

4.1 DIAMOND

Introduction

Diamond is a solid form of the element carbon. It has highest hardness and thermal conductivity of any natural material. Diamond mining in India can be traced back to the 5th Century (B.C). Mining and trading activity of diamonds took place to a large extent in 16th and 17th Century (A.D) in Andhra Pradesh. Golconda was the major trading centre. Before the 19th Century (AD), diamonds were recovered from older conglomerates and quaternary gravel. The diamond producing centres were gravel of river Krishna in Andhra Pradesh, Panna diamond belt in Madhya Pradesh, gravel of river Mahanadi in Odisha and Wairagarh Conglomerates of Maharashtra. The Majhgawan pipe in Madhya Pradesh and Wajrakarur pipe in Andhra Pradesh were also mined for diamond but the Kimberlite nature of these deposits were recognised much later in 1930. At present Majhgawan mine of M/s. National Mineral Development Corporation in Panna diamond belt of Madhya Pradesh is the only mine working on commercial scale in the country. GSI has carried out exploration work in search of deposits of diamond in many parts of India including the potential areas in Andhra Pradesh (Wajrakarur), Chhattisgarh, Jharkhand, Karnataka and Telangana.

Diamonds as precious stones are mostly used for ornamental purpose. Industrial diamonds are used for drill bits. India was once the single largest exporter of cut and polished diamonds in the world, though its domestic production of raw diamond is very insignificant.

Basis of Grade Classification

In the inventory as on 01.04.2020, the resources of diamond have been classified into the following grades :

- i) Gem
- ii) Industrial
- iii) Unclassified

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), total resources are broadly classified into 'reserves' and 'remaining resources' category.

According to the norms of this system, reserves of diamond have been placed under proved (111) and probable (122) categories.

The remaining resources have been placed under measured (331), indicated (332) and inferred (333) categories.

Salient Features of the Inventory

The total resources of diamond in the country as on 01.04.2020 are estimated at 31,723,991 carats with 1,054,457 carats gem grade, 1,095,382 carats industrial grade and 29,574,152 carats unclassified grade. Of these, 847,559 carats (2.67%) fall under reserve category and balance 30,876,432 carats (97.33%) are remaining resources. The entire quantity under reserve category is of 35.12% gem, 30.03% industrial and 34.84% of unclassified category and has been estimated in Panna district of Madhya Pradesh. Out of the total resources, 30,876,432 carats (97.33%) are in freehold and the balance 847,559 carats (2.67%) are in leasehold (public) areas.

All India scenario of diamond reserves, remaining resources and total resources as on 01.04.2020 vis-à-vis 01.04.2015 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and states. In Table-3, district-wise reserves/ resources as on 01.04.2020 have been given.

The estimated resources of diamond are concentrated only in three states. Of these, Madhya Pradesh is credited with 28,597,036 carats (90.14%) having 297,692 carats gem grade, 254,559 carats industrial grade and 28,044,785 carats unclassified grade, followed by Andhra Pradesh with 1,822,955 carats (5.75%), having 235,165 carats gem grade, 58,423 carats industrial grade and 1,529,367 carats unclassified grade and Chhattisgarh with 1,304,000 carats (4.11%) having 521,600 carats gem grade and 782,400 carats industrial grade.

A marginal decrease of 112,100 carats (0.35%) diamond resources has been recorded in comparison to the earlier inventory as on 01.04.2015. The decrease of unclassified grade diamond is (-) 664,351 carats where as increase of gem grade and industrial grade is (+) 297,692 & (+) 254,559 carats, respectively which is due to revised data supplied by M/s NMDC Ltd. for their Diamond Mining Project of main lease (113.332 ha) in Panna district, Madhya Pradesh.

Diamonds in small quantity are recovered from conglomerate and gravel beds also at shallow depths in Panna district of Madhya Pradesh.

Out of the 1,822,955 carats of diamond resources in Andhra Pradesh about 92% have alone been estimated in Anantpur district and the balance resources are in Krishna and Kurnool districts. The entire resource of Chhattisgarh is reported in Raipur district and that of MP's total resources of 28,597,036 carats about 4% resources is in Panna district and rest 96% in Chhattarpur district. The entire resource in Chhattarpur district is of 333 category.

Table - 1 : Reserves/Resources of Diamond as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change
	(In Carats)								
All India : Total	847,559	959,659	(-) 112,100	30,876,432	30,876,432	No Change	31,723,991	31,836,091	(-) 112,100
Gem	297,692	-	(+) 297,692	756,765	756,765	No Change	1,054,457	756,765	(+) 297,692
Industrial	254,559	-	(+) 254,559	840,823	840,823	No Change	1,095,382	840,823	(+) 254,559
Unclassified	295,308	959,659	(-)664,351	29,278,844	29,278,844	No Change	29,574,152	30,238,503	(-)664,351
Freehold	-	-	-	30,876,432	30,876,432	No Change	30,876,432	30,876,432	No Change
Gem	-	-	-	756,765	756,765	No Change	756,765	756,765	No Change
Industrial	-	-	-	840,823	840,823	No Change	840,823	840,823	No Change
Unclassified	-	-	-	29,278,844	29,278,844	No Change	29,278,844	29,278,844	No Change
Leasehold (Public)	847,559	959,659	(-) 112,100	-	-	-	847,559	959,659	(-) 112,100
Gem	297,692	-	(+) 297,692	-	-	-	297,692	-	(+) 297,692
Industrial	254,559	-	(+) 254,559	-	-	-	254,559	-	(+) 254,559
Unclassified	295,308	959,659	(-)664,351	-	-	-	295,308	959,659	(-)664,351

figures rounded off

National Mineral Inventory - An Overview

Out of the total resources of diamond in the country, about 29,047,514 carats (92%) resources have been estimated under inferred (333) category. These resources are based on a very limited and preliminary exploration. If these areas are examined for further

detailed exploration, the confidence level of resource position of diamond in the country may improve.

A total 21 deposits have been covered in the inventory as on 01.04.2020, for which resources have been estimated (19 freehold and 02 leasehold public).

**Table – 2 : Total Resources of Diamond as on 01.04.2020 vis-à-vis 01.04.2015
(By States)**

State	Total Resources		Net Change
	As on 01.04.2020	As on 01.04.2015	
	(In Carats)		
All India : Total	31,723,991	31,836,091	(-) 112,100
Gem	1,054,457	756,765	(+) 297,692
Industrial	1,095,382	840,823	(+) 254,559
Unclassified	29,574,152	30,238,503	(-) 664,351
Andhra Pradesh	1,822,955	1,822,955	No Change
Gem	235,165	235,165	No Change
Industrial	58,423	58,423	No Change
Unclassified	1,529,367	1,529,367	No Change
Chhattisgarh	1,304,000	1,304,000	No Change
Gem	521,600	521,600	No Change
Industrial	782,400	782,400	No Change
Madhya Pradesh	28,597,036	28,709,136	(-) 112,100
Gem	297,692	-	(+)297,692
Industrial	254,559	-	(+)254,559
Unclassified	28,044,785	28,709,136	(-) 664,351

figures rounded off.

