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LONG WALL WORKING UNDER GROUND MINES

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ABSTRACT

Long wall mining is one of the most acclaimed and widely used in underground method for coal extraction characterized with high production, productivity and safety potentials. The interaction of powered roof supports with the roof is the key issue in strata mechanics of long wall mining. The main aim of this research is about working of longwall that will create a safe work environment. Longwall mining has matured into the safest and most productive underground mining method used today. It is used for extraction of thin seams ranging up to ***0.6 to 2.4 m****. In long wall mining extraction is done by advancing and retreating methods preferably retreating. The main advantage of this process is* ***high recovery*** *and* ***simple ventilation.*** *In this method, dust control is very difficult when compared to other methods of extraction in mining. Long wall mining method gives more production when compared to bord and pillar method of mining. In ALP mine they use heavy machinery for development and production to acquire a large amount of coal. The purpose of this project is, modern mining industry is highly mechanized and relies on massive, multimillion dollar pieces of equipment to achieve production targets with safety potentials. The whole project is carried out on* ***WORKING OF LONGWALL METHOD*** *available at SCCL* ***ALP,*** *APA Area.*

INTRODUCTION

COAL: **Coal** is a fossil fuel and is the altered remains of prehistoric vegetation that originally accumulated in swamps and peat bogs. The energy we get from coal today comes from the energy that plants absorbed from the sun millions of years ago.

Coalification has an important bearing on coal's physical and chemical properties and is referred to as '**RANK**' of coal. Ranking is determined by degree of transformation of the original plant material to carbon. The ranks of coal from those with the least carbon to those with the most carbon are peat, lignite, sub-bituminous, bituminous and anthracite.

1.6 ADRIYALA MINE AT A GLANCE

Adriyala Longwall project Mine:

This mine is situated in dip side of GDK 10A Incline mine and proposed to work in a depth range of 350 m to 600m. No.1, 2, 3 and 4 seams are existing in this property. Total six No.s of Punch entries are there .TPE1, TPE2, PE1, PE2, PE3 and PE5.Presently TPE5 is being used for man and material transportation and TPE2 is for conveyor belt for coal transportation. All the 6 punch entries are used as Intake airways. Return air shaft of 7.5m dia with 481m depth and 400 KW fan is installed. Punch entries are made through the standing high wall of RG OC-II. There is a interconnection between Adriyala Longwall project mine and GDK 10A Incline mine through 60 Level and 3Dip/59L. The project is planned to work with longer Longwall panels of about 2.5km with a rated production of 3.0MT per

annum. No. 1 seam is being worked Longwall panel No.1 is completed, 2nd panel is under progress and gate roadways development is under progress with Bolter Miner. Development of Trunk roadways and Sump Galleries is also in progress. 2 No. s of Dosco , 1 Wirth Road headers, 2 LHD and 2 SDLs are working now.

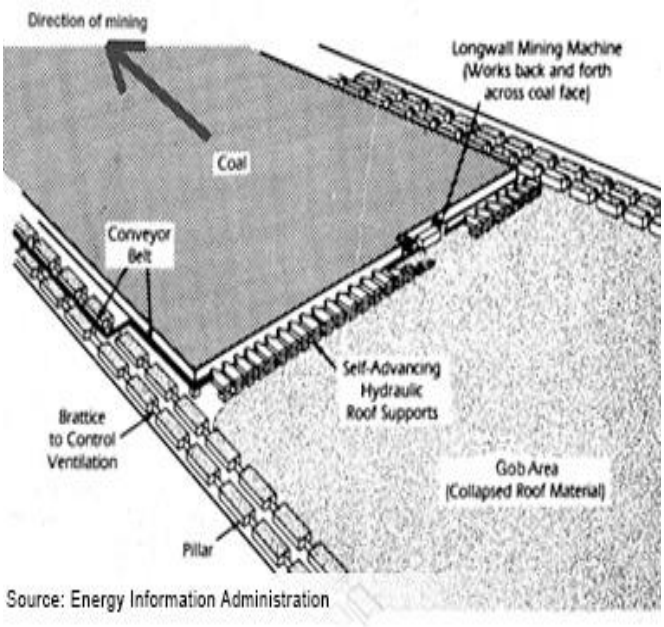

Fig: 2.3 Longwall retreating

ADRIYALA LONGWALL PROJECT

5.1 GENERAL

Ramagundam Coal Belt is located in the Karimnagar district of Andhra Pradesh in Godavari Valley Coalfields. The Geological Block under reference is an area of 12.96 Sq. Km. and bounded by North latitude $18^0$37'32" to $18^0$42'00" and East longitudes $79^0$34'29" to $79^0$36'19". This is covered by Survey of India Topo Sheet No. 56N/10.

