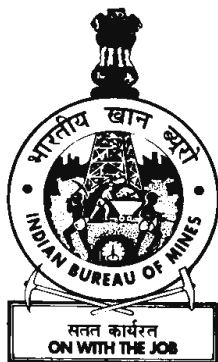


SILVER



Indian Minerals Yearbook 2015

(Part- II : Metals & Alloys)

54th Edition

SILVER

(FINAL RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
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15 Silver

Silver is one of the noble metals. Its brilliant white colour, malleability and resistance to atmospheric oxidation has enhanced its value as a highly desired precious metal which is used in many industrial applications. Apart from its monetary and decorative uses, its highest known electrical conductivity amongst all metals has increased its potential in modern age applications; viz, for printed electric circuits, coating for electronic conductors and in alloys of gold and copper for electrical contacts. Its chloride and iodide are light-sensitive and hence used in photographic material. These two major uses have contributed to increase supply of scrap of silver contained products.

In India, there are no native silver deposits except the small and unique Bharak deposit in Rajasthan. It occurs generally with lead, zinc, copper (especially their sulphide ore) and gold ores and is extracted 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. 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 smelters in Rajasthan, Tundoo and Moubandar (Ghatsila) smelters in Jharkhand and at Visakhapatnam smelter in Andhra Pradesh. The present production of silver comes from Chanderiya lead-zinc smelter of HZL and from gold refinery of HGML. In addition, Hindalco extracts silver as a by-product during smelting of imported copper concentrates at Dahej in Gujarat.

As per Annual Report 2014-15 the installed capacity for recovery of by-product silver at HCL plant is 9.87 tpy. Production of saleable silver (total) was 10.53 moz by HZL for the financial

year 2014-15. The Sindesar Khurd and Kayad mines, of HZL resulting in higher lead and silver volumes. Sindesar-Khurd mine of HZL is a world class silver rich mine having 101 ppm silver grade during the year. A new silver refinery in Pantnagar in Uttarakhand with capacity of 500 MT was commissioned in 2012 by HZL.

RESOURCES

As per the UNFC system, the total resources of silver ore in the country as on 1.4.2013 were estimated at about 519.57 million tonnes. Out of these, 118.28 million tonnes were placed under reserves category and 401.29 million tonnes under the 'remaining resources' category.

The total resources of silver in the country as on 1.4.2013 in terms of metal were estimated at 29,788.35 tonnes, of which 7,907.97 tonnes are under reserves and 21,880.38 tonnes are under the 'remaining resources'.

By States, Rajasthan accounted for about 88% resources in terms of ore, Jharkhand 5%, Andhra Pradesh 3% and Karnataka 2%. Madhya Pradesh, Uttarakhand, Odisha, Meghalaya, Sikkim, Tamil Nadu and Maharashtra together shared 2% ore resources (Table- 1).

PRODUCTION

Silver is recovered as a by-product from lead and zinc concentrates, copper slime and as a co-product of gold refining.

During the year 2014-15, the production of silver at 3,27,647 kg decreased by 6% as compared to the previous year. The production of silver from gold refining was 139 kg in 2014-15 as against 154 kg in 2013-14. One private sector and a public sector undertaking reported production of silver during 2014-15 (Tables- 2 to 4).

In addition, Hindalco Industries Ltd recovered 61,730 kg and 74,820 kg silver from imported copper concentrates in 2013-14 and 2014-15 respectively.

