

STATE REVIEWS



Indian Minerals Yearbook 2017

(Part- I)

56th Edition

**STATE REVIEWS
(Gujarat)**

(ADVANCE RELEASE)

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

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March, 2018

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, 25% bentonite, 18% granite, 12% wollastonite, 10% limestone and 9% bauxite 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, Mahesana 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 district; **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, Mahesana 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 2016-17 are furnished in Table - 3.

Table – 2 : Reserves/Resources of Lignite as on 1.4.2017 : 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, 2016-17.

Table – 1 : Reserves/Resources of Minerals as on 1.4.2015 : Gujarat

Mineral	Unit	Reserves				Remaining resources				Total resources (A+B)				
		Proved STD 111	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	20900	-	20900	342169	-	-	403801	-	49670	-	795640	816540	
Bauxite	'000 tonnes	154911	2094	28229	17324	35470	3925	28953	22107	56857	710	165347	350581	
Bentonite	tonne	9221227	-	9221227	6838864	-	12460170	2163813	1904	113259150	-	134723901	143945128	
Calcite#	tonne	-	-	-	-	-	-	-	-	12380	-	12380	12380	
Chalk#	'000 tonnes	4215	529	319	741	331	151	196	-	269	-	1687	6751	
China clay#	'000 tonnes	54111	3486	19671	77268	4790	28542	1663	4198	49337	4114	118021	195289	
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	34862	15934	20829	11947	27064	68785	20263	63780	280592	-	472431	544056	
Fire clay#	'000 tonnes	231	-	56	1193	664	966	2120	1053	53526	-	59522	59809	
Fluorite	tonne	-	-	-	4279230	-	-	-	5723360	2001920	-	12004510	12004510	
Granite														
(Dim. stone)	'000 cu m	-	-	-	-	-	-	-	-	8501947	-	8501947	8501947	
Graphite	tonne	-	-	-	-	-	-	-	2520805	835000	-	3355805	3355805	
Gypsum#	'000 tonnes	4	5	24	33	4	-	616	308	15446	-	16374	16407	
Laterite#	'000 tonnes	36019	-	399	8095	-	1467	-	-	-	-	9562	45981	
Lead-zinc														
Ore	'000 tonnes	-	-	-	2470	3010	1380	129	-	200	-	7189	7189	
Lead metal	'000 tonnes	-	-	-	74.10	90.30	41.40	3.90	-	-	-	210	210	
Zinc metal	'000 tonnes	-	-	-	123.5	150.5	69	1.10	-	-	-	344.	344.	
Lead & zinc metal	'000 tonnes	-	-	-	-	-	-	-	-	0.90	-	0.90	0.90	

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Table - 1 (concl.)

Mineral	Unit	Reserves										Remaining resources					Total resources (A+B)
		Proved		Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)			
		STD 111	STD121	STD122	STD121			STD221	STD222								
Limestone	'000 tonnes	750236	173244	76324	999804	277146	159554	120210	21110	906641	18772852	-	20257514	21257318			
Manganese ore	'000 tonnes	708	-	-	708	-	-	-	-	-	2180	-	2180	2888			
Marble	'000 tonnes	-	-	-	-	-	26571	45000	-	17129	34871	-	123571	123571			
Marl	tonne	117115856	4650000	20900000	123855856	11704870	-	-	-	-	-	-	11704870	135560726			
Ochre [#]	tonne	37862	-	75703	113565	-	32699	4303	-	-	3016066	-	3053068	3166633			
Perlite	'000 tonnes	-	-	-	-	140	683	595	-	-	-	988	2406	2406			
Quartz-silica sand [#]	'000 tonnes	27892	5617	15260	48769	26742	6681	17809	2932	3371	26099	21	83656	132425			
Phosphorite/Rock phosphate	tonne	-	-	-	-	-	-	-	-	-	314820	-	314820	314820			
Talc/soapstone/steatite [#]	'000 tonnes	-	-	4	4	-	20	9	-	-	4	-	33	37			
Vermiculite	tonne	-	-	-	-	-	-	-	-	-	1960	-	1960	1960			
Wollastonite	tonne	-	-	-	-	-	-	-	-	-	1990000	-	1990000	1990000			

Figures rounded off.

