

Coal Exploration & Reserves in Venkatesh Khani 7 Incline & Gowtham Khani Opencast Project (G.K-OC) in SCCL



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INTRODUCTION:

The term “Exploration” is defined as ‘the search for Coal, mineral or ore by geological, geophysical surveys, bore-holes, trial pits, or surface or underground headings, drifts or tunnels’. It aims at “locating the presence of economic deposits and establishing their nature, shape and grade”. The investigations may be divided into preliminary and final.

The division, which primarily undertakes the detailed exploration in virgin coal blocks, developmental drilling in running coal mines, Hydrological investigations, Geo-technical investigations, Geophysical investigations and other inter related preparation of geological notes reports and Geomodels. The division functions with multi disciplinary approach, which includes Geology, Drilling, Geophysics, Hydrogeology, Geo-engineering etc.

VENKATESH KHANI 7 INCLINE:

The Venkatesh Khani is part of Kothagudem area. This Mine is started in 1954 with conventional operation system. Now it is converted as semi mechanized Under Ground mine.

Location:

The mine is situated between North latitude 17° 27' 07" to 17° 30' 24" and East longitude 80° 40' 00" to 80° 41' 30" as covered in survey of India Topo sheet No.:65C/ 10 & 11 of Khammam District in Andhra Pradesh. It is at a distance of 297 kms from Hyderabad. The nearest railway station, Bhadrachalam Road, a branch line from Dornakal in Kazipet-Vijayawada section of the South Central railway, is about 10 kms from the line.

Topography:

The terrain is gently sloping towards east. The average ground level is about 138m above MSL. The minimum and maximum MSL is about 119m and 157m respectively. The mine is very extensive with an area of 6.5 Sq.km. and developed to maximum depth of 425m. The mine was opened in the year 1954 and the mine progressed to a distance of 2.6km from inclines, a shaft (6.00m diameter and 266m depth) was sunk from surface and was commissioned in the year 1974. The shaft is being used as Man-winding shaft. Two major faults of 40 to 80m up thrown on the north side and 90 to 168m down throw on the South side are limiting the mine. In this mine there are 3 seams of which Top seam is with a thickness of 9 to 11m, having a grade ‘G’ grade, King seam with a thickness of 5.5 to 10.5m, having ‘C’ grade and bottom seam with a thickness of 2.6m to 4m, having e ‘C’ grade are workable.

COAL SEAMS:

Three workable seams occur within mine boundaries. The thickness and parting of the seams are as follows.

Top Seam:

This seam occurs over King seam with a parting, ranging in thickness from 27.13 to 54.58 m this is a virgin coal seam in the entire coal belt except in 5 incline and Venkateshkhani-7 shows a thickness of 7.07 to 16.31 m, which is gradually an increase its thickness towards south with carbonaceous shale, shale, carbonaceous clay bands within the seam.

» The average thickness of Top Seam is 11 meters Mine area.

» This seam has the low grade coal with disturbed structures and shale content.

King Seam:

This seam overlies bottom seam with thickness varies from 1.52 m. to 13.93m. as per isopach plan drawn for parting thickness shows that there is a general increase in parting thickness from 5 incline (central part) to Goutam khani (SSE PART) side. This seam has been extensively mined over most part of the coal belt, while at present it is being mined in the 5 incline/shaft and Venkatesh Khani, 7 incline /shaft

» The average thickness of the King seam is 12 meters

Bottom Seam:

This is the bottom most coal seam in this belt which occurs only in the area between the abandoned Andrew 3 and 4 inclines in NW part and Goutham Khani -11 incline in S-SE part and Birley pit block with a notable features of thickness reduction beyond 220 m depth along dip direction. From isochore plan drawn for thickness shows that seam thickness varies from less than a meter to as much as 29 m.

» The average thickness of the bottom seam is 7 meters with low grade concentrations.

THE METHOD OF MINING

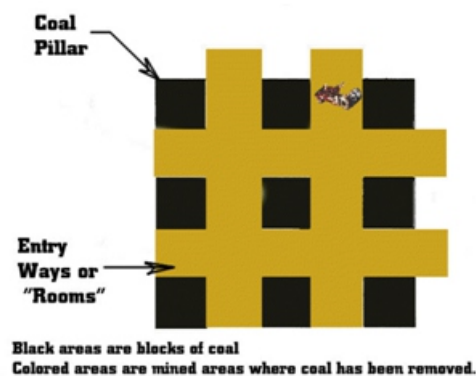
A)Top seam

Some skeleton development by conventional method was done in the year 1967-68. But due to inferior quality of coal and difficult roof conditions the development was suspended. Subsequently, when there was demand for power grade coal, the exploitation of Top seam was re-started in the year 1980 by Board and pillar system. As further development was not possible in top seam, depillaring with caving was started. Till now 04 depillaring caving panels were extracted using SDLs & LHDs. At present in the Top seam, depillaring Panel No.19 is under extraction by caving method with LHDs. The dip side developed pillars between 85L to 88L & 2D to 6D which served as trunk roadways for Long wall panels are being extracted.

