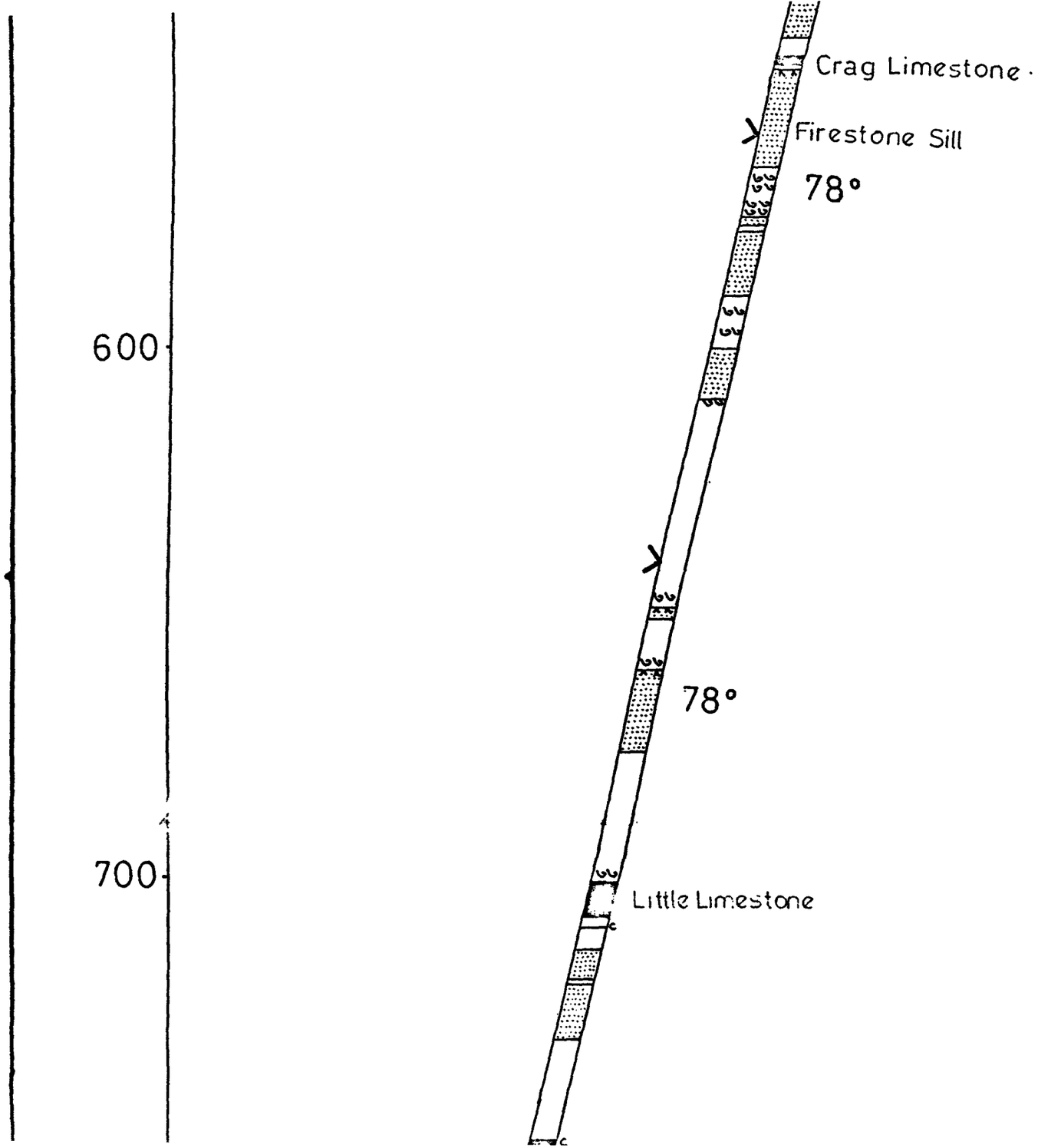
Depth From	Depth To	Bit No.	Recovery %	DESCRIPTION	Sample Number and Type	Depth From	Depth To	Assay/Test Results %	%	%	%		REMARKS
116-3	1128-0		100	Hard, generally medium grained, silicified sandstone with occasional dark, micaceous partings. Some thin dolomite veins and quartz mineralisation on fracture surfaces.									
128-0	1130-9		100	Firm, dark grey, micaceous, silty mudstone with pale siltstone laminations and bands. Some thin dolomite veining.									
130-9	1140-0		75	Firm, dark grey, micaceous, occasionally pyritic mudstone. Scattered plant debris.									
				End of Borehole.									

