

STATE REVIEWS



Indian Minerals Yearbook 2015 (Part- I)

54th Edition

STATE REVIEWS
(Gujarat)

(FINAL RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648

E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

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GUJARAT

Mineral Resources

Gujarat is the sole producer of chalk and is the principal producer of clay (others), fluorite (graded), kaolin, silica sand, lignite, petroleum & natural gas and marl in the country. The State is the sole holder of the country's chalk, marl and perlite resources and possesses 66% fluorite, 28% diatomite, 24% bentonite, 18% granite and 12% wollastonite resources.

The important mineral occurrences in the State are: **bauxite** in Amreli, Bhavnagar, Jamnagar, Junagadh, Kheda, Kachchh, Porbandar, Sabarkantha and Valsad districts; **ball clay** in Banaskantha, Bharuch, Kachchh and Patan districts; **bentonite** in Amreli, Bhavnagar, Jamnagar, Kachchh and Sabarkantha districts; **china clay** in Amreli, Banaskantha, Bhavnagar, Jamnagar, Junagadh, Kachchh, Mehsana and Sabarkantha districts; **chalk** in Porbandar district; **diatomite** in Bhavnagar district; **dolomite** in Bhavnagar and Vadodara districts; **fireclay** in Bharuch, Kachchh, Mehsana, Rajkot, Sabarkantha, Surat and Surendranagar districts; **fluorite** in Vadodara and Bharuch districts; **gypsum** in Bhavnagar, Jamnagar, Junagadh, Kachchh and Surendranagar districts; **lignite** in Bharuch, Bhavnagar, Kachchh and Surat districts; **limestone** in Amreli, Banaskantha, Bharuch,

Bhavnagar, Jamnagar, Junagadh, Kheda, Kachchh, Panchmahals, Porbandar, Rajkot, Sabarkantha, Surat, Vadodara and Valsad districts; **marl** in Amreli, Junagadh and Porbandar districts; **ochre** in Banaskantha, Bhavnagar and Kachchh districts; **perlite** in Rajkot district; **petroleum and natural gas** in oil fields of Ankaleshwar, Kalol, Navgam, Balol and Cambay in Cambay onshore and offshore basins; **quartz/silica sand** in Bharuch, Bhavnagar, Dahod, Kheda, Kachchh, Panchmahals, Rajkot, Sabarkantha, Surat, Surendranagar, Vadodara and Valsad districts; and **talc/soapstone/steatite** in Sabarkantha district.

Other minerals that occur in the State are: **apatite** and **rock phosphate** in Panchmahals district; **calcite** in Amreli and Bharuch districts; **copper ore** in Banaskantha district; **granite** in Banaskantha, Mehsana and Sabarkantha districts; **graphite** in Panchmahals district; **lead-zinc** and **marble** in Banaskantha and Vadodara districts; **manganese ore** in Panchmahals and Vadodara districts; **vermiculite** in Vadodara district; and **wollastonite** in Banaskantha district. The lignite resources are located in Bharuch, Bhavnagar, Kachchh and Surat districts (Tables - 1 and 2).

Exploration & Development

The details of exploration activities conducted by GSI and various agencies during 2014-15 are furnished in Table - 3.

During 2014-15, National Oil Companies (NOC) continued their operations for exploration of oil and gas in the State.

Table – 2 : Reserves/Resources of Lignite as on 1.4.2015 : Gujarat

(In million tonnes)				
District	Proved	Indicated	Inferred	Total
Total	1278.65	283.70	1159.70	2722.05
Bharuch	724.76	118.59	491.23	1334.58
Bhavnagar	-	-	299.17	299.17
Kachchh	335.61	56.40	33.09	425.10
Surat	218.28	108.71	336.21	663.20

Source: Coal Directory of India, 2014-15.