B)Index seam:

Index seam is worked from Ananda Khani. This seam is worked only in this section.

Due to inferior quality of coal and thinning down seam, this could not be worked further and was sectionalized. Seals are being monitored periodically. King seam (A.K section): The king seam in AK section has been extensively developed along Top section by Board & Pillar system. A few panels have been extracted by caving. One panel with hydraulic sand stowing has been extracted in both Top and Bottom sections having a parting of 3m. later sectionalized and abandoned. c) King seam (V.K section): The King seam in VK section has been extensively developed along Top section by Board & Pillar system. Totally 21 conventional depillaring panels were extracted. A few panels have been extracted by BG method in which both the sections are extracted (Reds & Blues). In the year 2006 Continuous Miner Technology was introduced.



Board & Pillar Method

Installation of Air Cooling system plant in King seam (56LN/10D) is completed. With this introduction, the face temperature is maintained at 26-27°C thereby creating congenial workings atmosphere in the district which has improved production, productivity and safety.

CONTINUOUS MINER (Caving and Non-caving method) :

To extract King seam dip most property Continuous Miner technology was introduced in the year 2006. Extraction in CMP-1 started by caving method on 04-09-06. Unfortunately during the extraction, a fatal accident occurred on 12-11-06 due to roof fall. Later permission was withdrawn by DMS. Again Continuous Miner was reintroduced in the year 2009. Extraction was done by Non-caving method. With this method 4 panels were extracted. While extraction of panels CMP-3A & 3B, there were incidents of unpredictable side spalling with floor heaving endangering safety of the persons, equipment

and loss of about 12 pillars of coal. Permission for extraction of subsequent panels was obtained to work by caving method. The next panels CMP-5A & 5B were extracted successfully on trail basis by caving method. Keeping the experience in view, it was proposed to work the next panels, CMP-6A(1),(2) & 6B by the same caving method. Accordingly CMP-6A(1) panel was extracted successfully and at present, extraction is being done by slicing in CMP-6A(2) panel.

Venkatesh Khani No.7 Incline

- | | |
|---------------------------------------|------------------|
| 1.Mine started on | : 15-08-1954 |
| 2.Mine reserves | : 65MT. |
| 3.Man-Winding shaft | : 01-05-1974 |
| 4.SDLs introduced on | : 10-08-1982 |
| 5.SDLs withdrawn on | : 31-12-1985 |
| 6.Road Headers introduced on | : 09-12-1981 (RH |
| Output-7,90,903 T) | |
| 7.Long wall introduced on | : 13-06-1985 |
| 8.Last Long wall panel worked | : 16th (sealed |
| | on 25-11-2005) |
| | (LW Output-49, |
| | 47,475 T) |
| 9.1000T strata bunker commissioned on | : 17-12-1990 |
| 10. Man-Riding introduced on | : 07-04-1990 |

MINE MACHINERY:

There are different type of machinery is used as the underground mining operations and transportation purposes. Board and pillar method used as the Load Haul Dumper (LHD), Long Wall Mining method used the Long Wall Machine and in Continuous Miner method used the Continuous Miner and Shuttle Cars. Above all these mining methods the extracted coal will be transported by conveyor belt from underground to surface.



