

The Geology and Shaft Sinking at Jangseong Anthracite Mine, Gangweon-Do, Republic of Korea.

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INTRODUCTION

Jangseong Anthracite Mine is situated at the southeastern end of the Samcheog coalfield, Gangweon-do, Republic of Korea (Fig. 1), and is the largest coal producer in the Republic of Korea, yielding some 2,200,000 tons of coal per annum. The mine itself is situated in the incised valley of the Hwangji River amid mountainous terrain which characterizes much of the northeast province of Gangweon. This northeastern part of the Republic of Korea is the chief coal producing area has both government owned and private coal mines operating there. The coal mined is anthracite which is the only coal type found in the southern part of the Korean peninsula.

The mine at Jangseong was first established by the Japanese in 1936. It was taken over by the government owned Dai Han Coal Corporation in 1950 and subsequently expanded to its present state.

GEOLOGICAL SETTING

The Samcheog Coalfield contains sediments of Carboniferous to? Triassic age (Pyeongang Group), surrounded by older sediments of Ordovician and Cambrian age (Joseon Supergroup). Into all of these sediments have been intruded acid igneous material of Late Jurassic to Cretaceous age.

The lowest beds of the Pyeongan Group,

namely the Manhang Formation, rest disconformably upon limestones of the Joseon Supergroup, the latter having been subjected to little tectonism prior to the deposition of the Late Paleozoic strata. The Manhang and the overlying Geumcheon Formations are marine in aspect, whilst the Jangseong, Gobangsan and Nogam Formations above are the products of non-marine deposition (Cheong. C.H. 1969). The Geumcheon and Jangseong Formations have traditionally been known and mapped as the Sadong Formation (Fig. 2).

All of these sediments have been subject to minor earth movements at the end of the Triassic Period, and then have been affected by a major orogeny during the later Jurassic Period.

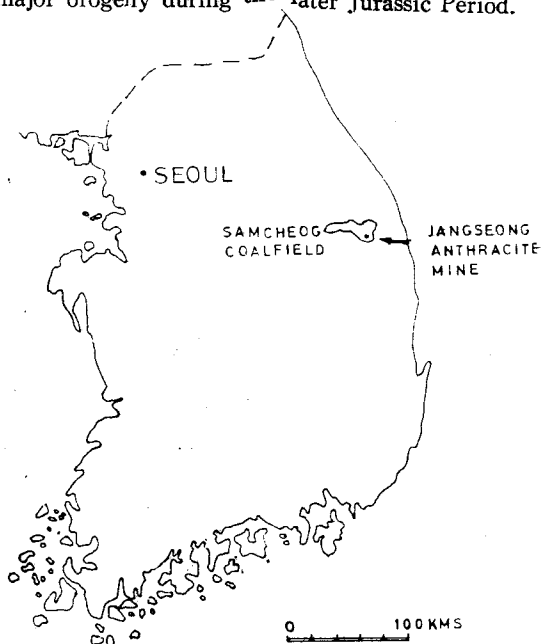


Fig. 1. Location of Jangseong Anthracite Mine, Republic of Korea.

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These tectonic episodes namely the Songnim Disturbance and the Daebo Orogeny respectively, have resulted in the present structural style of the Samcheog Coalfield.

Structurally the coalfield has been deformed into a series of folds whose axial planes trend 030-050, and which are overturned to the east. Upon this fold system has been superimposed a large asymmetrical synclinal fold the axis of which trends east-west with an almost vertical northern limb and a more gently dipping southern limb. The major fault developments are in a north-south direction or parallel to the 030-050 fold axes. East-west thrusting has been developed which accompanied the later large scale folding.

GEOLOGY OF JANGSEONG MINE

The mine is situated on the north side of the valley of the Hwangji River. The Pyeongan sediments lie disconformably on the Joseon Limestone and form part of the southern limb of the major coalfield syncline, having a regional dip of between 40 and 60 degrees and strike in a 068 direction. The lower Pyeongan strata have been intruded by a quartz porphyry which forms a circular outcrop (Fig. 2).

Sedimentary Sequence.

The lowest beds of the Pyeongan Group are those of the Manhang Formation, this comprises 250 metres of red and green to grey shales and sandstones, white and grey limestones and red conglomerates, these pass upwards into grey sandstones and dark grey limestones and black shales of the Lower Sadong or Geumcheon Formation. Above, the Upper Sadong or Jangseong Formation is one of black shales, sandstones and coals, the total thickness for the Sadong Formation being 300 metres. In Jangseong Mine, two coals are found 50 metres and 100 metres below the top of the Jangseong Formation. These coals are 5-6 metres and 1-2 metres