[#] 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 1.4.2016 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, 2016-17

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI Bauxite							
Western Kachchh	Umarsar and Guneru areas	1:5000	5	-	-	6	G4 Reconnaissance survey for lateritic bauxite and lithomargic clay was taken up around this areas by detailed mapping along with grid sampling. Geochemical Samples (grid samples, profile section samples & trench samples), XRD and petrographic samples were collected. Eastern part of the laterite-bauxite belt is lateritic, central part is pisolitic and western part being clayey bauxite. The thickness of laterite varies from 1-2 m whereas thickness of bauxite varies from 50 cm to 10 m and that of lithomargic clay from 30 cm to 5 m and the base is not exposed at all places. At places, bauxite is overlain and underlainly the basalts & also relicts of basalt are present within the bauxite. Chemical analysis of six sample have been received and out of these three samples are having more than 35% of Al ₂ O ₃ .
REE							
Chhota Udepur	Ambadongar carbonative complex, Saidiwasan area	Large-scale	13	-	-	512	G4 search was taken up for Rare Earth Elements (REE) and other Rare Metals (RM) in this area. The work was initiated as G-4 stage investigation to explore the occurrences of REE in Ambadongar – Saidiwasan area. Drilling work had been carried as G3 stage. Large-scale mapping and detailed mapping were carried out in different blocks of the area. Grid BRS (100 m x 100 m), petrographic samples and XRD samples were also collected. Four phases of carbonatite i.e .1) Ferro carbonatite/Ankeretic, 2) Calcio carbonatite / Sovite, 3) Brecciated carbonatite (Sovite clast > 75%), 4) Siliceous carbonatite. The

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Table - 3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							ambadongar Carbonatite complex is traversed by numerous prominent ferro carbonatite / ankeretic veins quartz veins and fluorite veins suspected for REE mineralisation. The analytic results of the grid samples show encouraging value for REE concentration. The REE in brecciated carbonatite showed encouraging value ranging from 500 ppm (0.05%) to 11,000 ppm. 512 m drilling was carried out to know the potentiality of REE in different variants of carbonatite and their extension. The zone of carbonatite varies from 50 to 80 m, average being 75 m. Pyrochlore, sulphide and magnetite with pyrochlore mineralisation are also observed in cores of different borehole.
Gujarat Mineral Development Corporation Ltd							
Limestone							
Kachchh	Lakhpat block	-	-	-	-	-	The chemical results is awaited. Estimated about 1500 million tonnes of limestone resources.
Lignite							
Surat	Tadkeshwar village, Mandvi Taluka	1:5000 1:3000	21.13 19.72	14	1200	600	GMDC, Gujarat continuously undertakes exploration activities to confirm the stratigraphy of the proposed mining area and behaviour of lignite and its resources. During 2016-17, GMDC carried out exploration in Tadkeshwar lignite lease area with an objective to know the exact boundary of lignite seams and re-assessment of reserves in north pit area (about 70 ha). An area of 21.13 ha was mapped on 1:5000 scale and external dump area of 19.72 ha on 1:3000 scale. Total 14 boreholes were drilled for a cumulative depth of 1200 m and collected 600 samples. Resources

