THE HYDRO - ELECTRIC COMMISSION

TASMANIA

GREAT LAKE POWER DEVELOPMENT ??

CORNWALL COLLIERY TEST DRIVE

GEOLOGICAL NOTES

644 G.L. 27

Accompanied by:

Geological Plans A7040
C2626

AMG REFERENCE POINTS ADDED

C O N T E N T S.

I. ABSTRACT:

The similarity of conditions at Cornwall, where Triassic coal is mined under cover ranging up to 1,000 feet, and at the Great Lake Headrace Tunnel, which is expected to traverse some 7,600 feet of Triassic rocks under cover ranging from 300 feet to 1,300 feet, prompted the investigation in the Cornwall Mine aimed at determining the stresses on support systems and the effectiveness of grouted rock bolts.

The present workings at Cornwall are carried out by the Bord and Pillar method and the widths of bords range between two and four times the height. The openings are in coal and generally laminated sandstone, siltstone and mudstone forms the roof whereas mudstone forms the floor. Timber posts and caps are used for supports, but generally there are no floor struts.

Strata movement affecting roof, floor and walls frequently occurs. Under low cover failure is confined to the roof and a break occurs at the junction of the roof and one wall (or sometimes both walls) allowing the flat-lying rocks to separate along bedding planes thus loading the supports. Where the cover exceeds about 800 feet floor heave also occurs and if this is allowed to go unchecked it may result in complete closure of the opening. The relative severity of the floor movement may be attributed to the presence of weak, soft mudstones underlying the coal and the presence of stronger sandstones immediately overlying the seam.

A 50 foot test drive was driven in weakly squeezing ground under 880 feet of cover at the end of the main heading of the present workings. Six horseshoe sets with invert struts and two circular sets were installed at 2'6" centres and one of each type was instrumented. In addition, forty-one 8' x 1" roof bolts were grouted into the walls and roof of a section 22 feet 10 inches in length and a torque of 250 ft. lbs. was applied.

A second test area was chosen in more strongly squeezing ground but this was abandoned when an attempt to control the approaches by the installation of 8 ft. roof bolts was unsuccessful. A torque of 100 ft. lbs. could not be applied to the bolts, thus indicating that the fracture zone around the opening extends beyond 8 feet.

In the test area an average of 30 deep 'clicks' per minute were observed at the working face with the sub-audible noise detector. The level fell to 2 'clicks' per hour after the face remained untouched for one week. In the strongly squeezing Right Hand Workings an average of 100 and more 'clicks' per minute were recorded at the working face, but the level fell to 15 'clicks' per minute 100 feet back from the face. The observed 'clicks' were associated with the formation of the fracture zone around the opening.

Under conditions comparable with those prevailing in the Cornwall Test Section, circular and horseshoe shaped openings should prove satisfactory and light support and roof bolting should be sufficient to control strata movement.

The areas of considerable strata movement appear to be under high cover in the vicinity of the small north trending fault-trough, but evaluation of the situation is complicated by the presence of old workings above adjacent sections. This situation suggests that combinations of cover and faulting may present similar conditions at Great Lake.

'Heaving' is aggravated by the shape of the workings, the lack of invert struts and the continual 'brushing' of the floor. Failure to control the movement results in enlargement of the fracture zone and progressive deterioration. Thus adequate supports should be placed early. This support should extend the complete width of the opening to prevent roof failure adjacent to the walls.

II. INTRODUCTION:

1. General:

This report contains the geological data collected during the tunnel support experiments which were carried out in the Cornwall Colliery in the latter part of 1959.

These experiments were designed to provide information applicable to the headrace tunnel at Great Lake, for the Cornwall mine is located in Triassic sediments which are similar to those that will be encountered in the tunnel.

2. Location and Access:

The Cornwall Colliery is situated two miles north-west of St. Marys on the southern fall of the Mt. Nicholas Range (Refer Geological Sketch No. 13). The workings are located at an approximate altitude of 1400 ft. above sea level, which is some 600 feet above the general level of the 'Break O'Day' Plain. The range reaches an altitude of about 2800 feet above sea level.

The colliery is accessible by rail and road, the rail distance from Hobart (via Conara) being 135 miles.

3. Previous Work:

The published reports on the coalfields are contained in the works of Gould (1883), Twelvetrees (1901) and the Department of Mines (Bulletins No. 7, 1922, and No. 44, 1938).

In addition, the Department of Mines has drilled two holes on the Cornwall lease and one on the neighbouring Jubilee lease. The locations of these holes are shown on Geological Sketch No. 13, and their drilling records are included in the appendix.

4. Production:

The mine produces about 500 tons of coal per day and employs 134 persons.

III. STRATIGRAPHY.

1. General:

The Mt. Nicholas Range is a narrow north-east trending ridge of Triassic sediments capped by remnants of a dolerite sill.

Typical sections through the upper part of the sediments are provided by the two Cornwall bores (refer Geological Sketch No. 13), which are situated in a saddle on the crest of the range (Bore No. 1 is located about 1/3 mile north of bore No. 2). The sections consist of alternations of light to medium-grey, fine to medium-grained lithic sandstones, medium to dark grey siltstones and mudstones, black shale (clod) and coal. There are eight coal phases and thirteen coal seams. The seams range in thickness from 3 inches to 11 feet (the thickest seam measured in the district is 17 feet 5 inches).

The two drilling records may be compared by positioning the coal seam at 404 feet in D.H. No. 1 against the coal seam at 462 feet in D.H. No. 2. This indicates that there is fair correspondence

004

333005

AMG REFERENCE POINTS ADDED

Cornwall Bore 2
2050' (Approx)

Cornwall Bore 1.

Mount 2400'

Nicholas Dolerite

Jurassic

Machine Road

Main Heading

Sandstones

Triassic

Entrance Blairs Tunnel
1400' (Approx.)

AMG
595259mE
5398155mN

CORNWALL

Range Jurassic Dolerite

CORNWALL FAULT

Mudstones

Siltstones

Bore 1
JUBILEE
1600' (Approx)

FAULT

Permian Mudstones

Limestone

Gould

Slates

Jubilee Road

capped by Permian Sediments

N

Quaternary

CULLENSWOOD
825' (Approx.)

To Fingal

Alluvium

Jurassic Dolerite

ST MARYS

825' (Approx.)

Brook o'Day Plain

AMG
598731mE
5396010mN

To Swansea

5 cm

Locality
Sketch Map
of the
CORNWALL - ST MARYS AREA

Chains 10 0 1 Mile
0 1 2 3 4 5,000 Ft.
30 Chains to 1 Inch
(Approx)

Geology after H.G.W. Reid,
Coal Resources Bulletin No 7

Compiled From Air Photos - Uncontrolled Radial Line Plot.

GS13
16-10-59

between coal phases but little correspondence between the interveening sediments, for facies changes are considerable; sandstones in one hole are frequently represented by siltstones and mudstones in the other. Similar facies changes are reported (Mr. Geachie, former Cornwall Mine Manager: personal communication to the Geologist-in-Charge) to occur between the Cornwall and Mt. Nicholas mines in the rock lying between the two main seams worked. The rock is reported to change from 37 feet of mudstone and sandstone at Cornwall to 70 feet of sandstone at Mt. Nicholas. However, as a major fault separates the two workings some doubt exists about the coal correlations.

A section through the lower part of the Triassic sediments is provided by the Jubilee bore. The rocks consist of interbedded lithic sandstones, siltstones, mudstones and shales, which are similar to those encountered in the Cornwall bores, but only 1" of coal is present.

Approximately 1000 feet of section is represented by the cores of the three bores.

2. Depositional Environment:

The lack of marine fossils suggests that the sediments are fresh-water lacustrine deposits. The sedimentation was sporadic, alternating between periods of active deposition, represented by the sandstones, siltstones and mudstones, and periods of quiet, when the coal forming carbonaceous material accumulated. Much of the lithic (rock fragments) material in the sandstones is volcanic, which suggests derivation from erosion of a volcanic terrain or from direct volcanic activity.

3. Correlation:

In view of the rapid facies changes, and the possibility that the Triassic sediments of the State were deposited in a series of small lakes rather than one big lake, only local correlations are possible. Thus correlation between the beds at St. Marys and Great Lake cannot be made. However, the beds at Cornwall are similar to those of the Bradys Formation of the Great Lake area.

IV. STRUCTURE.

1. Dip of Strata:

In general the sediments of the Mt. Nicholas range dip at from 3° to 10° towards the south. Slight rolls occur in the coal seams but the area is comparatively free from these occurrences.

2. Faulting:

Considerable minor normal faulting has occurred on the Cornwall Lease but this has not greatly affected mining. The maximum displacement so far encountered is about 40 feet, and no difficulties were met in tunnelling through this fault. Calcite deposition has taken place in this fault zone and there are now no openings and the zone is completely dry.

The main structure in the mine is a small north trending asymmetric fault-trough, which incorporates the fault with 40' displacement.

V. MINE WORKINGS:

Three coal seams have been worked at Cornwall (Refer Plan A7040). In descending order, these are :

the 'Blue' Seam, of average thickness 9 feet;
the 'Hittit' Seam, of average thickness 8 feet 9 inches; and
the 'No. 4' Seam, of average thickness 2 feet 6 inches.

At present the Company mines only the lower part of the 'Hittit' seam. Some 5 feet 6 inches of coal lying below a persistent sandstone band is extracted and the remainder is left in the roof. The operations are carried out by mechanical (Joy Continuous Miner) and hand methods and some 2/3rds. of the coal is mined by hand. The 'Bord and Pillar' system of mining is used, for this is suitable for conditions where the floor rock is inclined to heave. The method consists of mining bords (drives) and leaving pillars for later extraction. A double entry system is used, with one heading acting as an intake air-way and haulage-way and the other as the return air-way and emergency exit. The main cross drives are also driven in pairs.

In the vicinity of the test drive the main haulage-way has an average width of 17 feet and a height of 5 feet 6 inches. It is timbered at intervals of about 8 feet by hardwood logs of 8" diameter. The pillars of coal average 45 feet wide and 175 feet long.

The abandoned workings in the overlying 'Blue' Seam were carried out by both the 'Bord and Pillar' and 'Longwall' systems. The main feature of the 'Longwall' method is that practically all of the coal is removed. A continuous face is maintained around the workings and as this face advances the roof behind is allowed to break. The system is particularly adaptable to thin seams where the roof settles and the floor tends to heave, for the waste rock is used for pack-walls to support the roof and maintain the road-ways.