Long wall method



Conveyer Belt

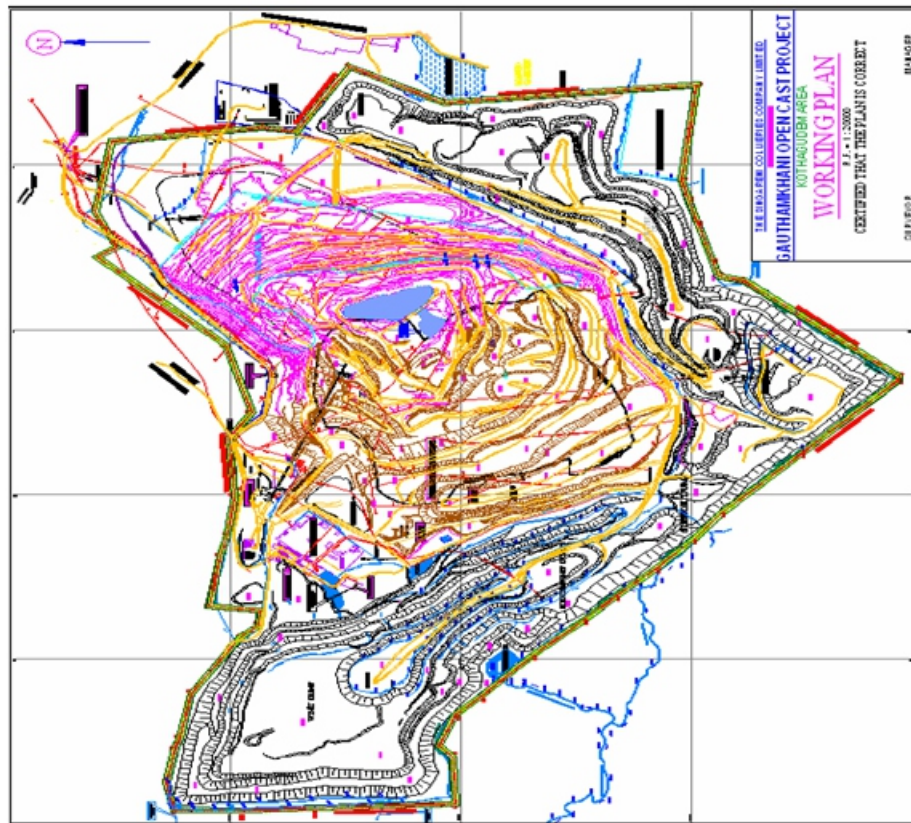
TRANSPORTATION Conveyer Belt:

In underground mines the coal from the working face is first is transported to the bunkers. From there it is transported by conveyor belts. There are many branch conveyor belts along the levels of the respective working faces. These connect to the main conveyor belt with connects the CSP which is hauled by 75HP motor at the surface from CSP coal is transported by Lorries and railway wagons.

SAFETY:

No person is allow to go underground without having helmet, cap lamp of battery light and footwear. The safety officer from time to time checks the roof conditions and advises preventive methods. Every foreman and sardhar is supplied with a safety lamp to detect the traces of Carbon monoxide, Methane, CO₂ gases. The walls in the mine are dusted so that the coal may not be subjected to shouldering. They are using recently Self rescuer.

GOWTHAM KHANI OPENCAST PROJECT (G.K-OC) GKOC working Plan



Goutham Khani Open Cast mine working pla

INTRODUCTION:

The Singareni Collieries Company Limited is a public sector company owned by State and Central governments, having 15 open cast and 34 underground mines are spread in 4 revenue districts in Andhra Pradesh state, namely Khammam, Warangal, Karimnagar and Adilabad.

LOCATION:

Goutham Khani Open cast mine is situated in Kothagudem area of Khammam district and is well connected by road (Vijayawada and Bhadrachalam road) 160km from Vijayawada and 280km from Hyderabad, and railway (branch line from Dornakal Jn of Delhi-Chennai- Grand trunk railway line). This project is opened in the year 1994 to extract erstwhile property of 4 underground mines viz., 8,9,10 and 11 inclines.

GEOLOGY:

Goutham khani Area has three coal seams viz., Top seam, Middle seam and Bottom seam Out of these three seams, Bottom and Middle seams are workable coal horizons. Top seam has restricted occurrence in the centre of main block. The property is basinal in structure and sloping from three sides. The maximum gradient is 1 in 5 and the average gradient is 1 in 10.

RESERVES:

Total reserves estimated in the block	:	81.12 M.T
Already excavated by UG method	:	5.56
Net total reserves	:	75.56 M.T
Minable reserves	:	71.01M.T
Extraction by UG method	:	6.85%

Reserves in GKOC P

Seam	Lithology	Thickness(m)
Top seam	Brown sandstone:	33.17
	Shaly coal :	06.47
	Grey sandstone :	17.99
Bottom seam	Grey sandstone :	17.99
	Coal :	14.67
	Grey sandstone :	1.96

Details of coal seams

The reserves and overburden quantity is furnished below.

Seam	Area	Reserves
Top seam	0.69 Ha.	6.07 MT
Middle seam	2.06 Ha.	22.16 MT
Bottom seam	2.57 Ha.	42.78 MT
Total reserves		71.01 MT
Total Overburden		391.30 M.cu.m
Total ratio of coal to overburden		1 : 5.51

Structure:

The area is extensively disturbed tectonically. There are as many as 34 faults varying throws. From the general lay and deposition of the bottom seam the basin is established to be a highly faulted and multilated, low dipping, gently plunging, asymmetrical, synform with its axis running in a ENE-WSW direction with a gentle plunge (1 in 32 to 64) to the East to East-North East.