To meet the increasing demand of power and shrinking of ongoing opencast projects, SCCL envisaged the opening up of deep shaft blocks for [illegible] production. The conceptual report for the shaft block II & III is prepared by CMPDIL, Ranchi.

LOCATION

The proposed "Adriyala longwall Project" is located in Kamanpur mandal of Karimnagar district of Andhra Pradesh. It is situated due southeast of existing GDK-10A/GDK-10 mine of Adriyala project area of SCCL. It is bounded by northern latitude of $18^0$39'03" to 18^0'41'34" and East longitude of $79^0$34'28" to $79^0$35'55". The mining block covers an area of 3.4 Sq.Km. The distances along strike and along dip are 2.75 Km and 1.25 Km respectively. The Ramagundam area is the heart of Singareni Collieries Company Ltd. and is also center of industrial activity with a chain of coalmines. This Adriyala Longwall Project is a part of mines of Ramagundam area, which is well connected by Rail and road.

GEOLOGY

The Ramagundam Shaft Block II & III extend over a strike length of about 9 Km and a dip length of 1.48 Km. covering an area of 12.96 Sq.Km. The block is covered by 2 perennial vagus viz., Bokkalavagu, and Jallaramvagu, small seasonal tanks and two Sriramsagar canals. The entire block is virgin.

The entire area is covered by surface soil followed by barren measure over most of the area and lower Kamthis along dip side limits.

The proposed Adriyala Longwall Project is carved out of Ramagundam Shaft Block-II and is extending from North of Bokkalavagu upto Fault F4. The regional strike of the deposit is more or less NNW-SSE. The gradient of beds is varying between 1 in 6.00 to 1 in 7.8.

The entire Adriyala Longwall project block is virgin and contains 7 seams viz., IA,I,II,IIIB, IIIA, III and IV in descending order. The depths of bottom most IV seam varies from 406m to 644m.

Out of the above 7 seams, 4 seams have attained workable thickness and persistent.
The generalized sequence of the coal seams, their parting and thickness in respect of proposed block is as below:

Sl. No.	Seam/Parting	Thickness (m)
1	I Seam	5.64
	Parting	19.93
2	II Seam	3.27
	Parting	64.51
3	III Seam	9.40
	Parting	6.31
4	IV Seam	3.66

The coal seams in Adriyala Longwall Project trend in NNW-SSE direction. The gradient is varying between 1 in 6 to 1 in 7.8.

MINE BOUNDARY

The boundaries of Adriyala shaft project are as follows

1	Rise side	Existing GDK-10A/GDK-10, Dip side boundary
2	Dip side	Proved limit of Shaft Block II & III
3	South side	Straightened BokkalaVagu
4	North side	Proved Fault F4-F4

CAVABILITY OF ROOF

All the proposed seams are under extraction by Longwall technology in the adjoining mines of GDK-10A and GDK-10 incline. There is no serious problem of cavability in these mines hence, no problem of caving is foreseen in this block.

AMOUNT OF DIRECTION OF DIP

The average gradient of seam in shaft block II is 1 in 6 to 1 in 7.8. The trend of occurrence of seam is in NNW-SSE direction and dips in ESE-WNW direction.

GASSINESS

All the seams are Degree-I, gassiness as per the data pertaining to adjoining mines.

SPONTANEOUS HEADING

Incubation period has been considered as 12 months.

HARDNESS OF COAL

Compressive strength of the coal in the seam is generally hard and is in the range of 300-500 $Kg/cm^{2.}$

5.2 METHOD OF WORK

Due to high depth of occurrence of the seams, simple geological structure and medium thickness of the seams, mechanized Longwall technology has been proposed for the seams in descending order. The III seam is proposed to be extracted in two sections.

SUPPORT SYSTEM

TRUNK ROADWAYS

The Continuous Miner package envisaged for trunk roadway development consisting of a roof bolter. The trunk roads are proposed to be supported by roof bolting with roof bolting machine. At disturbed patches and at junctions, the support system with girders is proposed.

GATE ROADWAYS

The Gate roadways are proposed to be supported by roof bolts and ”W” strap along with the wire meshing. The Bolting machine mounts on the Road Headers are provided for Gate roadway development.

DEVELOPMENT

DEVELOPMENT OF GATE ROADS USING HEADING MACHINES AT ALP:

i. BOLTER MINER:

The 12ED30 entry driver, with its integrated bolting system, allows simultaneous cut and bolt capabilities for improved productivity. Ideal for high seam applications, the 12ED30 is a single pass machine that addresses the bottleneck which occurs during gate road development when the roof is weak and early installation of roof bolts is required. Designed for safety.

