

Lignite : Source of Energy and Revenue in Bikaner District (Raj.)

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Abstract - Since than the state Department of Mines and Geology has made initials notable and purposeful strides in establishing sizeable lignite potentials in Kapurdi of Barmer, Merta in Nagaur and Gurha and Barsinghsar in Bikaner districts. These lignite deposits forms the basis for creating required capacities of lignite based thermal power in Rajasthan. Besides, more findings of lignite bearing areas by DMGR. E.g. Kuchera, Nimbri Chandrawat and kasnau-Igyar in Nagaur and Raneri, Vijaisinghpura and Gudu in Bikaner districts have kindled new hopes for potentials deposits in the vast target area of North Western part of the state which remain yet unexplored.

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INTRODUCTION

In view of limited resources of lignite established at Palana in Bikaner district about two decades back, the state Department of mines and Geology embarked on exploration of favourable geological horizon for lignite in North West Rajasthan. In this endeavour attention was focussed to locate and explore new fields of lignite in Barmer, Nagaur and Bikaner basins. Commencing investigations since July, 1980 taking a lead role. Given below is the synoptical status data generalised as a result of exploration carried out by the state Department of Mines and Geology in Bikaner district.

EXPLORATION OF LIGNITE IN BIKANER DISTRICT

In Bikaner district phenomenal break through was made by the state Department (DMGR) in the field of lignite exploration during the year 1985 and 1986. The first landmark and New year gift was to intersect a 20 m. thick lignite seam in Gurha area in January 1985. This was followed by establishing another milestone when still thicker seam about 27 thickness was found in other base hole and thereby potentiality and prospects of Gurha area was given to the status of economically exploitable lignite property.

Simultaneously to the continued and systematic exploration activities in Gurha area the state Department also focussed the attention to explore lignite in Bar singhsar, Vijaisinghpura areas. In this sincere endeavours within a short span of time, unprecedented and remarkable success was achieved when a 31 meter thick lignite seam was struck in Barsinghsar area in the borehole located about 2 Kms. away from Palana lignite field and this lignite find to promise has now raised great hopes to locate substantiate reserves around Palana.

Besides all as mentioned above, appreciably thick lignite horizons were also met with near Raneri village as a result of limited regional exploration. Presently three large lignite deposits are located in Bikaner district. Other small occurrence of lignite are also reported from this district. The three important deposit which were investigated during the course of this study are-

- Barsinghsar Lignite deposit
- Raneri-cherani Lignite deposit and
- Gurha Lignite deposit.

(1) BARA SINGH SAR LIGNITE DEPOSIT :

Location: Barsinghsar lignite area is situated about 25 Km South West of Bikaner district. The Barsinghsar reserve is located in the east of Barsinghsar village and South West of Palana lignite mines.

Topography :The entire Barsinghsar area is covered by acolian sand with undulating topography from geological plan it is very clear that the general slope of the region is towards NorthWest and West. The maximum and minimum altitude are 284 m and 263 m R.L. respectively. The entire area is devoid of any streams or Nullahs since the area is fully covered by sand the general geological featured are interpreted exclusively with the help of boreholes data's

Occurrence: Lignite occurs here as single main seam with few localized patches (upto z) above and (upto u) below the seam. The main seam is split in the east side of the deposits. The lignite seam is found to occurrence in an inverted saucer shape. With higher thickness in the middle and thinning towards the periphery also the depth of the seam is shallow in middle and deep towards periphery.

Review of exploration work : Occurrence of lignite in Barsingshsar was unknown until 1984. When Rajasthan Ground Water Board (RGWB) intersected a 3 lignite zone near Barsingshsar village while drilling a well for ground water. An expert committee was formed for investigation the prospect of lignite deposit in and around Barsingshsar area. At the instance of expert committee DMGR initiated regional drilling in June, 1985 and completed 11.563 meters of drilling in 84 boreholes (BBH series) and indicated promising patches for lignites. As per expert group decision DMGR and GSI operated an regional scale and MECL was assigned detail exploration MECL completed drilling about 23.925 mts. In 234 boreholes in June 1988 (M.B and B.S series). Subsequently boreholes were drilled around North side of the non lignite bearing area of the deposit MECL submitted their interim geological report in April, 1987 and in final geological report in October, 1989. The geological data given in their report were taken as the basis for preparing report.

Geology of Barsingshsar Area :

(a) Regional geology :

Lignite deposit in Barsingshsar area is confined to tertiary formation of western Rajasthan. The Aravalli range that traverses diagonally through the middle of Rajasthan in North East South West travels forms the eastern barriers of Western Rajasthan the part of Rajasthan. West Aravalli range formed an extensive Basinal set up from comb rain till tertiary periods forming the Southerly and south-eastern continuation of the Indus basin. This area is now under a cover of Alluvial and desert sand.

Several sedimentary basins have been identified in Western Rajasthan between the Aravalli's and Delhi super group of rocks. The Delhi super group acts as the eastern boundary and the malmi igneous suit as Southern boundary.

