

3.1 ANTIMONY

Introduction

Antimony is a strategic metal. Stibnite (Sb_2S_3 , Sb 71.4%) is the predominant ore of antimony. Antimony in its elemental form is a silver-white, brittle, crystalline, solid metal that exhibits poor electrical and heat conductivity properties. Commercial forms of antimony are generally ingots, broken pieces, granular or cast cake. Estimates of abundance of antimony in earth's crust range from 0.2 to 0.5 parts per million. Antimony ores occur both in deposits associated with volcanic rocks and also more deep-seated veins formed under moderate to high temperatures and pressure. The metal is obtained commonly as a by-product in lead-zinc-silver smelting. The entire requirement of antimony in the country is met through imports of its ore and Concentrates.

Basis of Grade Classification

The chief ore of antimony is stibnite (Sb_2S_3 , Sb 71.4%). It is more commonly obtained as a by-product in lead-zinc-silver mines. The resources have been classified as Ore and Metal.

Basis of Categorisation of Resources

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

Accordingly the entire estimation of antimony has been placed under inferred (333) category of remaining resources.

Salient Features of the Inventory

The total resources of antimony in the country as on 1.4.2015 are placed at 10,588 tonnes ore and 174 tonnes metal. These resources have been estimated in single deposit located in Lahul and Spiti district, Himachal Pradesh.

All India resources of antimony ore and metal, as on 1.4.2015 vis-a-vis 1.4.2010 are given in Tables - 1 to 2. It is evident from the tables that there is no change in resource position. The entire resources are in freehold. In Table - 3 district wise resources have been given.

There is only one deposit of antimony (in freehold area) reported in the country. Entire resources estimated under inferred (333) category.

**Table – 2 : Total Resources of Antimony as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

			(In tonnes)
State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India			
Himachal Pradesh			
Ore	10588	10588	No Change
Metal	174	174	No Change

figures rounded off.

Table -3 : District wise Reserves/Resources of Antimony as on 1.4.2010

State/District	Reserves	Remaining Resources	(In tonnes)
			Total Resources
All India : Total			
Ore	-	10,588	10,588
Metal	-	174	174
Himachal Pradesh/			
Lahul & Spiti			
Ore	-	10,588	10,588
Metal	-	174	174

figures rounded off.

**Table - 1 : Reserves/Resources of Antimony as on 1.4.2015 vis-à-vis 01.04.2010
(By Lease Status/Grade)**

Lease status/Grade	Reserves		Remaining resources			Total resources		
	Net change		Net change			Net change		
	1.4.2015	1.4.2010	1.4.2015	1.4.2010	1.4.2010	1.4.2015	1.4.2010	Net change
All India : Total								
Ore	-	-	10588	10588	No Change	10588	10588	No Change
Metal	-	-	174	174	No Change	174	174	No Change
Freehold								
Ore	-	-	10588	10588	No Change	10588	10588	No Change
Metal	-	-	174	10588	No Change	174	174	No Change

figures rounded off.

3.2 BAUXITE

Introduction

Bauxite is basically an aluminous rock containing hydrated aluminium oxide as the main constituent with varying proportion of iron oxide, silica, titania and other impurities like phosphorous pentoxide and vanadium pentoxide. It is an essential ore of aluminium metal. Hydrated aluminium oxides present in the bauxite ore are gibbsite ($\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$), boehmite ($\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ - alpha monohydrate) and diaspore ($\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ - beta monohydrate).

Bauxite deposits occur as blanket, beds and lenses, pockets or irregular and detrital. The deposits of bauxite according to their mode of formation may be classified into two main types i.e. lateritic type and terra-rossa type. Indian bauxite deposits are formed from weathering of deccan trap basalt, archaean felspathic gneisses and granulites, eocene clay and clayey limestone.

Bauxite is the only mineral raw material from which aluminium is extracted economically. Its other important uses are in manufacture of refractory material, chemicals

and abrasives. Low grade bauxite finds use in small proportion in cement industry and high grade bauxite is used as fluxing material in steel melting shop, ferro-alloy industries, petroleum refineries, etc.

Basis of Grade Classification

The grade classification adopted in the inventory as on 1.4.2015 is based on the report of the Expert Committee to review the classification of Minerals with regards to their Optimum Industrial Use (September, 2004). As per the recommendation of the committee, the specification for alumina and silica content has been revised downward for bauxite being used for metallurgical purpose. A limit of 35 to 40% Al_2O_3 has been defined for bauxite to categorise it as low grade ore.

