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THE BRORA COALFIELD, SUTHERLAND

by

R.S. Harker

Introduction: Brora is a prosperous village, situated on the east coast of Sutherland, 4 or 5 miles north-east of Golspie. The village is a little larger than Grassington and possesses, apart from fishing and farming, four substantial industries; a distillery, a wool mill, a brick works and above all, from the point of view of this study, a colliery. The colliery is of interest to both the geologist and to the economic historian (or industrial archaeologist). Interest to the former lies in the uniqueness of the colliery in working Jurassic coal and not Carboniferous. Interest to the latter lies in the fact that the colliery is worked by a private company, and not by the N.C.B. The steam winding engine is of great interest to the industrial archaeologist. [8]

Geology:-

The coalfield occurs in rocks of Jurassic age, the horizons of interest being; the Estuarine Series, which is the equivalent of the English Inferior Oolite, and which contains the coal, and the Kellaways Rock which forms the roof of the working seam. The coalfield, i.e. that containing workable coal, is 3 or 4 square miles in area, with the village of Brora on its eastern edge.

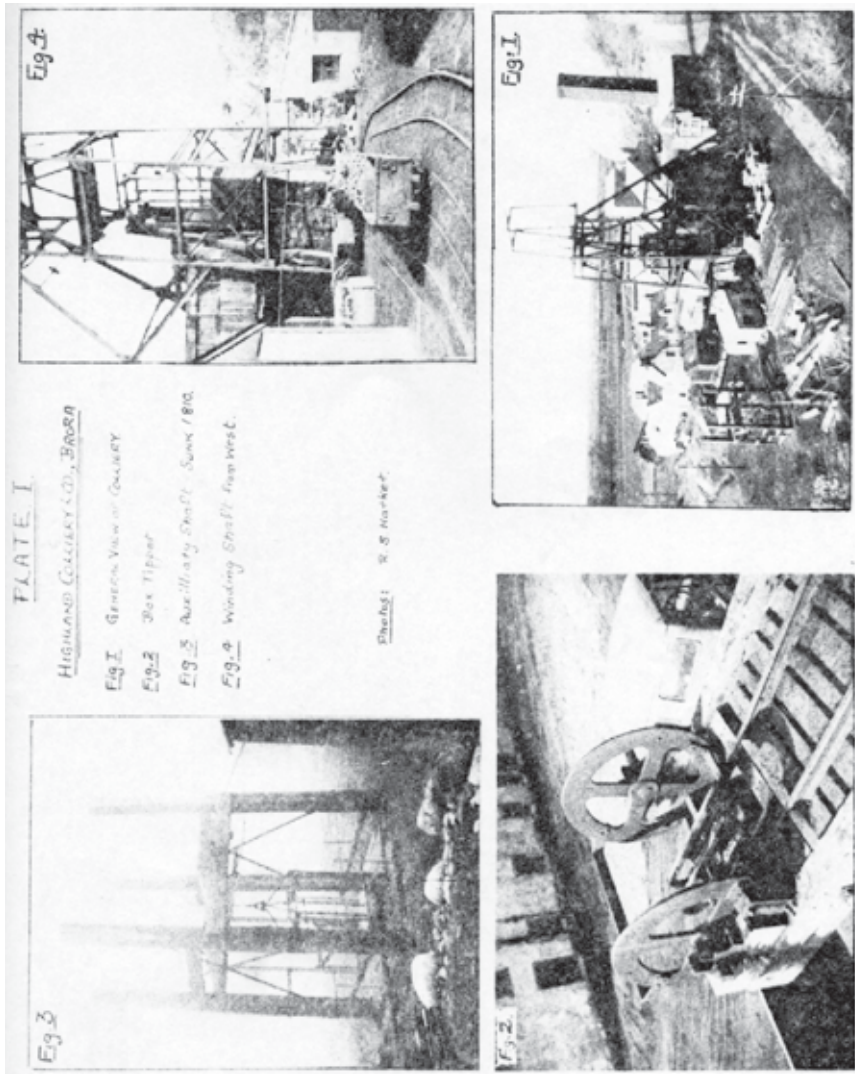
The only workable coal seam, the Main Coal, which is 3' 6" thick, occurs at the top of the Estuarine Series, overlain by 2' of soft sand, followed by 3' of hard, shelly, calcareous sandstone of "Kellaways age". The sequence beneath the Main Coal appears to be somewhat debatable, different accounts describing it differently. Judd says that below the Main Coal there occur 26' of highly carbonaceous shales, including several bods of coal up to 16" thick, which are less constant than the Main Coal. Woodward says that up to 6' of Parrot Coal occurs, below the Main Coal, which is fissile and shaley and of inferior quality. Another account says that the pavement of the Main Coal consists of 3" to 5" of "parrot" with an intensely sulphurous layer at the base, overlying bituminous shales. This latter is in accordance with records of a bore put down in 1770 at Inverbrora Links:-

