

STATE REVIEWS



Indian Minerals Yearbook 2013

(Part- I)

52nd Edition

**STATE REVIEWS
(Rajasthan)**

(FINAL RELEASE)

**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

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RAJASTHAN

Mineral Resources

Rajasthan is the richest state in terms of availability and variety of minerals in the country and produces about 30 different minerals. Rajasthan is the sole producer of lead & zinc ores, calcite, selenite and wollastonite. Rajasthan was the sole producer of garnet (gem) till 2004-05. Almost entire production of calcite and natural gypsum in the country comes from Rajasthan. The State is a major producer of asbestos, copper conc., ochre, phosphorite/rock phosphate, silver, steatite, ball clay, fluorite and felspar. The State is also an important producer of marble of various shades. Makrana area is the world famous centre for marble mining.

More than 85% of the country's potash, wollastonite, lead & zinc and silver resources are located in Rajasthan. The State is said to possess substantial share of the total resources of potash (94%), lead & zinc ore (89%), wollastonite (88%), silver (81%), gypsum (82%), fuller's earth (74%), diatomite (72%), marble (64%), asbestos (62%), copper ore (50%) and rock phosphate (30%).

Important minerals that are found to occur in the State are: **asbestos (amphibole)** in Ajmer, Bhilwara, Dungarpur, Pali, Rajsamand & Udaipur districts; **ball clay** in Bikaner, Nagaur & Pali districts; **barytes** in Alwar, Bharatpur, Bhilwara, Bundi, Chittorgarh, Jalore, Pali, Rajsamand, Sikar & Udaipur districts; **calcite** in Ajmer, Alwar, Bhilwara, Jaipur, Jhunjhunu, Pali, Sikar, Sirohi & Udaipur districts; **china clay** in Ajmer, Barmer, Bharatpur, Bhilwara, Bikaner, Bundi, Chittorgarh, Dausa, Jaipur, Jaisalmer, Jhunjhunu, Kota, Nagaur, Pali, Sawai Madhopur & Udaipur districts; and **copper** in Khetri belt in Jhunjhunu district & Dariba in Alwar district. Deposits of copper are also reported at Ajmer, Bharatpur, Bhilwara, Bundi, Chittorgarh, Dausa, Dungarpur, Jaipur, Jhunjhunu, Pali, Rajsamand, Sikar, Sirohi and Udaipur districts. Occurrence of other minerals, namely, **Dolomite** in Ajmer, Alwar, Bhilwara, Chittorgarh, Dausa, Jaipur, Jaisalmer, Jhunjhunu, Jodhpur, Sikar & Udaipur districts; **felspar** in Ajmer, Alwar, Bhilwara, Jaipur, Pali, Rajsamand, Sikar, Tonk & Udaipur districts; **fireclay** in Alwar, Barmer, Bharatpur, Bhilwara, Bikaner, Dausa, Jaisalmer, Jhunjhunu & Sawai Madhopur districts; **fluorspar** in Ajmer, Dungarpur, Jalore, Jhunjhunu, Sikar, Sirohi & Udaipur districts; **garnet** in Ajmer, Bhilwara, Jhunjhunu, Sikar & Tonk districts; **gypsum** in Barmer, Bikaner, Churu, Sri Ganganagar, Hanumangarh, Jaisalmer, Jalore, Nagaur & Pali districts; **iron ore (hematite)** in Alwar, Dausa, Jaipur, Jhunjhunu, Sikar & Udaipur districts; **iron ore (magnetite)** in Bhilwara, Jhunjhunu & Sikar districts; **lead-zinc** in Zawar in Udaipur district, Bamnia

Kalan, Rajpura-Dariba in Rajsamand & Rampura/Agucha in Bhilwara district have also been reported. Lead-zinc occurrences have also been reported from Ajmer, Chittorgarh, Pali and Sirohi districts. **Lignite** deposits are found to occur in Barmer, Bikaner, Jaisalmer and Nagaur districts. Flux grade **limestone** occurs in Jodhpur and Nagaur districts and chemical grade limestone in Jodhpur, Nagaur and Alwar districts. Cement grade deposits of limestone are widespread in Ajmer, Alwar, Banswara, Bhilwara, Bikaner, Bundi, Chittorgarh, Churu, Dungarpur, Jaipur, Jaisalmer, Jodhpur, Jhunjhunu, Kota, Nagaur, Pali, Sawai Madhopur, Sikar, Sirohi and Udaipur districts. **Magnesite** in Ajmer, Dungarpur, Pali & Udaipur districts; **marble** in Ajmer, Alwar, Banswara, Bhilwara, Bundi, Chittorgarh, Dungarpur, Jaipur, Nagaur, Sikar, Sirohi & Udaipur districts; **mica** in Ajmer & Bhilwara districts; **ochre** in Baran, Bharatpur, Bhilwara, Bikaner, Chittorgarh, Jaipur, Sawai Madhopur & Udaipur districts; **pyrite** in Sikar district; **pyrophyllite** in Alwar, Bhilwara, Jhunjhunu, Rajsamand & Udaipur districts; **quartz/silica sand** in Ajmer, Alwar, Bharatpur, Bhilwara, Bikaner, Bundi, Chittorgarh, Dausa, Jaipur, Jaisalmer, Jhunjhunu, Jodhpur, Kota, Pali, Rajsamand, Sawai Madhopur, Sikar, Sirohi, Tonk & Udaipur districts; **quartzite** in Ajmer, Alwar, Jhunjhunu & Sawai Madhopur districts; **rock phosphate** in Alwar, Banswara, Jaipur, Jaisalmer & Udaipur districts; **talc/steatite/soapstone** in Ajmer, Alwar, Banswara, Bharatpur, Bhilwara, Chittorgarh, Dausa, Dungarpur, Jaipur, Jhunjhunu, Karauli, Pali, Rajsamand, Sawai Madhopur, Sirohi, Tonk & Udaipur districts; **vermiculite** in Ajmer & Barmer districts; and **wollastonite** in Ajmer, Dungarpur, Pali, Sirohi & Udaipur districts.

Other important minerals that occur in the State are: **apatite** in Udaipur & Sikar districts; **bauxite** in Kota district; **bentonite** in Barmer, Jaisalmer & Jhalawar districts; **corundum** in Tonk district; **diatomite** in Barmer & Jaisalmer districts; **emerald** in Ajmer & Rajsamand districts; **fuller's earth** in Barmer, Bikaner & Jodhpur districts; **gold** in Banswara, Bhilwara, Dausa, Sirohi and Udaipur districts; **granite** in Ajmer, Alwar, Banswara, Barmer, Bhilwara, Chittorgarh, Jaipur, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Pali, Rajsamand, Sawai Madhopur, Sikar, Sirohi, Tonk & Udaipur districts; **graphite** in Ajmer, Alwar & Banswara districts; **kyanite** and **sillimanite** in Udaipur district; **manganese ore** in Banswara, Jaipur, & Pali districts; **potash** in Jaisalmer & Nagaur districts; **silver** in Ajmer, Bhilwara, Jhunjhunu, Rajsamand, Sikar & Udaipur districts; and **tungsten** in Nagaur & Sirohi districts (Table - 1). District-wise reserves/resources of lignite in the State are provided in Table-2.

