Mineral Resources of Chittorgarh

The district takes its name from the town of Chittorgarh, which appears to have been derived from Chitrakot, the ancient fort in the town.

The district is located between the latitudes 23^o 32' and 25^o 13' north and longitudes 74^o 12' and 75^o 49' east in the southeastern part of the state. The district comprises of 12 tehsils namely, Nimbahera, Bari Sadri, Begun, Chittorgarh, Pratapgarh, Bhainsrorgarh, Rashmi, Dungla, Kapasan, Gangrar, Bhadesar and Choti Sadri. The district has two parts, the smaller portion or Bhainsrorgarh in the east is separated by the State of Madhya Pradesh. The district has an area of 10,858 sq. kms. The district head quarter Chittorgarh is 115 kilometers from Udaipur and is well connected by road and meter gauge line of western railway with Udaipur, Ajmer, Ratlam and by broad gauge line with Kota and Neemuch. It is situated on the main railway line connecting Jaipur with Hyderabad via Ajmer and Khandwa.

Topographically the district is undulating with scattered hills of the Aravalli ranges. The western southern and northern parts of the district are somewhat plain. A series of hills run north south forming parallel valleys to the east of Chittorgarh. Bhainsrograrh area is practically hilly. The main rivers flowing through this district are Chambla, Banas, Berach, Gambhiri, Jakham with smaller rivers like Wagon, Gungali, etc. The annual average rainfall is 90 cms.

Geology of the District

The district comprises rocks of Bhilwara Super Group. Vindhyan Super Group and Deccan Traps. The geological succession of rocks is as given below:

Age Intrusive	Super Group	Group	Lithology	Extrusive
Upper	-	-	-	Deccan
Cretaceous to palaeocene				Trap (Basalt)
Upper	Vındhyan	Bhander Group	Shales, Sand-stone	-
Proterozoic	Super group	i) Lower ii) Lower Kaimur Group Khorip Group Lasarawan Group Sand Group Satola Group Great	Conglomerate Porcellanite	
Bhilwara Geological Cycle	Bhilwara Super Group Group	Ranthambhor Quartzite Shales and slates	Boundry	Fault Pegmatites Quartz vein
(>250 m.y.)	1	Pur-Banera	Calc-schist,	

Group	Calc-gneiss Dolomitic marble, Quartzite and Garnet-mica schist
(A) Hindoli Group	(A) Shales, Slates, Phyllites, Berach Granite, Metagreywackes, Limestone, Dolomitic marble
(B) Mangalwar	 (B) Migmatites, Giness, Feldspathic, Commplex, Garnet-mica schist, Impure Marble and Para- amphibolite.

The NW and SW part of the district near Pahuna Rashmi, Dungla and Bansi is occupied by gneisses and schist of Mangalwar complex. In the NW of Rashmi these rocks are overlain by NE-SW trending rocks of Pur Banera group, which are more or less calcareous faces rocks. Further eastwards rocks of Hindoli group are found. These trend NE-SW in north and swing to NW-SE in the southern part of the district. These meta sediments are intruded by the Berach granite which is found all along with Hindoli group of rocks. The rocks belonging to Ranthambore group represented by quartzite slates and shale are observed near Sitamata.

Vindhyan sedimentary are found further east separated by great boundary fault in the NW of Chittorgarh. These comprise conglomerates, shale, sandstone, limestone and porcellanite. Deccan traps are exposed in the southern portion, which are basaltic in nature. Several different flows have been identified, intrusive bodies of dolerite are found in Gangrar and Bari Sandri tehsils.

Mineral Resources

Dolerite

Sillis & dykes

The district can be identified as a limestone district of Rajasthan, since the district is endowed with large deposits of cement grade limestone as well as splittable limestone and sandstone, which is used for flooring purposes. Besides these, small deposits of china clay, red ochre, block able marble, etc. are also found in the district.

Since the beginning the department of Mines and Geology made continuous efforts to explore mineral resources of the district, which resulted, into proving of cement grade limestone deposits, which have helped in establishing cement plants.

(A) Cement Grade Limestone

Three different limestone Horizons of Vindhyan age are found in this district but mainly Nimbahera limestone is of cement grade. Based on this limestone, three cement plants are in operation while two more areas have been granted to establish cement plants.