**Table – 1 : Reserves/Resources of Silver as on 1.4.2013
(By Grades/States)**

(In tonnes)

	Reserves				Remaining resources				Total resources				
	Proved	Probable	Total	Feasibility	Pre-feasibility	Measured	Indicated	Inferred	Reconnaissance	Total			
	STD111	STD121	STD122	STD211	STD221	STD222	STD331	STD332	STD333	STD334	(A+B)		
All India : Total													
Ore	73381065	-	44900000	118281065	17368349	1484543	81338273	53600000	4767000	199821729	-	401288894	519569959
Metal	5213.97	-	2694.00	7907.97	107.38	42.85	403.00	3625.20	1995.36	15706.59	-	21880.38	29788.35
Andhra Pradesh													
Ore	-	-	-	-	-	-	16950000	-	-	-	-	16950000	16950000
Metal	-	-	-	-	-	-	128.13	-	-	-	-	128.13	128.13
Jharkhand													
Ore	-	-	-	-	-	-	-	-	23840000	-	-	23840000	23840000
Metal	-	-	-	-	-	-	-	-	5.22	-	-	5.22	5.22
Karnataka													
Ore	8681065	-	-	8681065	-	-	69462	-	-	314150	-	383612	9064677
Metal	2.67	-	-	2.67	-	-	0.48	-	-	2.92	-	3.40	6.07
Madhya Pradesh													
Ore	-	-	-	-	-	-	-	2096000	1120000	-	-	3216000	3216000
Metal	-	-	-	-	-	-	-	150.61	9.25	-	-	159.86	159.86
Maharashtra													
Ore	-	-	-	-	-	-	-	-	235000	-	-	235000	235000
Metal	-	-	-	-	-	-	-	-	0.23	-	-	0.23	0.23
Meghalaya													
Ore	-	-	-	-	-	-	-	880000	-	-	-	880000	880000
Metal	-	-	-	-	-	-	-	19.80	-	-	-	19.80	19.80

(Contd.)

Table - 1 (Concl.d.)

	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)		
Odisha													
Ore	-	-	-	-	960500	119000	-	-	670000	-	1749500	1749500	
Metal	-	-	-	-	27.34	3.40	-	-	34.17	-	64.91	64.91	
Rajasthan													
Ore	64700000	-	44900000	109600000	17368349	88200	64136031	51700000	42970000	172642579	-	348905159	458505159
Metal	5211.30	-	2694.00	7905.30	107.38	0.26	270.95	3463.60	1804.88	15613.93	-	21261.00	29166.30
Sikkim													
Ore	-	-	-	-	435843	63780	300000	-	150000	-	949623	949623	
Metal	-	-	-	-	15.25	0.04	27.60	-	13.80	-	56.69	56.69	
Tamil Nadu													
Ore	-	-	-	-	-	-	-	330000	460000	-	790000	790000	
Metal	-	-	-	-	-	-	-	15.87	26.68	-	42.55	42.55	
Uttarakhand													
Ore	-	-	-	-	-	-	1600000	1400000	390000	-	3390000	3390000	
Metal	-	-	-	-	-	-	134.00	4.20	0.39	-	138.59	138.59	

Figures rounded off.

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Table – 2 : Principal Producers of Silver, 2014-15

Name and address of the producer	Name of Plant	Location of the plant	
		State	District
Hindustan Zinc Ltd, Yashad Bhavan, Udaipur- 313 004 Rajasthan.	Chandera	Rajasthan	Chittorgarh
The Hutti Gold Mines Co. Ltd, Hutti,distt Raichur, 584 115 Karnataka	Hutti	Karnataka	Raichur

**Table – 3 : Production of Silver*, 2012-13 to 2014-15(P)
(By States)**

(Qty in kg; value in ₹'000)

State	2012-13		2013-14		2014-15 (P)	
	Qty	Value	Qty	Value	Qty	Value
India	374046	21234214	349774	15778713	327647	11947042
Karnataka	145	9136	154	6569	139	5117
Rajasthan	373901	21225078	349620	15772144	327508	11941925

*: Excludes by-product recovery of silver by Hindalco Industries Ltd at Dahej, Gujarat from imported copper concentrates.