VI. STRATA MOVEMENT.

The width of the bords ranges between 2 and 4 times the height, so that the shape is conducive to strata movement and this has frequently occurred.

Along the main heading of Blairs Tunnel failure is confined to the roof and the normal occurrence is for a break to occur at the junction of the roof and one wall (or less frequently at the junction with both walls) and for the flat-lying roof sediments to separate along bedding planes thus loading the pit supports. Generally the posts have been placed one or two feet from the walls and, as the caps do not extend to the walls, strips of roof adjacent to the walls have been left unsupported. Thus along many of the drives cracks have also developed in the roof above the ends of the caps and the unsupported section of the roof has fallen to the floor. This type of failure is shown on Plate III Figure 2.

Along the 'Machine Road' and the 'Right Hand Workings', where the main faults occur and the cover exceeds about 800 feet, both roof and floor failure takes place. Frequently floor heave is more severe than roof movement and this may be attributed to the presence of weak, soft mudstone underlying the coal and the presence of stronger sandstone immediately overlying the seam.

The 'Machine Road' was originally mined early in 1958 and since that time 12 to 18 inches of heave has occurred in the floor, buckling the rails and arching the centre of the floor. The road, however, is only lightly timbered and little to no movement has taken place at the base of the wooden supports. The area now appears to have stabilised. Movement along this road is shown on Plate IV.

Movement is more severe in the 'Right Hand Workings', and if unchecked results in complete closure of the opening, for the strata under the coal extrudes into the drive expanding until the floor meets the roof. As much as 12 inches of movement has occurred in 24 hours. In this section of the mine the floor heave is sufficiently severe to cause failure of the pit supports by rotation of their bases. The supports are installed with a slight inward slant at the top but as the floor heaves the bases are brought inwards and continued movement results in failure. This failure is shown on Plate III Figure 1.

The roadways in the squeezing areas are maintained by continual replacement of wooden supports and removal of heaved material by 'brushing' of the floor. The net effect is enlargement of the fracture zone around the opening and eventually the zone deteriorates so badly and rapidly that maintenance of the roadway is uneconomic.

Fretting takes place from the sides and roof of all openings in shale and coal and this has led to the failure of roof bolting by bearing plate failure.

VII. TEST DRIVE.

1. Location:

The test drive is an extension of the 'Hittit' seam workings and is located at the north-western end of Blairs Tunnel. The location is shown on Plan A7040.

2. Description:

The test chamber, which is 50 feet long, was shaped to accommodate horseshoe and circular sets of 13 foot internal diameter. Eight sets, consisting of 6 horseshoe sets (with invert struts) and two circular sets, were installed at 2'6" centres. In addition, a further section (22'10") is supported by forty-one, 8 foot by 1 inch roof bolts. A plan and a profile of the drive are shown on C2626.

The chamber was driven by hand in two man shifts. It took 1328 man hours. The coal was first removed then the roof and floor were shaped. For the first three sets the face was allowed to advance up to 11 feet ahead of set installation, but for the last 5 sets this advance was restricted to 8 feet.

During the early stages of the excavation excessive use of explosives disturbed the alignment of the first 6 sets, and these had to be re-installed. The accident indicated that at this stage there was little or no load on the sets.

3. Geology:

The drive was excavated in the 'Hittit' Seam and its roof and floor rocks. The section exposed, in descending order, consists of:

3. Geology (Contd.):

6"	Light to medium-grey mudstone
2"	Bituminous coal
18"	Black siltstone
2'6"	Laminated black carbonaceous shale (clod) and medium grey lithic sandstone
12"	Black shale (clod) with coal lenses
2"	Bituminous coal
4"	Black carbonaceous lithic sandstone
3"	Bituminous coal
1"	Grey fine-grained lithic sandstone
5'10"	Bituminous coal
19"	Mudstone with coal lenses. (To foot-plate of horseshoe set).

These beds dip to the south-east at 3°.

A small fault, with a maximum displacement of 5", runs in a longitudinal direction diagonally across the test chamber. In the roof sediments it dips to the west at 55°, but in the coal it is vertical. Along its length the mudstones are slickensided and thin ($\frac{1}{8}$") calcite veins occur in the coal, but the zone is now tight and dry.

Vertical jointing is prominent in both longitudinal and transverse directions.

4. Cover:

As shown on Geological Sketch No. 14 approximately 880 feet of Triassic sediments overlie the drive.

Blairs Tunnel runs oblique to the trend of the Mt. Nicholas Range, thus the cover increases northwards or over the right hand section of the mine.

For comparison, the maximum cover over the Great Lake Headrace Tunnel will be about 1300 feet of which some 900 feet will be dolerite.

5. Observations:

As the face advanced measurements were taken of the stresses and the radial deflections of the sets. These results will be analysed by Civil Designs.

In general, there is no evidence of heavy ground stress in the area. The sets are only lightly stressed and adequate support is maintained by the roof bolts. In the adjacent main heading sparce posts and caps, which were inserted mainly to control roof falls, are also adequate.

VIII. SECOND TEST AREA.

It was planned to undertake a second test drive in the heavily squeezing Right Hand Workings where the cover was approximately 980 feet. Parts of this area are still actively mined but other parts have been abandoned and heaving has been allowed to proceed unchecked. The access roadway is tortuous, narrow and low and thus it is difficult to transport heavy equipment such as sets. In order not to disrupt normal working an area had to be chosen which had the shortest access route and thus the area allocated was not removed from the influence of the old workings.

An attempt was made to improve and control the approaches to this area by the use of 8 foot by 1 inch roof bolts, but a torque of 100 ft. lbs. could not be applied to the bolts and the test was abandoned. The previous attempts to maintain the roadway by 'brushing' the floor had allowed the fracture zone around the opening to extend beyond 8 feet.

IX. SUB-AUDIBLE ROCK NOISE OBSERVATIONS.

Rock noise observations were made in the Test Areas, the Right Hand Workings and along the Machine Road using a 'Seismiphone' and a 'Mikroseis' Nr. 15.

In each case the observations were carried out working faces and at locations from 25 to 100 feet back from the faces. The listening posts consisted of $1\frac{1}{2}$" diameter holes drilled 4 feet into the rock and the periods of observation ranged up to 2 hours. The majority of observations were made manually during normal mine operations, but typical noises were also recorded on magnetic tape during meal breaks and after the completion of daily work. These recordings are available at the Geological Section.

The results of the observations are given in Table I.

The frequency of noise is greatest in the most actively squeezing ground - the Right Hand Workings - and the noise is greatest during the formation of the fracture zone around the opening.

TABLE I.

Location	Map Designation	Frequency of 'Deep Clicks' per Minute	Nature of Noise	Site Remarks	Approx. Cover	Relationship to Workings
Test Area No. 1	1 and 2	30	Singly, in Groups of 2 or 3, and in bursts of short duration ($\frac{1}{2}$ - 5 seconds)	Coal Face and Coal Wall	880'	1 - 10 hours after firing.
	1 and 2	1/30	"	Coal Wall	880'	7 days after firing.
Test Area No. 2	6	15	"	Coal Wall	980'	Large pillar adjacent to airway
Right Hand Workings	3	100 or greater	"	Coal Face	980'	Working face during meal breaks and after completion of daily work.
	5	15	"	Coal Wall	980'	Large pillar adjacent to airway; 100 ft. from coal face.
Machine Road Workings	4	50	"	Coal Face	980'	Working face during meal breaks and after completion of daily work.
	7	5	"	Coal Wall	980'	100 feet from working face.

X. CONCLUSIONS.

In relating the work at Cornwall to the Great Lake Headrace tunnel the following conclusions are drawn:

1. Under conditions comparable with those prevailing in the Cornwall Test Section, circular and horseshoe shaped openings should prove satisfactory and light support and roof bolting should be sufficient to control strata movement.

2. The areas of considerable strata movement appear to be under high cover in the vicinity of the small north trending fault-trough, but evaluation of the situation is complicated by the presence of old workings above adjacent sections. This situation suggests that combinations of cover and faulting may present similar conditions at Great Lake.

3. 'Heaving' is aggravated by the shape of the workings, the lack of invert struts and the continual 'brushing' of the floor.

4. Failure to control 'heaving' can result in enlargement of the fracture zone and progressive deterioration. Thus supports should be placed early to attempt to control the condition.

5. Supports should extend the complete width of the openings to prevent roof failure adjacent to the walls (See Plate III).

SJP/NW
29/4/1960

Figure 1. TestbArea No. 1. Fault in carbonaceous sandstone in the face and back at the location of the third 'horseshoe' set.

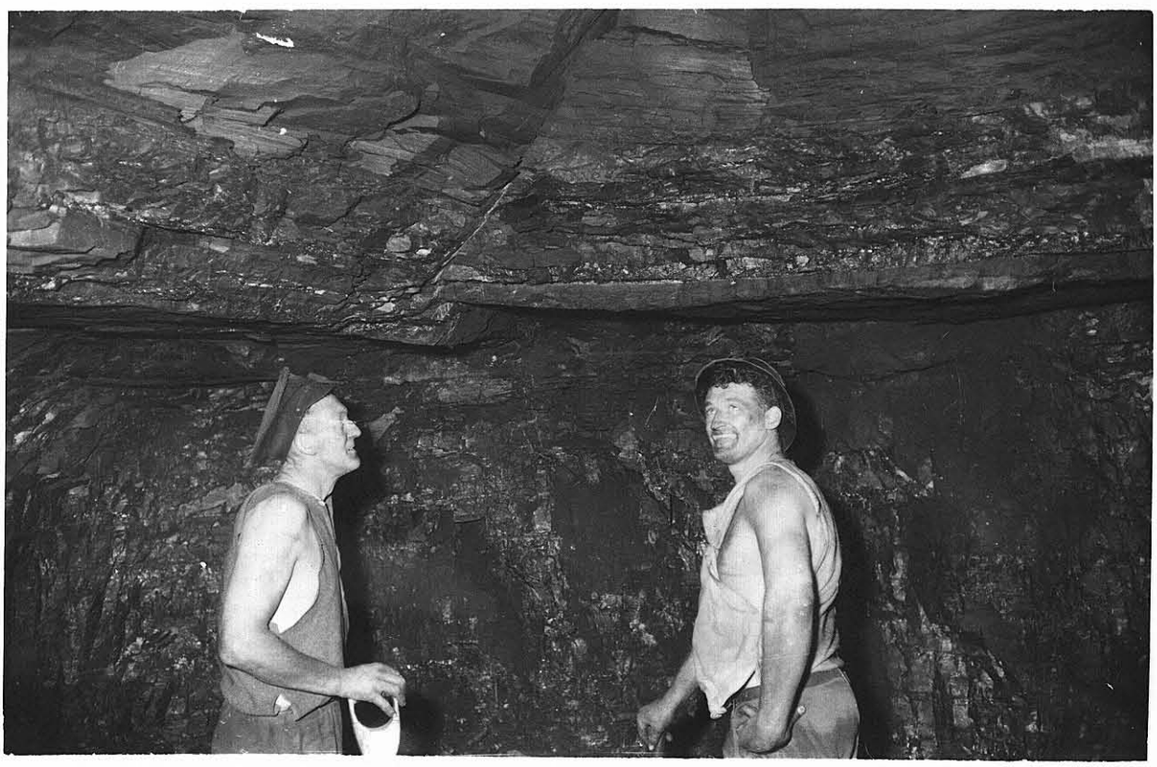


Figure 2. Test Area No. 1. Fault in carbonaceous sandstone in the face at the location of the fourth 'horseshoe' set.