Table – 1 : Reserves/Resources of Minerals as on 1.4.2010 : Rajasthan

Mineral	Unit	Reserves					Remaining resources					Total resources (A+B)		
		Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility STD221	Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334		Total (B)	
			STD121	STD122										STD222
Apatite	tonne	-	-	-	-	-	51521	1016000	-	-	-	1067521	1067521	
Asbestos	tonne	1694398	4588	797073	2496059	108785	3065861	3230441	87802	4526861	57800	11119651	13615710	
Ballclay	tonne	6275408	350832	2845470	9471710	4301217	1100691	2875062	18676	14045369	-	22341015	31812725	
Barytes	tonne	134448	11108	77397	222953	6018	4782	103931	37808	2304688	-	2768727	2991680	
Bauxite	'000 tonnes	-	-	-	-	-	-	-	-	528	-	528	528	
Bentonite	tonne	-	1141592	574950	11990932	-	-	-	24356005	222017000	139423096	25730000	411526101	423517033
Calcite	tonne	1261868	38025	1360678	2660571	283227	144688	2642951	539285	1037038	3090782	-	7737971	10398542
China clay	'000 tonnes	70012	7603	22497	100113	11524	14008	29483	1260	4067	271314	749	332405	432517
Copper														
Ore	'000 tonnes	25103	228	75585	100916	3375	-	10253	16513	100256	545858	-	676255	777171
Metal	'000 tonnes	214.73	3.29	973.16	1191.18	3.37	-	10.25	320.48	686.6	2179.09	-	3199.79	4390.97
Corundum	tonne	-	-	-	-	-	-	-	-	-	11925	-	11925	11925
Diatomite	'000 tonnes	-	-	-	-	634	-	-	-	-	1440	-	2074	2074
Dolomite	'000 tonnes	34309	9601	20250	64160	3559	5598	19484	16502	25480	324604	784	396010	460170
Feldspar	tonne	18083327	7793709	8837983	34715019	9839519	4042309	9666832	3154174	668648	25859733	-	53231216	87946235
Fireclay	'000 tonnes	8543	659	5000	14202	195	1071	583	2256	2580	45536	-	52221	66423
Fluorite	tonne	24391	-	41345	65736	608000	592258	520678	1528348	489488	1294529	145183	5178483	5244219
Fuller's Earth	tonne	-	-	-	-	-	-	-	-	350000	189709080	-	190059080	190059080
Garnet	tonne	6251	10700	9299	26250	214	39868	26687	2013	17694	85690	-	172167	198416
Gold														
Ore	(primary)	-	-	-	-	-	-	-	4600000	50193000	59182720	-	113975720	113975720
Metal	(primary)	-	-	-	-	-	-	-	6.67	103.34	107.47	-	217.48	217.48
Granite														
(Dim.														
Stone)	'000 cu m	5581	100380	4500	110461	38462	-	-	-	-	9021742	20000	9080204	9190665
Graphite	tonne	-	-	-	-	47600	-	165920	-	250000	1450034	-	1913554	1913554
Gypsum	'000 tonnes	20821	81	15834	36736	3405	63397	3105	750	710604	237550	-	1018810	1055546
Iron ore														
(Hematite)	'000 tonnes	5169	1152	819	7139	3168	3239	500	-	11510	5004	-	23420	30560
Iron ore														
(Magnetite)	'000 tonnes	2924	125	1191	4240	-	-	-	-	-	522590	-	522590	526831
Kyanite	tonne	-	-	-	-	13097	-	10606	-	-	-	-	23703	23703

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Table - 1 (Concl.d.)

Mineral	Unit	Reserves					Remaining resources					Total resources (A+B)		
		Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333		Reconnaissance STD334	Total (B)
			STD121	STD122			STD221	STD222						
Laterite	'000 tonnes	-	-	-	-	-	-	-	-	60490	62860	123350	123350	
Lead-zinc ore	'000 tonnes	20215	82178	287	102680	-	3864	13157	200065	287576	190	504852	607532	
Lead metal	'000 tonnes	398.42	1706.62	9.21	2114.25	-	46.7	272.54	2604.74	5055.46	-	7979.44	10093.69	
Zinc metal	'000 tonnes	1938.37	10223.8	11.66	12173.83	-	86.91	741.17	8821.59	12950.2	0.53	22600.4	34774.23	
Lead-zinc metal	'000 tonnes	-	-	-	-	-	-	-	-	117.55	-	117.55	117.55	
Limestone	'000 tonnes	1740173	91434	428111	2259717	141539	1607076	4438479	720874	11110360	914330	19400121	21659838	
Magnesite	'000 tonnes	1024	57	2045	3126	-	1420	76	149	49033	-	50678	53804	
Manganese ore	'000 tonnes	1134	-	647	1780	-	-	-	-	4030	-	4030	5810	
Marble	'000 tonnes	103736	172337	98	276171	-	2037	25606	90000	837615	-	955258	1231429	
Mica	kg.	7515531	21957	2767649	10305137	13633000	310	927638	16673890	19831574	50015	100090117	110395254	
Ochre	tonne	37586097	178095	13637968	51402160	15626752	11546886	16820861	896371	19196918	-	65911998	117314158	
Potash	Million tonnes	-	-	-	-	-	-	-	16936	3462	22	20419	20419	
Pyrite	'000 tonnes	-	-	-	-	13667	-	22917	26310	18392	-	90876	90876	
Pyrophyllite	tonne	139650	-	187041	326691	54308	38989	110709	68587	277249	-	782054	1108745	
Quartzite	'000 tonnes	163	-	86	249	-	18	18	-	706	-	742	991	
Quartz-silica sand	'000 tonnes	132135	10472	27757	170364	40583	13344	23433	7658	73883	-	162104	332468	
Rock phosphate	tonne	14107400	1589807	941200	16638407	20631561	7140437	13382355	152633	29893783	-	71280519	87918926	
Sillimanite	tonne	-	-	-	-	300	-	519	-	-	-	819	819	
Silver	tonne	37428349	17220000	123729631	178377980	3375000	88200	5216400	9240000	128042579	-	227542179	405920159	
Metal	tonne	1589.18	1934.4	4498.03	8021.61	270	0.26	50.42	883.8	6022.18	-	18984.59	27006.2	
Talc-steatite-soapstone	'000 tonnes	28719	2705	14770	46193	6155	7323	19196	1685	50768	5	85969	132162	
Tungsten	tonne	-	-	-	-	-	-	-	-	17000628	5964000	23928294	23928294	
Contained Ore	tonne	-	-	-	-	-	-	-	-	90171.5	2115	93707.94	93707.94	
WO ₃	tonne	-	-	-	-	-	-	-	-	13000	-	43693	43693	
Vermiculite	tonne	-	-	-	-	20623	2759	4428	-	2883	-	43693	43693	
Wollastonite	tonne	2289869	-	197253	2487122	3750545	-	3724191	76088	1213352	-	12089218	14576340	

Figures rounded off.

* Resources of crude oil and natural gas in Rajasthan are included in the Western Offshore areas of India and are not available separately.

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Table – 2 : Reserves/Resources of Lignite as on 1.4.2013 : Rajasthan

(In million tonnes)

District	Proved	Indicated	Inferred	Total
Total	1167.02	2671.94	1850.56	5689.52
Barmer	495.23	2379.94	1336.58	4211.75
Bikaner	558.79	231.43	305.45	1095.67
Jaisalmer & Barmer	-	-	13.80	13.80
Jalore	-	-	76.08	76.08
Nagaur & Pali	113.00	60.57	73.39	246.96
Jaisalmer	-	-	45.26	45.26

Source: Coal Directory of India, 2012-13.

