

EMERALD



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EMERALD

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

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18 Emerald

Emerald in hindi, commonly called as 'Panna', is a variety of mineral beryl and is chemically a complex silicate of aluminium and beryllium ($\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$). The hardness of Emerald is about 7.5-8 on Mohs' scale. Emeralds are rare & precious gemstones that command immense value on account of their colour, clarity and weight. Emeralds occur in hues varying from yellow-green to blue-green. However, emeralds with unique velvety green colour with high degree of transparency are considered as most precious among gemstones. The rose variety of beryl is called morganite, and the golden yellow variety is termed 'golden beryl'. If the colour is bluish green or blue then it is called 'aquamarine'. When emerald contains chromium as an impurity, makes the colour green. Emerald is generally found at the contact of pegmatites intruding schists, mainly amphibole schists.

RESOURCES

As per NMI data base, based on UNFC system, the total resources of emerald in the country as on 01.04.2015 are estimated at 55.87 tonnes. All resources placed under reconnaissance category and unclassified grade have been reported in the state of Jharkhand only (Table-1).

Occurrences of emerald are also reported from Rajasthan, Odisha, Tamil Nadu, Jammu & Kashmir and Andhra Pradesh. However, reserves have not been estimated so far. In Rajasthan, emeralds have been found to occur at a number of places in districts Udaipur, Rajsamand and Ajmer. In Ajmer-Rajsamand belt of Rajasthan, emerald occurrences are confined to the upper fringes of pegmatites. In district Ajmer, emerald-bearing zones are located at Gudas and Bubani. Commercial deposits of emerald are reported mainly from Tikhi, Kalaguman, Kanj-ka-Kheda, areas in district Rajsamand.

In Odisha, occurrences of emerald are reported from Bira-Mohorajpur belt in district Balangir, which extends into districts Sambalpur and Dhenkanal. Ghuchapada and Barmal prospects in district Balangir are other potential areas.

In Eastern Ghat belt of district Visakhapatnam, Andhra Pradesh, pegmatite veins containing beryl

and aquamarine, besides other gemstones are reported from several places.

PRODUCTION

Production of emerald has not been reported since 1983. However, a single lease of 46.32 ha area was granted to M/s Serva Shri Mining & Mineral Industries in district Ajmer, Rajasthan in the year 1998.

MINING AND MARKETING

Mining of emerald was mostly undertaken manually by opencast method. The pits were worked at shallow depths. The stones collected during mining were sorted out according to size, shape and quality. The stones so collected were deposited with the State Government under the supervision of DMG officials and mine owners. Crude emerald was sold through public auction from time to time.

The beauty of rough stone is enhanced by skilful cutting and polishing into faceted or rounded form for use in jewellery. The rough stones are sorted out to determine the angles to which facets can be cut. They may be sawed or polished in any direction according to shape, size and colour to be retained. After the shape and size are determined, the next process of 'pre-shaping' is done. The third and important process called 'calibration' gives the pre-shaped stone a definite proportion and size. The process that follows is 'faceting' and 'polishing'. The aim of this process is to achieve maximum internal reflection enhancing the beauty of stone. Emeralds are generally given a step-cut or cabochon-cut.

Jaipur in Rajasthan is the major centre for processing emeralds. Like diamonds, uncut emerald is imported and part of it is exported after processing. Emerald is next to diamond (uncut) amongst precious and semi-precious stones, being imported and re-exported after cutting and polishing.

Prices are governed by many factors including beauty, clarity, defect, demand, durability and rarity. Prices of precious stones also vary over time.

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**Table – 1 : Reserves/Resources of Emerald as on 1.4.2015
(By Grades/States)**

	Reserves		Remaining Resources					Total Resources (A+B)			
	Proved STD111	Probable STD121 STD122	Total (A)	Feasibility STD211	Pre-feasibility STD221 STD222	Measured STD331	Indicated STD332		Inferred STD333	Reconnaissance STD334	Total (B)
All India : Total	-	-	-	-	-	-	-	-	55869	55869	55869
By Grades											
Unclassified	-	-	-	-	-	-	-	-	55869	55869	55869
By States											
Jharkhand	-	-	-	-	-	-	-	-	55869	55869	55869

Figures rounded off.