Figure 1. Test Area No. 1. Slickensiding on the fault-plane in carbonaceous sandstone in the back between the first and third 'horseshoe' sets.

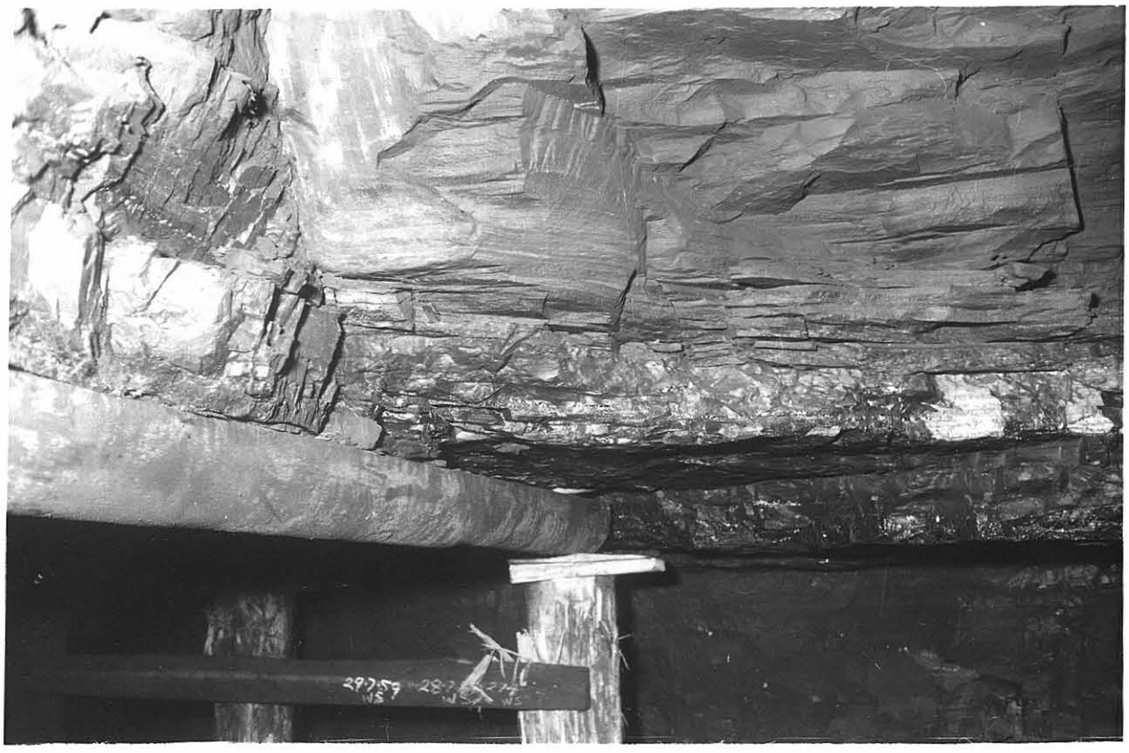


Figure 2. Test Area No. 1. Jointing in carbonaceous sandstone in the south-west wall at the start of the test drive.

Figure 1: Right Hand Workings showing floor heave in mudstone and failure of supports.

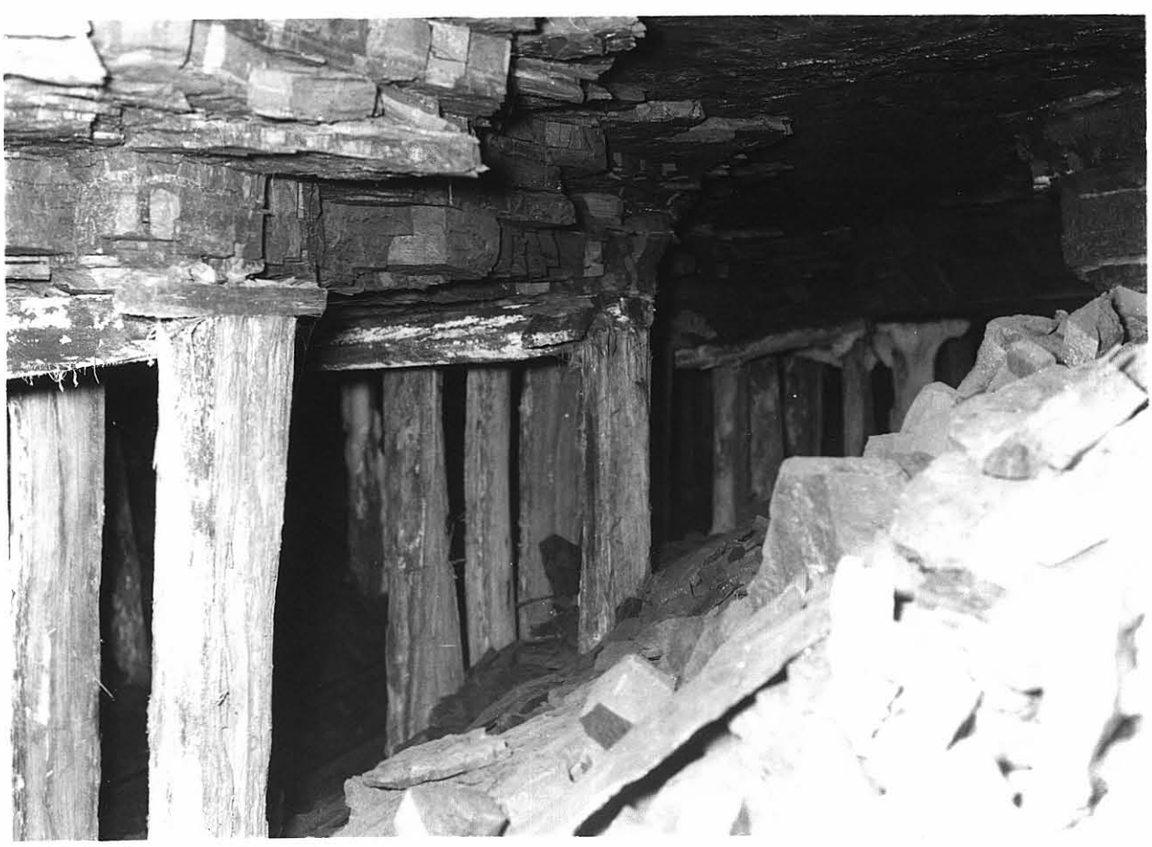


Figure 2: Right Hand Workings showing roof collapse in carbonaceous sandstone between the walls and supports.

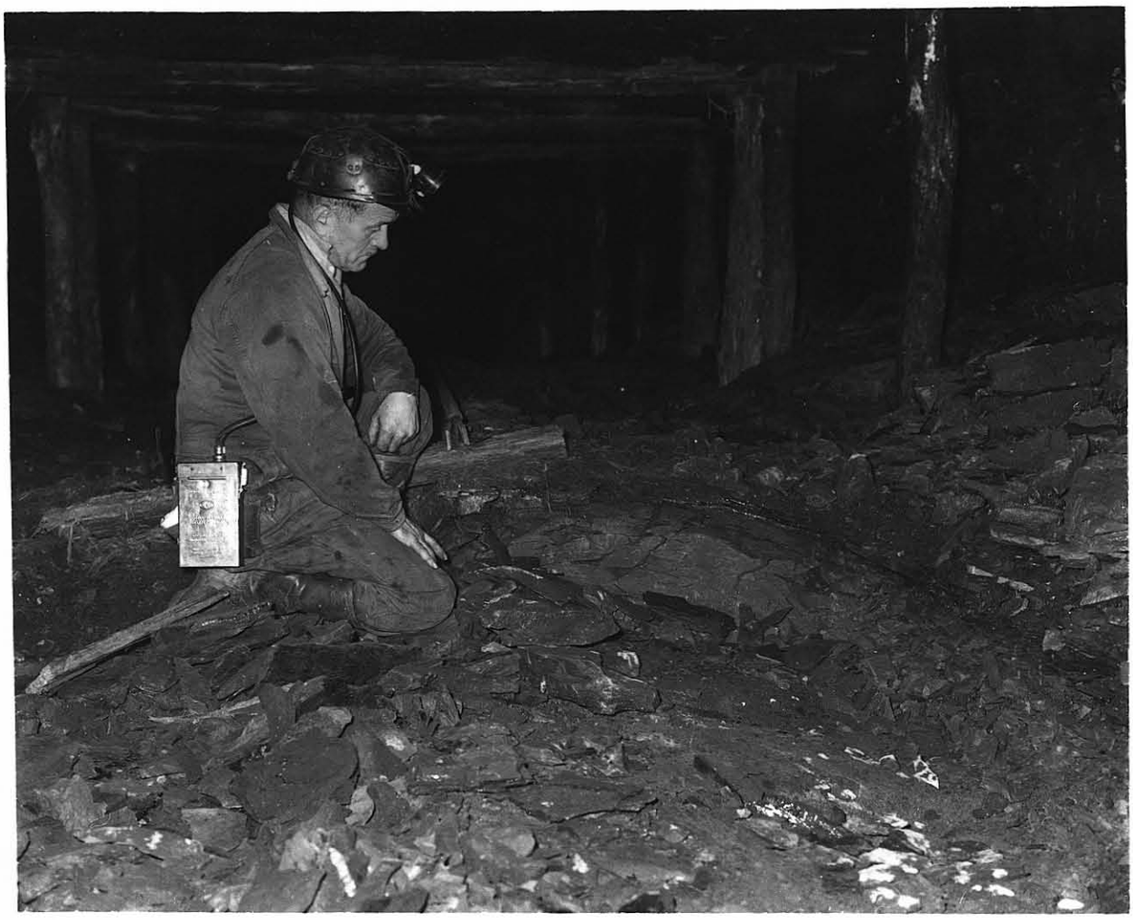


Figure 1: Machine Road Workings showing heave (doming) in mudstone at the centre of the floor.