Deposits of **petroleum** are located in the Bikaner-Nagaur basin and those of **natural gas** in Jodhpur and Jaisalmer basins in the State.

Exploration & Development

ONGC and OIL continued their seismic survey and drilling for exploration of petroleum and natural gas. Two wells with a meterage of 3,166

were drilled in the State by Oil India Ltd. Details of exploration activities conducted by ONGC and OIL for petroleum and natural gas are furnished in Table - 3.

The details of exploration activities conducted by various agencies for lignite and other minerals during 2012-13 are furnished in Table - 4.

Table – 3 : Exploration for Petroleum & Natural Gas in Rajasthan, during 2012-13

Agency	Drilling					
	Seismic Survey		Exploratory		Development	
	2D(GLKM)	3D(SQKM)	Wells	Meterage(Km)	Wells	Meterage(Km)
ONGC	271.17	151.18	2	4.54	-	-

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Table – 4 : Details of Exploration Activities in Rajasthan, 2012-13

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Base metal							
Ajmer	Pilwa	1:10,000	40.0 0.5	-	-	353	Reconnaissance stage investigation (G-4) was carried out in South Delhi Fold belt to evaluate the AEM and magnetic anomalies and to identify target area for basemetal mineralisation. Large Scale Mapping in and around Pilwa along with detailed mapping in West of Chinwali village. The quantum of field achievement includes collection of geochemical (BRS/SS) samples, petrological, channel sample, PTS samples and 100 cu m trenching / pitting. Besides, 100 sq. km area was studied by way of aerial photos and photogeological interpreted map was prepared. The area is a part of Taragarh formation of Ajmer Group of Delhi Super Group rock. The rocks exposed in the area are quartzite, porphyritic granite, charnockite, calc silicates and pelitic granulite. The high-grade rocks are the host rock for sulphide mineralisation. At places, charnockite shows fine disseminations of sulphide mineralisation. The granite shows porphyroblastic texture with plagioclase feldspar, quartz, garnet, biotite and opaques. Plagioclase feldspar shows lamellar twinning and sericitisation along the cleavage planes. The investigation has been completed.

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Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Basemetal							
Alwar	(Khera block) Mundiyawas Khera area	-	-	6	-	144	Prospecting stage investigation (G-3) was carried out to evaluate the depth potential of copper and precious metal mineralisation. Malachite stains, presence of old workings and occasional presence of fresh specks of sulphides like bornite, chalcopyrite and pyrite manifest surface indications of mineralisation. Three zones of mineralisation extending for about 300 m with an average width of 10-30 m have been identified. Channel sampling was carried out along three profiles across the mineralised zones. The investigation was supplemented by drilling to test the sub surface copper and associated precious metal mineralisation, if any, through six boreholes. The sulphide mineralisation is intersected in all the six boreholes. The mineralisation mostly occurs in the form of disseminations, streaks, stringers, veinlets and fracture fillings. Pyrrhotite, pyrite and rare specks of bornite and covellite are recorded within thin quartz and carbonate veins. The investigation will be continued in F.S.2013-14.
Alwar	Mundiyawas Khera area (Khera East block)	-	-	-	-	-	Reconnaissance stage investigation (G-4) was carried out to evaluate the potential of copper and precious metal mineralisation. This was a new item of one-year duration. The Khera East block exposes rocks belonging to the Thanagazi formation of the Ajabgarh Group of the Delhi Super Group. The litho units exposed are cherty quartzite, dolomitic marble intercalated with quartzite bands and patchy development of phyllite, meta greywacke and carbon phyllite. The surface indication of mineralisation is present in the form of sporadic malachite stains in dolomitic marble intercalated with quartzite bands and scattered slags in the eastern part of the area. In the western part of the area, disseminations of sulphides (pyrrhotite and arsenopyrite) occur within a fine grained black coloured rock / cherty quartzite containing carbonates. This band also extends upto the northern part of the mapped area and the width of the band is about 4-5 m. which contains very fine sulfide grains. The investigation has been completed.

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Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Base Metals							
Bhilwara	Karoi & Rajpura	-	-	8	1224	-	Prospecting stage investigation (G-3) was carried out for basemetals in areas in Pur-Banera belt, to assess the basemetal potential of the area. Based on field evidences and ore microscopic studies, it is established that the mineralisation is stratabound and evidences of remobilisation has been identified. The sulphide mineralisation occurs as fracture filling in the form of stringers and veins. The investigation was supplemented by drilling to test the presence of sub surface copper mineralisation in this area. The different units intersected in the boreholes are biotite bearing banded calc silicate rock, amphibole bearing banded calc silicate rock and garnet bearing banded calc silicate rock. The sulphide mineralisations intersected in the boreholes are in the form of disseminations, stringers and veins of chalcopyrite, bornite, covellite, pyrite and pyrrhotite. Analytical results of borehole BH-1 have been received. One mineralised zone is intersected in this borehole between depths of 3.00 m and 8.70 m with 0.28 % Cu. The investigation has been completed.
Bhilwara	Rampuriya & Gadariyakhera Block	1:2,000	1.0	5	873.20	548	Prospecting stage investigation (G-3) was carried out in Pur-Banera Belt to assess the basemetal and associated gold mineralisation. Area was covered by detailed mapping along with 100 cu.m of pitting and trenching and supplemented by drilling. In addition to these, collection of 363 nos. of soil/ BRS samples, 119 nos of channel samples and 66 nos of PTS were accomplished. The analytical results of soil samples indicate Pb values ranging from 25 ppm to 791 ppm and Zn from 60 ppm to 3636 ppm. Analysis of channel samples shows 1.13% Zn and 0.47% Pb (weighted average) over a width of 12 m. The borehole BH-I had intersected sulphide bearing mineralised zones between depth of 86.40 m and 97.85 m and contains pyrite, pyrrhotite and sphalerite. The ore minerals are present in the form of dissemination and vein filling. The Zn values ranges from 5 ppm to 1.8% and Pb values from <25 ppm to 0.32%. The borehole BH-3 has intersected mineralisation between depth of 38.05 m and 45.10 m with 7.05 m. X 1.0- 2 % VE (Pb+Zn). The investigation has been completed.

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Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Base metal							
Bhilwara	Salampura block	1:10,000 1:3,600	150.0 10.0 1.0	-	-	20	Prospecting stage investigation (G-3) was carried out in northern part of the Salampura block to assess the base metal potentiality. The host rock of base metal mineralisation is calc silicate rock. The sulphide mineralisation occurs in the form of disseminations and veins along foliation planes of calc silicate rock. The identified sulphide minerals are pyrite, pyrrhotite, galena and sphalerite.
-do-	Salampura & Dariba block	-	-	-	-	-	Reconnaissance stage investigation (G-4) was carried out for basemetal mineralisation between to assess the base metal potential in the gap area between Pur-Dariba copper prospect and Gurla basemetal prospect. This was a new item of one-year duration. The detailed mapping and geochemical sampling was carried out in gap area between Salampura and Dariba block. The garnet - biotite - sericite schist/ quartzite are exposed in southeastern part of the area and garnet biotite schist, calc silicate rock/amphibolite marble in the northwestern part while the central part is characterised by inter-banded sequence of garnet biotite schist/calc silicate with minor band of BMQ. There are two major old workings located at southeast and northwestern part of Village Dariba. The mineralisation is mainly hosted in magnetite bearing calcareous schist/ amphibolite marble which is intimately associated with Banded Magnetite Quartzite (BMQ) and calc-silicates. Malachite stains are also recorded in interbanded sequence of calc silicates and garnet-biotite schist and BMQ. The general strikes of beds are N30°E- S30°W with steep dips towards SE or NW. Pinch and swell structures are developed in BMQ at places. 100 nos. of soil samples have been collected from the area on 50 m X 200 m grid, which shows presence of anomalous zone in the area. The investigation has been completed.

