

6. Mining & Production in India

India ranks second in the world production of barytes with a production of 6.22 lakh tonnes. The production was highest in 1991 at 6.40 lakh tonnes. The production has declined to 3.72 lakh tonnes in 1992-93, because of sharp fall in production of barytes in the main producing district of Cuddapah in Andhra Pradesh.

India is endowed with world's largest massive barytes deposit, located at Mangampet, Cuddapah district, A.P. Cuddapah district is the major producer of barytes in India. Other producing districts are Nellore and Khammam in Andhra Pradesh, Udaipur, Sikar and Alwar in Rajasthan, and Sirmur in Himachal Pradesh. The statewide production of barytes for the years 1989-90 to 1993-94 is given in Table 6.1. Andhra Pradesh has been all along the highest and prominent producer of barytes.¹

6.1 LEASES AND MINES

Leases

There are 181 mining leases of barytes covering an area of 5731 ha. The statewide distribution of leases and their area is given in Table 6.2.

Mines

During 1993-94 there were 32 producing mines including one captive mine. Number of mines under public sector and private sector and their total production is given below :

	No. of Mines	Production (tonnes)
Public sector	2	387,163
Private sector	30	210,513
	32	597,676

6.2 PRODUCTION

In Table 6.3 the frequency of mines based on the production range is given. It may be seen that 94 percent of the total production is contributed by the mines, producing above 10,000 tpa, 3 percent of the total production by 3 mines producing between 5,001 and 10,000 tpa, and the remaining production by 24 mines producing less than 5,000 tpa.

(1) Andhra Pradesh

Andhra Pradesh contributes 98 percent of the total production of barytes in India. Out of total 32 mines in India there were 24 mines in Andhra Pradesh only. Cuddapah district has 21, Khammam district 1, and Prakasam district 2 mines.

During 1993-94 the production was 593,900 tonnes.

(2) Rajasthan

Rajasthan second in production after Andhra Pradesh, produced 2,793 tonnes in 1993-94. There are 8 small mines. The major producing mine is Relpatliya mine in Udaipur district. In Alwar district there are three underground mines.

(3) Other States

Besides Andhra Pradesh and Rajasthan, the other producing states are Himachal Pradesh and Madhya Pradesh. The production from these states is very meagre. The production from Himachal Pradesh and Madhya Pradesh was only 975 and 8 tonnes respectively in 1993-94.

6.3 MINING METHODS

In India, Barytes is mined by both opencast and underground methods. Majority of the mines are opencast and worked manually. The methods of working of some important barytes mines in Andhra Pradesh and Rajasthan are described below:

(1) Andhra Pradesh

In Andhra Pradesh barytes is mined by both opencast and underground mining methods. Bulk of the production comes from opencast mines. There are four underground mines producing barytes in Andhra Pradesh of which Shrotrium I mine of M/s Krishnappa Asbestos & Barytes (P) Ltd., Cuddapah is one of the important underground mine.

Almost all the opencast mines are labour intensive. In ore 35 mm dia. holes are drilled by jack hammers and blasted by using explosives and ordinary detonators. Barytes is manually sorted from the r.o.m. ore and transported to the railway station or grinding plants as the case may be, by trucks.

State owned enterprise Andhra Pradesh Mineral Development Corporation (APMDC) and C.M. Ramanath Reddy, M/s. Pragati Minerals and M/s. Tiffin's Barytes Asbestos & Paints Ltd. are the leading producers of barytes in Andhra Pradesh. The biggest opencast barytes mine of the country, located in Andhra Pradesh and one though small but important underground barytes mine in A.P. are described below:

(a) Opencast Mining

The Mangampeta barytes mine of (APMDC) is being worked by opencast method of mining using heavy earth moving machinery and is producing 2,00,000 to 4,00,000 tpa depending upon the demand. The Mangampeta barytes deposit is a bedded deposit with tuff in hanging wall and dolomite in foot wall. The soil and tuff forms the overburden. Under this strata there is a bed known as rosette baryte (inferior barytes) of sp.gr. 4.2. Below this bed lies the good quality barytes (sp.gr. more than 4.27), and next below this bed lies the black tuff and dolomite beds. The ore to overburden ratio is 1:3 (Plate I). Where the overburden is hard it is removed by drilling and blasting. Compressed air operated DTH drill (115mm) dia is used for drilling blast holes. At a time 20 to 30 holes are drilled and blasted. The details of drilling pattern are given below.