The limestone deposits of Chittorgarh district are well connected by rail and road. Most of the deposits are in the vicinity of Neemuch-Chittor-Kota broad gauge line and Ajmer-Chittor-Ratlam meter gauge line of the western railway.

1. Limestone deposits near Shambhupura

In between Chittorgarh and Nimbahera extensive limestone deposits occur near Karunda, Amarpura, Satkhanda, etc. The limestone is light gray in colour, fine grained and thinly bedded. Limestone near Sathkanda is low grade whereas near Amarpura it is of cement grade. The department has carried out investigation in this area carrying out 536.65 mts, drilling in 20 boreholes. The area has been divided in the three blocks for purpose of calculation of reserves. The reserve position is tabulated below.

Reserves (million tones)					
Block	Measured	Indicated	Inferred		
Amarana	36.87	87.37	-		
Amarpura	23.79	66.00	-		
Karunda	88.66	87.00	73.85		

The Amarana area has been leased out to M/s Grasim Industries where as Karunda is leased out to M/s. J.K. Cements.

2. Limestone deposits near Nimbahera-Mangrol

Grey limestone extending from Mangrol to Nimbahera in two bands is under mining lease to M/s J.K. Cement Works, Nimbahera for their cement plant of 1.54 million tones capacity. Investigations carried out by M/s J.K. Synthetics estimated about 60 million tones reserves in their Nimbahera area. Additional reserves have been proved in Mangrol area.

3. Limestone deposits near Keli-Gadola

Extensive limestone deposit occurs near Keli-Gadola village SE of Nimbahera. The Chittor-Neemuch state highway passes through this area. Limestone is exposed occasionally as knobs and mounds and mostly concealed below an over-burden of soil and shale having 2-to-15 mts. thicknesses. On the fringe of the limestone bed it is splittable in nature and being quarried as flaggy stone. Department has carried out preliminary investigation by drilling 323 mts. spread over 8 boreholes. The limestone thickness goes up to 20 to 56 mts towards the south near M.P. border. The analysis result indicates CaO 30-40% and SiO2 15-29% in most of the boreholes. Only in one borehole limestone with average CaO 44% was encountered but it also falls in the agriculture field with over burden about 20 mts.

4. Limestone deposit near Bora Khedi

A limestone band of about 5 kms length and 200 to 800 mts width occurs about 2 kms west of Nimbahera village trending N-S the limestone is gray to reddish brown, the latter is shelly in nature while gray is marginal cement grade. The limestone is interfolded with shale intercalations and is being worked as slab stone near Bora Khedi, Sakria, etc. The maximum thickness of limestone is 20-22 mts. Department drilled 18 boreholes totaling 587 mts. drilling. The analysis result shows CaO 41.68%, MgO 0.72% and SiO2 19.47%. The limestone is of low grade.

5. Limestone deposit near Tilakhera

This deposit occurs east of Shambhupura village across the railway line, in vicinity of Gambhiri dam.

Limestone occurs in the form of three narrow limbs separated by shale bands. Limestone is fine-grained, light grayish pale red and dark gray in colour. The limestone occurs as syncline. CCI has carried out investigations in this area. The analysis shows variations in the grade with colour. The CaO content ranges 42-48%, Silica 5-20% and MgO about 1-15%. 824 mts drilling was done over 16 boreholes in 10 sq. kms area and about 145 million tones reserves have been estimated. The area has been leased to M/s J.K. Cement and Graphite India Ltd. and left out area has been applied for by other parties.

6. Limestone deposits near Parsoli-Bhichor

Limestone band in Parsoli, Bhichor area occur in Z shape starting north of Parsoli, runs in west and then continues through Kerpura-Lacchipura and Bhichor from where it takes a northerly turn. The width of band is about 200-700 mts. It is grayish pink to brown in colour, fine to medium grained and thickly bedded. The department has carried out investigations in this area and estimated about 48 million tones of reserves containing CaO 44.45%, SiO2 15.2% and MgO about 1% Parsoli block based on 214 meters drilling spread over 12 boreholes.

The Chittor-Kota state highway passes through this area and nearest railway station is Parsoli on Kota-Chittor broad gauge line.

In Bhichor block about 23 million tones of reserves were estimated with CaO 40-45%, SiO₂ 1-16% and MgO 0.4-1.5%. The shelly limestone band contains 15 to 34% CaO. The area north of Bhichor partly falls in forest. The area has been applied for P.L. by M/s Saurashtra Cement (Gujarat).