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Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Base metal							
Jhunjhunu	Ponkh South Extension block (Central Khetri Belt)	-	-	04	99.0	425	Reconnaissance stage investigation was carried out to evaluate potential of copper and precious metal mineralisation. The litho units exposed in the area belong to Ajabgarh Group of Delhi Super Group. The main rock types exposed in the area are carbon phyllite, dolomitic marble, impure marble and quartzite. Gossan has been found at the top of carbon phyllites. Channel samples have been collected from gossan zones and oxidised carbon phyllite. A quantum of 150 cu.m of pitting/trenching has been carried out and BRS samples have been collected. Three gossans have been demarcated in the north east of the Village Ponkh, out of which the largest gossan lies in the north western part of the area and is 130 m in length with 30 m of width. The result of the chemical analysis show very poor copper mineralisation (10 ppm to 224 ppm) in the area. Out of four boreholes drilling has been accomplished in one borehole. The mineralisation mostly occurs in the form of disseminations, stringers, veins and specks of pyrite only. Evidences of malachite staining and occurrences of copper sulphides were not observed in the core samples. The investigation has been completed.
Sikar	Dariba North block	-	-	-	-	-	Prospecting stage investigation (G-3) was carried out to assess zones of basemetal mineralisation & associated precious metals through sub surface probing and to trace the northern continuity of sub-surface sulphide mineralisation, which has already been established by drilling in the southern continuation of Dariba North Block. The drilling was planned by keeping 200 m spacing of boreholes along geochemical profiles laid down in Mineralised Zone-I. The mineralisation mostly occurs in the form of foliation parallel fine disseminations, streaks, stringers, veins and specks of bornite, covellite, chalcopyrite and pyrrhotite. A total of 705.75 m of drilling has been accomplished in five boreholes.

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Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI Basemetal Sikar	Dariba North block	-	-	-	-	-	Zones of highly silicified and brecciated quartzite with semi-pelitic rock and intercalated amphibole marble containing sulphides which is manifested by disseminations of pyrite, chalcopyrite and occasional specks of bornite and covellite. The borehole DNBH-1 has intersected two mineralised zones with 0.50 m x 0.15% Cu and 2 m x 0.19 % Cu at shallow depth. The investigation will be continued in F.S.2013-14.
Sikar	Ghatiwala block	1 :2,000	1.0	-	-	273	Reconnaissance stage investigation (G-4) was carried out within North Delhi fold belt to trace the northern continuity of sulphide mineralisation which has been established in the southern continuation of the proposed block. The present block is located north of the Dariba north block and south of Nanagwas block. The quantum of field achievement includes detailed mapping along with collection of BRS, channel samples & PTS. A mineralised zone of about 200 m length has been delineated on the western margin of the mapped area. The analytical results of channel samples from channel GCH-1 indicate Cu value ranging from 5 ppm to 990 ppm. The investigation has been completed.
Sikar	Nanagwas area	-	-	4	-	-	Prospecting stage investigation (G-3) was carried out within North Delhi Fold belt to test the subsurface continuity of basemetal mineralisation and associated precious metals. Two mineralised zones namely I & II have been delineated on surface. Four boreholes were drilled to intersect mineralisation at targeted depth on zone -1. The details are as follows: Depth of intersection of mineralised zones (64.15 m -79.40 m) (90.80 m - 104.15 m) & (106.85 m - 107.85 m) with width & average grade(15.25 m x 0.37% Cu),(13.35 m x 0.30% Cu) & (1.0 m x 0.21% Pb) respectively.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI Basemetal Sikar	Palaswala Ki Dhani block (North Delhi Fold Belt)	1: 2,000	0.78	06	-	182	Reconnaissance stage investigation (G-4) was carried out to delineate zones of basemetal mineralisation and associated precious metals. The quantum of field achievement includes detailed mapping along with collection of channel samples from six channel lines coupled with collection of BRS samples. The surface indications of sulphide mineralisation is manifested in the form of bedding parallel pervasive malachite stains and specks of fresh sulphides in tremolite dolomitic marble and siliceous dolomitic marble. Three mineralised zone (MZ-I, MZ-II & MZ-III) has been identified. The MZ-I & MZ-II lies in western limb of the synform whereas the MZ-III is in core part. The average strike length of MZ-I, MZ-II and MZ-III is about 400 m, 600 m & 250 m, respectively with widths varying from 7 m to 15 m. The analytical results of channel-I indicate that the Cu content ranging from 5 ppm to 0.76%. The investigation has been completed.
Sirohi	Bhima &- Kivarli blocks	1 :10,000 :2,000	16.0 0.50	-	-	286	Reconnaissance stage investigation (G-4) was carried out for delineation of target areas for identification of basemetal mineralised zones for future follow up investigation. Large Scale Mapping and Detailed Mapping has been carried out. The quantum of other field achievements include collection of geochemical samples (SS and BRS) on 100m x 25m grid pattern, petrological samples, 50 cu m pitting and trenching, grab bed rock samples and channel samples. The Bhimana and Kivarli Blocks fall in the Western Sub-Metallic Domain of Pindwara-Watera-Deri-Ambaji (PWDA) Belt and lies about 15 km north of Abu Road Township. Four blocks showing favourable zone for mineralisation has been demarcated. The Danva and Pipela Blocks have already been explored and remaining two blocks viz Bhimana and Kivarli Blocks have been taken up during the FS: 2012-13 for the basemetal investigation.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Basemetal							
Sirohi	Bhima &- Kivarli blocks	1 :10,000 1 :2,000	16.0 0.50	-	-	286	Basic volcanics, calc silicates/impure marble, volcano sedimentary rocks and intrusives (basic dyke, Erinpura granite and quartz veins) comprise the litho sequence. The regional strike of the bedding and foliation is N45°E-S45°W with moderate to steep dips towards northwest. Evidence of mineralisation has been recorded in the basic volcanics in the form of malachite stains and sulphide specks. Analytical results of eleven (11) grab samples from basic volcanics has indicated the Cu and Zn values ranging from 11 ppm to 785 ppm and 21 to 450 ppm, respectively. The investigation will be continued in F.S.2013-14.
Udaipur	Chari NW block	1 : 10,000 1 :2,000	40.0 0.5	-	-	393	Reconnaissance stage investigation (G-4) was carried out in South Delhi Fold belt to evaluate the north western extension of Chari copper deposit and to identify target areas for sulphide mineralisation in Chari NW block. The Chari NW block is located near Pada village. Large Scale Mapping, detail mapping were carried out along with the collection of geochemical (BRS/SS) sample on 100 x 25 m grid pattern, PTS sample, channel sample, 50 m ³ of pitting/trenching, petrological sample. LSM indicates that the area can be divided into two stratigraphic domains, i.e. older Archaean basement lying in the northeastern part and overlying Lower Proterozoic Aravalli cover rocks in the southwestern part of the block. The basement rocks are represented by granitic-gneiss, granite and its variants, while the Lower Aravalli cover sequence is made up of basal quartzite, metavolcanics, dolomite/impure marble and meta-argillite. Meta-volcanics is host rock for base metal mineralisation. At places, sulfide minerals such as pyrite, chalcopyrite and arsenopyrite were also reported in meta-volcanics. The banded magnetite/haematite quartzites (BMQ/BHQ) are present mostly within the quartzites or at the contact of meta-volcanics and quartzite. A NW-SE trending gossan/ oxidised zone was identified in the meta-volcanics. This gossan/ oxidised band is about 350-400 meter in strike