Figure 2: Machine Road Workings showing heave in mudstone at the base of the wooden supports.

016

FORM No. H.E. 443

DRILLING RECORD 333017

SCHEME:- Cornwall Colliery

LOCATION:- Cornwall

POSITION PLOTTED ON DRAWING No.: Geological Sketch No. 13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: D. D. DIAMETER:

SITE REMARKS: On structural bench on the slopes of Mt. Nicholas.

POSITION	CO-ORDINATES:	E:	N:	HOLE No. 1
	ON LINE:	BEARING:	AT CH:	
	FROM STN.:	BEARING:	DIST.:	FILE No.
LEVEL:	SURFACE:	FORMATION:	WATER TABLE:	
				SHEET 1 OF 7 SHEETS
INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	
	VERT/~~HOR~~/~~INC~~:			

STANDARD LEVEL | DEPTH | CORE DRAWN | RECOVERY 0.2 0.4 0.6 0.8 1.0 | GRAPHIC LOG | JOINTS | WATER

R

5 cm

0' - 5' Talus.

5' - 6'. Weathered sandstone.

6' - 27' Medium to light grey siltstones and mudstones.

27' - 30' Dark grey to black mudstone.

30' - 34' Medium grey siltstone.

34' - 35' Dark grey to black mudstone.

35' - 35½' Black siltstone.

35½' - 38' Dark grey to black mudstone.

38' - 39½' Medium grey siltstone ; dip 6°.

39½' - 42' Laminated black carbonaceous mudstone.

42' - 43' Black shale (clod).

43' - 44' Black siltstone ; dip 5°.

44' - 45' Black cherty siltstone.

45' - 52' Soft, dark grey friable siltstone.

52' - 53½' Hard, dark grey silty chert.

53½' - 55½' Soft, black friable siltstone.

55½' - 58½' Hard, black and dark grey silty chert.

58½' - 59½' Light grey fine-grained lithic sandstone.

59½' - 61½' Driller recorded poor coal : core removed by Mines Dept.

61½' - 62½' Light grey fine-grained sandstone.

62½' - 65½' Driller recorded: 11" Coal / 1" band : core removed by Mines Dept.

65½' - 66½' Soft, weathered, light greenish-grey siltstone. 24" Coal

66½' - 68' Hard medium grey cherty siltstone.

68' - 68½' Soft, weathered, light greenish-grey siltstone.

68½' - 69½' Hard black silty chert.

69½' - 71½' Soft, Weathered, light grey siltstone.

71½' - 76' Driller recorded: poor quality coal : core removed by Mines Dept.

76' - 77' Hard, black and medium grey cherty siltstone.

77' - 79½' Soft, weathered, light grey siltstone and fine-grained sandstone.

79½' - 87½' Driller recorded:
2'2" coal / white band
4' 6" Dirty coal with stone bands. : core removed by Mines Dept.

87½' - 88' Soft, weathered, greenish-grey fine-grained sandstone.

88' - 90' Hard black carbonaceous shale (clod).

90' - 91' Soft, weathered light greenish-grey siltstone.

91' - 95' Soft, black friable siltstone.

95' - 97' Hard, black carbonaceous shale (clod).

97' - 98' Hard, medium grey cherty siltstone.

98' - 99' Soft, weathered, light greenish-grey siltstone.

99' - 101' Hard black cherty siltstone.

Numerous bedding plane partings - average dip 5°.

017

DRILLING RECORD 333018

SCHEME:– Cornwall Colliery

LOCATION:– Cornwall

POSITION PLOTTED ON DRAWING No.: G.S. 13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: DD DIAMETER:

SITE REMARKS:

POSITION: CO-ORDINATES: E. N:; ON LINE: BEARING: AT CH:; FROM STN.: BEARING: DIST.:

LEVEL: SURFACE: FORMATION: WATER TABLE:

INCL.: HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING:; VERT ~~HOR/INC~~.

HOLE No. 1

FILE No.

SHEET 2 OF 7 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	100'				Numerous bedding plane partings – average dip 5°	
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	200'					

101' – 102' Soft, weathered light and medium grey siltstone.
102' – 106½' Medium hard, black cherty siltstone.

106½' – 112' Light medium-grey laminated carbonaceous siltstone; dip 3°.
3" Coal

112' – 124½' Light grey, fine-grained lithic sandstone with carbonaceous laminations.

124½' – 128' Black carbonaceous shale (clod).

128' – 129½' Black sandy siltstone.

129½' – 130½' Weathered greenish-grey claystone.

130½' – 133' Medium hard, black silty mudstone.

133' – 134' Soft, weathered, light greenish-grey sandstone.
134' 6" Coal.

134½' – 141' Black carbonaceous shale (clod); friable; dip 10°.

141½' – 142' Medium grey siltstone.

142' – 147' Light grey fine-grained sandstone; dip 6°.

147' – 196' Light grey medium-grained lithic sandstone; few carbonaceous and coal laminations; dip 10°.

188' 3" Coal

194' – 196' Prominent carbonaceous layering, coal lenses

196' – 201' Light grey and medium grey carbonaceous silty mudstone.

FORM No. H.E. 443

018

DRILLING RECORD 333019

SCHEME:- Cornwall Colliery

LOCATION:- Cornwall

POSITION PLOTTED ON DRAWING No.: G.S .13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: DD DIAMETER:

SITE REMARKS:

POSITION	CO-ORDINATES:	E.	N:	HOLE No. 1
	ON LINE:	BEARING:	AT CH:	
	FROM STN.:	BEARING:	DIST.:	FILE No.
LEVEL.	SURFACE:	FORMATION:	WATER TABLE:	
				SHEET 3 OF 7 SHEETS
INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	
	VERT/~~HOR/INC.~~			

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	200					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	300					

Numerous bedding plane partings - average dip 10°

202' - 210½' Light grey medium-grained sandstone with clay pellets.

205½' 6" Black siliceous mudstone.

210½' - 211' Light grey siltstone; dip 12°.

211' - 238' Light grey medium grained lithic sandstone.

225½' - 228' Carbonaceous and coaly layering; friable; soft; dip 10°.

238' - 245' Light grey fine-grained lithic sandstone.

245' - 253' Light grey medium-grained lithic sandstone.

253' - 256' Light grey fine-grained lithic sandstone.

255½' - 256' Numerous fine carbonaceous laminations.

256' - 280' Light grey medium-grained sandstone; some carbonaceous laminations and mudstone pellets.

280' - 284½' Light grey fine-grained lithic sandstone.

283½' 1½" contorted coal layer.

284½' - 289' Medium-grey siltstone (broken pieces)

289' - 290½' Light grey coarse-grained lithic sandstone.

290½' - 317' Light grey medium-grained lithic sandstone with tidal lenses and siltstone partings; dip to 20°.

DRILLING RECORD 333020

019

SCHEME:– Cornwall Colliery	POSITION	CO-ORDINATES:	E.	N:	HOLE No. 1
LOCATION:– Cornwall		ON LINE:	BEARING:	AT CH:	
POSITION PLOTTED ON DRAWING No.: G.S. 13.		FROM STN.:	BEARING:	DIST.:	FILE No.
DATES: (a) DRILLED: (b) WATER TABLE:	LEVEL:	SURFACE:	FORMATION:	WATER TABLE:	
METHOD USED: DD. DIAMETER:					SHEET 4 OF 7 SHEETS
SITE REMARKS:	INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	
		VERT/~~HOR/INC~~:			

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER	R
	300'						
	5'						
	10'						
	15'						
	20'						
	25'						
	30'						
	35'						
	40'						
	45'						
	50'						
	55'						
	60'						
	65'						
	70'						
	75'						
	80'						
	85'						
	90'						
	95'						
	400'						

Numerous bedding plane partings – average dip 6°.

5 cm

317' – 320' Light grey fine-grained lithic sandstone.

320' – 324' Light grey medium-grained lithic sandstone.

324' – 324½' Light grey coarse-grained sandstone; with siltstone pebbles up to 1" diameter.

324½' – 337' Light grey fine-grained lithic sandstone.

337' – 343½' Light grey medium-grained lithic sandstone. few carbonaceous laminations.

343½' – 346½' Driller recorded:
1'7" coal
2" mudstone and coal
2" coal
5" mudstone
5" coal
: Core removed by Mines Department.

346½' – 347½' Medium grey mudstone.

347½' – 350' Medium grey laminated siltstone; dip up to 10°.

350' – 353' Black silty mudstone; friable.

353' 10" Coal

354' – 361½' Medium grey laminated siltstone.

361½' – 365' Black silty mudstone; friable.

365' – 376' Laminated medium to light grey siltstone and light grey sandstone; dip up to 15°.

376' – 377½' Black carbonaceous shale (clod).

377½' Driller recorded:
2'9" Coal.
: Core removed by Mines Dept.

380' – 383' Dark grey silty mudstone.

383' – 385' Light grey siltstone and fine sandstone.

385' – 388' Dark grey silty mudstone.

388' – 391' Driller recorded:
3' coal
: Core removed by Mines Dept.

391' – 393' Black carbonaceous shale; friable.

393' – 404' Medium grey siltstone and silty mudstone; dip up to 10°.