Reduced direct contact with the drill rig push button control station for two-handed control of all fully automated operations, including drilling and bolt insertions; two-handed control ensures that the operator cannot interact with rotating parts when initiating a drill cycle.

Roof and rib bolters are optionally equipped with dust collection capabilities.

Fig:5.1 Bolter Miner

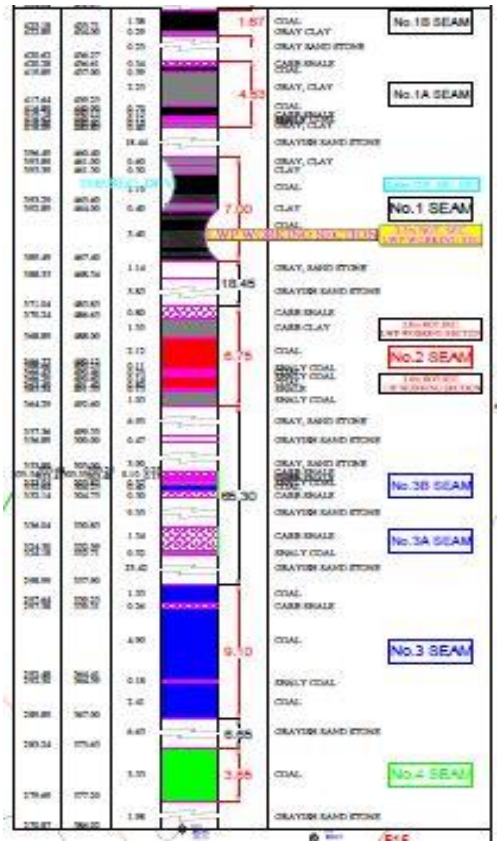

Fig : 5.10 Bore Hole Survey of ALP

6. SAFE OPERATING PROCEDURE AT FACE

6.1 SAFE OPERATING PROCEDURE FOR SHEARER AT LONGWALL FACE

7. FUTURE DEVELOPMENTS IN LONGWALL TECHNOLOGY:

In India, the pace of development of underground mechanisation had been tardy because of improper equipment selection, non-availability of spares & equipment itself. We have come to a stage wherein no further experimentation is acceptable and the technologies we are going to adopt in future are suitable for the Indian Geological

Conditions and must produce coal in bulk. Apart from going for modern technologies for deep mining, we have also to think of liquidating the developed pillars in our country which constitute around 3 billion tonnes. The variants here could he Continuous Miner and Remote Operated LHD's wherever feasible and SDL where the gradients are steep. Blasting Gallery is already successful in SCCL and need to be extended wherever conditions are suitable.

8. CONCLUSION AND RECOMMENDATIONS

- In this mine, at present, the loss in mine is mainly due to the poor quality of coal in rope seam, so through cost analysis should be assessed in detail with a regarded to the grade of coal being mined for different periods throughout the life of mine keeping in mind requirements.
- From the studies we revealed that most probable of breakdown is due on shearer, AFC, stage loader and system is ideal during to bucket full and it caused the whole system idle.
- Poor maintenance of coal haulage also one causes of break down.
- In case of shearers, the breakdowns are mainly due to haulage movement, ranging arm problems and cable damages. In case OF AFC and BSL, these are mainly due to chain looping failure of padlocks, loosing of bolts. By eliminating the above causes, the panel duration can be raised. The management should plan to achieve higher production by studying the breakdowns broadly and switch over to a alternatives other than routine.
- Construction of new bunker of large capacity avoiding delays in procuring required no. Of wagons can reduce idle hours.
- Proper maintenance of coal haulage, gate belt conveyor is essential in avoiding unnecessary idle hours.
- Equal importance in terms of spares and skilled man power is given to reduce the equipment breakdowns. Providing standard equipment like seals and valves is also important.
- AFC selected should be of higher capacity to deal with the eventualities during cavities, BSL & gate belt should be properly matches with AFC.
- Trained man power is strength of any mechanization and there is very less training for workers and technicians working b longwall. Proper training should be given to work men and technicians.
- Every persons employed in long wall should be made to understand what is expected out of him and he should be made accountable to the same.
- Selection & training of personnel, is given much more importance.
- Through a foundation has been laid for longwall technology it hassle no really taken off. Management has to critically examine the lesson a learnt during last 20 years and attempt to find remedial measures. While doing so, it has to be kept in mind, the most of the underground coal, world over, is won by longwall technology and it can be used under almost all under ground conditions.

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