Table - 3 : District wise Reserves/Resources of Diamond as on 01.04.2020

State Name	District Name	Reserves	Remaining Resources	(In Carats)
				Total Resources
All India : Total		847,559	30,876,432	31,723,991
Andhra Pradesh		-	1,822,955	1,822,955
	Anantapur	-	1,667,960	1,667,960
	Krishna	-	99,395	99,395
	Kurnool	-	55,600	55,600
Chhattisgarh		-	1,304,000	1,304,000
	Raipur	-	1,304,000	1,304,000
Madhya Pradesh		847,559	27,749,477	28,597,036
	Chhatarpur	-	27,400,000	27,400,000
	Panna	847,559	349,477	1,197,036

figures rounded off.

4.2 EMERALD

Introduction

Emerald is a green coloured, highly precious gemstone and a variety of the mineral beryl ($\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$) colored green by trace amounts of chromium and sometimes vanadium. It is one of the most reputed gemstone in vedic astrology. In hindi, emerald stone is revered as "Panna".

It is cyclosilicate and toughness (resistance to breakage) is classified generally poor. Emerald is rare and command immense value on account of their colour, clarity and weight. Emeralds, like all colored gemstones, are graded using four basic parameters—the four Cs of connoisseurship: color, clarity, cut and carat weight.

In gemology, color is divided into three components: hue, saturation, and tone. Trace amount of iron will tint emerald a bluish green or a yellowish green color depending upon its oxidation state. Yellow and blue are the normal secondary hues found in emeralds. Some believe that the name "emerald" should be used when chromium is the cause of the green color, and that stone coloured by vanadium should be called "green beryl".

In India, occurrences of Emerald is reported from Singhbhum (West) district of Jharkhand. Emerald is also reported to occur in Rajasthan, Odisha and Chhattisgarh. However, resources have not been estimated so far. In Rajasthan, emeralds have been found to occur at a number of places in districts Rajsamand and Ajmer. In Ajmer Rajsamand belt of Rajasthan, emerald occurrences are confined to the upper fringes of pegmatites. In Odisha, occurrences of emerald are reported from Bira-Mohorajpur belt in district Bolangir. In Chhattisgarh, occurrences of emerald are reported from Deobhog area in Raipur district. Sporadic and irregular crystals of emerald, aquamarine and amethyst are also reported in a

few localities in coimbatore district, Tamil Nadu. (GSI, miscellaneous Publication No.30).

Basis of Grade Classification

The following grade classification has been adopted in the mineral inventory as on 01.04.2020.

Unclassified : Estimation for which supporting data is not available to classify under any grade.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), total resources are broadly classified into 'reserves' and 'remaining resources' category.

According to norms of this system reserves / resources of Emerald has been placed under reconnaissance category.

Salient Features of the Inventory

All India scenario of emerald reserves, remaining resources and total resources as on 01.04.2020 vis-a-vis 01.04.2015 have been appended in Table - 1 and 2. In Table 3, district-wise reserves/resources as on 01.04.2020 have been given.

A total of 2 deposits have been reported in the present inventory. The total resources of emerald in the country as on 01.04.2020 are estimated at 55,869 kg same as that reported in 2015 since no new occurrence re-estimation is reported during the last 5 years.

Of the total resources, entire 55,869 kgs are placed in freehold category and Jharkhand is the only state where estimation of emerald has been done.

**Table - 1 : Reserves/Resources of Emerald as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)**

	(In Kg)								
	Reserves		Remaining resources		Total resources				
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change
All India : Total	-	-	-	55,869	55,869	No change	55,869	55,869	No change
Unclassified	-	-	-	55,869	55,869	No change	55,869	55,869	No change
Free Hold	-	-	-	55,869	55,869	No change	55,869	55,869	No change
Unclassified	-	-	-	55,869	55,869	No change	55,869	55,869	No change

figures rounded off.

Table – 2 : Total Resources of Emerald as on 01.04.2020 vis-à-vis 01.04.2015
(In Kg)
(By States)

State	Total Resources		Net Change
	As on 01.04.2020	As on 01.04.2015	
All India	55,869	55,869	No change
Jharkhand	55,869	55,869	No change

Figures rounded off

Table -3 : District wise Reserves/Resources of Emerald as on 01.04.2020

State	District name	Reserves	Remaining resources	(In Kg)
				Total resources
All India : Total		-	55,869	55,869
Jharkhand		-	55,869	55,869
	Singhbhum (West)	-	55,869	55,869

figures rounded off.

4.3 GARNET

Introduction

Garnet is a collective name for a group of isomorphic minerals having a composition of $3R^{++}O$, $R_2^{+++}O_3$, $3SiO_2$ where R represents bivalent metals like magnesium, calcium, manganese, iron and trivalent metals like aluminium, iron, manganese and chromium. Many garnets are admixture of the various varieties. The hardness varies from 6.5 to 7.5 on Moh's scale and specific gravity from 3.4 to 4.3. Colour is a physical property which can broadly distinguish varieties of garnets as follows:

1. Pyrope Mg-Al garnet, deep red in colour
2. Almandite Fe-Al garnet, deep red to brownish red in colour
3. Andradite Ca-Fe garnet, brownish red, yellow green or black in colour
4. Grossularite Ca-Fe garnet. Pale green, yellow or red in colour.
5. Spessartite Mn-Al garnet, deep hyacinth or brownish red in colour
6. Uvarovite Ca-Cr garnet, emerald green in colour.

Out of these, almandite and andradite are the most common varieties. Clear flawless and richly coloured garnet are used as semi-precious stones. The most important industrial use of fresh, hard garnet is as abrasive in the form of coated paper, cloth, discs and loose grains for surfacing and polishing of soft building stones. On crushing, it breaks into angular fragments which have high capillary attraction resulting in firm adhesion to cloth, paper or wheels coated with glue.

Basis of Grade Classification

The following grade classification has been adopted in the inventory based on the reported information of the exploration/exploitation agencies.

1. Gem
2. Semi-Precious
3. Abrasive

4. Others
5. Unclassified
6. Not Known

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), total resources are broadly classified into 'reserves' and 'remaining resources' category.

According to the norms of this system, 'reserves' of garnet have been placed under proved (111) and probable (121) & (122) categories. The 'remaining resources' have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of garnet in the country as on 01.04.2020 are estimated at 56,007 thousand tonnes; of these, 8,590 thousand tonnes (15.34%) fall under 'reserve' category and 47,416 thousand tonnes (84.66%) are under 'remaining resource' category.

All India scenario of garnet reserves, remaining resources and total resources as on 01.04.2020 vis-a-vis 01.04.2015 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and states. In Table-3, district-wise reserves/ resources as on 01.04.2020 have been given.

Out of the total resources, 36,607 thousand tonnes (65%) have been placed under freehold, 10,010 thousand tonnes (18%) in leasehold private and 9,389 thousand tonnes (17%) in leasehold public sectors.