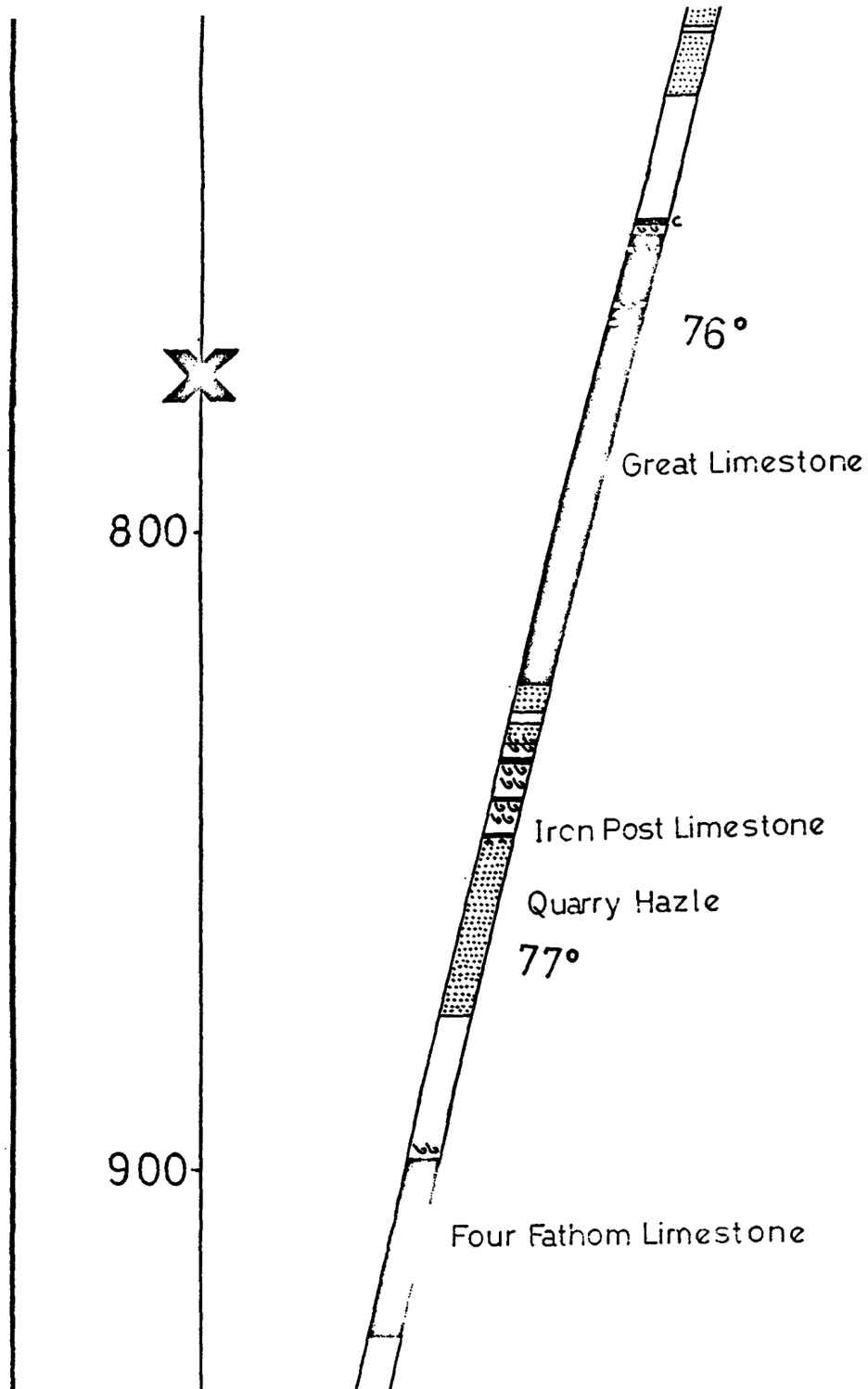
Project Hole No. Sheet No.