Basis of categorisation of Resources

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

According to the norms of this system, reserves

Basis of Grade Classification

1. Metallurgical Grade		
a) Metallurgical Grade – I (Predominantly Trihydrate)	Al_2O_3 Reactive Silica Total Silica	(+) 40% 2.8 % (max) 4% (max)
b) Metallurgical grade - II (Mixture of trihydrate and monohydrate)	Al_2O_3 Total Silica	(+) 40% 4% (max)
2. Refractory Grade	Al_2O_3 Fe_2O_3 CaO TiO_2	55% (min) 4.5% (max) 1.5% (max) 6% (max)
3. Abrasive grade	Al_2O_3 SiO_2	45% (min) 1% (max)
4. Chemical grade	Al_2O_3 Fe_2O_3	58% (min) 2.5% (max)
5. Low Grade	Al_2O_3 SiO_2	35 to 40% 10% (max)
6. Chemical/refractory mixed grade		
7. Metallurgical mixed grade		
8. Mixed grade excluding chemical and refractory		
9. Others - Estimation for marketable grades which could not be classified into above grades		
10. Unclassified - Minimum and maximum ranges of chemical constituents are too wide to be classified into any of the above grade.		
11. Not Known – Information on chemical constituents is not available or potential/actual use is not reported.		
12. Beneficiable	Aluminous laterite Bauxite	Al_2O_3 20% (min) Al_2O_3 30% (min) Silica reactive 5%(max.)

of bauxite 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 Inventory

The total resources of bauxite in the country as on 1.4.2015 are estimated at 3,897 million tonnes. These resources include about 656 million tonnes (17%) reserves and 3,240 million tonnes (83%) remaining resources. Out of the total resources, about 65% are in freehold areas and remaining 35% in leasehold areas.

All India scenario of bauxite reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 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, grades and state. In Table - 3 district wise reserves/resources as on 1.4.2015 have been given.

The country is endowed with huge quantities of metallurgical grade bauxite with resources of 3,145 million tonnes, about 81% of the total resources. Out of the total metallurgical grade, about 76% is metallurgical-I, 20% metallurgical - II and remaining 4% is metallurgical mixed grade.

The total resources of metallurgical grade-I bauxite has been increased by 151 million tonnes, metallurgical grade-II by 57 million tonnes and metallurgical mixed grade by 20 million tonnes as compared to earlier inventory.

Although metallurgical grades bauxite is reported from almost all the states in the country, the major resources of metallurgical grades are concentrated in seven states namely, Odisha (1792 million tonnes), Andhra Pradesh (615 million tonnes), Jharkhand (164 million tonnes), Gujarat (129 million tonnes), Maharashtra (127 million tonnes), Madhya Pradesh (125 million tonnes) and Chhattisgarh (120 million tonnes). They together account for 98% of the total metallurgical grades bauxite of the country. However, the resources of chemical, refractory and abrasive grades bauxite are very limited. The resources of abrasive grade bauxite have been mainly reported from Gujarat (2.46 million tonnes), chemical grade from Gujarat (13.2 million tonnes) and Maharashtra (3.9 million

tonnes) and refractory grade from Gujarat (83 million tonnes), Chhattisgarh (45 million tonnes), Madhya Pradesh (6 million tonnes) and Jharkhand (4.4 million tonnes).

State wise, Odisha continued to have the largest share of 1,995 million tonnes (51%) of all India resources, followed by Andhra Pradesh 615 million tonnes (16%), Gujarat 351 million tonnes (9%), Jharkhand 239 million tonnes (6%), Maharashtra 185 million tonnes (5%), Chhattisgarh 174 million tonnes and Madhya Pradesh 173 million tonnes (4% each). The balance 166 million tonnes (5%) resources are accounted together by eight states viz Goa, Karnataka, Tamil Nadu, Uttar Pradesh, Kerala, Bihar, Jammu & Kashmir and Rajasthan.

Overall increase of 417 million tonnes of bauxite resources have been recorded in comparison to earlier inventory as on 1.4.2010.

Seventy two new deposits were added during the five year span of National Mineral Inventory i.e. from 1-04-2010 to 1-04-2015, which included 23 freehold, 46 private leasehold and 3 public leasehold deposits. This has resulted in addition of 160 million tonnes of resources.

The states in which major addition of resources have been reported are Odisha, Gujarat, Jharkhand and Madhya Pradesh. In Odisha resources have been increased by 184 million tonnes mostly due to re-estimation of resources in existing deposits and addition of 21 new freehold deposits in Keonjhar(7), Koraput (10), Kalahandi (1) and Sundargarh (3) districts. In Gujarat resources have been increased by 114 million tonnes, which was due to re-estimation of resources in existing deposits and addition of 10 new private leasehold and 1 new public leasehold deposits in Jamnagar (5), Kheda (3), Sabarkanta (2) and Devbhoomi Dwarka (1) districts. In Jharkhand, addition of 1 new freehold deposit in Gumla district resulted in increase of 56 million tonnes of resources. Upward increase of 27 million tonnes was reported from Madhya Pradesh where 33 new private leasehold deposits were added in Satna (18), Katni (9), Jabalpur (5) and Rewa (1) districts.

A small increase of 10 million tonnes of resources in Maharashtra and 3 million tonnes in Chhattisgarh states was also reported due to either re-estimation or addition of few new deposits. However, a minor decrease of resources of 10 million tonnes in Karnataka and 3 million tonnes in Goa states was also recorded.