020

DRILLING RECORD 333021

SCHEME:– Cornwall Colliery
LOCATION:– Cornwall
POSITION PLOTTED ON DRAWING No.: G. S. 13.
DATES: (a) DRILLED: (b) WATER TABLE:
METHOD USED: D.D. DIAMETER:
SITE REMARKS:

POSITION — CO-ORDINATES: E. N: | ON LINE: BEARING: AT CH: | FROM STN.: BEARING: DIST.:
LEVEL. — SURFACE: FORMATION: WATER TABLE:
INCL. — HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING: | VERT/~~HOR/INC~~:

HOLE No. 1
FILE No.
SHEET 5 OF 7 SHEETS

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	100'				Numerous bedding plane partings – average dip 6°	
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	506'					

5 cm

404' – 406½' Driller recorded 2' 6" Coal : Core removed by Mines Dept.
406½' – 408' Dark grey siltstone ; some carbonaceous laminations.
408' – 417' Light grey fine to medium-grained lithic sandstone.

417' – 423' Light grey medium-grained lithic sandstone ; some carbonaceous layering.

423' – 426' Light grey fine-grained sandstone.
426' – 477' Light grey medium-grained lithic sandstone ; few carbonaceous laminations; dip up to 10°.

434' ⅛" coal lense and clay pellets.

451' 2" Black carbonaceous shale (clod).

455' – 456' Noticeably calcareous.

477' – 477½' Irregular sandstone and mudstone ; some slickensides.
477½' – 479' Light grey fine-grained lithic sandstone.
479' – 480' Irregular sandstone and mudstone with carbonaceous layering.
480' – 481' Dark grey silty mudstone.
481' – 481½' Irregular sandstone and mudstone; dip to 30°
481½' – 485' Light grey fine-grained lithic sandstone.
485' – 486½' Black carbonaceous shale (clod) and slickensided mudstone.
486½' – 490' Light grey fine-grained sandstone with up to ½" carbonaceous and coal laminations.
490' – 493' Dark grey silty mudstone.
491½' Slickensides.
493' – 498' Interbedded Light grey and medium grey siltstone and fine-grained sandstone.
498' – 509' Interbedded light grey siltstone and mudstone.

DRILLING RECORD 333022

SCHEME:- Cornwall Colliery
LOCATION:- Cornwall
POSITION PLOTTED ON DRAWING No.: G.S. 13.
DATES: (a) DRILLED: (b) WATER TABLE:
METHOD USED: D.D. DIAMETER:
SITE REMARKS:

POSITION — CO-ORDINATES: E.: N:; ON LINE: BEARING: AT CH:; FROM STN.: BEARING: DIST.:
LEVEL — SURFACE: FORMATION: WATER TABLE:
INCL. — HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING:; VERT/~~HOR~~/INC:

HOLE No. 1
FILE No.
SHEET 6 OF 7 SHEETS

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	500'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	600'					

JOINTS: Numerous bedding plane partings - average dip 6°

5 cm

509' - 518' Medium grey silty mudstone; laminated at base; dip 8°.

518' - 521' Light grey medium-grained lithic sandstone; crumbly.

521' - 524½' Driller recorded 2' 9" Coal : Core removed by Mines Dept.

524½' - 534' Medium grey laminated siltstone.

534' - 535' Medium grey silty mudstone with 2" black carbonaceous shale (clod).

535' - 537' Medium grey siltstone with ⅛"-¼" carbonaceous laminations at base.

537' - 537½' Medium grey siltstone.

537½' - 538½' Black carbonaceous shale (clod).

538½' - 544' Driller recorded:
6" fine sandstone.
9" coal
6" soft brown band
coal + light band
1' 2" coal + ½" band
3' 2" coal + band
9" coal
: core removed by Mines dept.

544' - 547' Light grey fine-grained lithic sandstone.

547' - 551½' Dark grey silty mudstone

551½' - 552' Black carbonaceous shale.

552' - 558' Interbedded light grey fine to medium-grained lithic sandstone.

558' - 561' Light grey fine-grained lithic sandstone.

561' - 562' Dark grey mudstone and black carbonaceous shale.

562' - 565½' Driller recorded:
2' 8" coal
Brown band
coal
: Core removed by Mines Dept.

565½' - 579' Interbedded medium grey siltstone and fine sandstone

571' ½" Coal

579' - 580½' Black carbonaceous shale (clod).

580½' - 582½' Medium grey fine-grained lithic sandstone with numerous carbonaceous laminations; crumbly.

582½' - 586' Black carbonaceous shale (clod).

586' - 587' Light greenish-grey and dark grey laminated silty mudstones; crumbly.

587' - 589' Black carbonaceous shale (clod).

589' - 594¾' Driller recorded:
10" Coal
4" Black stone + ½" white band
4' 0" coal
3' 0" Banded coal.

594¾' - 600' Laminated dark grey mudstone and medium grey siltstone.

FORM No. H.E. 443

022

DRILLING RECORD 333023

SCHEME:- Cornwall Colliery

LOCATION:- Cornwall

POSITION PLOTTED ON DRAWING No.: G.S. 13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: D.D. DIAMETER:

SITE REMARKS:

POSITION				HOLE No.
	CO-ORDINATES:	E:	N:	1
	ON LINE:	BEARING:	AT CH:	
	FROM STN.:	BEARING:	DIST.:	FILE No.
LEVEL	SURFACE:	FORMATION:	WATER TABLE:	
				SHEET 7 OF 7 SHEETS
INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	
	VERT/~~HOR/INC~~:			

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	600'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	700'					

5 cm

600' - 603' Light grey fine-grained lithic sandstone.

603' - 605' Dark grey silty mudstone

Hole Completed 605'

Note:

The Triassic sandstones in the above drill core are sub-felspathic, felspathic and volcanic lithic sandstones (arenites); they were formerly called 'felspathic' sandstones.

Lithic Sandstones (arenites) are moderately well sorted sandstones containing abundant unstable constituents in the form of sub-angular to sub-rounded grains. In some rock fragments are the most abundant detrital grains; others contain numerous quartz and felspar grains.

Logged by:

S. J. Patrick

6.10.59

FORM No. H.E. 443

DRILLING RECORD 333024

SCHEME:- Cornwall Colliery	POSITION	CO-ORDINATES:	E.	N:	HOLE No. 2
LOCATION:- Cornwall		ON LINE:	BEARING:	AT CH:	
POSITION PLOTTED ON DRAWING No.: Geological Sketch No -13.		FROM STN.:	BEARING:	DIST.:	FILE No.
DATES: (a) DRILLED: (b) WATER TABLE:	LEVEL.	SURFACE:	FORMATION:	WATER TABLE:	
METHOD USED: DD. DIAMETER: AXT					SHEET 1 OF 6 SHEETS
SITE REMARKS: On structural bench on the slopes of Mt. Nicholas.	INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	100'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	200'					

Numerous bedding plane partings - average dip 5°

0-102½' clay and boulders. (Driller's Comment).
102½-103' Light grey medium-grained sandstone.
103'-104½' Light grey to medium grey laminated siltstone and mudstone.
104½-105' Light grey fine grained sandstone.
105'-108' Medium grey siltstone; friable - core broken.
108'-112' Laminated black, medium and light grey siltstone. Dip 5°.
112'-113' Laminated light grey fine sandstone and siltstone.
113'-114½' Black shale (clod).
114½'-116' Light grey silty mudstone.
116'-121' Laminated light, medium and dark grey, white and black siltstone; ½" - 4" laminations; dip 5°.
121'-125' White siltstone with bands of black siltstone; calcareous; dip 5°.
125'-126' Black shale with white siltstone bands.
126'-130' Medium grey siltstone.
130'-132' Core removed by Mines Dept. Driller recorded light and dark mudstone.
132'-135' Core removed by Mines Dept. Driller recorded black shale (clod).
135'-137' Laminated light grey fine-grained sandstone and siltstone.
137'-137½' Medium grey mudstone.
137½'-139' Black shale (clod).
139'-140' Light grey mudstone
140'-143½' Core removed by Mines Dept. Driller recorded poor coal with grey band.
143'-145' Light grey mudstone with black shale.
145'-146' Core removed by Mines Dept. Driller recorded coal.
146'-147½' Light grey mudstone.
147'-149½' Core removed by Mines Dept. Driller recorded coal.
149½'-150' Medium grey mudstone.
150'-156' Core removed by Mines Dept. Driller recorded coal with white bands.
156'-157' Medium grey silty mudstone and black shale.
157'-161' Core removed by Mines Dept. Driller recorded poor quality coal with numerous bands (½" - 4") and some black shale (clod).
161'-161½' Medium grey siltstone.
161½'-164' Core removed by Mines Dept. Driller recorded poor quality coal with numerous bands (½" - 4") and some black shale (clod).
164'-165' Medium grey mudstone and black shale.
165'-165½' Coal
165½'-166' Medium grey silty mudstone.
166'-176' Core removed by Mines Dept. Driller recorded dirty coal with mudstone and black shale bands.
176'-179' Medium grey laminated siltstone and mudstone; dip 5°
179' 4" Coal and black shale.
179'-187' Light grey fine-grained lithic sandstone with carbonaceous laminae.
187'-189' Laminated light, medium and dark grey siltstone, mudstone and sandstone.
189'-191' Core removed by Mines Dept. Driller recorded dark shale.
191'-193' Interbedded light grey silty mudstone and black shale.
193'-195½' Core removed by Mines Dept. Driller recorded thin coal seams.
195½'-197½' Black shale.
197½'-199' Light grey silty mudstone.
199'-200' Light grey silty mudstone.

FORM No. H.E. 443

024

DRILLING RECORD 333025

SCHEME:- Cornwall Colliery

LOCATION:- Cornwall

POSITION PLOTTED ON DRAWING No.: G.S. 13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: D.D. DIAMETER:

SITE REMARKS:

POSITION — CO-ORDINATES: E.: N.: ON LINE: BEARING: AT CH: FROM STN.: BEARING: DIST.:

LEVEL — SURFACE: FORMATION: WATER TABLE:

INCL. — HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING:

HOLE No. 2.

FILE No.

SHEET 2 OF 6 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	200'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	300'					

Numerous bedding plane partings - average dip 5°

200'-201' Core Removed by Mines Dept. Driller recorded black shale (clod).