Coal, with a little black stone	-	3' 6"
Coal, parrot	-----	3"
Black coal or coaly bass	-----	7' 0"

During the sinking of the present Shaft, the Ross Pit, the section recorded was as follows:-

Coal	-----	3' 6"
Bituminous shale	-----	2' 0"
Slaty coal and pyrite	-----	1' 4"

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This latter is in close accordance with a bore put down in 1811, on the Water of Brora, to the west of the shaft:-

Hard coking coal - - - - -	3' 2"
Black clunch - - - - -	2' 0"
Hard splint coal - - - - -	1' 4"

Thus, it would appear likely that differences in accounts of the rocks below the Main Coal arc in part due to differences in nomenclature, but they are probably largely due

to the fact that the Main Coal is the only workable seam, and consequently, little attention has been paid to the underlying rocks.

The Estuarine Series outcrop for a short distance on the coast just to the south of Brora. They dip north and west, inland from the coast and are transected by a sinuous NNE-SSW fault with downthrow to the northwest. In consequence, the workings to the north and west of the fault, which are the more recent, are becoming progressively deeper, while the earlier workings, to the south and east, were initially very shallow.

In the Cromarty Firth area, about 15 miles to the south of Brora, the coal is represented by a 4" carbonaceous layer only.

[9]

Characteristics of the Coal:-

The coal is generally 3' 6" thick, though to the south, at Strathsteven, it thins to 2' 6". About the middle of the seam, there occurs a 2-3" band of pyritic material, which has to be separated from the coal before sale. In addition, there is a considerable percentage of disseminated pyrite within the coal itself, which detracts from its quality and imparts an undesirable tendency to spontaneous combustion on exposure to air and moisture, both underground and on the surface heaps (which latter are almost non-existent at the present workings). The coal is of a high ash content, but it burns freely, "throwing a powerful flame". Miller states, "it was accompanied by a peculiar odour that seemed to tell rather of the vegetable of which it had originally been composed, than of the mineral into which it had been converted, and then sunk into a light white ash, which every breath of air sent floating over carpets and furniture"

Thus, it is not a very good quality coal, though by careful screening and hand picking, it makes a tolerable household coal and a reasonable boiler fuel.

History:-

The Brora Coalfield has had a very chequered history, being continually opened and closed since its first recorded working in the 16th century. It is one of the oldest, if not the oldest, worked coalfield in Britain. Lady Jane Gordon, Countess of Sutherland, opened the first pit, on the south side of the river on the outcrop of the Great Oolite and Kellaways Rock, in 1573, or 1598. (There seems to be some dispute as to the actual year of opening). However, in 1634, John, the Fifth Earl of Sutherland, reopened the workings and four or five new pits were subsequently sunk during the remainder of the 17th century, by the Earls of Sutherland. These early pits, working very close to the outcrop were very shallow, being but a few yards in depth, but that they were extensive is evidenced by the fact that 15 men were killed by a roof fall in one of them.

About 1763, one John Williams took a lease on the entire field, which he worked for nearly five years. He gave up his lease when his sales dwindled as a result of a cargo

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of coal going to Portsoy catching fire spontaneously in the hold of the ship, which had sprung a leak. Williams' customers refused to purchase such a dangerous commodity. The workings, by this time, had reached a depth of from 30 to 40 yards.