Method of work: The mine is covered 4 underground mines with standing on pillars and extracted areas. As the seams are thick in these mines and partially extracted, it is proposed to extract the remaining coal with opencast method. The total extractable coal in this mine is about 75.56MT and 391M.cu.m. of OB above coal. The OB is moderately hard to hard sand stone. The mine high wall is on hill foot side and the its influence is high on slope stability. Gouthamkhani Opencast Project is proposed to be with shovel dumper combination and opened by two ramps at 1 in 16 gradient. Western ramp will serve the main block.

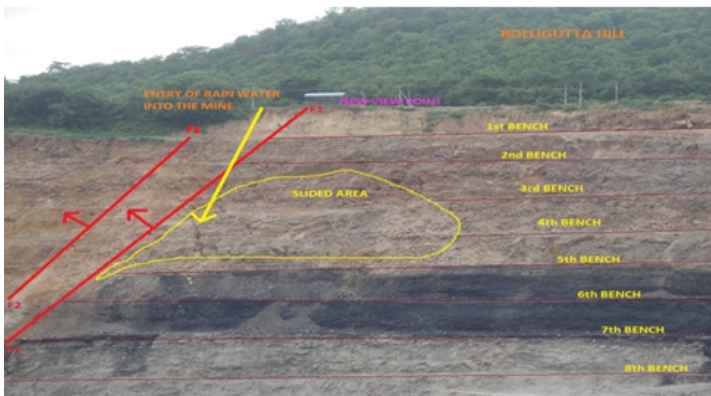
Design of benches: The bench width and height is planned to suit the statutory requirements as well as machinery deployed. 10cu.m. and 3cu.m. shovels are deployed in OB benches and 85T dumpers are plying on benches.

The width of bench is 20m. and height of bench is about 10m. in active area and 3m. width and 10m. height in high wall area. The slope angle is 70° from normal line.

METHOD OF WORK:

- » The quarry is planned with shovel dumper combination.
- » Deployment of Dragline is ruled out on account of geological structure.
- » The GKOC project is proposed to be opened by two ramps at 6% (1 in 16.6) gradient.
- » Western ramp will serve the main block and the eastern ramp will help in extraction of shallow reserves near the outcrop as well as provide access to extension block.

The extension block is in cropping under the Bolligutta hill. The minimum depth within the extension block is 128 m. It is therefore not possible to open this extension block independently as it requires a very long haul road as well as stripping of large quantities of overburden before the coal seams are exposed because of alignment of hill, the disposal of such large quantity of overburden over a very long distance will be quite costly proposition.



Overall view of GKOCP including slided area.



Due to the step faults (F1-F1, F2-F2) and heavy surface rain water flow immediate above the slided benches caused the entire strata become weak and slided towards quarry

SAFETY :

Mechanical and electrical fault accidents can be prevented by taking necessary precautions viz. 1) use of inflammable and combustible material in and underground should be restricted; 2) wood cuttings oily and greasy waste of jute should not be lifted below the ground; 3) all switches, motors, circuits, breakers, transformers etc. should be kept clean of coal dust and 4) belt conveyors especially their rollers should be kept clean from coal dust.

CONCLUSION:

Chief methods of mining of coal adopted in Kothagudem area in coal mining blocks are Board and Pillar method (adopted in 5,5A,5B inclines, 7 incline /shaft, Goutamkhani) and Longwall advancing method (VK -7shaft) to achieve the target of production.

References:

1. SCCL a joint venture company is having its head quarters at Kothagudem and organized by chairman and managing director, chief general manager, and general manager, mainly having three mining divisions.
2. SCCL Company and its mines are managed according to the governmental instructions providing necessary facilities to their workers.
3. The Kothagudem coals are mostly power grade coals of top grades utilized by power stations as major consumers, cement factories, railways, fertilizer plants etc. consumers is 4.5 m.t. out 17.00 m.t. produced from all SCCL mines.
4. SCCL playing a major role in the industrial development of south India according to long term production planning.
5. SCCL proved 5210 M.T. reserves out of GSI estimated reserves are of 10000 m.t.
6. The Singareni coals are mainly non-cooking, low to medium rank and high in volatile matter and high in ash content with increase in face mechanization and introduction of fully mechanized Longwall faces and it may not be possible to separate the dirt bands from coal and will load significant ash in the run of mine coals in future.
7. Thus we wish that Singareni Collieries Company Ltd. Kothagudem will play a major role in the all SCCL divisions in the production of coal at present and in future, adopting new technologies in the coal exploration and exploitation.