**Table – 4 : Production of Silver*, 2013-14 and 2014-15(P)
(By Sectors/States/Districts)**

(Qty in kg; value in ₹'000)

State/District	2013-14		2014-15(P)	
	Quantity	Value	Quantity	Value
India	349774	15778713	327647	11947042
Public sector	154	6569	139	5117
Private sector	349620	15772144	327508	11941925
Karnataka/Raichur	154	6569	139	5117
Rajasthan/Chittorgarh	349620	15772144	327508	11941925

* Silver as a by-product:

i) In Karnataka, it is recovered at Raichur while refining of gold at Hutti and Uti gold mines.

ii) In Rajasthan, it is recovered at Chandera, lead-zinc smelters of HZL.

iii) Excludes by-product recovery of 61,730 kg and 74,820 kg silver from imported copper concentrates in 2013-14 and 2014-15, respectively.

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WORLD REVIEW

The total reserves of silver in metal content are estimated at 570,000 tonnes. Peru (21%), Australia & Poland (15% each), Chile (14%), China (8%) and Mexico (6%) are the major countries having silver reserves (Table- 5).

Mexico, Peru, China, Australia, Russia, Bolivia and Poland are the main producers of silver. The global primary as well as by-product mine output slightly increased to 27,427 tonnes of metal content in 2014 from 26,053 tonnes in the previous year. World mine production of silver is given in Table- 6.

Australia

Production in Australia decreased by 7% principally owing to the 15% decrease in production of payable metal in concentrate at BHP Billiton Ltd's Cannington Mine to 769 tonnes in 2014 from 905 tonnes in 2013. The decrease was the result of lower average ore grades but was in accord with plans to cease operation at Cannington in 2015. This was partially offset by increased production from MMG Ltd's Century Mine, which produced 51 tonnes, up from 36 tonnes in 2013, owing to higher ore throughput.

Argentina

Silver production increased by 7% to 900 tonnes in 2014 from 844 tonnes in 2013 owing to production increases at most of the major silver mines and to the startup of Goldcorp Inc.'s Cerro Negro Mine, which produced 67 tonnes of silver and accounted for about half of the growth. Processing of ore at Cerro Negro commenced in July and began ramping up to full capacity of 4,000 tonnes per day of ore. Significant increases in silver production took place at Pan American Silver Corp.'s Manantial Espejo Mine and Troy

Resources Ltd's Casposo Mine. At Manantial Espejo, an 11% increase in the ore throughput and a 5% increase in the silver ore grade resulted in an 18% increase in silver production to 116 tonnes from 98 tonnes in 2013.

Chile

Silver production increased by 29% to 1,574 tonnes in 2014 from 1,219 tonnes in 2013. This increase was mostly due to the beginning of commercial production at Corporación Nacional del Cobre de Chile's (CODELCO's) Ministro Hales Mine. The mine produced 238 tonnes more silver in 2014 than in 2013. Silver production at CODELCO's Chuquicamata Mine increased by 87% to 187 tonnes of silver from 100 tonnes during 2013.

Mexico

Fresnillo plc increased its silver production by 5% to 1,400 t in 2014 from 1,330 t in 2013. Higher throughput at its Saucito Mine resulted in a 33% increase in silver production to 479 t from 360 t in 2013. Production also increased at Fresnillo's Herradura Mine (21 tonnes in 2014 compared with 9 tonnes in 2013) and Noche Buena Mine (3 tonnes in 2014 compared with 2 tonnes in 2013). The increases were partially offset by decreased production at Fresnillo's Ciénega Mine (127 tonnes in 2014 compared with 132 t in 2013) and Fresnillo Mine (625 tonnes in 2014 compared with 708 tonnes in 2013). First Majestic Silver Corp. increased output by 10% to 365 tonnes from 331 tonnes in 2013 owing to increased production at the Del Toro Silver Mine and increased mill production and capacity at the San Martin Silver Mine. Goldcorp produced 803 tonnes of silver at its Peñasquito Mine in 2014, a 15% increase from 698 tonnes in 2013 owing to higher ore grades and an increase in ore processed.

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**Table – 5 : World Reserves of Silver
(By Principal Countries)**

(In tonnes of silver content)

Country	Reserves
World: Total (rounded)	570000
Australia	85000
Bolivia	22000
Canada	7000
Chile	77000
China	43000
Mexico	37000
Peru	120000
Poland	85000
USA	25000
Russia	20000
Other countries	49000

Source: Mineral Commodity Summaries, 2016.