After Williams' unsuccessful venture, little work appears to have been done until around 1810, when the Duke of Sutherland sank a new shaft on the north side of the river, which shaft is still in existence as the present secondary shaft. Here the seam was found 250 ft. below the surface. A railway was built, 800 yards long, from the pithead to the harbour. This venture cost £16,000. The reopening of the colliery led to the erection of four large salt-pans, also by the Duke, on the sea shore, using the coal to evaporate the salt-water. This venture cost £3,327, and appears to have been quite successful. Salt-pans had been operated in the previous century, but they never previously used Brora coal, nor were they very successful; "Salt-pans were set a going at Brora, and great quantities made and exported by a company from Portsoy, in the [10] time of the late Earl of Sutherland. This work was discontinued about 16 years ago (1778, R.S.H.) on account of the duty on the coal, the seam found in the parish being of sulphurous quality."

The Duke of Sutherland also erected a distillery at Brora in about 1825, an industry which quite a quantity of coal. Thus, the Duke, after opening the colliery, created his own market for his coal. This rather insular nature of the market for Brora coal has been retained up to the present time.

Between 1814 and 1827, Murchison states that 70,000 tons of coal were raised from the field, i.e. about 5,000 tons per year. This tonnage has been maintained, when the colliery has been working, right up to the present, when production is still in the region of 5,000 tons per annum.

In 1872, a small pit was sunk 2 miles south west of Brora, at Strathstevan, through the Kellaways Rock to the coal, which there had an average thickness of only 2' 6". The coal was cut out after a short distance by a large fault.

Working of the Brora coalfield during the 20th century appears to have been fairly continuous. A production of 6,000 tons is recorded for 1910, while in 1922, 30 tons per day were being produced. This latter production was entirely consumed in the neighbourhood; by the brick works, the Brora Wool Mill, which supplied the village with electricity, the distillery, and by household consumption.

Documentation after 1922 appears to be rather scant until the end of the 1950s when the colliery was run, under license from the N.C.B. by the Brora Coal and Brick Company Ltd., which company was wound up in April, 1961. The pit was reopened in October, 1961, by the Highland Colliery Ltd.

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The Highland Colliery Ltd. And the Ross Pit:-

The present company, which works the field under license from the N.C.B., is the Highland Colliery Ltd., which was formed in October, 1961, after a lapse of six Months from the winding up of the Brora Coal and Brick Co. Ltd. The brick works, though but 50 yards from the pit-head, is now a company in its own right.

The present company was financed by the Highland Fund Ltd, a non-profit making organisation devoted to the development of the economy of the Scottish Highlands. The Fund loaned the colliery £9,000, which is being paid off voluntarily by the workers at the rate of 10/- per ton per week. The Fund also helped finance the reorganisation of the brick work, though to what extent, the author could not say.

The voluntary paying off of the colliery debt by the workers suggests that the company is run on a form of co-operative or combine basis.

This is further evidenced by the lack of demarcation between; the manager, who is only distinguishable by his white helmet, and the electrician were observed, as the author was leaving the colliery to be tipping tubs into a lorry. There is no trouble from the [11] Trade Unions at Brora.

As the actual coal face was not visited by the author, the details of the actual winning of the coal are lacking. Long-wall stoping is the method used, with the aid of three chain-cutters. The competent nature of the roof rock and the incompetency of the strata beneath the seam causes the old stopes to cave from below, i.e. the roof does not collapse, but, rather, the floor rises in response to the lateral translation of vertical pressure.

Haulage along the main road-way is in 7 cwt. square tubs, called boxes. Two single-rope winches haul the boxes up the dip, which in places is 1 in 4, and is about half a mile in length from the working surface to the shaft bottom. The winch from the working face up the steepest incline can haul 3 boxes at a time, while the second winch can haul 12 to the shaft bottom. The latter winch was built by Lawrence Scot, Norwich and Manchester, and is a 25hp. D.C. electric type, soon to be changed to A.C.