Table - 1 : Reserves/Resources of Bauxite as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In '000 tonnes)								
All India : Total	656422	592938	(+) 63484	3240442	2886681	(+)353761	3896864	3479619	(+) 417245
Chemical	6896	2314	(+) 4582	13393	12019	(+) 1374	20289	14332	(+) 5957
Refractory	67158	72268	(-) 5110	77870	21480	(+) 56390	145027	93748	(+) 51279
Chemical/Refractory Mixed with others	4426	3455	(+) 971	15278	13643	(+) 1635	19704	17098	(+) 2606
Metallurgical – 1	439093	378011	(+) 61082	1942349	1852864	(+) 89485	2381442	2230875	(+) 150567
Metallurgical – 2	45296	41894	(+) 3402	592016	538178	(+) 53838	637312	580072	(+) 57240
Metallurgical mixed	15080	16792	(-) 1712	111518	90081	(+) 21437	126598	106873	(+) 19725
Low	40816	41731	(-) 915	281922	231550	(+) 50372	322738	273281	(+) 49457
Mixed Grade excluding Chemical/Refractory	19225	22863	(-) 3638	44092	35321	(+) 8771	63317	58183	(+) 5134
Abrasive	721	172	(+) 549	2906	1867	(+) 1039	3627	2039	(+) 1588
Others	11685	11287	(+) 398	24435	17324	(+) 7111	36120	28611	(+) 7509
Unclassified	5789	1262	(+) 4527	57540	51573	(+) 5967	63329	52835	(+) 10494
Not Known	236	889	(-) 653	22027	20782	(+) 1245	22263	21672	(+) 591
Beneficiable	-	-	-	55096	-	(+) 55096	55096	-	(+) 55096
Freehold	-	-	-	2533979	2419758	(+) 114221	2533979	2419758	(+) 114221
Chemical	-	-	-	12272	11913	(+) 359	12272	11913	(+) 359
Refractory	-	-	-	18956	19058	(-) 102	18956	19058	(-) 102
Chemical/Refractory Mixed with others	-	-	-	12765	12765	-	12765	12765	-

(Contd.)

National Mineral Inventory - An Overview

Table-1 (Contd.)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
Metallurgical - 1	-	-	-	1525314	1509518	(+) 15796	1525314	1509518	(+) 15796
Metallurgical - 2	-	-	-	529762	511726	(+) 18036	529762	511726	(+) 18036
Metallurgical mixed	-	-	-	103032	86331	(+) 16701	103032	86331	(+) 16701
Low	-	-	-	243350	180872	(+) 62478	243350	180872	(+) 62478
Mixed Grade excluding Chemical/Refractory	-	-	-	29436	27299	(+) 2137	29436	27299	(+) 2137
Abrasive	-	-	-	2392	1552	(+) 840	2392	1552	(+) 840
Others	-	-	-	13454	11909	(+) 1545	13454	11909	(+) 1545
Unclassified	-	-	-	21676	26082	(-) 4406	21676	26082	(-) 4406
Not Known	-	-	-	21570	20732	(+) 838	21570	20732	(+) 838
Leasehold (Private)	493549	267593	(+) 225956	433382	410992	(+) 22390	926931	678585	(+) 248346
Chemical	6896	2314	(+) 4582	1121	106	(+) 1015	8018	2419	(+) 5599
Refractory	67158	72268	(-) 5110	58914	2422	(+) 56492	126072	74690	(+) 51382
Chemical/Refractory Mixed with others	4426	3455	(+) 971	1836	879	(+) 957	6262	4333	(+) 1929
Metallurgical - 1	276771	61940	(+) 214831	220397	299168	(-) 78771	497167	361107	(+) 136060
Metallurgical - 2	45296	36462	(+) 8834	57610	21388	(+) 36222	102907	57851	(+) 45056
Metallurgical mixed	15080	16792	(-) 1712	8486	3750	(+) 4736	23566	20542	(+) 3024
Low	40816	41582	(-) 766	37414	45736	(-) 8322	78230	87318	(-) 9088
Mixed Grade excluding Chemical/Refractory	19225	22863	(-) 3638	14656	8021	(+) 6635	33881	30884	(+) 2997

(Contd.)

Table-1 (Concl.d.)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
Abrasive	721	172	(+) 549	514	314	(+) 200	1235	487	(+)748
Others	11469	7939	(+) 3530	5754	3667	(+) 2087	17223	11606	(+) 5617
Unclassified	5455	917	(+) 4538	26224	25491	(+) 733	31679	26408	(+) 5271
Not Known	236	889	(-) 653	457	50	(+) 407	693	939	(-) 246
Leasehold (Public)	162873	325345	(-) 162472	273081	55931	(+) 217150	435954	381276	(+) 54678
Chemical/Refractory Mixed with others	-	-	-	677	-	(+) 677	677	-	(+) 677
Metallurgical - 1	162322	316071	(-) 153749	196639	44179	(+) 152460	358961	360250	(-) 1289
Metallurgical - 2	-	5432	(-) 5432	4644	5063	(-) 419	4644	10495	(-) 5851
Low	-	149	(-) 149	1158	4942	(-) 3784	1158	5091	(-) 3933
Others	216	3348	(-) 3132	5226	1747	(+) 3479	5443	5095	(+) 348
Unclassified	334	345	(-) 11	9640	-	(+) 9640	9974	345	(+) 9629
Beneficial	-	-	-	55096	-	(+) 55096	55096	-	(+) 55096

figures rounded off.

Of the total resources of bauxite, about 1,330 million tonnes (34%) have been estimated under inferred & reconnaissance categories. These resources are based on a limited and preliminary exploration. If these resources are examined for further detailed exploration, the confidence level of resource position of bauxite in the country may improve.