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Basemetal							
Udaipur	Chari NW block	1 : 10,000 1 : 2,000	40.0 0.5	-	-	393	length with thickness varying from 10 m to 15 m and is the favourable locales for basemetal mineralisation. Detailed mapping and channel sampling have been carried out in this zone and analytical results are awaited. Pyrite, chalcopyrite and malachite stains are observed in hand specimens from this zone. Ore microscopic study reveals presence of pyrite and chalcopyrite mineralisation in meta-argillites/slate. The investigation will be continued in F.S. 2013-14.
Gold							
Banswara	Gundelapara (W) block	1:2,000	1.0	-	-	604	Reconnaissance stage investigation (G-4) was carried out to delineate and assess the potential zones of gold and associated basemetals for follow up investigation. Geochemical samples were collected from nineteen channels. The rock types exposed in Gundelapara West Block are a part of Jagpura Formation of Debari Group of Aravalli Supergroup. Three mineralised zones were delineated during the course of work. The first zone is located in eastern part of the mapped area within impure marble over a strike length of 400 m and 10-30 m width. This zone is characterised by the presence of NNW-SSE trending gossans. The second zone is present in the southwestern part of the area in impure marble, which is 200 m in strike length and 5-20 m width. The third zone is developed at the contact of amphibolite and impure marble on the western part, characterised by occurrence of malachite. Analytical results of the channel samples so far received indicate two anomalous copper zones with thickness varying from 2 m to 5 m with about 0.1 % Cu. The investigation has been completed.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Gold							
Dungarpur & Udaipur	Bhukia - Dagocha	1:10,000	70.0	-	-	668	Reconnaissance stage Investigation (G-4) was carried out to delineate target areas of gold-copper mineralisation. Pyrrhotite bearing marble unit having 3 km strike length and upto 300 m width is located near Village Kuldla. The units also contain a few specks of arsenopyrite and chalcopyrite. Analysis of one grab sample of this pyrrhotite bearing marble has shown presence of anomalous cobalt (upto 0.1%) and nickel (upto 0.1%). Another grab sample of pyrrhotite bearing marble analysed 2 ppm gold. Some hitherto unexplored gossan patches are recorded over amphibolite and marble. In order to locate new targets for gold exploration between the Bhukia and Dagocha gold-copper prospects investigation was carried out in 18 km long and 4 km wide tract extending from Dudka in the southeast to Rathri in the northwest. Large scale geological mapping along with collection of bedrock samples, geochemical samples and channel samples has been carried out. Three gossan bodies up to 300 m length along with several smaller gossans have been recorded in the area. The investigation has been completed.
Iron ore							
Karauli, Sawai Madhopur, Tonk, Bundi etc.	Karauli- Bundi area	-	-	-	-	40	Reconnaissance stage investigation (G-4) for iron ore was carried out to assess the potentiality of the iron ores and iron rich lithounits occurring in Hindoli Group of rocks. Large-scale mapping was carried out in parts of Bharatpur and Karauli districts. The main lithounits exposed in the mapped area are BIF (BHC& BHJ) and quartzite with small patches of shale, dolomitic marble and basic rock. A number of old workings of variable dimensions have been recorded in the Banded Iron Formations near Karwari, Karbar mina, Ghuseithi, Doghati and Dedrauli areas in Karauli district. Two types of iron ore (Haematite) have been identified-(a) Very soft, friable, dark steel grey to reddish in colour and (b) compact, massive, iron black in colour.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Iron ore							
Karauli, Sawai Madhopur, Tonk, Bundi etc.	Karauli- Bundi area	-	-	-	-	40	XRD analysis of two grab samples of BIF has been done which indicated presence of hematite < 50% and quartz > 50% in one sample collected from Karwari. The other sample collected from Ghusethi indicated 20% hematite and 68% quartz. Chemical analysis of 40 nos. of grab samples has analysed Fe content varying from 25% to 45% whereas two samples from Doghati area assay 56 % of Fe with 9% SiO ₂ . The SiO ₂ content generally is high and varies from 35% to 75%. There is no signature of REE, gold and base metal mineralisations from the samples analysed so far. The investigation will be continued in F.S.2013-14.
Lignite							
Bikaner	Kharicharnan South area	-	-	12	1534.0	-	Reconnaissance stage (G-4) exploration by scout drilling was taken up to locate lignite bearing blocks and to establish the stratigraphic set up in the north central part of Palana Basin. About 937 m of GP logging was completed during the period. The boreholes intersected Quaternary sediments, Marh Formation and Nagaur Formation. No lignite seam was intersected during the period. The work is in progress.
Limestone							
Jaisalmer	Sabbu-ka- Toba- Asu-Tar	1:5,000	1.25 2.50	-	-	-	Reconnaissance stage investigation (G-4) was carried out to locate low silica SMS (LD grade) limestone. Small patches of limestone are exposed in arcuate shape exposures covering an area of about 0.24 sq kms along eastern bank of IGNP canal. The limestone belong to the Khuiala Formation of Upper Tertiary age and the physical and chemical properties of limestone tentatively conforms with specifications for the low silica SMS grade (LD grade) limestone. Detailed mapping & large scale mapping was carried out. The main lithology exposed in the area is iron stone fragments of Shumar Formation and calcrete, which occur as small mounds. The investigation has been completed.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Phosphorite							
Jaisalmer	Kalinjara	1:50,000	200.0	-	-	176	Reconnaissance stage investigation (G-4) has been carried out to locate the possible new occurrences of phosphorite and to identify the potential target areas for future follow up investigation. The Fatehgarh Formation consists of conglomerate, ferruginous sandstone, highly fossiliferous sandstone, bentonitic clay, phosphatic sandstone and phosphatic mudstone. The phosphatic band was exposed over a distance of 20 km in which phosphate occurs as replacement of shells of gasteropods, ostracods, nummulites and bone fragments. The P ₂ O ₅ content varies from less than 5% to more than 15%. The total quantum of work carried out includes photogeological study & mapping, to facilitate the delineation of phosphorite bearing zone. In addition to these and 151 number of bed rock samples along with 200 cu m of pitting/trenching and collection of 50 each nos. of PTS and channel were accomplished. Five nos. of clay samples were also collected for XRD studies. Analytical results of samples so far received yielded an average of 8 % P ₂ O ₅ content. The investigation has been completed.
	Fatehgarh	1:10,000	50.0				
REE							
Pali	Sendra- Chitar	-	-	-	-	-	Reconnaissance stage investigation (G-4) was carried out within South Delhi fold belt in Pali and Ajmer districts to identify and locate rare metal bearing intrusive granites and also to delineate probable zones of Sn-W mineralisation in the granite. Three skarn zones have been identified along the western contact of the Chang Pluton, which presumably is the locale for Sn and W mineralisation. However, night traverses with the help of UV lamp did not yield any indication of scheelite mineralisation in the skarn zones. Surface indications of base metal mineralisation are recorded in the form of malachite stains within the banded calc schist rock. A quantum of 48 cu m of trenching was carried out in the soil covered areas. The various litho units identified are pebbly schist, quartz-mica schist, biotite bearing foliated calc-silicate, epidote bearing calc biotite schist, quartz mica schist with iron staining, slaty schist, actinolite schist and highly limonitised quartz-biotite schist. The investigation has been completed.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