Table – 1 : Reserves/Resources of Minerals as on 1.4.2010/1.4.2013* : Gujarat

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						
Apatite*	tonne	-	-	-	-	-	-	-	-	-	351000	351000	351000	
Ball clay#	tonne	-	-	-	-	-	-	249810	-	49670	-	299480	299480	
Bauxite*	'000 tonnes	122060	20627	152619	16339	25679	3925	29733	22107	58778	-	156561	309180	
Bentonite	tonne	-	12460170	12460170	-	-	-	2163813	1904	119553173	-	121718890	134179060	
Calcite#	tonne	-	-	-	-	-	-	-	-	12380	-	12380	12380	
Chalk#	'000 tonnes	3266	528	4332	184	5	127	-	-	269	-	585	4917	
China clay#	'000 tonnes	34290	240	40763	4654	856	24135	-	878	40904	-	71425	112188	
Copper*														
Ore	'000 tonnes	-	-	-	2470	3010	1380	129	-	7131	-	14120	14120	
Metal	'000 tonnes	-	-	-	30.13	36.72	29.04	0.69	-	113.38	-	209.96	209.96	
Diatomite	'000 tonnes	-	-	-	-	-	-	-	-	811	-	811	811	
Dolomite**	'000 tonnes	40376	16071	80240	6627	27532	66174	20263	63780	280754	-	465131	545371	
Fireclay#	'000 tonnes	276	29	437	1175	635	923	638	962	53526	-	57859	58295	
Fluorite*	tonne	4279230	-	4279230	-	-	-	-	5723360	2001920	-	7725280	12004510	
Granite														
(Dim. stone)	'000 cu m	-	-	-	-	-	-	-	-	8501947	-	8501947	8501947	
Graphite*	tonne	-	-	-	-	-	-	-	2520805	835000	-	3355805	3355805	
Gypsum#	'000 tonnes	9	5	37	-	-	-	-	-	15138	-	15138	15175	
Laterite**	'000 tonnes	14734	-	14898	7239	-	16938	-	-	-	-	24176	39074	
Lead-zinc*														
Ore	'000 tonnes	-	-	-	2470	3010	1380	129	-	200	-	7189	7189	
Lead metal	'000 tonnes	-	-	-	74.10	90.30	41.40	3.90	-	-	-	209.70	209.70	
Zinc metal	'000 tonnes	-	-	-	123.5	150.5	69	1.10	-	-	-	344.10	344.10	
Lead & zinc metal	'000 tonnes	-	-	-	-	-	-	-	-	0.90	-	0.90	0.90	

Table - 1 (concl.)

Mineral	Unit	Reserves			Remaining Resources				Total Resources (A+B)					
		Proved STD111	Probable STD121	STD122	Total (A)	Feasibility STD211	Pre-feasibility STD221	Measured STD331		Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
Limestone	'000 tonnes	542498	72263	195715	810475	60640	88866	159549	18728	858265	18014634	-	19200681	20011157
Manganese ore*	'000 tonnes	-	-	-	-	-	-	-	-	-	2954	-	2954	2954
Marble	'000 tonnes	-	-	-	-	-	26571	45000	-	17129	34871	-	123571	123571
Marl	tonne	133236150	4650000	2090000	139976150	11704870	-	-	-	-	-	-	11704870	151681020
Ochre*	tonne	12243	32699	65047	109989	-	-	26520	6971	6210	2906608	-	2946309	3056298
Perlite	'000 tonnes	140	-	288	428	-	683	307	-	-	-	988	1978	2406
Quartz-silica sand#	'000 tonnes	16042	684	19256	35982	17133	5110	11774	2144	2999	25629	-	64789	100771
Phosphorite/Rock phosphate*	tonne	-	-	-	-	-	-	-	-	-	314820	-	314820	314820
Talc/soapstone/steatite*	'000 tonnes	-	-	6	6	-	20	8	-	-	4	-	31	37
Vermiculite	tonne	-	-	-	-	-	-	-	-	-	1960	-	1960	1960
Wollastonite	tonne	-	-	-	-	-	-	-	-	-	1990000	-	1990000	1990000

Figures rounded off.