A total 931 deposits of bauxite have been covered in National Mineral Inventory as on 1.4.2015, of which 567 deposits are in freehold areas and 364 deposits in leasehold areas (Public leasehold 44 and private leasehold 320).

**Table – 2 : Total Resources of Bauxite as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

State	Total Resources		(In '000 tonnes)
	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total	3896864	3479619	(+) 417245
Andhra Pradesh	615267	615267	No Change
Bihar	4114	4114	No Change
Chhattisgarh	173755	170979	(+) 2776
Goa	55168	58001	(-) 2833
Gujarat	350581	236720	(+) 113861
Jammu & Kashmir	2725	2025	(+) 700
Jharkhand	239061	146323	(+) 92738
Karnataka	45635	55705	(-) 10070
Kerala	14096	14096	No Change
Madhya Pradesh	173388	146791	(+) 26597
Maharashtra	184574	174885	(+) 9689
Odisha	1994574	1810457	(+) 184117
Rajasthan	528	528	No Change
Tamil Nadu	24491	24820	(-) 329
Uttar Pradesh	18908	18908	No Change

figures rounded off.

Table - 3 : District wise Reserves/Resources of Bauxite as on 1.4.2015

(In '000 tonnes)

State/District	Reserves	Remaining Resources	Total Resources
All India : Total	656422	3240442	3896864
Andhra Pradesh	-	615267	615267
Godavari (East)	-	44696	44696
Visakhapatnam	-	570571	570571
Bihar	-	4114	4114
Monghyr	-	1514	1514
Rohtas	-	2600	2600
Chhattisgarh	15068	158687	173755
Balrampur	7478	3015	10493
Bastar	-	41	41
Bilaspur	-	4412	4412
Dantewara	-	483	483
Jashpur	-	8432	8432
Kabirdham	3026	30544	33570
Kanker	-	47065	47065
Kondagaon	-	988	988
Korba	-	1386	1386
Raigarh	-	3950	3950
Surguja	4565	58371	62935
Goa	13564	41603	55168
North Goa	-	10440	10440
South Goa	13564	31163	44728
Gujarat	185234	165347	350581
Amreli	791	2	793
Bhavnagar	-	638	638
Devbhoomi Dwarka	677	49	726
Jamnagar	160900	78506	239405
Junagarh	-	18785	18785
Kheda	1386	2584	3971
Kutch	17326	40696	58022
Porbandar	4023	2755	6778
Sabarkantha	131	20948	21079
Valsad	-	384	384
Jammu & Kashmir	-	2725	2725
Udhampur	-	2725	2725
Jharkhand	62740	176321	239061
Dumka	-	12830	12830
Gumla	43101	144966	188066
Latehar	-	5561	5561
Lohardaga	16988	9102	26090
Palamau	2651	3862	6513
Karnataka	4389	41246	45635
Belgaum	4389	3564	7952
Chikmagalur	-	200	200

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concl'd.)

State/District	Reserves	Remaining Resources	Total Resources
North Kanara	-	19687	19687
South Kanara	-	16637	16637
Udupi	-	1158	1158
Kerala	-	14096	14096
Kannur	-	7620	7620
Kasargod	-	1870	1870
Kollam	-	2838	2838
Thiruvananthapuram	-	1768	1768
Madhya Pradesh	23591	149797	173388
Anuppur	8633	1167	9800
Balaghat	-	22850	22850
Guna	-	49	49
Jabalpur	854	1486	2340
Katni	5382	40028	45410
Mandla	-	23755	23755
Rewa	1698	35424	37122
Satna	5085	18643	23729
Shahdol	1405	6136	7541
Shivpuri	-	30	30
Sidhi	534	219	754
Vidisha	-	10	10
Maharashtra	26188	158386	184574
Kolhapur	2949	88351	91300
Raigad	17778	18166	35945
Ratnagiri	5460	27008	32468
Satara	-	22110	22110
Sindhudurg	-	1451	1451
Thana (Thane)	-	1300	1300
Odisha	325269	1669305	1994574
Bargarh	-	129850	129850
Bolangir	-	25294	25294
Kalahandi	-	261216	261216
Kandhamal	-	40740	40740
Keonjhar	-	58540	58540
Koraput	146444	603039	749483
Malkangiri	-	17000	17000
Nawapara	-	2000	2000
Raygada	177873	500852	678725
Sundargarh	953	30773	31726
Rajasthan	-	528	528
Kota	-	528	528
Tamil Nadu	379	24112	24491
Dindigul	-	1119	1119
Namakkal	-	6419	6419
Nilgiris	-	14881	14881
Salem	379	1693	2072
Uttar Pradesh	-	18908	18908
Banda	-	14408	14408
Lalitpur	-	4000	4000
Varanasi	-	500	500

Figures rounded of

3.3 COPPER

Introduction

Copper is an important non-ferrous metal having wide range industrial applications. The domestic demand of copper and its alloys is met through domestic production, recycling of scrap and by imports. Hindustan Copper Limited (HCL), a public sector undertaking, is the only integrated producer of primary copper in India. Other two primary producers of copper, viz HINDALCO (Unit of Birla Copper) and Sterlite Industries (India) Ltd., imports copper concentrates for feeding their smelters. They have their smelters located at Dahej, Bharuch district, Gujarat and Tuticorin in coastal Tamil Nadu, respectively. India, however is not self-sufficient in resources of copper ore.