REE							
Pali	Dhani - granite	1 : 2,000	1.01	-	393.10	28	Reconnaissance stage investigation (G-4) was carried out to assess the REE potential. The investigation involved detailed mapping (1:2,000) of 1.01 sq km supplemented by channel sampling. In addition, a quantum of 393.10 meters of drilling has been accomplished. The area is predominantly represented by Erinpura granite and Dhani granite with ramifying veins of pseudotachylite. Highly silicified and brecciated iron rich rock and quartz veins also comprise the area. The contact between Erinpura granite and Dhani granite is faulted. The trend of the fault is NE-SW with moderate dip towards SE. Thirteen Channel samples out of 28 collected from hydrothermally altered Dhani granite indicates, REE of more than 0.1%. Five zones of REE mineralisation have been identified.
DMG							
Bajari							
Dhaulpur	N/v Thekuli Tasimo	1:10,000 1:3,600	150.0 10.0 1.0	-	-	20	Fine to medium grained, brown or early light pink coloured bajari was noticed N/v Thekuli Tasimo. About 1.05 million tonnes of bajari were estimated tentatively.
Granite/ Masonry stone							
Jhunjhunu	N/v Nand- Rijhani Rasora- Maragsar	1:4,000 1:10,000	3.0 10.0	-	-	7	Occurrences of granite were located N/v Nand, Rijhani, Ratanshar (Mahakhar) & Keharpura, which is used for decorative purposes. Granite of this area is pink-red to grey, coarse grained, porphyritic with black chunks of tourmaline. At places it is bouldery & traversed by wide spaced joints. It can yield sizeable blocks for cutting/polishing. Area N/v Jhadaya Nagar is comprising small hillock of earthy to brownish, fine grained, hard quartzite. Quartzite hillock is about 40 m high & having length x width of about 700 m x 100 m. Resources were not estimated.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DMG							
Limestone							
Nagaur	N/v Bher Godhan	1:10,000	15.0 2.0	19	775.50	-	The main rock types of this area are dolomitic limestone / high grade limestone, which are bedded in nature and shows horizontal disposition. Two to seven zones of fine to medium grained grey colour & crystalline limestone zones were intersected having 1.50-19.25 m thickness. The cement grade limestone bands were noticed in pit section which was overlain by 1 m to 1.5 m thick zone of dolomitic limestone or alluvium to the south of Godhan. The thickness of limestone zone were noticed, which varies from 2.5 - 3 m, which will further continue in depth. To the SE of village Godhan out crops of dolomitic limestone were mapped which is cement to chemical grade in quality. About 25.16 million tonnes of cement grade limestone resources were estimated.
Nagaur	N/v Jathera Kharat & Surpalia	1:10,000	10.0	-	-	17	The main rock types of this area are dolomitic limestone / high grade limestone, which are bedded in nature and shows horizontal disposition. Besides these rocks, other formation like alluvium of recent to sub recent & gypsum of tertiary formation also occurs. At 1 km of east of Jathera & 1 km south of Janjolai villages, occurrences of limestone were noticed in alluvium covered areas. In pit section, 2 m thick zone of fine to medium grained grey colour limestone were noticed below 1-2 m thick zone of alluvium & cherty dolomitic limestone 1 m thick bed of gypsum was also mapped N/v Kharat & is traced upto Sarau-Nasar village. The occurrences of gypsum bearing area were found on approximately in 5 sq km area. Resources were not estimated.
Jaipur & Alwar	-	1:4,000	1.00	-	600	1	Objective of exploration was to investigate horizons of high grade limestone. Limestone belonging to Ajabgarh Group of Delhi Super Group was reported from tube wells N/v Baragaon, quartzite is forming the high hills. Carbonate rocks of grey to black colour belonging to Alwar Group of Delhi Super Group were mapped N/v Bhankari Resources were not estimated.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DMG							
Limestone							
Nagaur	N/v Harima	1:2,000	2.0	21	611	386	The main rock types of this area are dolomitic limestone / high grade limestone, which are bedded in nature and shows horizontal disposition. Cement grade limestone was intersected in all the boreholes in the form of repeated horizons having cumulative thickness of 7.50 m - 25 m each. About 74.60 million tonnes resources of cement grade limestone were estimated.
Sandstone							
Nagaur	N/v Chauritra, Mangara, Baswani, etc	1:1,000 1:50,000	15.0 150.0	-	-	-	The object of exploration was to investigate new areas of sandstone & masonry stone. Around these areas at 16 places occurrences of ferruginous fine grained sandstone, whitish brown fine grained massive sandstone were noticed. The thickness of these sandstones varies from 2-3 m. Resources were not estimated.
Sandstone/ Granite							
Pali	Mokalawa Narlai Koliwara	1:2,000	2.0	-	-	-	Objective of exploration was for delineation of sandstone & granite areas. The main rock types of these areas are fine to medium grained whitish brown sandstone. These sandstones are bedded in nature and shows horizontal disposition. The Mokalawa area comprises of thick beds of horizontally bedded brown coloured, fine to medium grained sandstones. These sandstones are suitable for making slabs and extraction of blocks which is suitable to use as dimensionial stone. The granite of Narlai areas are greyish in colour fine to medium grained in texture. Granite of Koliwra area are whitish and greyish in colour. These granites occur as big boulders on surface and sheets on base of boulders. An area of 0.40 sq km have been mapped M. V. Kasti for delineation of sandstone. The area comprises with fine to medium grained pinkish coloured massive blockable sandstone overlain by granular sandstone. Resources were not estimated.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Sandstone/ Masonry stone							
Bharatpur	Alwar	-	15	-	-	14	Quartzite is the dominating rock. Quartzite is exposed in the hill part, which is brown and greyish in colour. In general the quartzite is hard and massive but also found weathered, ferruginous and friable at places. The potential deposit of masonry stone were marked in Alwar and Bharatpur districts. Geologically, the area comprises rocks of Bhande group of Vindhyan Super group which represented by sandstone & shale. 29 Nos. plots of 1 hect. size have been delineated for masonry stone N/v Aipur, Dhanwara, Chinawara, Goleta & Bhatessra.
Ortho-quartzite/ Limestone/ Quartz & Felspar							
Jhunjhunu	1:4,000	1.0	-	-	10		Geologically, the area represented by quartzite, cal-gneisses, calc-silicate, marble, garnet-chlorite schist, amphibole gneisses of Ajabgarh Group of Delhi Super Group intruded by albite, granite & rhyolite quartz & pegmatite veins. Occurrence of white to creamish-brown, fine to medium grained felspathic quartzite & black coloured amphibolites were noticed near villages Sihorian-ki-Dhani, Dumoli, Khatipura, Murdpur & Manota which are suitable for use as a masonry stone. Occurrences of vertical to sub-vertically disposed grey coloured slate / phyllite which are suitable for masonry purposes forming mound were also noticed near villages Ahir-ki-Lambi & Bhopalpara. Resources were not estimated.
	1:10,000	10.0					
	1:50,000	150.0					