7. Limestone deposit near Chanda Khedi-Srinagar area

Another limestone belt occurs in the district in the Begun tehsil near Katunda-Ramnagar, Chanda Khedi, Srinagar, Thukrai, Samaria, Gorla, etc.

This area is about 10 kms from Begun village on Chittor-Rawat Bhata road. The limestone is exposed in patches from Chittoria in north to Thukrai in south. Limestone is siliceous, gray, brown and red in colour with intercalatory shale bands. The analysis results of core and surface samples indicate that limestone at surface is marginal cement grade but at depth becomes shaly, 24 bordholes were drilled totaling 1877 mts drilling and 300 million tones reserves were estimated with 40 to 42% CaO.

8. Limestone deposits near Thailla-Chittoria-Gorla-Samaria

This deposit is located about 72 kms from Chittorgarh on Chittor-Kota road near Ladpura. Limestone occurs as dome shaped outcrops and is fine grained, gray to brownish red in colour and horizontally bedded. The top thin bed of brownish limestone is dolomitic in nature while gray is marginal cement grade. The department has carried out investigations in Gorla, Samaria and Thailla Chittoria area. In all about 110 M.T. reserves have been estimated containing CaO 40 to 45% SiO₂ 10 to 18% and MgO less than 2%. Part of the area near Samaria falls in reserve forest and remaining part has been applied by M/s Zuari Agor Chemicals.

9. Limestone deposits near Katunda-Ramnagar

In Katunda-Ramnagar area also gray and brownish red limestone occurs in alternating bands. The red limestone is shelly in nature. Department has carried out detailed investigations by drilling 9 bore holes totaling 230 meters. The analysis revealed that top horizon is of 40-41% CaO content while in depth CaO is maximum up to 38%. Hence it is not usable for cement making.

10. Limestone deposits near Binota-Tatermala

Limestone occurs in oval shape outcrop having 5.5 kms strike length, 40 to 400 mts width. Limestone is gray, brown, chocolate and pinkish in colour, fine grained, thinly bedded with thin shale partings. Eight boreholes were drilled involving 406 mts drilling showing CaO content from 42 to 46% SiO₂ 12 to 18% and MgO 1 to 2.5%. Thus limestone is marginal cement grade. About 70 million tones reserves have been estimated. In Tatermala the limestone is splittable in nature and being extensively quarried.

11. Limestone deposits near Bambori-Jaloda-Bhagwanpura

The limestone belt of this area extends for 2.5 kms having 300-400 mts width. Limestone is pinkish brown to gray in colour with thin intercalactory shale beds. Five boreholes were drilled totaling 170 mts drilling, showing CaO 30-38%, SiO2 20-30% and MgO 1-4%. Limestone is of very low grade and is not suitable for cement industry.

12. Limestone deposits near Bheyor, Bandmagra

A 4 kms long belt of Vindhyan limestone runs form west of Bheyor to Bandamagra tehsil Rawat Bhata. It is 200 to 600 mts wide. The general trend of belt is NW-SE with 5° to 7° dips on either side. Few samples indicated 30 to 40% CaO and it is of low grade.

13. Limestone deposits near Dungla

High and chemical grade limestone of Aravali Super Group occurs near village Dungla for a strike length of about 1 kms having width of about 50 mts. The limestone is fine to medium grained, striking N-S with dips varying from 6° to 8° due east. Probable reserves of about 1.0 million tones have been estimated containing 45 to 54% CaO. It is being used as sweetener in cement factories. The area is completely leased out.

(B) Splitable Limestone

The limestone is quarried at various places for building and flooring purpose, mainly near Sainti, Manpura, Segwa, Bhenra, Binota, Bhagwanpura, Khodip, Tatermala, Salarmala, Arnia mali, Charliya, Parsoli, Bhichor, etc. It is fine grained, thinly bedded and well jointed. They split along bedding plains.