(b) Lithology :

The basement rock comprises of Vindhyan sand stone and dolomite. Reddish fine grained Vindhyan sandstone is exposed near Dulmera about 20 Km north of Bikaner. It may be assumed that the Vindhyan were exposed all through pelazoic and mesozoic period. Since they were not encountered in any of the boreholes drilled by Rajasthan ground water Board (RGWB) Vindhyan are overlain with an unconformity directly by tertiary formation starting from eocene period. Few outcrop are exposed near Kolayat area comprising mainly of marh sand stone and Jogira fuller's earth.

Lignite seam has increasing thickness upto 31.10 m in south west of Barsingshsar village significantly with the decrease overburden i.e. 48.35 m. In some of the boreholes intercalatory bonds of carbanaceous clays have also been found with lignite seam unlike Palana

formation, fuller's earth and nummulitic lime stone have been found absent in Barsingshsar area.

Barsingshsar lignite deposit at a glance

1. Mineable lignite reserves. - 62 million tones
2. Annual lignite production.- 1.5 million tones
3. Suggested method of mining.- open caste (SME system)
4. Power plant capacity. - two units of 120 MW
5. Land requirement.-1300 hectares for mining 330 hectares for power plant
6. Lignite cost. - Rs415.64/Tonnes
7. Location. - 25 Km S.west of Bikaner
8. Geological lignite reserves.- 71 million tones
9. Lignite thickness. - Average -- 21m , max-42 m , min. - 7.5m
10. Strike length of seam. - 2500 m
11. Dip length of seam. -1800 m
12. Area of lignite deposit.- 2.5 sp. Km.
13. Floor. - silty clay

(2) RANERI-CHANERI LIGNITE DEPOSIT:

In this deposit two boreholes were drilled during the year 1966-67. In one of the borehole about 0.50 m thick lignite seam was net with under an overburden of 99 mts. Further work was discontinued in view of discouraging results. The expert group on Rajasthan lignite in its first meeting (OCT 1982) examined and reviewed all existing information and data of in Bikaner district. It was that recommended to take up regional exploration in the area North West of Palana lignite field by drilling widely spaced boreholes. Accordingly a programme for drilling few test boreholes around Raneri under regional scanning was formulated for the year 1985-1986. This regional exploration programme of DMGR envisaged only 750 m, drilling spread over & boreholes as entire regional exploration in the area of west of Palana lignite field was entrusted to the MECL.

The Investigations were commenced with the May, 1985 and 976.5 m drilling was done till November, 1985; compiling 8 boreholes spread at 800 m. The total coverage was about 2.5 Sq.km .lignite seam is encountered in the area having thickness varying from 0.55 m (RBH 7) to as much as 5.15 m (RBH-3) under an overburden of 88.40 m (RBH) to a maximum of 116.00 (REH-6). The overlying formations comprise surface sand and lime kankar variegated clay with inter colation of fuller's earth friable clayey sandstone, greyish black shales, lignite under clays and gravelly friable. Sand stone in descending order from top, lignite seam attain the maximum thickness of 4 to 5 m.

Discontinuing the preliminary/regional exploration for lignite in Raneri area. It may be said that there is further scope of carrying out investigation with the possibility of intersecting thick lignite seam in quarriable limits of 1 : 1.5 lignite to overburden ratio in South West of Raneri village.

(3) GURHA LIGNITE AREA

Location: Gurha lignite bearing area (72°51' : 27°53') is located about 40 Kms from Bikaner town in SSW direction. It is approachable by National highway No. 15 and nearest railway Head Shri Kolayatji at 11 Kms distance. This lignite deposit lies at crowfly distance of 25 kms. West of Palana lignite field whereas by road it is situated at about 40 Kms.

Review of exploration work: In Gurha area, investigations for lignite were taken up by DMGR in December 1982 as per the recommendation of the expert group (October, 1982) with the objectives of establishing additional lignite reserves to support the proposed 2x60 m.w. Thermal power plant based on Palana lignite potentials.

Geology of Gurha Area : Regionally the geology of the area comprised the sedimentary rocks belonging to lower tertiary group mostly of marh (mudh) and Jogira formation. These uncomfortably last on Proterozoic of magoueformation. Gurha the surrounding are show the alternations of sand stone, ochets and fuller's earth of Jogira formation. Which are exposed in Patchy out crops; otherwise the most of the area is covered by wind blown sand. Following lithostratigraphical set up is constituted based on exploratory boreholes data-

Lithe units

1. Top sandy soil and lime kankar. 0 – 12 m
2. Clay of white, grey, pinkish and reddish colour with intercalation of upper friable 2 – 70 m white medium to coarse grained sub angular. sand stone and earth at places.
3. Block shale. 1—44 m
4. Lignite with association of carbonaceous 0.25 – 26.90 m Shale
5. Friable coarse grained sand stone. 5.00 – 40 m

Lignite occurs mostly in the form of one seam or it is splitted into two or three sub seams the cumulative thickness varies from .25 to as much as 26.90 m under a varying overburden of 38 m to a maximum of 148 m.