Resources of garnet have been classified into Gem, abrasive, semi-precious, others, unclassified and not-known grade based on the reported end use data by the exploration/exploitation agencies. The largest share in total resources of garnet is estimated under unclassified grade with 34,378 thousand tonnes (61%) followed by abrasive variety 20,874 thousand tonnes (37%). The remaining two percent is accounted by Semi-precious, others, Gem and Not-known grades.

National Mineral Inventory - An Overview

Table - 1 : Reserves/Resources of Garnet as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)

Lease status/Grade	(In Tonne)						
	Reserves		Remaining resources		Total resources		
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change	
All India : Total	8,590,472	12,783,856	(-) 4,193,384	47,416,654	43,377,166	56,007,127	(-) 153,895
Gem	1	39,396	(-) 39,395	46,158	81,450	46,160	(-) 74,686
Abrasive	8,537,296	12,667,217	(-) 4,129,921	12,336,250	8,236,565	20,873,546	(-) 30,236
Semi-Precious	637	1,158	(-) 521	7,831	4,645	8,468	(+)2,665
Others	-	-	-	260,982	260,982	260,982	No change
Unclassified	52,538	76,085	(-) 23,547	34,325,967	34,318,396	34,378,505	(-) 15,976
Not Known	-	-	-	439,466	475,128	439,466	(-) 35,662
Freehold	-	-	-	36,607,689	36,198,968	36,607,689	(+)408,721
Abrasive	-	-	-	1,785,767	1,457,477	1,785,767	(+)328,290
Semi-Precious	-	-	-	3,506	2,973	3,506	(+)533
Others	-	-	-	230,657	169,400	230,657	(+)61,257
Unclassified	-	-	-	34,176,932	34,175,282	34,176,932	(+)1,650
Not Known	-	-	-	410,827	393,836	410,827	(+)16,991
Leasehold (Private)	207,889	3,633,770	(-) 3,425,881	9,802,824	6,897,538	10,010,714	(-) 520,594
Gem	1	39,396	(-) 39,395	46,158	81,450	46,160	(-) 74,686
Abrasive	207,251	3,576,469	(-) 3,369,218	9,620,302	6,636,024	9,827,553	(-) 384,940
Semi-Precious	637	1,158	(-) 521	4,320	1,667	4,957	(+)2,132
Others	-	-	-	30,325	91,582	30,325	(-) 61,257
Unclassified	-	16,747	(-) 16,747	101,719	86,622	101,719	(-) 1,650
Not Known	-	-	-	-	193	-	(-)193
Leasehold (Public)	8,382,583	9,150,086	(-) 767,503	1,006,141	280,660	9,388,724	(-) 42,022
Abrasive	8,330,045	9,090,748	(-) 760,703	930,181	143,064	9,260,226	(+)26,414
Semi-Precious	-	-	-	5	5	5	No change
Unclassified	52,538	59,338	(-) 6,800	47,316	56,492	99,854	(-) 15,976
Not Known	-	-	-	28,639	81,099	28,639	(-) 52,460

figures rounded off.

The state of Tamil Nadu is endowed with the largest share of 25,884 thousand tonnes (46%) of total resources in the country followed by Andhra Pradesh 17,267 thousand tonnes (31%), Odisha 9,507 thousand tonnes (17%) and the remaining 6% resources are accounted together by other states namely Chhattisgarh, Jharkhand, Kerala, Rajasthan and Telangana.

A total 6 new lease hold (Private) deposits with resources of 518 thousand tonnes have been reported in the inventory as on 01.04.2020. However, in the inventory as on 01.04.2020, a net decrease of about 153,895 tonnes resources of garnet have been recorded as compared to earlier inventory as on 01.04.2015.

In Odisha, a substantial quantity of about 114 thousand tonnes resources have been increased mainly due to reassessment of the resources in

existing lease hold deposits in Ganjam and Nawapara districts. In Rajasthan also resources have been increased by 766 thousand tonnes. However, resources in Tamil Nadu has been decreased by 1,034 thousand tonnes due to downward revision in resources in existing lease hold deposits of private and public sector.

A sizeable quantity of about 28,969 thousand tonnes (52 %) have been estimated under inferred (333) and reconnaissance (334) categories. These resources are based on a limited and preliminary exploration. A detailed exploration in these areas may improve the confidence level of the resources.

A total 159 deposits have been covered in the inventory as on 01.04.2020. Out of this, 75 deposits are in freehold areas and 84 deposits are in leasehold areas (77 deposits in leasehold private sector and 7 deposits in leasehold public sector).

Table – 2 : Total Resources of Garnet as on 01.04.2020 vis-à-vis 01.04.2015 (By States)

State	Total Resources		Net Change
	As on 01.04.2020	As on 01.4.2015	
All India : Total	56,007,126	56,161,022	(-) 153,896
Andhra Pradesh	17,267,129	17,267,129	No change
Chhattisgarh	28,800	28,800	No change
Jharkhand	110,071	110,071	No change
Kerala	198,861	198,861	No change
Odisha	9,507,364	9,392,956	(+)114,408
Rajasthan	1,050,811	285,000	(+765,811
Tamil Nadu	25,883,894	26,918,009	(-) 1,034,115
Telangana	1,960,196	1,960,196	No change

figures rounded off.

Table - 3 : District wise Reserves/Resources Garnet as on 01.04.2020

(In Tonne)

State	District	Reserves	Remaining Resources	Total Resources
All India : Total		85,90,472	47,416,654	56,007,126
Andhra Pradesh		-	17,267,129	17,267,129
	Godavari East	-	12,811,200	12,811,200
	Nellore	-	34,149	34,149
	Srikakulam	-	4,412,555	441,255
	Visakhapatnam	-	9,225	9,225
Chhattisgarh		-	28,800	28,800
	Bastar	-	28,800	28,800
Jharkhand		-	110,071	110,071
	Hazaribagh	-	110,071	110,071
Kerala		-	198,861	198,861
	Kollam	-	188,861	188,861
	Thiruvananthapuram	-	10,000	10,000
Odisha		8,330,046	1,177,318	9,507,364
	Ganjam	8,330,045	829,307	9,159,352
	Kalahandi	1	6	7
	Nawapara	-	5	5
	Sambalpur	-	348,000	348,000
Rajasthan		207,888	842,923	1,050,811
	Ajmer	15	90,728	90,743
	Bhilwara	182,405	405,234	587,639
	Jhunjhunu	-	2,570	2,570
	Rajsamand	-	275,463	275,463
	Sikar	-	3,972	3,972
	Tonk	25,469	64,955	90,424
Tamil Nadu		52,538	25,831,356	25,883,894
	Kanyakumari	52,538	8,995,140	9,047,678
	Ramnathapuram	-	1,625	1,625
	Thanjavur	-	4,900	4,900
	Tiruchirapalli	-	32,260	32,260
	Tirunelveli	-	16,651,061	16,651,061
	Tiruvarur	-	146,370	146,370
Telangana		-	1,960,196	1,960,196
	Khammam	-	1,960,196	1,960,196

figures rounded off.