**Table – 6 : Mine Production of Silver
(By Principal Countries)**

(In tonnes of metal content)

Country	2012	2013	2014
World: Total	25064	26053	27427
Argentina	750	774	905
Australia	1727	1840	1847
Bolivia	1206	1287	1345
Canada	685	640	493
Chile	1195	1174	1572
China	3639	3670	3568
Kazakhstan	963	964	989
Mexico	5358	5821	5766
Peru	3481	3674	3778
Poland	1149	1161	1384
Russia*	1400	1412	1334
USA	1055	1037	1184
Other countries	2456	2599	3262

Source: World Mineral Production, 2010-2014.

** Smelted and/or refinery production.*

FOREIGN TRADE

Exports

There were no exports of silver ores and concentrate in 2014-15. Exports of silver in 2014-15 decreased to 5 tonnes from 31 tonnes in the preceding year. Exports were mainly to UAE & Belgium (40% each) and the USA (20%). Export of silver-clad base metals was 22,375 kg during 2014-15. Exports of Semi-Manufactured silver were only at 1 tonne during the year 2014-15 as compared to 31 tonnes in previous year. Besides export of Silver powder was only at 4 tonnes during the year 2014-15 (Tables-7 to 11).

Imports

Imports of silver were 7,708 tonnes in 2014-15 against 6,512 tonnes in the previous year. Imports were mainly from the China (24%), UK (19%), Russia (11%), Korea Rep. of (8%), Hong Kong (7%), Chinese Taipei/Taiwan & Switzerland (6% each) and Sweden (2%). Imports of silver-clad base metals were 2,774 kg in 2014-15 as against 5,486 kg in the previous year. France (43%), USA (41%) and Italy (12%) were the major importers. Imports of Semi-Manufactured silver were 402 tonnes during the year 2014-15 as compared to 414 tonnes in previous year. Besides Imports of Silver unrought were 7,306 tonnes during the year 2014-15 as compared to 6,096 tonnes in previous year. China (24%) and UK(20%) were the major importer. (Tables-12 to 16).

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**Table – 7 : Exports of Silver
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	31	1127885	5	346251
UAE	5	241662	2	139482
Belgium	-	-	2	99340
USA	15	575975	1	48440
UK	++	536	++	13944
Finland	1	24802	++	12429
Iran	2	101496	++	6018
Macedonia	++	3697	++	6009
Italy	++	4131	++	4623
Germany	++	230	++	4348
Turkey	++	15590	++	2743
Other countries	8	159766	++	8875

**Table – 8 : Exports of Silver-clad Base Metals
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (kg)	Value (₹'000)	Qty (kg)	Value (₹'000)
All Countries	2	42	22375	264220
USA	-	-	10491	130912
Canada	-	-	2000	35066
Finland	-	-	860	14996
Singapore	-	-	1177	10593
South Africa	-	-	1260	9688
Philippines	-	-	901	8743
Slovenia	-	-	444	7339
Estonia	-	-	560	7077
Sweden	-	-	1160	6592
Saudi Arabia	-	-	533	4730
Other countries	2	42	2989	28484

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**Table – 9 : Exports of Silver:Semi-Manufactured
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	31	1114052	1	89597
USA	15	565570	1	45270
Finland	1	24802	++	12429
Iran	2	101496	++	6018
Macedonia	++	2891	++	6009
Italy	++	3954	++	4623
Germany	++	163	++	4348
Turkey	++	15590	++	2743
Switzerland	++	6465	++	2198
Japan	++	10	++	1662
Chinese Taipei/Taiwan	++	648	++	1512
Other countries	13	392463	++	2785

**Table – 10 : Exports of Silver:Unwrought
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	13706	++	17848
UK	++	385	++	13905
USA	++	10405	++	3170
Sri Lanka	-	-	++	204
Hong Kong	-	-	++	200
Unspecified	-	-	++	369
Other countries	++	2916	-	-