Copper mineralisation occurs in a number of states but major and commercial deposits are located in the states of Madhya Pradesh, Rajasthan, Jharkhand, Gujarat, Andhra Pradesh, Karnataka and Odisha.

Basis of Grade Classification

The copper ore resources are classified on the basis of total metal content i.e. copper. On this basis, grade wise classification is made as follows :

1. Ore with 1.85% Cu and above
2. Ore with 1.0% to (-)1.85% Cu
3. Ore with 0.5 to (-) 1.0% Cu
4. Ore with (-) 0.5% Cu.

Basis of Categorisation of Resources

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

According to norms of this system, 'reserves' of copper ore and corresponding metal has been placed under proved (111) and probable (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 copper ore in the country as on 1.4.2015 are estimated at 1511.49 million tonnes with about 12.15 million tonnes of copper metal. Of these

207.76 million tonnes (13.74%) fall under reserve category containing 2.73 million tonnes of copper metal and the balance 1303.73 million tonnes (86.25%) are remaining resources containing 9.42 million tonnes of copper metal.

All India scenario of copper ore and metal reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 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 1.4.2015 have been given.

Of the total resources, the share of Public Sector is (36.55%), Private Sector (1.7%) and quantities estimated in freehold areas are (61.74%).

Of the total resources, 8.28 million tonnes (0.55%) comprise ore containing 1.85% Cu and above, 657.92 million tonnes (43.53%) of 1% to below 1.85% Cu, 657.69 million tonnes (43.51%) of 0.5 % to (-)1% Cu and 187.59 million tonnes (12.41%) of (-) 0.5% Cu.

Of the three major states, Rajasthan is credited with 813.32 million tonnes ore (53.80%) containing 4.47 million tonnes copper, Jharkhand 295.38 million tonnes ore (19.54%), containing 3.27 million tonnes copper, Madhya Pradesh 283.42 million tonnes ore (18.75%), containing 3.41 million tonnes copper and the rest 7.90% are accounted for by other states namely Andhra Pradesh, Arunachal Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Uttarakhand and West Bengal.

Of the total increase of ore resources, 5.64 million tonnes comprise ore containing ore with 1.85% and above Cu ; 40.12 million tonnes contain (+) 0.5% Cu to below 1% Cu . However, 18.22 million tonnes ore containig 1.00 to below 1.85% Cu and 74.51 million tonnes ore with (-) 0.5 % Cu recorded decrease in the inventory as on 1.4.2015 as compared to 1.4.2010.

A decrease of about 47 million tonnes in ore resources with 0.12 million tonnes of metal recorded in comparison to the earlier inventory as on 1.4.2010. However, a total 19 new deposits having cumulative resources of 383.79 million tonnes containing 2.74 million tonnes metal has been reported in the inventory as on 1.04.2015.

In Rajasthan, a net increase of 36 million tonnes of ore containing 0.84 million tonnes metal resources is attributed due to addition of 13 freehold deposits having 178 million tonnes ore containing 0.17 million tonnes metal. These deposits are reported from Alwar, Banaswara, Bhilwara, Jhunjhunu and Sikar districts. However, decrease of 4.83 million tonnes ore with 0.05 million tonnes metal has been reported by HCL's mines in Jhunjhunu district.

The resources reported in the inventory as on 1.4.2015 in Telangana state was earlier part of Andhra Pradesh.

An increase of 0.010 million tonnes ore with 0.002 million tonnes metal in Arunachal Pradesh due to inclusion of new deposit.

In Madhya Pradesh, a decrease of 93.75 million tonnes ore with 0.40 million tonnes metal is reported mainly due to downward revision of resources in Malanjkhand deposit, Balaghat district. A new leasehold public deposit was reported in Balaghat having 202 million tonnes ore resources containing 2.54 million tonnes metal.

In Chandrapur district, Maharashtra resources has been increased by 1.18 million tonnes ore containing 0.004 million tonnes metal due inclusion of 2 new deposits.

In Karnataka a net increase of 1.13 million tonnes ore with 0.23 million tonnes metal attributed due to addition of 2 leasehold public deposits in Chitradurga district having 3.30 million tonnes ore containing 0.027 million tonnes metal.

As compared to inventory as on 1.4.2010, a decrease of 186.6 million tonnes in reserves and an increase of 139.64 million tonnes in remaining resources categories have been recorded as on 1.4.2015. These changes reflect the improvement in the resources.

Of the total resources of copper ore about 778 million tonnes (51%) resources have been estimated under inferred and reconnaissance categories. 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 copper ore in the country may improve.

In the inventory as on 1.4.2015, total 157 deposits have been covered, of which 141 deposits are in freehold areas and 16 deposits in leasehold areas (Public 15 deposits and Private 01 deposit).