WORLD REVIEW

World production of emerald is reported mainly from Colombia, Pakistan, Afghanistan, Africa, Nigeria, Mozambique, the United States of America, Madagascar, Brazil, Zambia and Zimbabwe.

Afghanistan

Afghanistan's Panjshir Valley, has commercial emerald production. The emerald mines of Afghanistan are located approximately 70 miles (113 km) northeast of Kabul and extend from the village of Khenj to Dest-e-Rewat.

Madagascar

Madagascar was a globally significant producer of gemstone that included emerald, ruby and sapphire. Emerald was produced from the Kianjavato emerald mines which are located in the rain-forest region of eastern Madagascar, approximately 60 km west of the coastal city of Mananjary. Emeralds are also mined at the Ianapera (Sakalava) emerald deposits in the Ianapera (Janapera) area of Tuléar (Toliara) Province, 350 km east of the town Toliara. Societe Orgaco of France mined the emerald (536 kg Heaven's gift) in matrix at the Morafeno mine near Mananjary and exported it to Reunion.

Pakistan

In Pakistan, the Fizzagat emerald mine is situated near the district headquarters Mingora in Swat valley.

Brazil

Brazilian emerald deposits are found in a typical geological setting with Archean basement and supracrustal, ultramafic and granitoid rocks. Brazil emerald mines are located in the states of Bahia, Minas Gerais and Goias.

Colombia

In Colombia, the mining activity of emerald has been concentrated in the departments of Cundinamarca and Boyaca, in the denominated East and West emerald belts. Mining districts of Chivor, Gachala and Macanal (Eastern Belt) and Muzo, Coscuez, Penas Blancas, La Palma-Yacoi and La Pita (Western Belt) are located. The most representative mines are Muzo, Cunas, Coscuez, La Pita and Chivor.

Others

The majority of the gems produced in Zambia are found in the Kamakanga and Kagem mines. Both are located in the north-eastern region of the country. Zimbabwe produces rough emeralds from the Sandawana mine, located in the south-west of the country. In the United States of America, in Beaver County, Utah rare red emeralds are found in the

eastern slopes of the Wah Wah Mountains. In Ethiopia, a new deposit of high-quality emeralds has been found in the rural villages of Kenticha and Dermi, in the district Seba Boru. Mining still is done through hand tools, without heavy machinery.

FOREIGN TRADE

MMTC is an authorised agency of the Government of India for import of precious & semi-precious stones including emerald and supply these items to jewellers for domestic sales and exports.

Exports

Export of emerald (uncut) was 2.15 tonnes in 2016-17. Exports were mainly to Hong Kong (24%) and UAE (23%). (In 2015-16 exports value of emerald (cut & uncut) increased to `1,788 crore from `1,595 crore in the previous year. Exports were mainly to Hong Kong (54%), USA (15%) & Thailand (6%). The share of uncut emerald increased in total value from previous year and it was 11% during the year as compared to 5% from previous year and that of cut emerald was about 89% during 2015-16 Tables- 2 to 5).

Imports

Thailand (3%) & USA (2%). Import of emerald (uncut) was 8 tonnes in 2016-17. Imports were mainly from Hong Kong (75%) and UAE (12%). In 2015-16 imports value of emerald (cut and uncut) increased considerably by 38% to `8,726 crore from `6,306 crore in the previous year. The share of uncut emerald in total value was only 8% and that of cut emerald was about 92% in 2015-16. Imports were mainly from Hong Kong (78%), UAE (7%) (Tables- 6 to 9).

Table – 2 : Exports Value of Emerald (Cut & Uncut) : Total (By Countries)

	(Value in ₹'000)	
Country	2014-15	2015-16 (P)
All Countries	15945392	17879969
Hong Kong	8073255	9598986
USA	2940936	2729836
Thailand	987616	1122856
Singapore	399522	721198
UAE	483395	704324
Italy	494869	400988
UK	636414	365379
Belgium	155938	342307
Lebanon	23624	302265
Japan	324490	291693
Other countries	1425333	1300137

Note: Quantity not given due to partial coverage; value figures, however, have full coverage.