* Reserves/Resources as on 1.4.2013.

Declared as minor mineral vide Gazette notification dated 10.02.2015.

Note: The proved and indicated balance recoverable reserves of crude oil and natural gas as on 1.4.2015 in the State are 138.49 million tonnes and 72.20 billion cu m, respectively.

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Table – 3 : Details of Exploration Activities in Gujarat, 2014-15

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Glauconite							
Kachchh	Around village Guneri	1:5000	7.5	-	-	184	Detailed Investigation for potash in glauconite bearing shale and sandstone was carried out. Detailed mapping and grid sampling of glauconite was carried out around Guneri, Siyot, Atda and Umarsar areas of Kachchh district. The objective of the work was to assess the potentiality of potash rich glauconite in Katrol and Bhuj Formations. An area of 7.5 sq km was mapped on 1:5000 scale to demarcate glauconite bands and associated lithounits. The area was divided into 114 grids of 250 m × 250 m and sampling was carried out by pitting and from exposed sections. Pitting of 150 cubic m was carried in grid pattern. A total of 151 samples were collected and sent for chemical analysis. 24 samples were collected for petrographic studies and 09 samples were collected for XRD studies. Section measurements were carried out at 5 sections. The study area falls in northwest of Kachchh mainland which is part of Bhuj Formation of Cretaceous Age. The glauconite of study area belongs to Guneri Member of Bhuj Formation (Upper Tithonian to Albian) (Biswas, 1977) which is hosted by ferruginous sandstone and are sandwiched between ironstone bands at places. The various lithounits observed in the area include ferruginous sandstone, feldspathic sandstone, glauconitic sandstone/glauconite, basalt, dolerite and laterite. Feldspathic sandstone is fine to medium-grained and white coloured, cross-bedded and occurring as small hillocks and outcrops on river beds. Glauconite is fine to medium-grained, very light to dark green and occurs as small discontinuous bands within ferruginous sandstone. Occurrences of other economic minerals like gypsum, bauxite and bentonite as small veins/pockets/patches were observed around Guneri and Umarsar areas. The area is structurally disturbed because of minor and major faults parallel and perpendicular to KMF. Glauconite occurs as three different forms in the study area, viz, hard and compact glauconitic sandstone, sandy to clayey soft glauconite, and intercalation of glauconite with fine-grained ferruginous sandstone/siltstone. The bands are discontinuous and the average thickness varied from a few (Contd.)

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Table - 3 (Concl.d.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Gujarat Mineral Development Corporation Ltd							
Ball Clay & Silica Sand							
Bharuch	N/v Amod, Maljipura and Bhuri	-	-	-	-	-	centimeters to 0.5 m. Based on the observations from pits and well sections, glauconite is found to occur at 0 to 4 m depth. The chemical analysis results and XRD results are awaited.
Lignite							
Bhavnagar	Surka (North)	-	-	43	4494.68	222	The total geological reserves was estimated at 114.72 million tonnes (111).
Kachchh	N/v Panandhro	-	-	-	-	-	The balance reserves of lignite at the end of March, 2015 were 2.55 million tonnes.
-do-	N/v Mata No Madh	-	-	188	13,825.3	1348	-
Surat	N/v Tadkeshwar	-	-	29	2,268	60	Recoverable (111) reserves are estimated to be about 29 million tonnes.

Production

The value of mineral production (excludes atomic mineral and value for February and March in respect of 31 minerals declared as minor mineral vide Gazette notification dated 10.02.2015) in Gujarat in 2014-15 at ₹ 18,365 crore decreased by 2% as compared to that in the previous year. The State is ranked sixth in the country and accounted for about 7% of the total value of mineral production during the year. Gujarat was the sole producer of chalk and also reported almost entire output of marl in the country. The other important minerals produced in the State were clay (others) (67%), kaolin (64%), silica sand (29%), lignite & bauxite (25% each), fire clay (24%), sulphur (21%), petroleum (crude) (12%) and natural gas (utilised) (5%). The production of sulphur increased by (18%), limestone (10%) and lignite (6%). However,

during the year under review, decrease in production was reported in natural gas (utilised) and petroleum (crude) (8% each), bauxite (25%) and marl (32%) as compared to that of the previous year (Table- 4).