Table - 1 : Reserves/Resources of Copper as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
	(In '000 tonnes)								
All India : Total									
Total Ore	207767	394372	(-)186605	1303730	1164086	(+)139644	1511498	1558458	(-)46960
Total Metal	2734.62	4768.33	(-)2033.71	9423.53	7518.34	(+)1905.19	12158.15	12286.67	(-)128.52
Ore with 1.85% and above Cu	-	-	No Change	8283	2641	(+)5642	8283	2641	(+)5642
Ore with 1.00 to below 1.85% Cu	203834	381698	(-)177864	454091	294447	(+)159644	657925	676145	(-)18220
Ore with (+)0.5% to below 1.00% Cu	3934	588	(+)3346	653764	616982	(+)36782	657698	617570	(+)40128
Ore with (-) 0.5 % Cu	-	12086	(-)12086	187592	250016	(-)62424	187592	262102	(-)74510
Freehold									
Total Ore	-	3227	(-)3227	933297	885796	(+)47501	933297	889022	(+)44275
Total Metal	-	59.74	(-)59.74	5645.72	5408.71	(+)237.01	5645.72	5468.45	(+)177.27
Ore with 1.85% and above Cu	-	-	No Change	8283	2641	(+)5642	8283	2641	(+)5642
Ore with 1.0% to below 1.85% Cu	-	3227	(-)3227	205135	201908	(+)3227	205135	205135	No Change
Ore with (+)0.5% to below 1.00% Cu	-	-	No Change	558002	542279	(+)15723	558002	542279	(+)15723
Ore with (-) 0.5 % Cu	-	-	No Change	161878	138968	(+)22910	161878	138968	(+)22910
Leasehold (Public)									
Total Ore	207767	379059	(-)171292	344719	264662	(+)80057	552486	643721	(-)91235
Total Metal	2734.62	4696.5	(-)1961.89	3752.11	2096.01	(+)1656.1	6486.73	6792.52	(-)305.79
Ore with 1.0% to below 1.85% Cu	203834	378471	(-)174637	248956	92539	(+)156417	452790	471010	(-)18220
Ore with (+)0.5% to below 1.00% Cu	3934	588	(+)3346	95763	74703	(+)21060	99697	75291	(+)24406
Ore with (-) 0.5 % Cu	-	-	No Change	-	97420	(-)97420	-	97420	(-)97420
Leasehold (Private)									
Total Ore	-	12086	(-)12086	25714	13628	(+)12086	25714	25714	No Change
Total Metal	-	12.08	(-)12.08	25.7	13.62	(+)12.08	25.7	25.7	No Change
Ore with (-) 0.5% Cu	-	12086	(-)12086	25714	13628	(+)12086	25714	25714	No Change

figures rounded off.

**Table – 2 : Total Resources of Copper as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(In '000 tonnes)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total			
Ore	1511498	1558458	(-)46960
Metal	12158.15	12286.67	(-)128.52
Andhra Pradesh			
Ore	7582	8248	(-)666
Metal	113.7	122.82	(-)9.12
Arunachal Pradesh			
Ore	10	-	(+)10
Metal	0.02	-	(+)0.02
Gujarat			
Ore	14120	13060	(+)1060
Metal	209.96	208.6	(+)1.36
Haryana			
Ore	32908	32908	No Change
Metal	113.62	113.62	No Change
Jharkhand			
Ore	295389	288126	(+)7263
Metal	3275.4	3094.27	(+)181.13
Karnataka			
Ore	34665	33535	(+)1130
Metal	229.5	229.27	(+)0.23
Madhya Pradesh			
Ore	283429	377188	(-)93759
Metal	3418.5	3819.57	(-)401.07
Maharashtra			
Ore	14390	13210	(+)1180
Metal	137.67	132.7	(+)4.97
Meghalaya			
Ore	880	880	No Change
Metal	9	9	No Change
Nagaland			
Ore	2000	2000	No Change
Metal	15	15	No Change
Odisha			
Ore	6051	6051	No Change
Metal	63.44	63.44	No Change
Rajasthan			
Ore	813327	777171	(+)36156
Metal	4475.81	4390.97	(+)84.84
Sikkim			
Ore	958	958	No Change
Metal	21.47	21.47	No Change
Tamil Nadu			
Ore	790	790	No Change
Metal	3.81	3.81	No Change
Telangana			
Ore	666	-	(+)666
Metal	9.12	-	(+) 9.12
Uttarakhand			
Ore	4220	4220	No Change
Metal	60.04	60.04	No Change
West Bengal			
Ore	113	113	No Change
Metal	2.09	2.09	No Change

figures rounded off.

Table - 3 : District wise Reserves/Resources of Copper as on 1.4.2015

(In '000 tonnes)			
State/District	Reserves	Remaining Resources	Total Resources
All India : Total			
Ore	207767	1303730	1511498
Metal	2734.62	9423.53	12158.15
Andhra Pradesh			
Ore	-	7582	7582
Metal	-	113.7	113.7
Guntur			
Ore	-	3102	3102
Metal	-	43.62	43.62
Kurnool			
Ore	-	1340	1340
Metal	-	12.93	12.93
Prakasam (Ongole H.Q)			
Ore	-	3140	3140
Metal	-	57.15	57.15
Arunachal Pradesh			
Ore	-	10	10
Metal	-	0.02	0.02
East Kameng			
Ore	-	10	10
Metal	-	0.02	0.02
Gujarat			
Ore	-	14120	14120
Metal	-	209.96	209.96
Banaskantha			
Ore	-	14120	14120
Metal	-	209.96	209.96
Haryana			
Ore	-	32908	32908
Metal	-	113.62	113.62
Bhiwani			
Ore	-	2230	2230
Metal	-	11.82	11.82
Mahendragarh			
Ore	-	30678	30678
Metal	-	101.8	101.8
Jharkhand			
Ore	7314	288074	295389
Metal	81.87	3193.53	3275.4