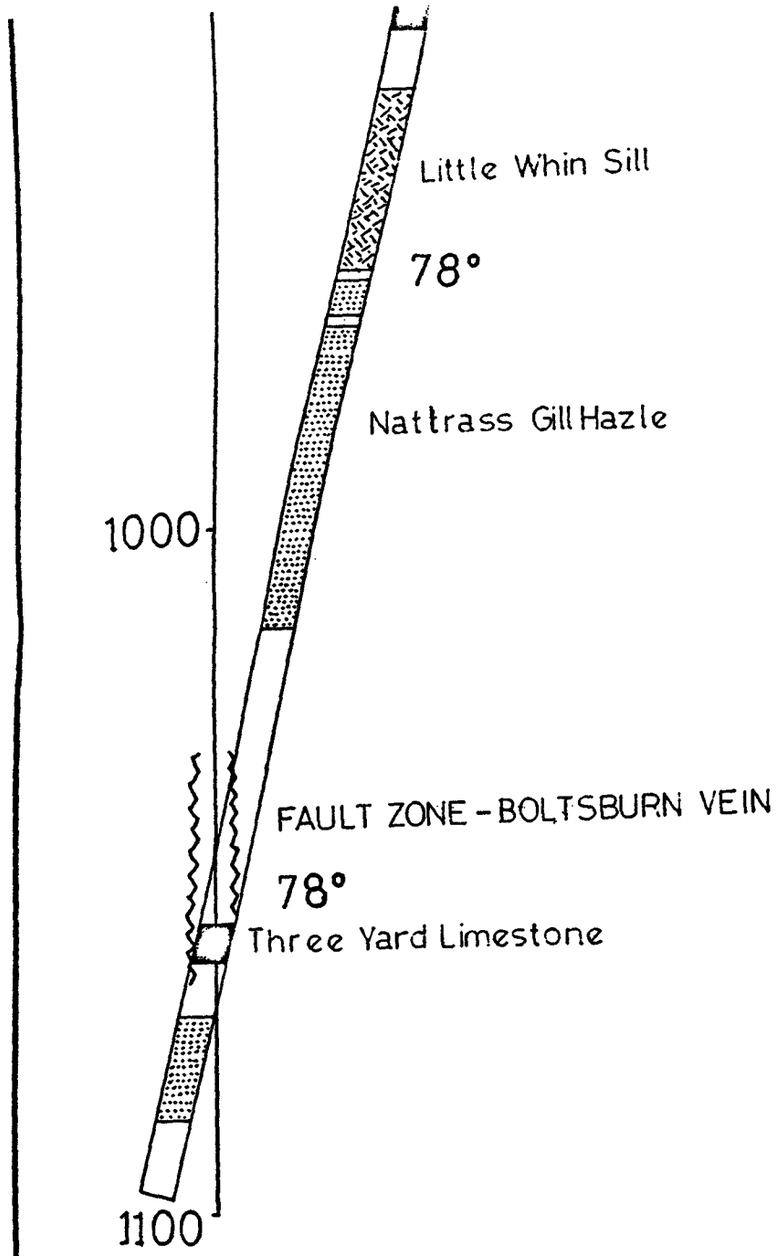
Simplified Graphic Log of Borehole BH1
Dead Friars
Acmin Exploration (UK) Ltd.


200
300
Grinstone Sill
72°
Upper Felltop Limestone
74°
Coalcleugh Coal


400
500
High Grit Sill
75°
76°
Low Grit Sill
Crag Limestone


600
700
Crag Limestone
Firestone Sill
78°
78°
Little Limestone


800
900
76°
Great Limestone
Iron Post Limestone
Quarry Hazle
77°
Four Fathom Limestone



Mudstone and Silty Mudstone

Sandstone and Siltstone

Limestone

Quartz Dolerite

c Coal

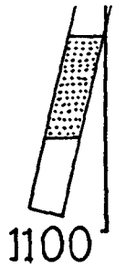
Marine Fossils

^^ Plant Fossils

70° Inclination in Degrees

TARGET

Wedge



PLAN VIEW OF BOREHOLE BH1

0 Horizontal Scale 100 200 300FE

Mackay and Schnellmann Ltd

February 197