(C) High Grade Dolomite

- (i) Bhagwanpura-Bambori-Saror-Jaloda, etc area tehsil Nimbahera, Bari-Dadri, Chotti, Sadri, Distt. Chittorgarh.
 About 11.17 M.T. reserves of high grade dolomite with 18 to 21% MgO, 2 to 5% SiO2 were estimated on the basis of
- (ii) Chittoria-Chanda Khedi, Uthana Kheri, The Bagun The area lies 90 kms NE of Chittor city on Bijoliya Bundi tar road where high grade dolomite band extends for 15 kms strike length with a width of 10 to 30 mts and it persists up to 7 to 10 meters in depth, chemically it contains CaO 30 to 32%, MgO 18 to 21% and R2 O3 up to 1%. Decrepitation test of few samples indicated suitability in steel plants. But for economic viability detailed investigations will be carried out. On the basis of preliminary investigations about 45 M.T. of inferred reserves have been estimated.

(D) Decorative Stone

(i) Marble

Chocolate coloured siliceous limestone (Marble) is being quarried in Mandaldeh-Pandoli area. The area is located about 13 kms west of Chittorgarh on Chittorgarh-Kapasan road. It is exposed for a strike length of about 1.5 kms. Presently mining operation is in progress and block sizes from $4 \ge 1 \le 2$ ft. to $8 \ge 3 \le 2$ ft. are being produced.

(ii) Granite

a. Near village Gangrar

Breach granite outcrops of pink to off white colour exposed in the east and south east of Gangrar in extensive area and these are medium to coarse grained, fractured having two or three sets of joints, it is of heterogenous nature has fissures and shows variation in colour, therefore only khandas may be extracted from which small sized tiles may be produced.

b. Greyish to green dolerites near village Det-Bhatkheda-Ganiya area

Greenish grey coloured dolerite is exposed near village Det and Bhatkheda in form of boulders. This extends for 2 to 3 kms in strike length have a width of 50 to 200 mts. Due to close spaced joints large size blocks cannot be extracted but small khandas can be produced which may be used for tile making.

c. Deccan Traps

The Southern part of the district is covered by flows of Deccan trap Basalts. It can be cut and retains polish but contains vesicles, which restrict its use to small khandas. Several area have been identified near Dhamotary, Gyaspur, Nakor Gopalpura, Deogarh, etc.

(E) China Clay, Red Ochre-Laterite

There are several horizons of shales of vindhyan sediments exposed in the district. Bauxite, china clay and red ochre are found with some shale horizons whereas in southern part of the district patches of laterite are found with shale, which is the alteration product of Deccan trap. The minerals china clay, red ochre, literate are being quarried and used in cement industry. Main deposits are china clay, red ochre, literate are being quarried and used in cement industry. Main deposits are china deposits are located near village Banasti, Sawa, Chothpura, Choti Sadri and at many places in Pratapgarh tehsil.

(F) Diamondiferous Conglomerate

Diamondiferous conglomerate bed is located about 2 kms west of Kesarpura in tehsil Pratapgarh. The conglomerate bed is lying under soil cover in Nala cutting for a length of 200 mts and 20 mts in width.

A 60-kilogram sample was sent to NMDC and as per their report a piece of diamond weighing about 10 cent was recovered from it. On the basis of this result a 100 tonnes bulk sample of conglomerate from Kesarpura area was sent to G.S.I. Diamond processing plant at Racherla in Kurnool district of Andhra Pradesh for assessment of its diamondiferous nature. After processing operation neither any diamond nor any kimberlite indicator mineral was found except few heavy minerals like Heametite (500 gms.), Magnetite (50 gms.), Specularite (25 gms.), Gluconite (20 gms.).

(G) Other Occurrences

Small deposits of low-grade soapstone and pyrophyllite have been in operation near village Dindoli, Sadipura (Kapasan Tehsil) and Chikland (Pratapgarh Tehsil). Also occurrence of silica sand is found near village Kanoj (Kapasan tehsil). Occurrences of gluconite are also found near village Badwalli (Nimbahera tehsil).

(H) Base Metals

Indications of base metals are found in Chittorgarh district near Gangrar, Det, Devdhan, Sudri villages.

Indications in the form of gossan, old working and malachite staining were observed near Gangrar. The spot samples indicated presence of 100-550 ppm lead, 350 to 1600 ppm Zinc, 100-300 ppm copper, 50 to 150 ppm nickel and cobalt up to 1-ppm silver. However nomineralization could be encountered in detailed prospecting. Small occurrences have also been seen near Choti Sadri but these are insignificant. Indications of base metals are also found near village Jasma.