The value of production of minor minerals was estimated at ₹ 6,180 crore for the year 2014-15.

The number of reporting mines in the State was 413 in 2014-15 as compared to 490 in the previous year.

Mineral-based Industry

The present status of each mineral-based industry is not readily available. However, the important mineral-based industries in organised sector in the State are furnished in Table - 5.

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**Table – 4 : Mineral Production in Gujarat, 2012-13 to 2014-15
(Excluding Atomic Minerals)**

(Value in ₹ '000)

Mineral	Unit	2012-13			2013-14			2014-15 (P)		
		No. of mines	Quantity	Value	No. of mines	Quantity	Value	No. of mines	Quantity	Value
All Minerals		487		229520813	490		187363387	413		183648296
Lignite	'000t	7	14500	14990900	7	11600	12547100	10	12300	17914600
Natural Gas (utilised)	m c m	-	2032	16804900	-	1657	13703602	-	1526	12620215
Petroleum (crude)	'000t	-	5331	96895046	-	5061	91987587	-	4653	84571872
Bauxite	t	80	3429903	1632905	95	7309743	2726039	71	5507566	2091034
Manganese Ore	t	1	-	-	1	-	-	1	-	-
Agate [#]	t	1	493	247	1	100	50	-	-	-
Ball Clay [#]	t	2	10900	1853	2	8600	1462	-	-	-
Chalk [#]	t	114	175516	88301	109	142696	72900	91	94467	49974
Clay (others) [#]	t	27	1928419	256099	29	1612566	253614	26	1515449	253461
Dolomite [#]	t	24	499122	103159	13	526355	110781	18	388173	87242
Fireclay [#]	t	9	86316	6602	9	154301	14316	5	173357	14765
Fluorite	t	1	-	-	1	-	-	-	-	-
Gypsum [#]	t	3	38	4	3	20	3	-	-	-
Kaolin [#]	t	54	2656099	496079	57	3074737	613017	44	2456977	490988
Laterite [#]	t	3	117880	12746	2	19050	3554	2	61174	10400
Limestone	'000t	119	26071	3393162	120	23373	3159255	115	25729	3381545
Marl	t	-	4240183	250348	-	3216915	270164	-	2177450	255663
Ochre [#]	t	2	4690	797	1	5050	859	1	6300	1071
Quartz [#]	t	19	164462	24330	20	156379	28370	17	102885	19565
Silica Sand [#]	t	19	869926	72208	18	844988	73943	12	873200	89601
Moulding Sand	t	1	200	90	1	150	68	-	-	-
Talc/soapstone/ steatite [#]	t	1	2626	783	1	1301	403	-	-	-
Sulphur ^s	t	-	74697	-	-	76088	-	-	90096	-
Minor Minerals [@]		-	-	94490254	-	-	61796300	-	-	61796300

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

\$ Recovered as by-product from oil refineries.

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

Declared as minor mineral vide Gazette notification dated 10.02.2015.