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**Table – 3 : Exports of Emerald (Uncut)
(By Countries)**

Country	2016-17 (P)	
	Qty (t)	Value (₹'000)
All Countries	2.15	2301688
Hong Kong	0.52	881497
Singapore	0.38	356550
UAE	0.50	536515
Thailand	0.45	36847
Zambia	0.27	393756
Israel	++	70176
Switzerland	0.01	978
USA	0.01	767
Other countries	0.01	24602

Source: Export-Import Data Bank

**Table – 4 : Exports of Emerald (Cut)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty ('000 carat)	Value (₹'000)	Qty ('000 carat)	Value (₹'000)
All Countries	142515	15213538	138459	15941482
Hong Kong	43179	7964722	34652	8596541
USA	30582	2938080	33967	2724224
Thailand	11454	921585	13824	1076612
UAE	3690	441256	2707	565572
Italy	3547	494869	5241	400988
UK	32574	636409	31736	365328
Belgium	33	155938	23	342307
Lebanon	46	23624	27	302265
Japan	4704	324490	4537	291592
Switzerland	205	312285	302	269338
Other countries	12501	1000280	11443	1006715

**Table – 5 : Exports of Emerald (Uncut)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3	731854	2	1938487
Hong Kong	++	108533	2	1002445
Singapore	2	391703	++	682841
UAE	++	42139	++	138752
Thailand	1	66031	++	46244
Zambia	-	-	++	43783
Israel	++	16794	++	9453
Switzerland	-	-	++	7643
USA	++	2856	++	5612
Austria	++	2	++	743
Germany	-	-	++	574
Other countries	++	103796	++	397

**Table – 6 : Imports of Emerald (Uncut)
(By Countries)**

Country	2016-17 (P)	
	Qty (t)	Value (₹'000)
All Countries	8	18249169
Hong Kong	6	13075390
Zambia	++	1094019
UAE	1	2567847
Russia	++	99223
Brazil	1	148571
Singapore	++	802968
Thailand	++	123605
China	++	3749
Unspecified	++	44
Other countries	1	333753

Source: Export-Import Data Bank

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**Table – 7 : Imports of Emerald (Cut & Uncut)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Value (₹'000)		Value (₹'000)	
All Countries	63062394		87263267	
Hong Kong	47018351		68325815	
Unspecified	1183482		7347649	
UAE	8328642		6194686	
Thailand	2162739		2414772	
USA	957693		1322116	
Zambia	2010643		484019	
UK	305619		269534	
Russia	-		245502	
Brazil	286932		136048	
Singapore	15		116620	
Other countries	808278		406506	

Note: Quantity not given due to partial coverage; value figures, however, have full coverage.

**Table – 8 : Imports of Emerald (Cut)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (‘000 carat)	Value (₹'000)	Qty (‘000 carat)	Value (₹'000)
All Countries	65144	56629469	85280	80620162
Hong Kong	41172	43558519	54045	63582758
UAE	6054	8031338	5230	5798035
Thailand	12868	1994471	14890	2325341
USA	1217	913882	1760	1296632
Sri Lanka	917	122385	1495	74272
UK	4	279128	143	68125
Colombia	4	10537	60	30957
Italy	20	56290	274	19806
France	1	1676	1	17651
Unspecified	900	1151158	7127	7306465
Other countries	1987	510085	255	100120

**Table – 9: Imports of Emerald (Uncut)
(By Countries)**

Country	2014-15		2015-16 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	32	6432925	42	6643105
Hong Kong	3	3459832	8	4743057
Zambia	7	1988162	8	483091
UAE	++	297304	1	396651
Russia	-	-	++	245502
UK	++	26491	++	201409
Brazil	9	281714	5	136048
Singapore	-	-	++	116233
Thailand	10	168268	8	89431
China	-	-	4	51375
Unspecified	1	32324	++	41184
Other countries	2	178830	8	139124