4.4 GOLD

Introduction

Gold a soft, shiny, yellow element that is the most easily shaped metal. It is durable, resistant to corrosion, and a good conductor of heat and electricity. Gold is generally believed to be a symbol of security and prosperity. It occurs in veins and alluvial deposits. Gold is a relatively scarce metal in the world and a scarce commodity in India. India is a minor producer of gold but has huge demand for the metal mainly in jewellery and ornament sector. The domestic demand is mainly met through imports. Properties of gold which make it useful for industrial consumption are malleability, ductility, colour, resistance to corrosion, high electrical conductivity, lustre and therapeutic effects of some of its salts.

Basis of Grade Classification

Gold ore is not used directly in the industry, it is first converted into metal and then marketed for end-use. Therefore the resources of gold as on 01.04.2020 have been classified based on their type of occurrences as primary and placer (ore and metal).

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), the resources have broadly been classified into 'reserves' and 'remaining resources'. According to the norms of this system, reserves of gold ore have been placed under proved (111) and probable (121) & (122) categories. The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of primary gold ore in the country as on 01.04.2020 are estimated at 518.23 million tonnes with 607.26 tonnes of gold metal. Of these, 23.73 million tonnes (4.58%) fall under reserve category containing 92.76 tonnes of primary gold metal and balance 494.51 million tonnes (95.42%) are remaining resources

containing 514.5 tonnes of primary gold metal. The total resources of placer gold ore as on 01.04.2020 are estimated at 26.12 million tonnes with 5.86 tonnes gold metal. The entire placer gold resources have been estimated under remaining resources in Kerala state.

All India scenario of gold ore and metal reserves, remaining resources and total resources as on 01.04.2020 vis-a-vis 01.04.2015 have been given in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and state. In Table-3, district wise reserves/ resources as on 01.04.2020 have been given.

Of the total resources, 443.37 million tonnes primary gold ore (85.55%) containing 435.35 tonnes metal and 26.12 million tonnes of placer gold ore (100%) containing 5.86 tonnes metal are in freehold. About 69.04 million tonnes of primary gold ore (13.32%) containing 161.14 tonnes metal are in leasehold public and 5.82 million tonnes of primary gold ore (1.12%) containing 10.77 tonnes metal are in leasehold private.

Of the total primary gold ore resources (518.23 million tonnes), Karnataka endowed with 103 million tonnes (20%) ore resources containing 251.17 tonnes metal followed by Rajasthan 125.91 million tonnes of ore (24.30%) containing 234.56 tonnes metal, Bihar 222.88 million tonnes (43%) of ore containing meagre 37.6 tonnes of metal. The remaining 66 million tonnes ore (about 13%) containing 523.6 tonnes metal resources are reported from eight states namely Andhra Pradesh, Chhattisgarh, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu, Uttar Pradesh and West Bengal. Besides, about 26.12 million tonnes placer gold ore resources containing 5.86 tonnes metal have been estimated in the state of Kerala. The resources reported in Bihar is of very low grade ore and estimated under UNFC code (333) & (334).

An overall increase of primary gold ore resources is about 16.39 million tonnes. However, resources of primary metal decreased by about

**Table - 1 : Reserves/Resources of Gold as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)**

Lease status/Grade	Reserves			Remaining resources			Total resources		
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change
	(In Tonne)								
All India : Total									
Ore (Primary)	23,728,100	17,228,174	(+)6,499,926	494,506,270	484,611,458	(+)9,894,812	518,234,370	501,839,632	(+)16,394,738
Metal (Primary)	92,76	70,09	(+)22,67	514.5	584.65	(-)70.15	607.26	654.74	(-)47.48
Ore (Placer)	-	-	-	26,121,000.00	26,121,000.00	No change	26,121,000.00	26,121,000.00	No change
Metal (Placer)	-	-	-	5.86	5.86	No change	5.86	5.86	No change
Freehold									
Ore (Primary)	-	-	-	443,368,088	419,889,035	(+)23,479,053	443,368,088	419,889,035	(+)23,479,053
Metal (Primary)	-	-	-	435.35	407.15	(+)28.20	435.35	407.15	(+)28.20
Ore (Placer)	-	-	-	26,121,000.00	26,121,000	No change	26,121,000.00	26,121,000	No change
Metal (Placer)	-	-	-	5.86	5.86	No change	5.86	5.86	No change
Leasehold (Public)									
Ore (Primary)	20,470,000	13,316,100	(+)7,153,900	48,571,910	63,873,107	(-)15,301,197	69,041,910	77,189,207	(-)8,147,297
Metal (Primary)	87.46	61.53	(+)25.93	73.68	173.34	(-)99.66	161.14	234.87	(-)73.73
Leasehold (Private)									
Ore (Primary)	3,258,100	3,912,074	(-)653,974	2,566,272	849,316	(+)1,716,956	5,824,372	4,761,390	(+)1,062,982
Metal (Primary)	5.3	8.56	(-)3.26	5.47	4.16	(+)1.31	10.77	12.72	(-)1.95

figures rounded off.

47.48 tonnes in inventory as on 01.04.2020 as compared to previous inventory as on 01.04.2015. The increase is attributed to reconciliation of resources in existing deposits and inclusion of 11 new freehold deposits. New freehold deposits of gold has been reported in Karnataka (9 deposits), Madhya Pradesh & Maharashtra (each one deposit) by exploration agencies.

In Karnataka, a decrease of 0.84 million tonnes ore containing 59.45 tonnes metal recorded in inventory as on 01.04.2020 as compared to earlier inventory as on 01.04.2015. It is mainly due to re-assessment of resources in the existing deposits. Nine new deposits with 7.30 million tonnes of ore containing 14.28 tonnes of metal in freehold (04 deposits in Tumkur, 02 deposits in Kolar and one deposit each in Hassan, Dharwar & Hubli district) were also reported in the state.

In Andhra Pradesh, an increase of gold ore about 2.95 million tonnes containing 7.63 tonnes metal has been recorded due to upward revision in resources of one leasehold (Private) deposit in Kurnool district and one new freehold deposit in Chittoor district.

In Rajasthan, an increase of about 1.31 million tonnes ore containing 1.45 tonnes of metal has been recorded due to re-estimation of resources in existing 3 freehold deposits as compared to inventory as on 01.04.2015.

In Maharashtra, an increase of 0.11 million tonnes of ore containing 0.09 tonnes of metal has been recorded due to addition of one new freehold deposit in Gadchiroli district as compared to inventory as on 01.04.2015.

In Madhya Pradesh, an overall decrease of 0.09 million tonnes of ore containing 0.15 tonnes of metal was recorded due to re-estimation of resources in one existing freehold deposit besides addition of one new freehold deposit as compared to the inventory as on 01.04.2015.

In Jharkhand, an overall decrease of 0.05 million tonnes ore containing 0.87 tonnes metal has been recorded due to re-estimation of resources in one leasehold (Private) deposit in Singhbhum(east) district besides addition of one new freehold deposit as compared to inventory as on 01.04.2015.

In Uttar Pradesh, 13.0 million tonnes of ore with 2.08 tonnes of metal reported for the first time in the present inventory.

There is no change in gold ore and metal content in the states of Bihar, Chhattisgarh, Kerala, Tamil Nadu, and West Bengal.