From the exploratory data and analytical data it is evident that lignite seam or cense show a great variation laterally as well as in depth continuously in its quality due to inter mixing of various low grade carbonised shay and clayey bands. Thus base data of proximate analysis indicating the behaviour and variation in moisture, ash, volatile matters and fixed carbon of individual sample was taken into consideration for identification and determining the varying ranks of lignite. Following parameters have ben adopted in the quality assessment of lignite intercalary bands of low grade or incipient lignite and

on this basis thickness of each band or zone has been completed. As a result of preliminary investigations carried out to far. Lignite was found to cover an area of 7.95 Sq.kas. In this area geological reserves of about 37.79 million tonnes are inferred. Average thickness of lignite seam is around 4.00 m.

The total lignite bearing area as above is divided into two blocks namely western and eastern separated by a barren zone-represented by a cross fault. In comparison to western block significantly thick lignite seam 5.85 m. to 26.90 m. was found in the eastern block under an overburden varying from 38.00 to 90.60 m. (W-1 and W-2) Taking into consideration the drilling data of boreholes spaced at 400 m. grids and 0.50 m. as cut off minimum thickness of seam, economically mineable insitu geological reserves of lignite have been estimated under 1: 15 lignite to overburden ratio limit. In the western block (W-1 and W-2) covering an area of about 0.732 Sq.kms. about 3.17 million tonnes geological insitu are indicated under 1 10 to 1: 15 lignite to overburden ratios.

Other deposits:

PALANA LIGNITE DEPOSIT

Palana is located south of the Bikaner. The coal or lignite of a dark brown colour was discovered in 1896 while sinking a well at Palana. On an analysis made in the Geological survey laboratory following results were obtained-

Moisture 6.20%, volatile matter 42.72%, ash 9.8% thus indicating a fuel that would burn rapidly on account of large amount of volatile matter but would be some what deficient in thermal power operations were started in 1898 and the colliery s connected by a rail link in 1899. The seam is 26 feet was thick. 250 feet below the surface and 50 feet above the water level more than two million tons of coal are estimated to exist and the deposit has shown sign of exhaustion only in one direction. The extraction has grown steadily year by year. The following table indicates the annual out put-

Year	Out put in tons
1898	511
1899	4249
1900	9250
1901	12094
1902	16503
1903	21764
1904	45078
1905	42964
1906	32372
1907	28062

Year.	Out put in tons
1923-24	2100
1924-25	26472
1939-40.	39723
1940-41	42837
1941-42.	47070
1944-45	43069
1745-46.	18291
1946-47	61126

MANDAL CHARAN LIGNITE DEPOSIT AREA :

Mandal charan lignite deposit is a minor deposit area of Lignites. Now the geographical reserve are not available. Average thickness of lignite is 3.33 meter, and average overburden thickness is 128.50 and average ratio is 1 : 33.56.

DADHNU LIGNITE DEPOSIT:

The average thickness of lignite in Badhnu is 0.47 meter and average overburden thickness is 107.3 meter and average ratio is 1:200.

BHOLASAR DEPOSIT :

The data about Bholasar lignite are following

Insitu tonnage - 4.69 MMT

C V range - 2100-2500K.cal/kg

Overburden thickness Range - 75-125

GANGASHAHAR LIGNITE DEPOSIT

Insitu ratio. -1 : 41

AVR Lignite thickness. -2.56 m

Average thickness of overburden. - 120.25

A brief comparision of lignite and Coal properties.

1. Heat value of lignite is 2880 K. Cal/Kg. as against 4,000 of coal. NLC in TamilNadu generates 1440 MW of power and 840 MW is under installation.

2. Lignite is mainly used for Thermal power generation. Besides it some of the other uses of lignite are:

(a) For briquettes for domestic use.

(b) As fuel for other industries, lignite is being utilised for cement, brick-kiln, paper, oil, tea and other industries.

Tamil Nadu and Gujarat together well about 2.5 million tonnes/annually of lignite for such industries.

(c) For making fertilizer.

(d) For mud chemical and oil well drilling.

(e) Lignite as oil. Processed lignite can be used as engine oil as it is being done in Canada.

Superiority of Rajasthan lignite over other lignite!

- (1) Compared to landed cost of Coal the cost of lignite mining at Bikaner, Barmer and Nagaur will be much less because of high transportation cost of coal in addition to high cost of coal.
- (2) The calorific value of Rajasthan lignite is than other lignite in the country.
- (3) Compared to Tamilnadu and Gujarat there is no water problem due to aquifers causing serious mining problem. In Neyveli 60,000 gallons per minute is pumped out to keep lignite mine free from water.
- (4) Since western Rajasthan is thinly populated lignite mining will not cause much disturbance either to environment or to the population.

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