The boxes are wound up the shaft by a John Wood and Son, Wigan, 1901, steam powered winding engine, which operates at 60 to 70 lbs per square inch pressure, generating about 30 hp. The boiler is of the Cornish type, built by Tetlow Bros. Hollingwood, Manchester, 1904. The engine is a magnificent piece of equipment, zealously guarded by an aged winchman, who stokes his own boiler.

The winding shaft is 265 ft. deep, 10 ft. in diameter at the top, becoming narrower towards the bottom. It is entirely lined with dressed stone, except for one or two places where the rock is strong enough to stand alone. The wooden Guide rails form a square about 4 ft. across, and take a single deck, four man, or one box cage.

Drainage of the mine is by means of a three-piston pump, built by Joseph Evans and Sons, Wolverhampton, discharging at the rate of 60 gallons per minute. The pump operates for 2 hours a day. It is powered by a 25 hp. A.C. motor, by Lancs. Dynamo and Motors Co. Ltd. The water is piped up the secondary shaft which also acts as the upcast ventilation shaft. A torpedo type extractor fan is used in this shaft; it is only supplementary to the natural flow down the winding shaft and up the secondary. The winding: gear on the secondary shaft, or the "upcast airway engine", is a converted ship's winch.

The boxes of coal, on reaching the shaft bottom, are wound, one at a time, to a stage 7 or 8 ft. above the lip of the shaft and are trammed from there to a tippler. The coal here falls across a 2½" bar screen; the oversize goes into boxes on the ground, the -2½" into a small hopper. The oversize is then either bagged or tipped into lorries for bulk delivery. From the hopper, the -2½" passes up a small bucket elevator into a rotary screen of ½" and 1½" mesh. The three grades, i.e. -½", +½", and +1½", fall into hoppers which discharge into boxes on the ground. The -½", called "gum", and the +½" are used in industry, i.e. they go to the brick works, the distillery, the wool mill and to the colliery boiler house. Delivery to the latter is a curious arrangement, whereby the "gum" is filled into boxes on the ground, trammed to the shaft and into the cage, [12] lifted the 7 or 8 ft. to the stage and then tipped down a chute into the boiler house. The +1½" is either bagged or delivered in bulk. Both this and the +2½" is household coal and constitutes about 50% of the mine material.

Very little sorting of the coal is required on the surface, as the face workers are quite astute at picking the pyrite from it before it is loaded into the boxes. The baggers at the pit-head further hand pick the household material. No washing, at all, is necessary, as the seam is very uniform and no pavement shale is excavated other than to make space for roadways; hence the lack of any substantial waste heap on the surface.

Weekly production is around 120 tons, which is sufficient to meet local needs and leave a household surplus for sale further afield. In winter, the cost of the coal at the pit-head is 8/- per cwt. loose, or 8/6 per bag. When transport charges are added, one cwt bag over on the west coast of Scotland costs 9/9. In summer, the costs are from 7/6 to 9/-. The company owns three lorries, a tipper for refuse disposal and bulk delivery, and two flat lorries for bag delivery.

The work is conducted during one shift per day, from 6-45am to 2.45pm. The total work-force is 27 men including the manager, 19 of whom normally work underground. When the author visited the mine, only six men were underground as it was the lambing season. The manager said that many man-days were lost through lambing and croft-work. Another indication of the happy nature of the mine was the observation, in the return air-way near the foot of the shaft, of numerous seed boxes of mushrooms. Here the temperature was 73 deg. F. and the humidity sensibly high. The guide informed the author that previously they grew rhubarb, but that they had become tired of it.

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It is hoped that, assuming the estimates of coal reserves to be correct, the mine will continue working at the present rate of production for another five or six years. Unless further reserves are proved to the north and west, the mine will then have to close down permanently. However, the object of the Highland Fund in financing the company would appear to have been to give employment to as many men for as long as possible. In providing fulltime employment for 27 men for 8 or 9 years, the Fund may be regarded as having ably fulfilled its purpose and, indeed, is to be congratulated on its achievement, as industry in the Northern Highlands is far from abundant.

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