Of the total resources of gold ore, about 365 million tonnes (70%) of primary ore and 23.56 million tonnes of placer ore have been placed under inferred and reconnaissance categories. These resources are based on a limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of gold ore in the country may improve.

A total of 115 deposits have been covered in the inventory as on 01.04.2020, of which 101 deposits are in freehold, 14 deposits are in leasehold (12 public and 2 private).

**Table – 2 : Total Resources of Gold as on 01.04.2020 vis-à-vis 01.04.2015
(By States)**

State	Total Resources		Net Change
	(In Tonne)		
	As on 01.04.2020	As on 01.04.2015	
All India : Total			
Ore (Primary)	518,234,370	501,839,632	(+)16,394,738
Metal (Primary)	607.26	654.74	(-)47.48
Ore (Placer)	26,121,000	26,121,000	No Change
Metal (Placer)	5.86	5.86	No Change
Andhra Pradesh			
Ore (Primary)	15,730,998	12,773,404	(+)2,957,594
Metal (Primary)	47.17	39.54	(+)7.63
Bihar			
Ore (Primary)	222,884,860	222,884,860	No Change
Metal (Primary)	37.6	37.6	No Change
Chhattisgarh			
Ore (Primary)	4,841,033	4,841,033	No Change
Metal (Primary)	5.51	5.51	No Change
Jharkhand			
Ore (Primary)	10,076,527	10,126,638	(-)50,111
Metal (Primary)	15.43	14.56	(+)0.87
Karnataka			
Ore (Primary)	103,008,506	103,846,184	(-)837,678
Metal (Primary)	251.17	310.62	(-)59.45
Kerala			
Ore (Primary)	558,460	558,460	No Change
Metal (Primary)	0.2	0.2	No Change
Ore (Placer)	26,121,000	26,121,000	No Change
Metal (Placer)	5.86	5.86	No Change
Madhya Pradesh			
Ore (Primary)	7,692,934	7,788,000	(-) 95,066
Metal (Primary)	8.25	8.4	(-)0.15
Maharashtra			
Ore (Primary)	1,627,000	1,517,000	(+) 110,000
Metal (Primary)	3.64	3.55	(+)0.09
Rajasthan			
Ore (Primary)	125,913,720	124,603,720	(+)1,310,000
Metal (Primary)	234.56	233.11	(+)1.45
Tamil Nadu			
Ore (Primary)	67,000	67,000	No Change
Metal (Primary)	1	1	No Change
Uttar Pradesh			
Ore (Primary)	13,000,000	-	(+)13,000,000
Metal (Primary)	2.08	-	(+)2.08
West Bengal			
Ore (Primary)	12,833,333	12,833,333	No Change
Metal (Primary)	0.65	0.65	No Change

figures rounded off.

Table - 3 : District wise Reserves/Resources Gold as on 01.04.2020

(In Tonne)				
State	District	Reserves	Remaining Resources	Total Resources
All India : Total				
	Ore (Primary)	23,728,100	494,506,270	518,234,370
	Metal (Primary)	92.76	514.5	607.26
	Ore (Placer)	-	26,121,000.00	26,121,000.00
	Metal (Placer)	-	5.86	5.86
Andhra Pradesh				
	Ore (Primary)	3,258,100	12,472,898	15,730,998
	Metal (Primary)	5.3	41.87	47.17
	Anantapur			
	Ore (Primary)	-	795,815	795,815
	Metal (Primary)	-	3.03	3.03
	Chittoor			
	Ore (Primary)	-	4,841,532	4,841,532
	Metal (Primary)	-	23	23
	Kurnool			
	Ore (Primary)	3,258,100	6,835,551	10,093,651
	Metal (Primary)	5.3	15.84	21.14
Bihar				
	Ore (Primary)	-	222,884,860	222,884,860
	Metal (Primary)	-	37.6	37.6
	Jamui			
	Ore (Primary)	-	222,884,860	222,884,860
	Metal (Primary)	-	37.6	37.6
Chhattisgarh				
	Ore (Primary)	-	4,841,033	4,841,033
	Metal (Primary)	-	5.51	5.51
	Kanker			
	Ore (Primary)	-	2,403,608	2,403,608
	Metal (Primary)	-	1.61	1.61
	Raipur			
	Ore (Primary)	-	2,437,425	2,437,425
	Metal (Primary)	-	3.9	3.9
Jharkhand				
	Ore (Primary)	-	10,076,527	10,076,527
	Metal (Primary)	-	15.43	15.43
	Ranchi			
	Ore (Primary)	-	9,524,000	9,524,000
	Metal (Primary)	-	12.6	12.6
	Singhbhum(East)			
	Ore (Primary)	-	390,527	390,527
	Metal (Primary)	-	0.37	0.37
	Singhbhum(West)			
	Ore (Primary)	-	162,000	162,000
	Metal (Primary)	-	2.46	2.46
Karnataka				
	Ore (Primary)	20,470,000	82,538,506	103,008,506
	Metal (Primary)	87.46	163.71	251.17

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State	District	Reserves	Remaining Resources	Total Resources
	Chitradurga			
	Ore (Primary)	-	1,230,000	1,230,000
	Metal (Primary)	-	4.63	4.63
	Dharwar			
	Ore (Primary)	-	10,339,500	10,339,500
	Metal (Primary)	-	33.52	33.52
	Gulbarga			
	Ore (Primary)	-	100,000	100,000
	Metal (Primary)	-	0.42	0.42
	Hassan			
	Ore (Primary)	-	5,425,000	5,425,000
	Metal (Primary)	-	9.51	9.51
	Haveri			
	Ore (Primary)	-	8,095,000	8,095,000
	Metal (Primary)	-	25.55	25.55
	Hubli			
	Ore (Primary)	-	60,000	60,000
	Metal (Primary)	-	0.04	0.04
	Kolar			
	Ore (Primary)	-	38,056,563	38,056,563
	Metal (Primary)	-	42.28	42.28
	Raichur			
	Ore (Primary)	20,470,000	9,737,000	30,207,000
	Metal (Primary)	87.46	26.98	114.44
	Tumkur			
	Ore (Primary)	-	9,495,443	9,495,443
	Metal (Primary)	-	20.78	20.78
Kerala				
	Ore (Primary)	-	558,460	558,460
	Metal (Primary)	-	0.2	0.2
	Ore (Placer)	-	26,121,000.00	26,121,000.00
	Metal (Placer)	-	5.86	5.86
	Malappuram			
	Ore (Primary)	-	558,460	558,460
	Metal (Primary)	-	0.2	0.2
	Ore (Placer)	-	24,815,000	24,815,000
	Metal (Placer)	-	4.53	4.53
	Palakkad			
	Ore (Placer)	-	1,306,000	1,306,000
	Metal (Placer)	-	1.33	1.33
Madhya Pradesh				
	Ore (Primary)	-	7,692,934	7,692,934
	Metal (Primary)	-	8.25	8.25
	Jabalpur			
	Ore (Primary)	-	200,000	200,000
	Metal (Primary)	-	0.4	0.4
	Katni			
	Ore (Primary)	-	346,600	346,600
	Metal (Primary)	-	0.39	0.39

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concltd.)