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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		
							estimated under i) measured (STD 331) category - 40.00 million tonnes and ii) recoverable (STD 111) category - 33.90 million tonnes. The company has also established 18 million tonnes of additional lignite reserve in Mata-no - Madh area, Kuchchh district, Gujarat.
Ball Clay & Silica Sand							
Bharuch	N/v Amod, Maljipura & Bhuri.	-	-	-	-	-	The deposit extends from Village Amod, Maljipura and Bhuri.
Lignite							
Bhavnagar	Tagdi village	-	-	-	-	-	As on 31.3.2016, the total geological reserves/resources has been estimated at 114.72 million tonnes.
Kachchh	N/v Panandhro	1: 5000	-	-	-	-	As on 31.3.2016, the balance reserves/resources of lignite have been estimated at 2.06 million tonnes.
-do-	N/v Mata No Madh	-	-	-	-	-	As on 31.3.2016, the balance reserves/resouces of lignite have been estimated at 35.38 million tonnes.
Surat	N/v Tadkeshwar	-	-	-	-	-	-

Production

Production of many important minerals like lignite, natural gas (ut.), petroleum (crude), bauxite, lime stone, marl, sulphur etc. was reported from Gujarat during the year 2016-17.

The value of minor minerals' production was estimated at Rs. 5775 crore for the year 2016-17.

The number of reporting mines in the state was 194 in 2016-17 in case of MCDR minerals (Table-4).

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, 2014-15 to 2016-17
(Excluding Atomic Minerals)**

(Value in ` '000)

Mineral	Unit	2014-15			2015-16			2016-17 (p)		
		No. of mines	Quantity	Value ^{\$}	No. of mines	Quantity	Value ^{\$}	No. of mines	Quantity	Value ^{\$\$}
All Minerals		427		83368583	240		82036986	204		65270885
Lignite	'000t	10	12317	17914600	10	10123	14723500	10	10546	-
Natural Gas (ut.)	m c m	-	1527	-	-	1490	-	-	1580	-
Petroleum (crude)	'000t	-	4654	-	-	4459	-	-	4605	-
Bauxite	t	79	5825628	2381970	115	10387092	4857172	86	5818467	2857981
Manganese Ore	t	2	15564	10179	2	46153	19633	2	43059	20581
Chalk	t	91	94467	49974	-	-	-	-	-	-
Clay (others)	t	26	1515449	253461	-	-	-	-	-	-
Dolomite	t	18	388173	87242	-	-	-	-	-	-
Fireclay	t	5	173357	14765	-	-	-	-	-	-
Fluorite (graded)	t	1	-	-	1	-	-	1	-	-
Kaolin	t	44	2456977	490988	-	-	-	-	-	-
Laterite	t	2	61174	10400	-	-	-	-	-	-
Limestone	'000t	119	26010	4041937	112	25622	4370924	105	24923	4330213
Marl	t	-	2177449	257030	-	2389707	319957	-	2203701	316310
Ochre	t	1	6300	1071	-	-	-	-	-	-
Quartz	t	17	102885	19565	-	-	-	-	-	-
Silica Sand	t	12	873200	89601	-	-	-	-	-	-
Sulphur [#]	t	-	90096	-	-	101743	-	-	100952	-
Minor Minerals [@]		-	-	57745800	-	-	57745800	-	-	57745800

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

\$ Excludes the value of Petroleum (crude) & Natural Gas (ut.) \$\$Excluding Fuel 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.

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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, Sidheeegram, Distt. Junagadh.	1200
Hi Bond Cement, Gondal.	1200
J. K. Laxmi, Kalol, Distt. Ganghinagar (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)

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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, Jamkhambhaliya.	96
Saurashtra Calcine Bauxite & Allied Industries Ltd, Bhatia.	39
Birla VXL Ltd, Porbandar.	36
Shri Natraj Ceramics & Chemical Industries Ltd, Khambhaliya.	24

*G: Grinding Unit**Note: (i) Jhagadia Copper (acquired by HCL in 2015) has not reported copper production since 2010-11.**(ii) Data, not readily available for fertilizer and cement industries on respective websites, is taken from Indian Fertilizer Scenario, 2016/FAI Statistics, 2015-16 and Survey of Cement Industry & Directory, 2016 respectively.*