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**Table – 11 : Exports of Silver:Powder
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	127	4	238806
UAE	-	-	2	139426
Belgium	-	-	2	99340
UK	-	-	++	40
Other countries	++	127	-	-

**Table – 12 : Imports of Silver
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	6512	269736492	7708	276863750
China	1204	49625899	1820	69243611
UK	2305	93422970	1472	50461467
Russia	484	19801048	850	30581026
Germany	291	11867751	742	25772844
Korea, Rep.of	446	18682312	623	22734128
Hong Kong	436	18320175	538	20071243
Chinese Taipei/Taiwan	336	13625141	452	16070065
Switzerland	305	12503977	444	15208675
Sweden	6	266192	161	5519501
Indonesia	20	810176	94	3589976
Other countries	679	30810851	512	17611214

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**Table – 13 : Imports of Silver-clad Base Metals
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (kg)	Value (₹'000)	Qty (kg)	Value (₹'000)
All Countries	5486	80226	2774	28253
USA	1548	17018	1135	12531
Italy	2885	52330	345	7652
France	563	2519	1183	5455
Spain	12	899	5	962
Brazil	-	-	9	700
Germany	404	2854	30	521
UK	21	453	35	262
Guatemala	-	-	12	127
Hong Kong	10	125	20	43
Other countries	43	4028	-	-

**Table – 14 : Imports of Silver Semi-Manufactured
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	414	20276875	402	13865841
Korea, Rep.of	72	2989113	109	3874574
Sweden	5	222125	65	2171553
China	++	5763	53	2021911
Hong Kong	10	415085	36	1370140
Russia	14	567935	14	531426
Finland	10	412135	16	526355
UK	101	4076635	14	523711
USA	75	3316979	25	506270
Thailand	++	96	12	463464
Indonesia	5	219198	10	378280
Other countries	122	8051811	48	1498157

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**Table – 15 : Imports of Silver :Unwrought
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	6096	249347115	7306	262988879
China	1204	49620136	1767	67215582
UK	2204	89346276	1458	49937727
Russia	470	19233113	836	30049600
Germany	286	11645940	740	25685766
Korea, Rep.of	374	15693199	514	18859554
Hong Kong	426	17905090	502	18701103
Chinese Taipei/Taiwan	305	12218006	451	16004694
Switzerland	275	11228065	441	15116713
Sweden	1	44067	96	3347948
Indonesia	15	590978	84	3211695
Other countries	536	21822245	417	14858497

**Table – 16 : Imports of Silver :Powder
(By Countries)**

Country	2013-14		2014-15(P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2	112502	++	9030
China	-	-	++	6118
Germany	++	2979	++	1831
Chinese Taipei/Taiwan	++	18738	++	734
USA	++	143	++	319
UK	++	59	++	28
Other countries	2	90583	-	-

FUTURE OUTLOOK

India is the biggest importer and largest consumer of silver in the world. In spite of a weaker Indian currency the prices plunged from ₹60,000 to ₹35,000 per kg. Global economic slowdown has also affected demand from industrial sector. Silver is woven into fabric in India. Jari is a textile made from threads of silver & gold. Jari is used in the making of sarees. Suits, bridal wear & other clothing for special occasions. India's silver demand for jari has averaged about two million ounces in the past few years. Considering the current pattern of utilisation of silver in the country and the anticipated increase in the GDP, the future

demand for silver is likely to exceed 6,000 tonnes per annum by 2017 as per the report of the Working Group on Mineral Exploration and Development (Other than Coal & Lignite) for the XII Five Year Plan (2012-2017). There is a need for intensifying the exploration for identification of more silver bearing resources from which silver is recovered as a by-product. There are around 12 million tonnes of Cu-Pb-Zn complex sulphide ores in Ambamata (Gujarat), Deri (Rajasthan), Manandur (Tamil Nadu) and Askot (Uttarakhand), which need to be exploited during 12th plan in view of the significant demand for these metals. While recovering these metals, the silver can also be recovered as by-product.