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Hazaribagh			
Ore	-	571	571
Metal	-	13.19	13.19
Singhbhum (East)			
Ore	7314	287503	294818
Metal	81.87	3180.34	3262.21
Karnataka			
Ore	872	33793	34665
Metal	7.71	221.79	229.5
Chikmagalur			
Ore	-	160	160
Metal	-	0.4	0.4
Chitradurga			
Ore	872	3159	4031
Metal	7.71	26.88	34.59
Gulbarga			
Ore	-	1840	1840
Metal	-	11.04	11.04
Hassan			
Ore	-	5324	5324
Metal	-	47.54	47.54
North Kanara			
Ore	-	500	500
Metal	-	6.15	6.15
Raichur			
Ore	-	8230	8230
Metal	-	78.93	78.93
Shimoga			
Ore	-	14580	14580
Metal	-	50.85	50.85
Madhya Pradesh			
Ore	154530	128899	283429
Metal	2036.37	1382.13	3418.5
Balaghat			
Ore	154530	47450	201980
Metal	2036.37	499.17	2535.54
Betul			
Ore	-	6030	6030
Metal	-	38.51	38.51
Jabalpur			
Ore	-	75119	75119
Metal	-	840.97	840.97

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Katni			
Ore	-	300	300
Metal	-	3.48	3.48
Maharashtra			
Ore	-	14390	14390
Metal	-	137.67	137.67
Bhandara			
Ore	-	1072	1072
Metal	-	13.76	13.76
Chandrapur			
Ore	-	9160	9160
Metal	-	73.32	73.32
Gadchiroli			
Ore	-	830	830
Metal	-	6.72	6.72
Nagpur			
Ore	-	3328	3328
Metal	-	43.87	43.87
Meghalaya			
Ore	-	880	880
Metal	-	9	9
Khasi Hills (East)			
Ore	-	880	880
Metal	-	9	9
Nagaland			
Ore	-	2000	2000
Metal	-	15	15
Phek			
Ore	-	2000	2000
Metal	-	15	15
Odisha			
Ore	-	6051	6051
Metal	-	63.44	63.44
Mayurbhanj			
Ore	-	3430	3430
Metal	-	37.98	37.98
Sambalpur			
Ore	-	2621	2621
Metal	-	25.46	25.46
Rajasthan			
Ore	45051	768276	813327
Metal	608.67	3867.14	4475.81

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Ajmer			
Ore	-	8340	8340
Metal	-	66.67	66.67
Alwar			
Ore	-	14837	14837
Metal	-	142.3	142.3
Banswara			
Ore	-	7453	7453
Metal	-	17.08	17.08
Bharatpur			
Ore	-	22	22
Metal	-	0.24	0.24
Bhilwara			
Ore	-	9568	9568
Metal	-	101.9	101.9
Bundi			
Ore	-	1980	1980
Metal	-	18.22	18.22
Chittorgarh			
Ore	-	18720	18720
Metal	-	158.48	158.48
Dausa			
Ore	-	4600	4600
Metal	-	54.28	54.28
Dungarpur			
Ore	-	1090	1090
Metal	-	13	13
Jaipur			
Ore	-	23810	23810
Metal	-	113.43	113.43
Jhunjhunu			
Ore	45051	492113	537164
Metal	608.67	2404.86	3013.53
Pali			
Ore	-	1997	1997
Metal	-	16.58	16.58
Rajsamand			
Ore	-	26800	26800
Metal	-	27.85	27.85
Sikar			
Ore	-	140190	140190
Metal	-	557.24	557.24

(Contd.)

National Mineral Inventory - An Overview

Table-3 (Concl'd.)

State/District	Reserves	Remaining Resources	Total Resources
Sirohi			
Ore	-	7673	7673
Metal	-	111.62	111.62
Udaipur			
Ore	-	9083	9083
Metal	-	63.39	63.39
Sikkim			
Ore	-	958	958
Metal	-	21.47	21.47
Sikkim East			
Ore	-	958	958
Metal	-	21.47	21.47
Tamil Nadu			
Ore	-	790	790
Metal	-	3.81	3.81
Villupuram			
Ore	-	790	790
Metal	-	3.81	3.81
Telangana			
Ore	-	666	666
Metal	-	9.12	9.12
Khammam			
Ore	-	666	666
Metal	-	9.12	9.12
Uttarakhand			
Ore	-	4220	4220
Metal	-	60.04	60.04
Almora			
Ore	-	500	500
Metal	-	2.5	2.5
Dehradun			
Ore	-	390	390
Metal	-	1.44	1.44
Pithoragarh			
Ore	-	3330	3330
Metal	-	56.1	56.1
West Bengal			
Ore	-	113	113
Metal	-	2.09	2.09
Purulia			
Ore	-	113	113
Metal	-	2.09	2.09

figures rounded off.

3.4 LEAD & ZINC

Introduction

Lead and Zinc are strategic metals which have uses in non-ferrous and ferrous industries. Battery sector is known for prime lead consumption while galvanizing is the most important zinc consumer. Most of the Indian lead-zinc resources are confined to Proterozoic fold belt and Precambrians of the western part of the country.

