

EMERALD



Indian Minerals Yearbook 2017

(Part- III : Mineral Reviews)

56th Edition

EMERALD

(FINAL RELEASE)

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

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March, 2018

11 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.

RESERVES/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.

**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

In 2016-17 exports value of emerald (cut & uncut) increased to ₹ 2,034 crore from ₹ 1,788 crore in the previous year. Exports were mainly to Hong Kong (53%), USA (15%) and UAE & Thailand (6% each). The share of uncut emerald and that of cut emerald remained unchanged to 11% and 89% respectively, during 2016-17 when compared to previous year (Tables- 2 to 4).

Imports

In 2016-17 imports value of emerald (cut and uncut) increased considerably by 30% to ₹ 8,726 crore compared to the previous year. The share of uncut emerald in total value was 16% and that of cut emerald was about 84% in 2016-17. Imports were mainly from Hong Kong (91%), UAE (3%), Thailand (2%) and USA (1%) (Tables- 5 to 7).

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

Country	(Value in ₹'000)	
	2015-16 (R)	2016-17 (P)
All Countries	17879971	20340187
Hong Kong	9598986	10690622
USA	2729836	3128701
UAE	704324	1251751
Thailand	1122856	1205566
Switzerland	276981	1031226
Italy	400988	421292
Zambia	45274	395010
Singapore	721198	394783
UK	365379	307840
France	251637	305514
Other countries	1662512	1207882

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

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (‘000 carat)	Value (₹‘000)	Qty (‘000 carat)	Value (₹‘000)
All Countries	138459	15941484	131357	18038499
Hong Kong	34652	8596541	31034	9809125
USA	33967	2724224	50336	3127934
Thailand	13824	1076612	11255	1168719
Switzerland	302	269338	469	1030248
UAE	2707	565572	430	715236
Italy	5241	400988	5079	421147
UK	31736	365328	17400	307840
France	162	251637	220	305346
Japan	4537	291592	5806	219477
Germany	5886	236208	3950	190653
Other countries	5445	1163444	5378	742774

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (₹‘000)	Qty (t)	Value (₹‘000)
All Countries	2	1938487	2	2301688
Hong Kong	2	1002445	1	881497
UAE	++	138752	1	536515
Zambia	++	43783	++	393756
Singapore	++	682841	++	356550
Israel	++	9453	++	70176
Thailand	++	46244	++	36847
Baharain	-	-	++	18666
Belgium	-	-	++	2403
Nepal	-	-	++	1469
Japan	++	101	++	1080
Other countries	++	14868	++	2729

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**Table – 5: Imports Value of Emerald
(Cut & Uncut)
(By Countries)**

(Value in ₹'000)

Country	2015-16 (R)	2016-17 (P)
All Countries	87263269	113428795
Hong Kong	68325815	102738918
UAE	6194686	3795533
Thailand	2414772	2175781
USA	1322116	1541999
Zambia	484019	1146990
Singapore	116620	822403
Sri Lanka	74973	175514
Brazil	136048	148571
Colombia	42409	125310
Russia	245502	99223
Other countries	7906309	658553

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

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (‘000 carat)	Value (₹'000)	Qty (‘000 carat)	Value (₹'000)
All Countries	85280	80620163	96284	95179628
Hong Kong	54045	63582758	76670	89663528
Thailand	14890	2325341	14093	2052176
US	1760	1296632	2755	1445181
UAE	5230	5798035	1088	1227686
Sri Lanka	1495	74272	622	175514
UK	143	68125	35	89437
Switzerland	2	11301	439	69766
Zambia	++	928	29	52971
Italy	274	19806	144	49220
Colombia	60	30957	5	48204
Other countries	7381	7412008	404	305945

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	42	6643106	8	18249167
Hong Kong	8	4743057	6	13075390
UAE	1	396651	1	2567847
Zambia	8	483091	++	1094019
Singapore	++	116233	++	802968
Brazil	5	136048	1	148571
Thailand	8	89431	++	123605
Russia	++	245502	++	99223
USA	++	25484	++	96818
Colombia	++	11452	++	77106
Iceland	-	-	++	62039
Other countries	12	396157	++	101581