201'-202' Light grey silty mudstone and sandstone + clay pellets.

202'-205' Core Removed by Mines Dept. Driller recorded black shale (clod).

205'-206' Light grey mudstone.

206'-209' Core Removed by Mines Dept. Driller recorded coal and black shale (clod).

209'-211' Dark to medium grey carbonaceous mudstone.

211'-216' Medium to dark grey, laminated, fine-grained lithic sandstone.

216'-259' Light greenish-grey medium to fine-grained lithic sandstone with carbonaceous and coaly partings.

254' Siltstone layer dip 5°

259'-260' Small paraconformity; clay pellets and coaly partings.

260'-275' Light greenish-grey medium to fine-grained lithic sandstone.

272½' Coal parting.

273½' 7" Black shale.

275'-276½' Black shale (clod).

277' Small paraconformity; 2" coal; clay pellets.

277'-282' Light greenish-grey medium to fine-grained lithic sandstone.

282'-298' Core not available. Driller recorded sandstone.

298'-299' Light grey medium grained lithic sandstone with numerous irregular coaly partings.

299'-300' Medium grey siltstone - calcareous; small paraconformity.

FORM No. H.E. 443

025

DRILLING RECORD 333026

SCHEME:- Cornwall Colliery

LOCATION:- Cornwall

POSITION PLOTTED ON DRAWING No.: G.S. 13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: DD. DIAMETER:

SITE REMARKS:

POSITION	CO-ORDINATES:	E.	N:	HOLE No. 2
	ON LINE:	BEARING:	AT CH:	
	FROM STN.:	BEARING:	DIST.:	FILE No.
LEVEL.	SURFACE:	FORMATION:	WATER TABLE:	
INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	SHEET 3 OF 6 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	300'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	400'					

Numerous bedding plane partings - average dip 5°

300' - 332'. Light greenish-grey medium-grained lithic sandstone.

327' ¼" calcite vein.

331' coal parting.

332' 3" coal.

332½' - 338' Laminated medium-grey siltstone and dark-grey mudstone.

338' - 358½' Light greenish-grey medium-grained sandstone with some carbonaceous layers and clay pellets (up to 1")

341' - 342' Weathered zone; soft yellow brown.

347½' - 348' Weathered zone; soft yellowish-brown.

350' - 350½' Weathered zone; soft yellowish-brown.

358½' - 359½' Medium to dark-grey laminated sandstone; small angular unconformity at base; dip 22°.

359½' - 367' Light greenish-grey medium-grained lithic sandstone with ½" clay pellets and ½" clay bands.

367' - 368' Medium grey siltstone

368' - 401½' Light greenish-grey medium-grained lithic sandstone.

368' - 376' Weathered zone; soft yellowish-brown.

377' - 382' Weathered zone; soft yellowish-brown.

390' - 396' Weathered zone; soft yellowish-brown.

396 - 401½ Light grey medium-grained lithic sandstone.

026

FORM No. H.E. 443

DRILLING RECORD 333027

SCHEME:- Cornwall Colliery

LOCATION:- Cornwall

POSITION PLOTTED ON DRAWING No.: G. S. 13.

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: D.D. DIAMETER:

SITE REMARKS:

POSITION			
CO-ORDINATES:	E.	N:	HOLE No. 2
ON LINE:	BEARING:	AT CH:	
FROM STN.:	BEARING:	DIST.:	FILE No.
LEVEL: SURFACE:	FORMATION:	WATER TABLE:	
INCL.: HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	SHEET 4 OF 6 SHEETS
VERT~~/HOR~~/INC.			

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	100'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'				F. Zone	
	80'					
	85'					
	90'					
	95'					
	500'					

401½' - 402½' Light grey fine-grained lithic sandstone.
402½' - 406' Medium grey laminated siltstone.

406' - 409' Core removed by Mines Dept. Driller recorded coal.

409' - 409½' Dark grey mudstone.
409½' - 411½' Coal with 7" mudstone band. Core removed by Mines Dept.
411½' - 413' Medium grey laminated siltstone dip 10°.

413' - 416½' Coal with 1" white band; core removed by Mines Department.

416½' - 434' Interbedded dark grey mudstone, medium grey siltstone and light grey fine-grained lithic sandstone; dips up to 15°.

434' - 434½' Light grey fine-grained lithic sandstone.
434½' - 435½' Dark grey siltstone.
435½' - 439' Light grey fine-grained lithic sandstone with carbonaceous partings.

439' - 450' 9" Coal
7" Black shale
2'6" Coal
11" White mudstone
9" Coal
1" White band
5'8" Coal
: Core removed by Mines Dept.

450' - 469' Dark grey laminated mudstone.
451' ½" Coal parting.

459' - 461' Medium grey siltstone with 1/16" - ¼" mudstone laminations.
461' - 462' Dark grey laminated siltstone; dip 10°.
462' - 465' 3" Coal
2" Grey band.
2" Coal
½" Brown Coal
2'8" Coal
: Core removed by Mines Dept.
465' - 466' Dark grey laminated silty mudstone.
466' - 473' Light greenish grey medium-grained sandstone; some silty layers; dip 10°.

473' - 476' Broken slickensided mudstone. Fault zone.
476' - 512' Light greenish-grey speckled medium-grained lithic sandstone; some carbonaceous layering.

484½' ⅛" Coal parting dip 6°.

497' ¼" coal parting; clay pellets; dip 6°.

DRILLING RECORD 333028

SCHEME:– Cornwall Colliery	POSITION	CO-ORDINATES:	E:	N:
LOCATION:– Cornwall		ON LINE:	BEARING:	AT CH:
POSITION PLOTTED ON DRAWING No.: G.S. 13.		FROM STN.:	BEARING:	DIST.:
DATES: (a) DRILLED: (b) WATER TABLE:	LEVEL	SURFACE:	FORMATION:	WATER TABLE:
METHOD USED: D.D. DIAMETER:				
SITE REMARKS:	INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:

HOLE No. 2 | FILE No. | SHEET 5 OF 6 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	0					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	100'					

JOINTS: average dip 10°; Plane partings; Bedding; Numerous

500' Soft, friable

510'-512' Soft, friable

512'-516' Dark grey carbonaceous mudstone

516'-517' Soft, light grey siltstone; friable; powders easily

517'-518' Dark grey mudstone.

518'-523' Medium grey siltstone.

523'-525½' Dark grey mudstone.

525½'-530½' Interbedded medium grey, medium to fine lithic sandstone, siltstone and mudstone, dip 20°.

530½'-531½' Medium grey fine grained lithic sandstone.

531½'-552' Light greenish grey medium-grained lithic sandstone; ½" carbonaceous layer at 234'; dip 10°.

552'-553½' 4" coal and light grey fine-grained lithic sandstone.

553½'-557' Medium grey siltstone.

557'-558½' Dark grey mudstone.

558½' – Fault: dip 45°; slickensides.

558½'-559' Light grey fine-grained sandstone Dip 2°.

559'-562' Dark grey siltstone.

562'-566' Dark grey laminated carbonaceous mudstone; silty at base.

566'-571' Dark grey fine-grained sandstone with some carbonaceous laminae.

571'-571½" Light grey medium-grained sandstone with clay pellets.

571½'-573½' Dark grey sparcely laminated mudstone.

573½'-574½' Medium grey fine-grained lithic sandstone.

574½'-576½' Dark grey laminated siltstone.

576½'-578' Medium grey fine-grained lithic sandstone.

578'-579' Dark grey laminated siltstone.

579'-582½' Coal : Core removed by Mines Dept.

582½'-587' Medium-grey carbonaceous siltstone.

587'-590' Dark-grey carbonaceous mudstone; dip 10°

590'-593' Dark grey carbonaceous siltstone.

593'-598' Medium grey fine-grained carbonaceous lithic sandstone.

598'-604½' 2'3" Coal
4" white clay
3" Coal
Band
1'4" Coal
: Core removed by Mines Dept.

028

DRILLING RECORD 333029

SCHEME:– Cornwall Colliery
LOCATION:– Cornwall
POSITION PLOTTED ON DRAWING No.: G. S. 13.
DATES: (a) DRILLED: (b) WATER TABLE:
METHOD USED: D.D DIAMETER:
SITE REMARKS:

POSITION — CO-ORDINATES: E.: N.: | ON LINE: BEARING: AT CH: | FROM STN.: BEARING: DIST.:
LEVEL. — SURFACE: FORMATION: WATER TABLE:
INCL. — HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING:

HOLE No. 2
FILE No.
SHEET 6 OF 6 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	600				Numerous bedding plane partings – average dip 5° /	
	5					
	10					
	15					
	20					
	25					
	30					
	35					
	40					
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					
	700					

1" Brown band
1'10" Coal

604½' - 609' Light greenish-grey sandstone with carbonaceous laminae ; dip 8°.

609' - 615½' Dark grey to black carbonaceous mudstone ; dip 4°.

615½' - 619½' Light greenish-grey fine-grained lithic sandstone, dip 6°.

619½' - 620' Dark grey mudstone.

620' - 625' 1' 11" Coal. : Core removed by Mines Dept.
2" Hard white band.
2' 6" Coal

625' - 626' Dark grey mudstone ; horizontal dip.

626' - 638' Light greenish-grey medium-grained lithic sandstone ; few ⅛" carbonaceous laminae, dip 4°.

636' 1' Light fawn-blue-grey medium-grained lithic sandstone.

638' - 639½' Poor coal : Core removed by Mines Dept.

639½' - 642' Laminated carbonaceous mudstone and siltstone. 639 ½" calcite vein.

642' 2" coal.

642' - 644' Dark grey fine-grained carbonaceous sandstone.

644 - 654½' 1" 2" coal
½" grey band
2" coal
1" grey band : Core removed by Mines Dept.
4" coal
1" stone band
11" coal
1½" coal, mudstone, sandstone band.
10" coal
3" stone band.
4' 9" coal

654 - 655 Dark grey carbonaceous mudstone.

Hole Completed 655'

Note:

The Triassic sandstones in the above drill core are sub-felspathic, felspathic and volcanic lithic sandstones (arenites) ; they were formerly called 'felspathic sandstones'.

Lithic sandstones (arenites) are moderately well sorted sandstones containing abundant unstable constituents in the form of sub-angular to sub-rounded grains. In some rock fragments are the most abundant detrital grains ; others contain numerous quartz & felspar grains.