(Contd.)

STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
MECL							
Lead-Zinc							
Ajmer	Tikhi extension South block	1:1,000	0.50	15	3414.0	775	Objective of the exploration was to trace continuity of lodes as well as to trace the continuity of new ore zones containing high grade galena. The rock types belong to Pre-Cambrian age. The metasediments represented by the calcareous rocks and perlitic schist. Major part of the deposit is almost a plain country with thick soil cover, alluvium & scarce rock exposures of dolomitic marble, quartzite & calc-silicate rock. About 2.32 million tonnes of lead-zinc ore resources were estimated with a grade of 5.98% Pb, 0.86% Zn & 0.30% Cu at TMC cut off.
Bhilwara	Gurla (North) block	1:5,000	1.20	23	3941.0	1948	Main objective of exploration was to prove strike continuity of mineralisation at close space interval & to prove down dip continuity of mineralised zone upto 150 m below ground level to augment ore resources. About 7.10 million tonnes with 0.86% Pb, 1.40% Zn & 0.36% Cu in the total strike length of 1792 m at 2% TMC (Pb + Zn + Cu) cut off or 0.50% Cu cut off were estimated.
Lignite							
Barmer - Field	Baytui	-	-	3	797.50	10	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was proving of lignite existence towards east of Kawas block & north of Nimbalkot North block. Exploration work is underway.

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STATE REVIEWS

Table – 4 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
MECL							
Lignite							
Barmer Field	Bhurtiya	-	-	29	9805.60	114	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was to scan the gap areas between Nort-East of Magne-Ki-Dhani, South-West of Kawas Gravity & western part of Chawa Gravity blocks for establishing the continuity of lignite developments in the proposed block to locate the potential area. Exploration work is underway.
-do-	Matasar Tala	-	-	4	1640.00	28	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was to scan the gap areas between Nort-East of Magne - Ki - Dhani, south-West of Kawas Gravity & western part of Chawa Gravity blocks for establishing the continuity of lignite developments in the proposed block to locate the potential area. Exploration work is underway.
Jaisalmer	Aslai-Soda	-	-	6	1313.00	6	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was to proving of lignite existence in between Khuri & Narsingh-ki-Dhani blocks. Exploration work is underway.
-do-	Bandhai	-	-	29	4943.00	6	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was to prove the lignite existence towards west of Khuiyala block where lignite occurrence has been already proved. Exploration completed but the result are not encouraging.
-do-	Khuriyalai	-	-	47	4875.00	33	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was to prove the lignite existence towards south of Ramgarh block where lignite occurrence has been already proved. Exploration has been completed.
Nagaur	Deswal	-	-	32	6689.00	8	Promotional drilling on behalf of Ministry of Coal was carried out. Exploration work is underway.

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STATE REVIEWS

Table – 4 (Concl.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
MECL							
Lignite							
Nagaur	Phalodi, Gangardi & Ucharada	-	-	39	8310.50	80	Promotional drilling on behalf of Ministry of Coal was carried out. Objective of exploration was to scan the Tertiary stretch of around 130 sq kms areas in order to find the possible continuity of the known occurrences viz. Kapriyan-ki-Dhani, Metra Road & Indawar/ Mokala blocks explored by the DMG, Rajasthan. Exploration work is underway.
Phosphorite							
Udaipur	Dhol-ki-Pati	-	1.0	19	1784.90	1501	The main rock types exposed are dolimites with minor intercalations of phyllites and quartzites. These dolomites are capped by brecciated quartzite. Two types of dolomite were present, one which hosts the phosphorite mineralisation and is generally capped by silvirete and the other which is non-phosphatic and does not have silvirete capping. About 1.264 million tonnes phosphorite resources with average grade 8.765 Pb were estimated.
RSMM Ltd.							
Rock Phosphate							
Udaipur	Jhamarkotra mine	-	-	11	878.0	-	Objective of exploration was to establish the continuity of ore at depth for mine planning. As on 1.4.2013, resources were estimated at 50.53 million tonnes.

Production

The value of mineral production in Rajasthan during 2012-13 at ₹30,402 crore increased 23% as compared to the previous year. Its share to the total value of mineral production in the country in 2012-13 was about 11% and is placed at first position among the states in the country during the year under review. Of the total value, about 51% came from petroleum (crude) alone. It is the richest state in the variety of minerals in the country and produces about 30 types of minerals. Rajasthan was the sole producer of lead and zinc ores and concentrate, calcite, selenite and wollastonite. Almost entire production of silver and gypsum in the country was reported from the state during 2012-13.

Rajasthan was the leading producer of ochre accounting for 93%, ball clay 89%, phosphorite 88%, steatite 81%, felspar 61% and fireclay 40% of the total production in the country. Besides, it was the second leading producer of copper concentrates contributing 35%, petroleum (crude) 23%, limestone 19%, quartz 16% and mica (crude) 6% of the nation's output for the year 2012-13. Among the production of important

minerals, iron ore increased manifolds and the lignite production more than doubled. Increase in production was also reported in silver (81%), felspar (62%), quartz (43%), calcite (33%), petroleum (crude) (31%), ochre (25%), ball clay (22%), natural gas (ut.) and kaolin (16% each), lead conc. (14%), limestone (9%), lead & zinc ores (7%), zinc concentrates (6%), copper concentrates (4%) and steatite (2%). Whereas, the production decreased in copper ore (2%), dolomite (5%), phosphorite (8%), barytes (9%), gypsum (11%), silica sand (18%), wollastonite (23%), fireclay (28%), mica (crude) (31%), manganese ore (33%), quartzite (41%) and selenite (42%) as compared to that in the previous year. (Table-5).

The production value of minor minerals was estimated at ₹6,762 crore for the year 2012-13.

The number of reporting mines in Rajasthan was 490 in the year 2012-13 as against 418 in previous year.

The index of mineral production in Rajasthan (base 2004-05 = 100) was 203.3 in 2012-13 as compared to 180.2 in the previous year.

STATE REVIEWS

**Table – 5 : Mineral Production in Rajasthan, 2010-11 to 2012-13
(Excluding Atomic Minerals)**

(Value in ₹ '000)