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Table – 5 : Principal Mineral-based Industries in Gujarat

Industry/plant	Capacity ('000 tpy)
Abrasives	
Carborandum Universal Ltd, Okha, Distt. Jamnagar.	NA
Carborandum Universal Ltd, Bhatia, Distt. Jamnagar.	NA
Flexo-Plast Abrasives, Ahmedabad.	NA
Emery (I) Pvt Ltd, Badeshwar, Distt. Jamnagar.	7
Asbestos Products	
Gujarat Composite Ltd, Digvijaynagar, Distt. Jamnagar.	98
Ramco Industries Ltd, Singura, Distt. Kachchh.	72
Sanghi Industries Ltd, Sanghipuram, Distt. Kachchh.	36
U.P. Asbestos Ltd, Valsad.	36
Cement	
Ambuja Cements Ltd, Ambuja Nagar, Distt. Junagadh.	4500
Ambuja Cement Ltd, Magdalla, Distt. Surat (G).	1000
Gujarat Sidhee Cements, Sidheegram, Distt. Junagadh.	1200
Hi Bond Cement, Gondal.	1200
J. K. Laxmi, Kalol, Distt. Gandhinagar (G).	550
Sanghi Industries Ltd, Sanghipuram, Distt. Kachchh.	3000
Shree Digvijay Cement Co. Ltd, Digvijaygram, Distt. Jamnagar.	1075
Saurashtra Cements Ltd, Ranavav, Distt. Junagadh.	1500
Tata Chemicals Ltd, Mithapur, Distt. Jamnagar.	490
UltraTech Cement Co. Ltd, Pipavav, Distt. Amreli.	5800
UltraTech Cement Ltd, (Narmada Cement), Jafrabad, Distt. Amreli.	500
UltraTech Cement (formerly a unit of JCCL), Sewagram, Distt. Kachchh.	2400
UltraTech Cement (formerly a unit of JCCL), Wanakbori, Distt. Kheda (G).	2400
UltraTech Cement Ltd, Magdalla (G).	700

(Contd.)

Table - 5 (Contd.)

Industry/plant	Capacity ('000 tpy)
Chemical	
Baroda Rayon Corpn. Ltd, Surat.	26 (yarn) 21.8 (H ₂ SO ₄) 2.2 (sodium sulphate)
Century Chemicals, Nava Nanga, Distt. Jamnagar.	108 (refined salt)
Gujarat Alkalies & Chemicals Ltd, Baroda.	14.9 (caustic soda)
Gujarat Alkalies & Chemicals Ltd, Dahej, Distt. Bharuch.	242.6 (caustic soda) 151.4 (Cl) 26.7 (phosphoric acid)
Indian Rayon Industries Ltd, Veraval, Distt. Junagadh.	16 (yarn) 35.7 (H ₂ SO ₄) 10 (carbon disulphide) 9.3 (sodium sulphate) 91.3 (caustic soda)
Navin Fluorine Industries Ltd, Surat.	22(HF)
Saurashtra Chemicals Ltd, Porbandar, Distt. Porbandar.	365 (soda ash) 20.4 (caustic soda) 26.4 (refined bicarbonate)
Shree Sulphurics Pvt. Ltd, Ankleshwar, Distt. Bharuch.	58 (H ₂ SO ₄) 12 (chloro-sulphuric acid)
Tata Chemicals Ltd, Mithapur, Distt. Jamnagar.	875 (soda ash)
Copper Smelter	
Hindalco Industries Ltd, Birla Copper, Dahej, Distt. Bharuch.	500 (copper smelting) 1670 (H ₂ SO ₄) 15 tonnes (Au) 150 tonnes (Ag)
HCL, Gujarat Copper Project, Jhagadia, Distt. Bharuch.	50 (electrolytic copper) 20 (copper anodes)
Fertilizer	
Aarti Fertilizers, Vapi, Valsad.	132 (SSP)
Coromandel International Ltd (Formerly Liberty Phosphate Ltd), Nandesari, Vadodara.	100 (SSP)
GSFC, Vadodara.	370.6 (Urea) 165 (DAP) 200 (Complex) 228 (AS)
GSFC, Sikka (Sikka - I & II), Jamnagar.	722 (DAP)
GNFC, Bharuch.	636.9 (Urea) 142.5 (Complex)

(Contd.)

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Table - 5 (Contd.)