6.10.59.

Logged by:
J. G. Paterson.

029

DRILLING RECORD 233030

SCHEME:- Jubilee Colliery

LOCATION:- Jubilee

POSITION PLOTTED ON DRAWING No.: Geological sketch 13

DATES: (a) DRILLED: (b) WATER TABLE:

METHOD USED: D.D. DIAMETER:

SITE REMARKS: On small structural bench on the slopes of Mt. Nicholas.

POSITION			
CO-ORDINATES:	E.	N:	HOLE No. 1
ON LINE:	BEARING:	AT CH:	
FROM STN.:	BEARING:	DIST.:	FILE No.
LEVEL. SURFACE:	FORMATION:	WATER TABLE:	
INCL. HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:	SHEET 1 OF 4 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	0'					
	5'					
	10'					
	15'					
	20'					
	25'					
	30'					
	35'					
	40'					
	45'					
	50'					
	55'					
	60'					
	65'					
	70'					
	75'					
	80'					
	85'					
	90'					
	95'					
	100'					

Numerous bedding plane parting. — average dip 5°

0 - 9' No Core.

9' - 16' Light yellowish-green weathered medium-grained sandstone.

16' - 44' Light grey medium-grained lithic sandstone; calcareous in part.

44' - 50' Light yellowish-green medium-grained weathered sandstone.

47' Clay pellets.

50' - 55' Light grey medium-grained sandstone.

55' - 62' Light yellowish-green medium-grained weathered sandstone; few coal lenses.

62' - 67' Light-grey fine-grained lithic sandstone.

67' - 69' Light-grey medium-grained sandstone; some broken pieces.

69' - 73' Medium grey siltstone.

73' - 74½' Black carbonaceous shale (clod).

74½' - 77' Light grey fine-grained sandstone; 1/16" - ½" carbonaceous layering; dip 5°.

77' - 80' Medium-grey siltstone.

80' - 89½ Medium grey fine-grained lithic sandstone; thin 1/16" carbonaceous layering; dip 5°.

89½ - 93½' Light yellowish-green fine-grained weathered sandstone; coarser at top.

93½' - 95' Medium grey fine-grained sandstone.

95 - 115' Light yellowish green fine to medium grained weathered sandstone.

030

DRILLING RECORD 333031

SCHEME:- Jubilee Colliery
LOCATION:- Jubilee
POSITION PLOTTED ON DRAWING No.: G.S. 13.
DATES: (a) DRILLED: (b) WATER TABLE:
METHOD USED: D.D. DIAMETER:
SITE REMARKS:

POSITION — CO-ORDINATES: E.: N:; ON LINE: BEARING: AT CH:; FROM STN.: BEARING: DIST.:
LEVEL. — SURFACE: FORMATION: WATER TABLE:
INCL. — HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING:

HOLE No. 1
FILE No.
SHEET 2 OF 4 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	100					
	5					
	10					
	15					
	20					
	25					
	30					
	35					
	40					
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					
	200					

Numerous bedding plane partings - average dip 5°

105' - 106½' Fresh sandstone.

115' - 118' Light grey medium-grained sandstone with carbonaceous layers; dip 5°.
118' - 119' Black carbonaceous shale (clod).
119' - 119½' Laminated medium-grained sandstone and black carbonaceous shale.
119½' - 121' Medium grey silty mudstone
121' - 138½' Laminated medium grey siltstone, sandstone and mudstone with carbonaceous laminae; dip to 10°.

138½' - 141½' Light grey fine-grained lithic sandstone.
141½' - 142' Dark grey slickensided mudstone.
142' - 156' Medium grey siltstone with 1/16" carbonaceous laminations; dip 5°.

156' - 158' Light grey fine-grained lithic sandstone.
158' - 167½' Light greenish grey medium-grained lithic sandstone with few coaly partings.

167½' - 169' Black carbonaceous shale (clod).
169' - 171' Dark grey carbonaceous siltstone.
171' - 177' Interbedded light grey fine-grained sandstone and dark grey siltstone with carbonaceous laminations; dip to 10°.
177' - 182' Medium grey laminated carbonaceous siltstone.
182' - 196' Interbedded dark grey siltstone, sandstone and black carbonaceous shale.

192' 1" Coal

196' - 197' Black carbonaceous shale (clod).
197' - 203' Interbedded dark grey siltstone and mudstone; dip 5°.

DRILLING RECORD 333032

SCHEME:- Jubilee Colliery
LOCATION:- Jubilee
POSITION PLOTTED ON DRAWING No.: G.S. 13.
DATES: (a) DRILLED: (b) WATER TABLE:
METHOD USED: D.D. DIAMETER:
SITE REMARKS:

POSITION — CO-ORDINATES: E. N: | ON LINE: BEARING: AT CH: | FROM STN.: BEARING: DIST.:
LEVEL. — SURFACE: FORMATION: WATER TABLE:
INCL. — HOLE DRILLED: DEPRESSION ANG.: INCL. BEARING: | VERT/~~HOR/INC~~

HOLE No. 1
FILE No.
SHEET 3 OF 4 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	~~100~~				Numerous bedding plane partings — average dip 5°	
	5					
	10					
	15					
	20					
	25					
	30					
	35					
	40					
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					
	300					

203' - 205' Medium grey mudstone.
205' - 228' Interbedded medium grey siltstone fine sandstone.
228' - 231½' Light grey medium-grained lithic sandstone.
231½' - 232' Medium grey siltstone.
232' - 248' Light grey medium-grained lithic sandstone.
240' - 241' 1' zone of clay pellets.
248' - 249' Light grey coarse-grained sandstone; broken.
249' - 252½' Light grey medium-grained lithic sandstone; crumbly.
252½' - 253' Dark grey clay pellet conglomerate and siltstone.
253' - 256' Light grey fine-grained sandstone with siltstone bands and carbonaceous laminations.
256' - 268' Light grey medium-grained lithic sandstone.
260' Two ½" bands black siltstone dip 5°
268' - 272' Whitish grey medium-grained lithic sandstone.
272' - 274½' Light grey fine-grained lithic sandstone.
274½' 2" band dark grey silty mudstone.
274½' - 276' Light grey medium-grained lithic sandstone.
276' - 283½' Light grey fine-grained lithic sandstone; few carbonaceous laminations; dip to 10°.
283½' - 284' Light grey medium-grained lithic sandstone.
284' - 289' Interbedded dark grey siltstone and silty mudstone.
289' - 294' Light grey medium to fine grained lithic sandstone.
294' - 294½' 2" Contorted black carbonaceous shale and 4" medium grey medium-grained lithic sandstone.
294½' - 297' Whitish-grey fine-grained lithic sandstone; few clay pellets.
297' - 299½' Light grey medium-grained lithic sandstone.

DRILLING RECORD 223033

SCHEME:– Jubilee Colliery	POSITION	CO-ORDINATES:	E.	N:
LOCATION:– Jubilee		ON LINE:	BEARING:	AT CH:
POSITION PLOTTED ON DRAWING No.: G.S. 13		FROM STN.:	BEARING:	DIST.:
DATES: (a) DRILLED: (b) WATER TABLE:	LEVEL.	SURFACE:	FORMATION:	WATER TABLE:
METHOD USED: D.D. DIAMETER:				
SITE REMARKS:	INCL.	HOLE DRILLED:	DEPRESSION ANG.:	INCL. BEARING:
		VERT/HORIZ:		

HOLE No. 1 | FILE No. | SHEET 4 OF 4 SHEETS

5 cm

STANDARD LEVEL	DEPTH	CORE DRAWN	RECOVERY 0.2 0.4 0.6 0.8 1.0	GRAPHIC LOG	JOINTS	WATER
	300				Numerous bedding plane partings – average dip 5°	
	5					
	10					
	15					
	20					
	25					
	30					
	35					
	40					
	45					
	50					
	55					
	60					
	65					
	70					
	75					
	80					
	85					
	90					
	95					
	100					

299½' – 300' Medium grey coarse-grained lithic sandstone with coal lenses; crumbly.
301' – 304' Interbedded dark-grey siltstone and fine sandstone.
304' – 304½' Black carbonaceous shale (clod)
304½' – 306' Dark grey slickensided mudstone.
306' – 311' Light grey fine-grained lithic sandstone.

311' – 314½' Light grey medium-grained lithic sandstone.

314½' – 317' Light grey fine-grained lithic sandstone.

317' – 324' Interbedded dark grey siltstone, silty mudstone and light grey fine-grained lithic sandstone.

324' – 327½' Medium grey siltstone.

327½' – 330½' Interbedded medium-grey siltstone and silty mudstone.

330½' – 331½' Black carbonaceous shale (clod).
331½' – 332' Dark grey silty mudstone.
332' – 333' Light grey fine-grained lithic sandstone with numerous carbonaceous laminations.
333' – 339½' Interbedded dark-grey siltstone, mudstone and light grey fine-grained sandstone.
339½' – 340' Black carbonaceous shale (clod).
340' – 343' Medium-grey siltstone.
343' – 345½' Medium grey coarse-grained lithic sandstone.
345½' – 349' Interbedded medium grey silty mudstone and siltstone.
349' – 349½' Black carbonaceous shale (clod) with ⅛" coal lenses.
349½' – 351½' Medium grey silty mudstone.
351½' – 352' Black carbonaceous shale with 1/16" clay pellets.
352' – 353' Medium greenish-grey silty mudstone.
353' – 361' Light greenish-grey volcanic with small zeolite vugs and veins; fine-grained basalt.

361' – 364½' Black silty mudstone with inclusions of light greenish-grey volcanic rock.

364½' – 371' Medium to dark grey siltstone with numerous iron particles.

371' – 373½' Light greenish-grey fine-grained lithic sandstone.