State	District	Reserves	Remaining Resources	Total Resources
	Sidhi			
	Ore (Primary)	-	7,122,000	7,122,000
	Metal (Primary)	-	7.41	7.41
	Singrauli			
	Ore (Primary)	-	24,334	24,334
	Metal (Primary)	-	0.05	0.05
Maharashtra				
Ore (Primary)		-	1,627,000	1,627,000
Metal (Primary)		-	3.64	3.64
	Bhandara			
	Ore (Primary)	-	57,000	57,000
	Metal (Primary)	-	0.11	0.11
	Gadchiroli			
	Ore (Primary)	-	110,000	110,000
	Metal (Primary)	-	0.09	0.09
	Nagpur			
	Ore (Primary)	-	1,460,000	1,460,000
	Metal (Primary)	-	3.44	3.44
Rajasthan				
Ore (Primary)		-	125,913,720	125,913,720
Metal (Primary)		-	234.56	234.56
	Alwar			
	Ore (Primary)	-	2,900,000	2,900,000
	Metal (Primary)	-	2.16	2.16
	Banswara			
	Ore (Primary)	-	109,733,000	109,733,000
	Metal (Primary)	-	221.67	221.67
	Bhilwara			
	Ore (Primary)	-	1,270,000	1,270,000
	Metal (Primary)	-	0.72	0.72
	Dausa			
	Ore (Primary)	-	4,600,000	4,600,000
	Metal (Primary)	-	6.67	6.67
	Dungarpur			
	Ore (Primary)	-	4,500,000	4,500,000
	Metal (Primary)	-	1.13	1.13
	Sirohi			
	Ore (Primary)	-	2,430,720	2,430,720
	Metal (Primary)	-	1.13	1.13
	Udaipur			
	Ore (Primary)	-	480,000	480,000
	Metal (Primary)	-	1.08	1.08
Tamil Nadu				
Ore (Primary)		-	67,000	67,000
Metal (Primary)		-	1	1

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concl.)

State	District	Reserves	Remaining Resources	Total Resources
	Dharmapuri			
	Ore (Primary)	-	67,000	67,000
	Metal (Primary)	-	1	1
Uttar Pradesh				
	Ore (Primary)	-	13,000,000	13,000,000
	Metal (Primary)	-	2.08	2.08
	Lalitpur			
	Ore (Primary)	-	13,000,000	13,000,000
	Metal (Primary)	-	2.08	2.08
West Bengal				
	Ore (Primary)	-	12,833,333	12,833,333
	Metal (Primary)	-	0.65	0.65
	Purulia			
	Ore (Primary)	-	12,833,333	12,833,333
	Metal (Primary)	-	0.65	0.65

figures rounded off.

4.5 RUBY

Introduction

Ruby is a transparent, lustrous, red gem variety of corundum. It frequently shows variation in colour from deep to pigeon's blood red, in parallel or irregular bands. The colour is supposed to be due to traces of chromium. The minute, hexagonal or irregular, often elongated or angular cavities and irregularly occurring inclusions are distinguishing characters of natural ruby. It also has low dispersion and hence exhibit no 'fire'. There is an abnormal amount of fire, when parallel. Fibrous inclusions occur along the lines of crystallisation. Ruby, when cut in encabocho fashion (dome shaped, the base coinciding with the basal plane of the crystal) shows a white, six-rayed star on the surface when examined in light. The phenomenon is called as 'asterism'. Such star ruby is a valuable gem stone. Ruby occurs as disseminated crystals formed by:

1. Magmatic segregation of basic igneous rocks.
2. Desilication of pegmatite dykes intruded into basic igneous rocks.
3. Metamorphism of highly aluminous rocks.

It also occurs as alluvial placers. Though the resources of ruby have only been estimated in Odisha, its occurrences are also reported from Tumkur and Chikmagalur districts, Karnataka, and Tiruchirapalli district, Tamil Nadu.

Basis of Grade Classification

Ruby is the prime gem variety of corundum. This is the most fascinating gem stone after diamond. Resources of ruby in the inventory as

on 01.04.2020 have been placed under unclassified grade.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), total resources are broadly classified into 'reserves' and 'remaining resources' category.

According to the norms of this system, remaining resources have been placed under pre-feasibility (221) & (222) and inferred (333) categories.

Salient Features of the Inventory

Total resources as on 01.04.2020 of ruby in the country are estimated at 5,349 kg. The entire resources of ruby are placed under 'remaining resources' category, which are estimated in the state of Odisha only.

All India scenario of ruby reserves, remaining resources and total resources as on 01.04.2020 vis-a-vis 01.04.2015 have been given in Tables - 1 and 2. These tables give an idea about changes in terms of increase or decrease of resources as per lease status, grade and state. In Table-3, district-wise reserves/resources as on 01.04.2020 have been given.

Total 5 deposits of ruby have been covered in the NMI as on 01.04.2020, of which 2 deposits are in freehold areas and 3 deposits in non-working leasehold (public) areas. The resources of ruby remained unchanged in NMI as on 01.04.2020 since no production is reported since 01.04.2010.

**Table - 1 : Reserves/Resources of Ruby as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)**

Lease status/Grade	(In Kilogram)					
	Reserves		Remaining resources		Total resources	
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change
All India : Total	-	-	No Change	5,349	5,349	No Change
Unclassified	-	-	No Change	5,349	5,349	No Change
Freehold						
Unclassified	-	-	No Change	4,537	4,537	No Change
Leasehold (Public)						
Unclassified	-	-	No Change	812	812	No Change

figures rounded off.

National Mineral Inventory - An Overview

**Table – 2 : Total Resources of Ruby as on 01.04.2020 vis-à-vis 01.04.2015
(By States)**

(In Kilogram)

State	Total Resources		Net Change
	As on 01.04.2020	As on 01.04.2015	
All India : Total	5,349	5,349	No Change
Odisha	5,349	5,349	No Change

*figures rounded off.***Table - 3 : District wise Reserves/Resources of Ruby as on 01.04.2020**

(In Kilogram)

State	District name	Reserves	Remaining Resources	Total Resources
All India : Total		-	5,349	5,349
Odisha		-	5,349	5,349
	Kalahandi	-	5,349	5,349

figures rounded off.

4.6 SAPPHIRE

Introduction

Sapphire in true sense is a blue, transparent, gem variety of corundum but in trade parlance all gem varieties other than red are called as sapphire. Natural sapphire has low dispersion and hence no fire. Some of them are characterised by the presence of fine parallel fibres as inclusions exhibiting the phenomenon of 'Silk'. With an abnormal amount of silk developed along the lines of crystallisation and when the crystal is cut in en-cabochon fashion, it shows 'asterism' i.e. a white, six-rayed star seen on the surface when examined in light. The blue colour of sapphire is considered to be due to the presence of titanium.

Sapphire occurs as disseminated crystals formed by the following :

1. Magmatic segregation in basic/ultrabasic igneous rocks.
2. Desilication of pegmatite dykes intruded into basic igneous rocks.
3. Metamorphism of highly aluminous rocks.