Hole diameter	- 115 mm
Depth of hole	- 6 to 9 m
Burden	- 2.5 m to 3.0 m
Spacing	- 2.5 m to 3.0 m

The height of the overburden benches is about 7 m to 8 m and width varies from 12 m to 15 m. Superdyne and special gelatine are used. The consumption of explosive is very low in overburden as it consists of tuff/shales, which are not very hard. Loaders and dumpers are deployed for loading and transporting the ore and overburden. The ore is dressed and sorted gradewise manually.

National Environmental Engineering Research Institute (NEERI), Nagpur has recently developed a technique called "Integrated Bio Technical Approach" with reference to this aspects concerned with the main waste dump and intend to suggest to implement the same technique for Mangampeta barytes deposit.

(b) Underground Mining

Shrotrium I mine of M/s Krishnappa Asbestos and Barytes(P) Ltd., Cuddapah is one of the important underground barytes mine in A.P.

The barytes deposit in this mine is lenticular vein type of deposit. The general strike of the ore body is ENE-WSW with steep dip due south. The host rock is dolomite. There are two well developed veins 100 m apart. The production in 1992-93 was 720 tonnes. The mine has been developed at the south-east end of the lease by putting 4 inclines.

One incline is for haulage, and the other is for fan drift. Two intermediate inclines are for man way and waste transport from surface to the stope area for filling. The mine has been developed upto 90 m depth from surface and has six levels inter-connected with suitable winzes and raises.

After ascertaining the pinching out of the deposit, both in strike and dip direction, stoping operation has been commenced. The total width of the ore body in bottom levels is 4 m including the intercalations of dolomite but as such the cumulative thickness of baryte is only 2.5 m.

Stoping is carried out by overhand cut and fill method. Holes, 5 m deep with 1.2 to 1.5 m spacing and 1 m burden, are drilled in the top slice. At a time ten holes in two rows with 4 to 5 holes in each row are drilled and blasted using special gelatine, ordinary detonators and safety fuse. After blasting, the back is supported by square set timbering, and props. Later on the stoped out area is filled with waste hauled in from surface. Where the thickness of ore body is less than 3 m, work has to be done with under hand faces. Since the width of the vein is small and waste rock excavated is also small, fill material has to be obtained from outside and transported to the place of stoping. The average stope block size maintained is 15 m x 15 m.

(2) Rajasthan

In Rajasthan major production comes from Udaipur district. Railpatliya mine in Udaipur is an important mine in the state.

Alwar district has considerable reserves of good quality barytes and has three underground barytes mines namely Jamrauli (86.50 ha), Khora-Makrora (35.25 ha) and Bhagat Ka Bas (32.99 ha). Barytes occurs in the form of small veins which are very thin and almost vertical. Khora-Makrora and Bhagat-Ka-Bas, are semi-mechanized mines whereas Jamrauli is a manual mine.

In some of the leasehold areas of barytes, the mineralisation occurs as fissure fillings. The host rock is quartzite interbedded with phyllites. The trend of veins varies from N-S to NW-SE direction with south easterly steep dip.

The method of working of some important mines is described below.

RAILPATLIYA MINE IN UDAIPUR DISTRICTS

This is the biggest producing mine in Rajasthan. The production of barytes varies from 5,000 to 6,000 tpa. The lease area has been divided into four blocks and mining is carried out in these blocks by pitting.

For breaking the ore, 0.45 m deep holes are drilled with jack hammers and blasted with spe-

cial-gelatine. The powder factor is 7 tonnes per kilogram of explosives.

The overburden is loaded manually into tractor trolleys of 4 tonnes capacity and transported to the dumping yard. The ore is also transported through tractor trolleys.