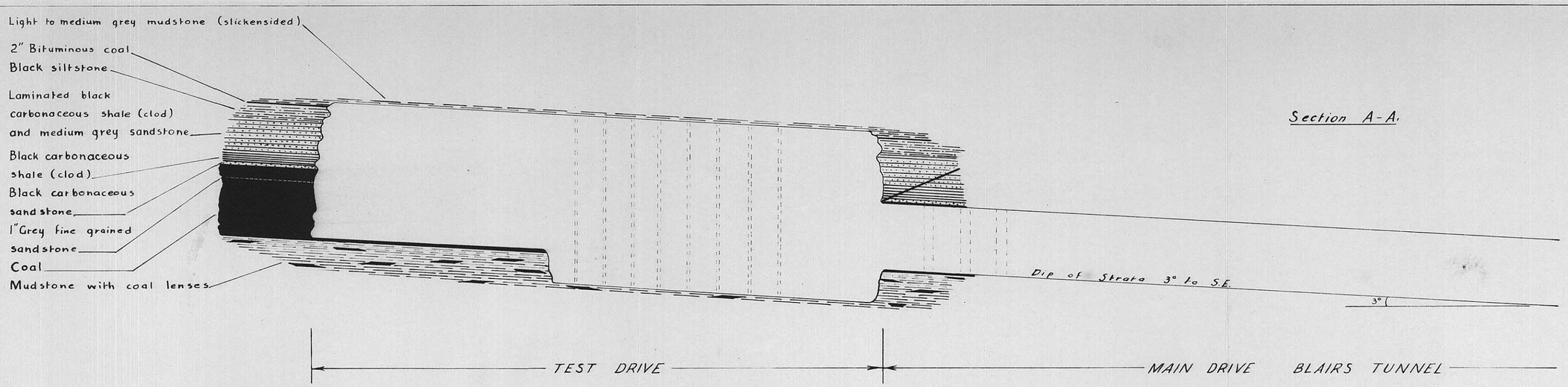
373½' – 374½' Light greenish-grey coarse-grained sandstone.

374½' – 375½' Medium-grey siltstone.

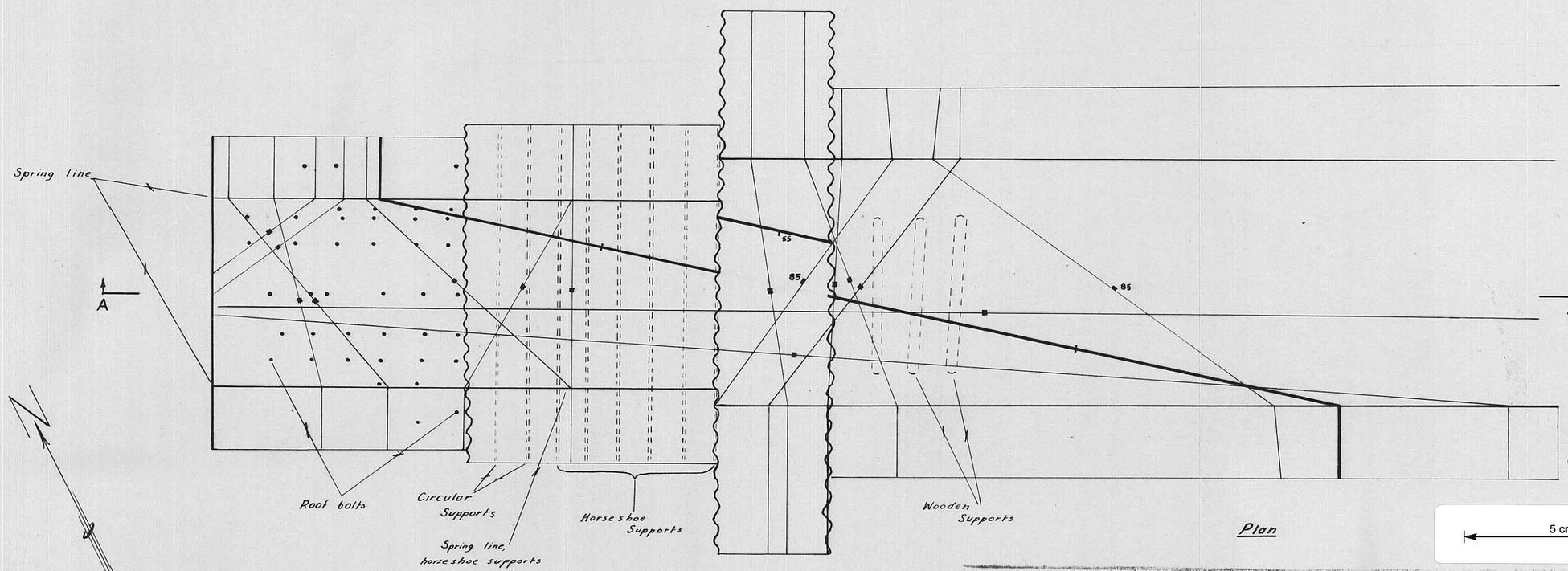
Hole completed: 375½'. Logged by: S.G. Paterson

Note: The sandstones in the above drill core 5-10-59 are sub-felspathic, felspathic and volcanic lithic sandstones (arenites); they were formerly called felspathic sandstones.

Lithic Sandstones (arenites) are moderately well sorted sandstones containing abundant unstable constituents in the form of sub-angular to sub-rounded grains. In some rock fragments are the most abundant detrital grains; others contain numerous quartz and felspar grains.



Section A-A.



Plan

5 cm

333034

THE HYDRO-ELECTRIC COMMISSION, TASMANIA

GREAT LAKE POWER DEVELOPMENT

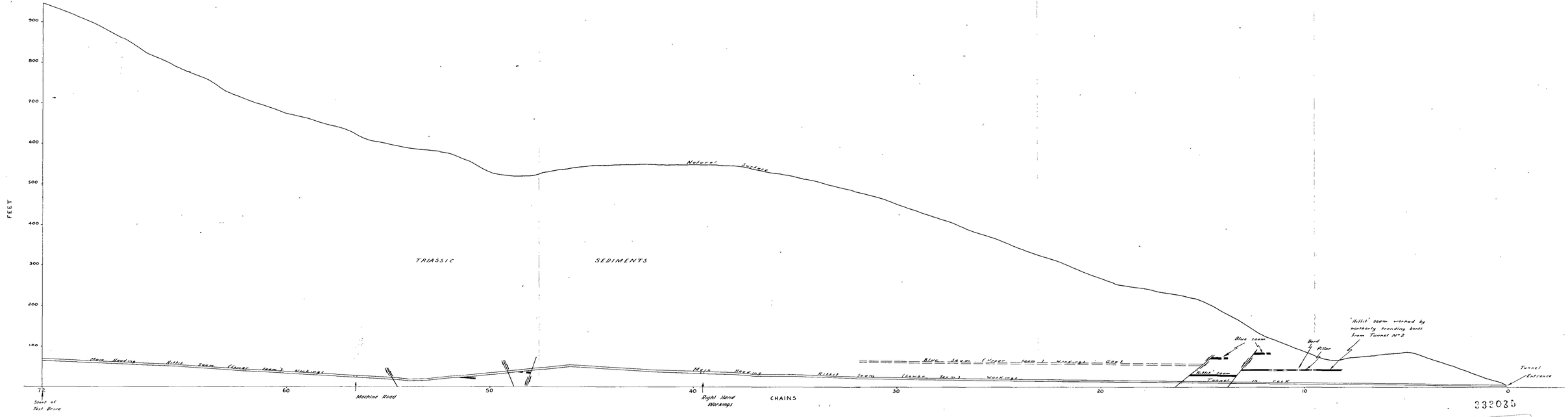
CORNWALL COLLIERY TEST AREA NO.1
PLAN & GEOLOGICAL SECTION

Plotted		Geology by:-	SCALES	C2626
Traced	31/10	Hale	8 Feet to 1 Inch	Sheet of Sheets
Checked				

002 Deputy C.C.E

CHIEF CIVIL ENGINEER

REFERENCE DRAWINGS



332035

5cm

CORNWALL COLLIERY

Section along Main Heading - Blairs Tunnel

003

GS14

20 10 99

N

WEAKLY SQUEEZING

MODERATELY SQUEEZING

STRONGLY SQUEEZING

RIGHT HAND WORKINGS

MACHINE ROAD

TEST DRIVE No.1 Plate I & II

PROPOSED TEST DRIVE No.2

Pl. III Fig. 1

Pl. III Fig. 2

FAULT

BACK HEADING — MAIN HEADING — RETURN AIRWAY

BOUNDARY OF 'BLUE SEAM' (UPPER SEAM) WORKINGS : GOAF

'HITTIT SEAM' (LOWER SEAM) PRESENT WORKINGS

'HITTIT SEAM' (LOWER SEAM) OLD WORKINGS FROM TUNNEL No 2 (1917)

'HITTIT SEAM' (LOWER SEAM) OLD 'EASTERN' WORKINGS; CLOSED BY FIRE JULY 1955

BOUNDARY OF 'HITTIT SEAM' (LOWER SEAM) WORKINGS FROM TUNNEL No 1 (1899)

BOUNDARY OF 'HITTIT SEAM' (LOWER SEAM) WORKINGS FROM BLACKSMITHS TUNNEL (1908)

No 4 SEAM WORKINGS

PILLARS EXTRACTED

FAULT WITH THROW AND DIP WHERE AVAILABLE

SUB-AUDIBLE ROCK NOISES LISTENING POST

DIRECTION OF AIRFLOW - RIGHT HAND WORKINGS

100 50 0 100 200 300 400 500 Feet
0 1 2 3 4 5 Chains

"HITTIT SEAM" WORKINGS FROM TUNNEL No 1 (1899) WITH RISE TO "BLUE SEAM"

TUNNEL No 4 (1912) IN "BLUE SEAM"

RISE TO "BLUE SEAM"

TUNNEL No 2 (1917) "HITTIT SEAM"

VENTILATION TUNNEL & EMERGENCY EXIT TO BLAIRS TUNNEL

BLAIRS TUNNEL

TUNNEL "BLUE SEAM"

ORIGINAL TUNNEL "BLUE SEAM"

BLACKSMITHS TUNNEL "HITTIT SEAM" (1908)

DIP TUNNEL TO HITTIT SEAM

No 4 SEAM WORKINGS

TUNNEL "BLUE SEAM"

Encountered old workings from Blacksmiths Tunnel

GREAT LAKE POWER DEVELOPMENT
CORNWALL COLLIERY - ROCK TESTING
COMPOSITE PLAN OF PART OF WORKINGS

Cornwall Coal Co. & S.T.P.
J.P. Geologist-in-Charge

2 Chains to 1 Inch.

5 cm

A7040

001

60-312 333036