It also occurs in alluvial placers. Though the resources of sapphire are confined only in Jammu & Kashmir, its occurrences are also reported from Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

Basis of Grade Classification

Sapphire is a prime gem variety of corundum. It is the most fascinating gem stone after diamond.

The blue variety is called 'Sapphire'. In the inventory as on 01.04.2020, the resources have been placed under 'unclassified grade'.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), total resources are broadly classified into 'reserves' and 'remaining resources' category.

According to the norms of this system, the entire estimation of sapphire has been placed under inferred (333) category of remaining resources.

Salient Features of the Inventory

The total quantity of sapphire estimated in the country as on 01.04.2020 at 450 kilogram, is placed under remaining resources category. The entire resource is in a single lease hold (public) deposit and has been estimated in Doda district of Jammu and Kashmir. Since the information of exploitation of this deposit is not available, the resource position remains unchanged since 01.04.2010.

All India scenario of sapphire reserves, remaining resources and total resources as on 01.04.2020 vis-a-vis 01.04.2015 have been given in Tables -1 and 2. The tables give an idea about the changes in terms of increase or decrease of resources as per lease status, grade and state. In Table-3, district wise reserves/resources have been given.

**Table – 2 : Total Resources of Sapphire as on 01.04.2020 vis-à-vis 01.04.2015
(By States)**

State	Total resources		Net Change
	As on 01.04.2020	As on 01.04.2015	
	(In Kilogram)		
All India : Total	450	450	No change
Jammu & Kashmir	450	450	No change

figures rounded off.

Table -3 : District wise Reserves/Resources of Sapphire as on 01.04.2020

State	District name	Reserves	Remaining resources	Total resources
All India : Total		-	450	450
Jammu & Kashmir		-	450	450
	Doda	-	450	450

figures rounded off.

**Table - 1 : Reserves/Resources of Sapphire as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)**

Lease status/Grade	(In Kilogram)								
	Reserves		Remaining resources		Total resources				
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change
All India : Total	-	-	No change	450	450	No change	450	450	No change
Unclassified	-	-	No change	450	450	No change	450	450	No change
Leasehold (Public)	-	-	No change	450	450	No change	450	450	No change
Unclassified	-	-	No change	450	450	No change	450	450	No change

figures rounded off.

4.7 SILVER

Introduction

Silver is a noble and scarce metal. It is white in colour, malleable and resistance to atmospheric oxidation. Hence it is in use since last thousands of years. Apart from its monetary and decorative uses, its highest known electrical conductivity amongst all metals has found application in modern age, viz for printed electric circuits, coating for electronic conductors and in alloys of gold and copper for electric contacts. Its chloride and iodide are light sensitive and hence used in photographic material. These two modern uses are also responsible for contributing its supply as scrap.

It occurs generally with lead, zinc, copper and gold ores and its extraction is as a by-product from electrolysis or chemical methods.

Silver is recovered as a co-product as well as a by-product in the country. Economically viable native silver deposits are not reported. Silver was recovered in the past as a co-product in gold refining, at KGF complex and Hutti Gold Mines in Karnataka, as a by-product in smelting and refining of lead, zinc and copper concentrates at Chanderiya and Debari smelter in Rajasthan, at Tundoo and Moubandar smelters (Ghatsila) in Jharkhand and at Visakhapatnam in Andhra Pradesh. The present production of silver comes from Chanderiya Lead-Zinc smelters of HZL and from gold refinery of HGML. Besides, Hindalco Industries Ltd. recovers silver as a by-product during smelting from imported copper concentrates at Dahej, Gujarat.

Basis of Grade Classification

As silver is associated with copper, lead, zinc and gold mineralisation and recovered as a by-product, hence a specific basis could not be adopted for grade classification. Therefore, the resource classification has been adopted in the inventory in terms of ore and metal.

Basis of Categorisation of Resources

As per United Nations Framework Classification (UNFC), total resources are broadly classified into 'reserves' and 'remaining resources' category.

According to norms of this system reserves of silver ore and corresponding metal have been placed under proved (111) and probable (121) & (122) categories.

The remaining resources have been placed under feasibility (211), pre-feasibility (221) & (222), measured (331), indicated (332) and inferred (333) categories.

Salient Features of the Inventory

The total resources of silver ore in the country as on 01.04.2020 are estimated at 568.64 million tonnes with 30267.91 tonnes of silver metal. Out of the total resources, 170.45 million tonnes ore (29.97%) fall under reserve category containing 7707.07 tonnes silver metal and the balance 398.20 million tonnes of silver ore (70.03%) are remaining resources containing 22560.84 tonnes of silver metal.

All India scenario of silver ore and metal reserves, remaining resources and total resources as on 01.04.2020 vis-a-vis 01.04.2015 have been appended in Tables - 1 and 2. The tables give an idea about the significant changes in terms of increase or decrease of resources as per lease status, grade and state. In Table-3, district wise reserves/resources as on 01.04.2020 have been given.

Of the total resources, 59.97 million tonnes ore (10.55%) containing 1121.80 tonnes metal are in freehold, 122.07 million tonnes ore (21.47%) containing 325.85 tonnes metal are in leasehold public and 386.60 million tonnes ore (67.99%) containing 28820.26 tonnes metal are in leasehold private.

Rajasthan is credited with the largest share of the resources at 490.71 million tonnes ore (86.29%) containing 29642.21 tonnes silver metal followed by Karnataka 25.93 million tonnes ore (4.56%) containing 9.72 tonnes metal, Jharkhand 23.84 million tonnes ore (4.19%) containing 5.22 tonnes metal, Andhra Pradesh 16.95 million tonnes ore (2.98%) containing 128.13 tonnes metal, Uttarakhand 3.39 million tonnes ore (0.59%) containing 138.59 tonnes metal, Madhya Pradesh 3.22 million tonnes of ore (0.57%) containing 159.86 tonnes metal and the rest 4.60 million tonnes ore (0.81%) containing 184.18 tonnes metal are shared by other states namely Maharashtra, Meghalaya, Odisha, Sikkim and Tamil Nadu.

An over all increase of 56.69 million tonnes resources with 286.09 tonnes metal has been recorded in the inventory as on 01.04.2020 in comparison to the earlier inventory as on 01.04.2015. The increase was due to re-estimation of resources in existing freehold and leasehold (private & public) deposits.

**Table - 1 : Reserves/Resources of Silver as on 01.04.2020 vis-à-vis 01.04.2015
(By Lease Status/Grade)**

Lease status/Grade	Reserves			Remaining resources			Total resources		
	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change	01.04.2020	01.04.2015	Net change
	(In Tonne)								
All India : Total									
Ore	170,446,020	150,443,903	(+20,002,117	398,197,732	361,510,732	(+36,687,000	568,643,752	511,954,635	(+56,689,117
Metal	7,707.07	7,171.94	(+535.13	22,560.84	22,809.88	(-249.04	30,267.91	29,981.82	(+286.09
Freehold									
Ore	-	-	-	59,967,079	59,347,079	(+620,000	59,967,079	59,347,079	(+620,000
Metal	-	-	-	1,121.80	1,119.19	(+2.61	1,121.80	1,119.19	(+2.61
Leasehold (Private)									
Ore	103,274,929	93,042,812	(+10,232,117	283,329,000	250,692,000	(+32,637,000	386,603,929	343,734,812	(+42,869,117
Metal	7,490.48	6,957.83	(+532.65	21,329.78	21,582.32	(-252.54	28,820.26	28,540.15	(+280.11
Leasehold (Public)									
Ore	67,171,091	57,401,091	(+9,770,000	54,901,653	51,471,653	(+3,430,000	122,072,744	108,872,744	(+13,200,000
Metal	216.59	214.11	(+2.48	109.26	108.37	(+0.89	325.85	322.48	(+3.37

figures rounded off.