BHAGAT-KA-BAS BARYTES MINE IN ALWAR DISTRICT⁽¹¹⁾

Mining is carried out by underground method. The entry to the deposit is through three inclines viz. incline No.1, 2 and 3. The size of the inclines is 4 m x 2 m and are driven along the dip of the deposit at 30° to 50° due west. Inclines are used for hoisting, manway and ventilation.

From these inclines, levels are driven at 6 to 8 m intervals along the strike of the deposit. These are connected by driving winzes at 8 to 30 m intervals. The size of the levels and winzes is 4 m x 2 m. In underground, the deposit has been proved over a length of 165 m in strike and to a depth of 40 m. The barytes ore body is 30 cm in width and occurs as veins within a quartz sericite schist. The mine has been developed upto 5th level.

In development faces 24 holes 0.70 m in length are drilled with jack hammer in wedge cut pattern. They are charged with explosives and blasted with ordinary detonators and safety fuse. The powder factor is 2.5 tonnes per kg of explosives. There is hoisting arrangement from 4th level to surface, with a 5 HP hoist, and a skip of 0.5 tonne capacity. Material from 5th level is brought on head load upto 4th level and from there it is hoisted to the surface.

As the mine workings are below the water table, the make of water is about 2000 litres per hour. The water accumulated in working faces is pumped to a sump in the second level. From there the water is pumped to the surface by a 10 HP pump.

(3) Himachal Pradesh

Kumla - Andhra Khala, barytes mine is the only producing mine which produced 1063 tonnes of barytes in 1992-93. The description of the mine is given below :

It is an underground mine. The barytes mineralisation occurs inside the hill. Two adits

have been made in the hill to reach the ore zone. The adit at lower horizon, is about 50 m in length and from there the development in the ore zone is about 25 m. The adit at upper horizon is about 175 m in length and the development in the ore zone

is about 25 m. The dimensions of the drives are 2 m x 1.8 m. Mining is done manually with the use of pick axes, chisels, hammer and crow bars. The material is brought out on head load.

TABLE- 6.1 : STATEWISE PRODUCTION OF BARYTES 1989-90 TO 1993-94

State	(Quantity in tonnes)				
	1989-90	1990-91	1991-92	1992-93	1993-94
Andhra Pradesh	629203	557537	614285	399513	593900
Himachal Pradesh	1102	1589	937	1063	975
Madhya Pradesh	14	288	6	39	8
Maharashtra	-	-	-	-	-
Rajasthan	14856	7868	6987	4901	2793
Total	645179	567194	622215	405516	597676

Source : 1. IMYB, IBM 1994. 2. Mineral Statistics Division, IBM.

TABLE- 6.2 : STATEWISE DISTRIBUTION OF MINING LEASES OF BARYTES

Sl. No.	State	No. of Mining Leases	Area in ha.
1.	Andhra Pradesh	148	3541.90
2.	Rajasthan	10	1142.19
3.	Bihar	7	455.69
4.	Madhya Pradesh	6	29.01
5.	Tamil Nadu	3	97.18
6.	Maharashtra	3	187.04
7.	Himachal Pradesh	2	60.69
8.	Karnataka	1	24.28
9.	Orissa	1	193.31
All India		181	5731.39

Source : Mineral Statistics Division, IBM.

TABLE -6.3 : PRODUCTION OF BARYTES BY FREQUENCY GROUPS

(Quantity in tonnes)

Production Group	No. of Mines	Production for the group	Percentage	Cumulative Percentage
All Groups	32	655,149	100.0	-
Up to 100	7	297	0.05	0.05
101 to 200	2	212	0.03	0.08
201 to 500	5	1,598	0.25	0.33
501 to 1,000	3	2,205	0.35	0.68
1,001 to 2,000	4	5,207	0.82	1.50
2,001 to 5,000	3	8,305	1.31	2.81
5,001 to 10,000	3	19,844	3.12	5.93
Above 10,000	5	597,481	94.07	100.00

Source : Mineral Statistics Division, IBM.