Mineral	Unit	2010-11			2011-12			2012-13 (P)		
		No. of mines	Qty	Value	No. of mines	Qty	Value	No. of mines	Qty	Value
All Minerals		308		199853728	418		247321485	490		304018587
Lignite	'000t	4	1525	1071600	4	2963	1161800	6	7081	2776600
Natural Gas (ut.)	m cu m	-	432	2765232	-	590	4244057	-	685	5665038
Petroleum(crude)	'000t	-	5149	94011369	-	6552	119036428	-	8593	156184417
Copper Ore	t	-	971620	-	-	1000485	-	-	982926	-
Copper Conc.	t	2	45174	1809887	2	41450	1993078	2	43245	2876511
Iron Ore	'000t	1	27	8172	2	32	8006	2	235	197997
Lead & Zinc Ore	t	-	7539999	-	-	8041881	-	-	8582015	-
Lead Conc.	t	6	147625	2000435	6	161854	2454497	8	184485	3291429
Zinc Conc.	t	*	1427231	17930226	*	1414009	19862214	*	1492781	23958034
Manganese Ore	t	1	16638	24957	1	7483	14966	1	4987	12736
Silver**	kg	-	148082	5430068	-	206942	11550277	-	373901	21225078
Phosphorite	t	2	1964112	4937753	2	2019584	7337111	2	1867229	7508630
Asbestos	t	2	-	-	2	-	-	2	-	-
Ball Clay	t	25	776193	301368	38	1351705	598843	32	1649048	809803
Barytes	t	1	6105	2433	1	8055	4416	1	7352	4672
Calcite	t	4	38826	14104	3	54081	20835	6	72076	25003
Clay (others)	t	4	7864	1140	6	50	12	9	150232	45901
Dolomite	t	1	210498	30553	1	239639	40550	1	227485	47951
Felspar	t	59	306126	89127	95	488365	159571	159	789444	231422
Fireclay	t	12	507381	91472	12	447615	88291	10	323125	74110
Fluorite(graded)	t	1	565	1815	1	196	561	-	-	-
Garnet (abrasive)	t	-	-	-	-	-	-	1	614	565
Gypsum	t	26	4879990	1463997	33	3937375	1674326	30	3495925	1697126
Kaolin	t	15	559927	169143	18	512145	104587	31	592154	335982
Laterite	t	1	-	-	1	-	-	-	-	-
Limestone	'000t	24	44773	7212296	25	47982	8113633	26	52065	7931464
Mica (crude)	t	3	16	381	5	114	2833	4	79	1979
Mica (waste & Scrap)#	t	-	1204	-	-	2241	-	-	3878	-
Ochre	t	11	1095912	199020	17	1326438	230002	13	1661108	432119
Pyrophyllite	t	-	-	-	-	-	-	1	7518	1124
Quartz	t	32	133797	26046	56	114632	22485	63	163668	38123
Quartzite	t	1	4250	1849	1	7648	3327	1	4489	669
Silica Sand	t	8	232788	74016	16	755074	169043	13	617677	238298
Talc/Steatite/Soapstone	t	56	664649	420656	63	738877	634367	60	756381	653515
Selenite	t	3	6736	5726	3	13047	16105	3	7577	9968
Wollastonite	t	3	183381	145958	4	184445	159974	3	141550	127033
Minor Minerals@		-	-	59612929	-	-	67615290	-	-	67615290

Note: The number of mines excludes natural gas (utilised) and minor minerals.

** Number of mines covered under lead concentrates.*

*** Recovered at Chanderiya Lead-Zinc Smelter of HZL from lead concentrates produced in Rajasthan.*

Includes mine waste and that obtained while dressing of crude mica.

@ Figures for earlier years have been repeated as estimates, wherever necessary, because of non-receipt of data.

STATE REVIEWS

Mineral-based Industry

The important large and medium-scale mineral-based industries in the organised sector in the State are given in Table - 6.

Table - 6 : Principal Mineral-based Industries in Rajasthan

Industry/plant	Capacity ('000 tpy)
Cement	
ACC Ltd, Lakheri, Dist. Bundi.	480
Aditya Cement, Shambhupura.	1750
Gujarat Ambuja Cements Ltd, Rabriyawas Dist. Pali.	3600
Binani Cement, Binanipuram, Dist. Sirohi.	4850
Birla Corporation Ltd, Chittorgarh Birla Cement Works, Chandera Cement Works.	720 1280
Grasim Industries Ltd (White Cement Division) Kharia Khangar, Dist. Jodhpur.	560 (white cement) 200 (wall putty)
J.K.Udaipur Udyog Ltd, Udaipur.	900
J.K.Cement, Nimbahera, Dist. Chittorgarh.	3300
J.K.Cement, Mangrol.	750
J.K. White Cement Works, Gotan, Dist. Nagaur.	300
J.K.Laxmi Cement, Banas, Dist. Sirohi.	5000
Manglam Cement, Morak, Dist. Kota.	2000
Neer Shree Cement, Morak, Dist. Kota.	600
Shree Cement Ltd, Andheri, Deori, Dist. Ajmer Beawar, Dist. Ajmer Rasi, Dist. Pali Kushkhera, Dist. Alwar (G).	4200 2600 3000 1200
Shriram Cement Works, Kota.	400
Chemical	
DCM Shriram Industries Ltd, Kota.	9 (rayon/yarn) 7.7 (sodium sulphate)
Modi Alkalies & Chemicals Ltd, Alwar	84.2 (caustic soda) 50.3 (Cl) 39.6 (HCl)
Ceramics	
Bikaner Ceramics Pvt. Ltd, Bikaner	2.2
Kajaria Ceramics Ltd, Bhiwadi	16.7 (million sq m)
Fertilizer	
Chambal Fertilizer & Chemical Ltd, Gadepan, Dist. Kota	1729.2 (urea)
Khaitan Chemical & Fertilizers Ltd, Dhinwa, Dist. Chittorgarh	200 (SSP)
Shriram Fertilizers & Chemicals Ltd, Shriramnagar, Dist. Kota.	330 (urea) 113.8 (caustic soda) 13.2 (bleaching powder) 61.2 (HCl) 61.2 (Cl)

(Contd.)

Table - 5 (Contd.)

Industry/plant	Capacity ('000 tpy)
Plaster of Paris	
Abhishek Plaster Industries, Baramsar, Dist. Hanumangarh.	6.1
Agrawal Industries, Nohar, Dist. Hanumangarh.	6.3
Balaji Plaster Industries, Taranagar, Dist. Churu.	6
Balaji Industries, Taranagar, Dist. Churu.	6.5
Ganesh Plaster Industries, Taranagar, Dist. Churu.	6
Gil Brothers, Taranagar, Dist. Churu.	7.1
Hind Plaster Industries, Taranagar, Dist. Churu.	6
Jaishri Plaster Industries, Taranagar, Dist. Churu.	6.3
Jagdamba Plaster Industries, Rawatsav, Dist. Hanumangarh.	7
Jai Bhavani Plaster Industries, Baramsar, Dist. Hanumangarh.	6
Jai Sriram Plaster Industries, Taranagar, Dist. Churu.	7.1
M.G. Plaster Pvt Ltd, Taranagar, Dist. Churu.	6.2
Mahabir Plaster Industries, Taranagar, Dist. Churu.	6
Multani Industries, Nohar, Dist. Hanumangarh.	8.4
R.D. Plaster Industries, Nohar, Dist. Hanumangarh.	8.4
R.N.Industries, Bikaner, Dist. Bikaner.	18
Shalimar Plaster & Chemical Industries, Sardarshahar, Dist. Churu.	14
Shri Lakshmi Gypsum, Chak, Dist. Hanumangarh.	6
Shriram Plaster, Taranagar, Dist. Churu.	6.3
SS Plaster Industries, Taranagar, Dist. Churu.	6
Shiv Bhakti Industries, Nohar, Dist. Hanumangarh.	8.4
Tiger Plaster, Sardarshahar, Dist. Churu.	11
The Sardarshahar Plaster & Minerals, Sardarshahar, Dist. Churu.	19.4
Updesh Industries Ltd, Chak, Dist. Hanumangarh.	9
Copper Smelters	
HCL, KCC, Jhunjhunu.	31(Cu cathode) 182 (H ₂ SO ₄)
Lead & Zinc Smelters	
HZL Zinc Smelter, Debari.	88 (Zn)
HZL Lead-zinc Smelter, Chanderiya.	185 (Pb) 525 (Zn) 0.74 (Cd)* 168 tonnes (Ag)* 2.1 (Cu cathode) 704 (H ₂ SO ₄)*

* Total for all smelters of HZL.