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About 76.72% of the total increase in resources, amounting to 43.49 million tonnes ore with 282.73 tonnes metal have been accounted alone by Rajasthan. The remaining 13.2 million tonnes (23.28%) ore with 3.37 tonnes increase has been accounted by Karnataka.

In Rajasthan, a net increase of 43.49 million tonnes of ore resources containing 282.73 tonnes of metal has been recorded due to re-estimation in resources of existing freehold and leasehold private deposits in the state.

In Karnataka, an increase of 13.20 million tonnes of the resources containing 3.37 tonnes of metal has been recorded due to re-estimation in resources of the existing one leasehold public deposit.

Of the total resources of silver ore, about 211.26 million tonnes (37.15%) resources with 12442.92 tonnes of metal have been estimated under inferred category. These resources are based on very limited and preliminary exploration. If these areas are examined for further detailed exploration, the confidence level of resource position of silver ore in the country may improve.

A total of 38 deposits have been recorded in the inventory as on 01.04.2020, of which 20 deposits are in freehold and 18 in leasehold, comprising 12 deposits in leasehold (Public) and 6 deposits in leasehold (Private).

Table – 2 : Total Resources of Silver as on 01.04.2020 vis-à-vis 01.04.2015 (By States)

State	Total Resources		Net Change
	As on 01.04.2020	As on 01.04.2015	
	(In Tonne)		
All India : Total			
Ore	568,643,752	511,954,635	(+)56,689,117
Metal	30,267.91	29,981.82	(+)286.09
Andhra Pradesh			
Ore	16,950,000	16,950,000	No change
Metal	128.13	128.13	No change
Jharkhand			
Ore	23,840,000	23,840,000	No change
Metal	5.22	5.22	No change
Karnataka			
Ore	25,933,612	12,733,612	(+)13,200,000
Metal	9.72	6.35	(+)3.37
Madhya Pradesh			
Ore	3,216,000	3,216,000	No change
Metal	159.86	159.86	No change
Maharashtra			
Ore	235,000	235,000	No change
Metal	0.23	0.23	No change
Meghalaya			
Ore	880,000	880,000	No change
Metal	19.8	19.8	No change
Odisha			
Ore	1,749,500	1,749,500	No change
Metal	64.91	64.91	No change
Rajasthan			
Ore	490,710,017	447,220,900	(+)43,489,117
Metal	29,642.21	29,359.49	(+)282.72
Sikkim			
Ore	949,623	949,623	No change
Metal	56.69	56.69	No change
Tamil Nadu			
Ore	790,000	790,000	No change
Metal	42.55	42.55	No change
Uttarakhand			
Ore	3,390,000	3,390,000	No change
Metal	138.59	138.59	No change

figures rounded off.

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Table - 3 : District wise Reserves/Resources Silver as on 01.04.2020

(In Tonne)				
State	District	Reserves	Remaining Resources	Total Resources
All India : Total				
	Ore	170,446,020	398,197,732	568,643,752
	Metal	7,707.07	22,560.84	30,267.91
Andhra Pradesh				
	Ore	-	16,950,000	16,950,000
	Metal	-	128.13	128.13
	Guntur			
	Ore	-	16,950,000	16,950,000
	Metal	-	128.13	128.13
Jharkhand				
	Ore	-	23,840,000	23,840,000
	Metal	-	5.22	5.22
	Singhbhum (East)			
	Ore	-	23,840,000	23,840,000
	Metal	-	5.22	5.22
Karnataka				
	Ore	22,120,000	3,813,612	25,933,612
	Metal	5.43	4.29	9.72
	Chitradurga			
	Ore	-	383,612	383,612
	Metal	-	3.40	3.40
	Raichur			
	Ore	22,120,000	3,430,000	25,550,000
	Metal	5.43	0.89	6.32
Madhya Pradesh				
	Ore	-	3,216,000	3,216,000
	Metal	-	159.86	159.86
	Betul			
	Ore	-	2,630,000	2,630,000
	Metal	-	125.52	125.52
	Katni			
	Ore	-	586,000	586,000
	Metal	-	34.34	34.34
Maharashtra				
	Ore	-	235,000	235,000
	Metal	-	0.23	0.23
	Bhandara			
	Ore	-	235,000	235,000
	Metal	-	0.23	0.23
Meghalaya				
	Ore	-	880,000	880,000
	Metal	-	19.80	19.80
	Khasi Hills (East)			
	Ore	-	880,000	880,000
	Metal	-	19.80	19.80

(Contd.)

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Table-3 (Concl.d.)

State	District	Reserves	Remaining Resources	Total Resources
Odisha				
Ore		-	1,749,500	1,749,500
Metal		-	64.91	64.91
	Sundergarh			
	Ore	-	1,749,500	1,749,500
	Metal	-	64.91	64.91
Rajasthan				
Ore		148,326,020	342,383,997	490,710,017
Metal		7,701.64	21,940.57	29,642.21
	Ajmer			
	Ore	3,380,929	8,224,000	11,604,929
	Metal	57.85	238.34	295.92
	Alwar			
	Ore	-	3,150,000	3,150,000
	Metal	-	22.83	22.83
	Bhilwara			
	Ore	39,100,000	45,822,579	84,922,579
	Metal	2,120.20	3,123.55	5,243.75
	Jhunjhunu			
	Ore	45,051,091	26,748,418	71,799,509
	Metal	211.16	84.46	295.62
	Rajsamand			
	Ore	49,000,000	160,360,000	209,360,000
	Metal	4,985.64	13,928.55	18,914.19
	Sikar			
	Ore	-	500,000	500,000
	Metal	-	125.00	125.00
	Udaipur			
	Ore	11,794,000	93,079,000	104,873,000
	Metal	327.06	4,417.84	4,744.90
Sikkim				
Ore		-	949,623	949,623
Metal		-	56.69	56.69
	Sikkim East			
	Ore	-	949,623	949,623
	Metal	-	56.69	56.69
Tamil Nadu				
Ore		-	790,000	790,000
Metal		-	42.55	42.55
	Villupuram			
	Ore	-	790,000	790,000
	Metal	-	42.55	42.55
Uttarakhand				
Ore		-	3,390,000	3,390,000
Metal		-	138.59	138.59
	Dehradun			
	Ore	-	1,790,000	1,790,000
	Metal	-	4.59	4.59
	Pithoragarh			
	Ore	-	1,600,000	1,600,000
	Metal	-	134.00	134.00

figures rounded off.