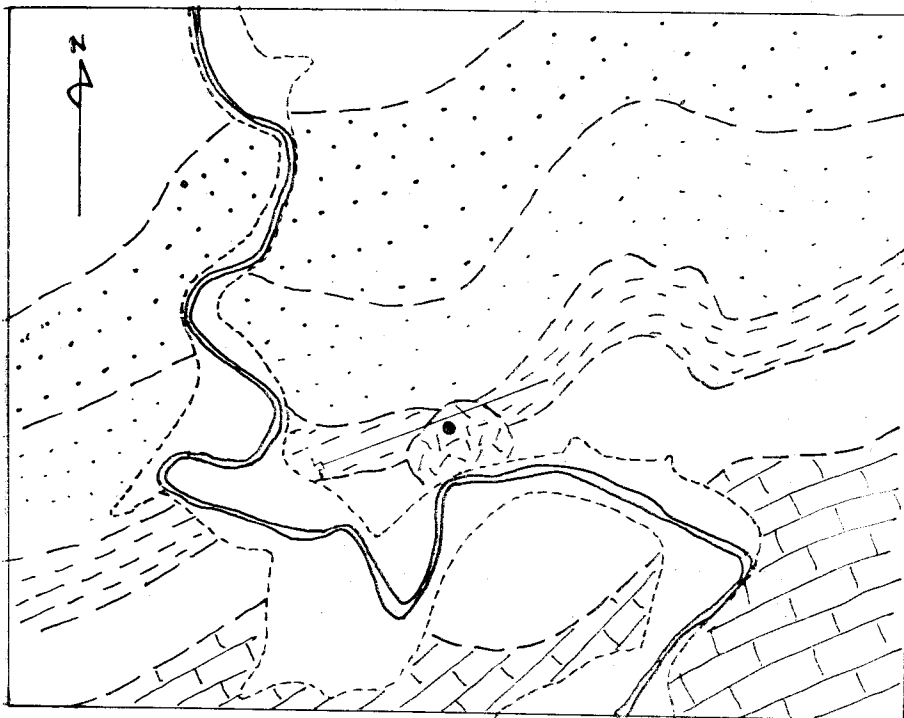
in thickness respectively. The coal seams are anthracite grade and invariably have a sheared top and bottom, are of variable thickness and subject to local folding in which pinching squeezing and thrusting are common features. Original characteristics such as dirt partings, sedimentary variations in thickness and internal structure are not identifiable due to subsequent tectonic effects and later proximity to igneous intrusions.

Above the Sadong Formation, the Pyeongan Group consists of two dominantly arenaceous formations. The lower Gobangsan Formation is made up of a basal white coarse sandstone with sporadic pebble horizons, followed by red and green sandstones and shales, then grey sandstone and coaly shale, the Formation being 800-1000 metres thick. The highest beds of the Nogam Formation consist of distinctive red and cream sandstones intercalated with green sandstones and conglomerates which total 400 metres. Igneous Rocks.

Into the Pyeongan sediments has been intruded an igneous body which is cylindrical in shape and can be seen to taper with depth. This body has smaller veinlets extending outwards into the surrounding sediments. The rock type is that of a quartz porphyry, a homogeneous greenish-grey rock which in thin section is seen to be composed of phenocrysts of plagioclase feldspar (Oligoclase composition) in a groundmass of feldspar and quartz. A feature of the rock in its present state is the presence of disseminated siderite.

SHAFT SINKING

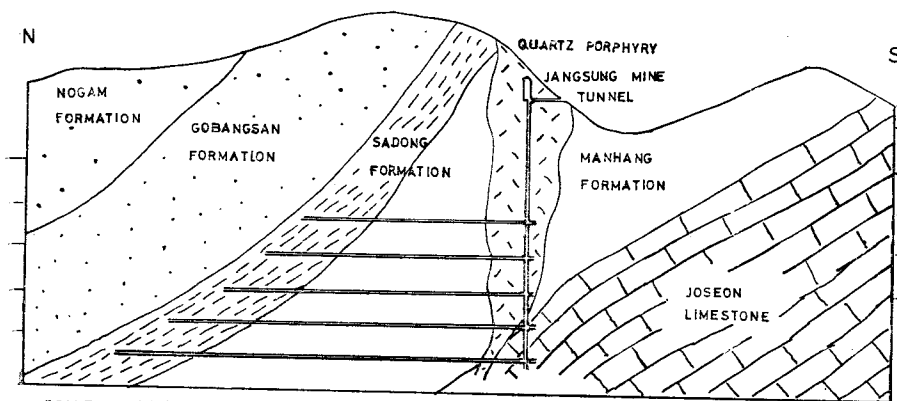
At Jangseong Mine a shaft was sunk by the Pierce Management Corporation (USA) in 1968. This was drilled down into the quartz porphyry body and due to the homogeneous nature of the lithology and a lack of large scale fracturing, such as is present in the surrounding sediments,



SCALE 1 : 25000

- | | |
|------------------------------|-------------------|
| JANGSEONG MAIN TUNNEL | SADONG FORMATION |
| SHAFT POSITION BELOW SURFACE | MANHANG FORMATION |
| QUARTZ PORPHYRY | JOSEON LIMESTONE |
| NOGAM FORMATION | |
| GOBANGSAN FORMATION | |

Fig. 2. General geology of Jangseong Anthracite Mine area, showing shaft position.



SCALE 1 : 10000
FOR KEY SEE FIG 2

Fig. 3. Cross section of Jangseong Anthracite Mine shaft sinking showing main Levels.

few engineering problems were encountered. The shaft was sunk to a depth of 600 metres from a position underground 610 metres east of the west entrance of the main Jangseong tunnel, and at a level of 600 metres above sea level (Fig. 3). From this shaft, working levels have been developed at 75 metres, 150 metres, 225 metres, 300 metres and 375 metres above sea level (Fig. 3). The shaft diameter is 6.2 metres exclusive of a concrete sleeve 0.4 metres in thickness. Above the top of the shaft, an extension upwards into the quartz porphyry has been made and here is housed the shaft winding gear for the mine. The bottom level of the shaft penetrates the Joseon Limestone due to the thinning of the igneous body at this depth.

The workings extend 600 metres northward into the Jangseong Formation (Fig. 3), where

the main coal seams are worked. Small working faces using the slant chute caving method are developed along the strike of these coals.

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