Industry/plant	Capacity ('000 tpy)
Hindalco Industries Ltd, Dahej, Distt. Bharuch.	400 (DAP/Complex)
IFFCO Ltd, Kandla, Distt. Kachchh.	1200 (DAP) 1215.4 (NP/NPKs)
IFFCO Ltd, Kalol, Distt. Gandhinagar.	544.5 (Urea)
Khaitan Chemicals & Fertilizers Ltd, Dahej, Bharuch.	181.5 (SSP)
KRIBHCO Ltd, Hazira, Distt. Surat.	2195 (Urea)
Narmada Agro Chemicals Pvt. Ltd, Mangrol, Junagadh.	15 (SSP)
Narmada Bio-chem Pvt Ltd, Kalyangadh, Ahmedabad.	132 (SSP)
Nirma Ltd, Moraiya, Ahmedabad.	100 (SSP)
Sona Phosphates Ltd, Sarigam, Valsad.	15 (SSP)
T J Agro Fertilizers Pvt. Ltd, Navsari.	22 (SSP)
Foundry	
Steelcast Ltd, Ruvapuri Road, Bhavnagar.	NA
Iron & Steel	
Essar Steel Ltd, Hazira, Distt. Surat.	6800 (Sponge iron) 8540 (Crude/Liquid steel)
Ferro Alloys	
Baroda Ferro Alloys Ltd, Panchmahals.	3.5
Essel Mining & Industries Ltd, Vapi, Distt. Valsad.	2.1
Electro Ferro Alloys Ltd, Ahmedabad.	0.3
Sponge Iron	
Electrotherm India Pvt Ltd, Samakhalli, Distt. Kachchh.	75
Gallant Metal Ltd, Samakhialli, Distt. Kachchh.	170
Global Hi-Tech Industries Ltd, Bhuj, Distt. Kachchh.	105
Glass	
Alembic Glass Industries Ltd, Baroda.	35.0
Bhagwati Glass Containers Ltd, Kalol.	8.7
Bharat Glass Tube Ltd, Bharuch.	7.2

(Contd.)

Table - 5 (Concl.)

Industry/plant	Capacity ('000 tpy)
Gobind Glass & Industries Ltd, Kadi.	NA
Gopal Glass Works Ltd, Budasan, Distt. Mehsana.	40.6
Gujarat Borosil Ltd, Govali, Distt. Bharuch.	62.5
Gujarat Guardian Ltd, Ankaleshwar, Distt. Bharuch.	150 (float glass)
Piramal Glass Ltd, Jambusar.	355 (tpd)
Piramal Glass Ltd, Kosamba.	340 (tpd)
Haldyn Glass (Gujarat) Ltd, Padra, Vadodara.	43
Prestige Glass Industries Pvt Ltd, Vagra.	11.5
Petroleum Refinery	
IOCL, Koyali.	13700
RPL, Jamnagar	33000
RPL, Jamnagar (SEZ).	27000
Essar Oil Ltd, Vadinar.	20000
Refractory	
Shri Natraj Ceramics & Chemical Industries Ltd, Khambhaliya, Distt. Jamnagar.	28
Meenal Ceramics Pvt. Ltd, Chattral, Distt. Kalol.	12
VRW Industries Ltd, Ahmedabad.	24
Calcined Bauxite	
Bombay Minerals Ltd, Jamkhabhaliya.	96
Saurashtra Calcine Bauxite & Allied Industries Ltd, Bhatia.	39
Birla VXL Ltd, Porbandar.	36
Shri Natraj Ceramics & Chemical Industries Ltd, Khambhaliya.	24
<i>G: Grinding Unit</i>	
<i>Note: (i) Jhagadia Copper (acquired by HCL in 2015) has not reported copper production since 2010-11.</i>	
<i>(ii) Data, not readily available for fertilizer and cement industries on respective websites, hence it has been taken from Indian Fertilizer Scenario, 2015/FAI Statistics, 2014-15 and Survey of Cement Industry & Directory, 2015 respectively.</i>	