Galena (PbS) is by far the most important ore of lead. Other commonly occurring minerals are Anglesite (PbSO_4) and Cerussite (PbCO_3). The principal ore of zinc is sphalerite (ZnS). Other important minerals are Calamine (ZnCO_3) and Hemimorphite ($2\text{ZnOSiO}_2 \cdot \text{H}_2\text{O}$).

Basis of Grade Classification

The grade classification as adopted in the inventory is based on the report of the committee constituted for revision of end-use grade classification (September, 2004). The lead-zinc ore resources are classified based on the total metal content (Pb+Zn) into three grades namely :

- i) Ore with (+) 10% Pb + Zn
- ii) Ore with 5-10% Pb + Zn
- iii) Ore with (-) 5% Pb + Zn

Presently, M/s Hindustan Zinc Ltd (HZL) is the company holding largest resources of lead & zinc in the country. The leases of HZL are located at Kayar in Ajmer district, Rampura-Agucha in Bhilwara district, Bamnikalan, Rajpura Dariba & Sindesar Khurd in Rajsamand district and Zawar group of mines in Udaipur district of Rajasthan state. Out of these Rampura-Agucha is the largest lead & zinc deposit in the country. Besides, there are 3 lease hold public deposits of lead and zinc, one each in Gujarat, Rajasthan and Sikkim which are not working.

Basis of Categorisation of Resources

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

According to the norm of this system, reserves of lead-zinc 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), inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The total resources of lead & zinc ore in the country as on 1.4.2015 are estimated at 749 million tonnes containing about 13.00 million tonnes of lead metal, 36.36 million tonnes of zinc metal and 0.14 million tonnes of lead & zinc metal. Of these, about 106 million tonnes (14%) of ore have been placed under reserve category containing 2.48 million tonnes of lead metal and 9.99 million tonnes of zinc metal, and the balance 643 million tonnes (86%) of ore under remaining resources with about 10.52 million tonnes of lead metal, 26.36 million tonnes of zinc metal and 0.14 million tonnes of lead & zinc metal.

All India resources of lead & zinc ore and metal with break-up into reserves, remaining resources and total resources as on 1.4.2015 vis-a-vis 1.4.2010 have been given in Tables - 1 and 2. These tables give an idea about the significant changes in terms of increase or decrease in resources as per lease status, grades and state. In Table-3 district wise reserves/resources as on 1.4.2015 have been given.

Of the total resources, about 381 million tonnes (51%) of ore containing 4.43 million tonnes lead metal, 9.09 million tonnes zinc metal and 0.14 million tonnes lead & zinc metal have been placed in freehold areas, while 369 million tonnes (49%) of ore containing 8.57 million tonnes lead metal and 27.27 million tonnes zinc metal have been placed in leasehold areas. In the present inventory as on 1.4.2015, only 7.74 million tonnes (1.03%) resources are held in public sector leaseholds. Remaining 361.1 million tonnes (48.2%) resources are in held in private sector leasehold.

About 17% of the total resources of lead and zinc ore contains (+) 10% lead and zinc, 44% having 5-10% lead and zinc and remaining 39% ore have been estimated with (-) 5% lead and zinc.

About 89% of the country's total resources of lead & zinc are in Rajasthan having 670 million tonnes of ore containing 11.46 million tonnes of lead metal, 34.39 million tonnes of zinc metal and 0.14 million tonnes of lead & zinc metal. Besides, minor resources of lead & zinc ore have also been reported from Andhra Pradesh (22.69 million tonnes), Madhya Pradesh (14.84 million

Table - 1 : Reserves/Resources of Lead & Zinc as on 01.04.2015 vis-à-vis 01.04.2010
(By Lease Status/Grade)

Lease status/Grade	Reserves			Remaining resources			Total resources		
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India :									
Total : Ore	106116	108979	(-) 2863	643343	576614	(+) 66729	749459	685593	(+) 63866
Ore with (+) 10% Pb & Zn.	54387	76093	(-) 21706	69839	63755	(+) 6084	124226	139849	(-) 15623
Ore with 5-10% Pb & Zn.	51729	32886	(+) 18843	278156	219416	(+) 58740	329885	252301	(+) 77584
Ore with (-)5% Pb & Zn	-	-	-	295348	293443	(+) 1905	295348	293443	(+) 1905
Metal									
Lead	2482.34	2245.01	(+) 237.34	10521.36	9304.38	(+) 1216.98	13003.70	11549.39	(+) 1454.31
Zinc	9999.52	12453.26	(-) 2453.74	26363.24	24211.64	(+) 2151.60	36362.76	36664.9	(-) 302.14
Lead & Zinc metal	-	-	-	143.13	118.45	(+)24.68	143.13	118.45	(+)24.68
Freehold									
Total : Ore	-	-	-	380616	378711	(+) 1905	380616	378711	(+) 1905
Ore with (+) 10% Pb & Zn	-	-	-	10095	10095	No Change	10095	10095	No Change
Ore with 5 - 10% Pb & Zn	-	-	-	75419	75418	(+)1	75419	75418	(+)1
Ore with (-) 5% Pb & Zn	-	-	-	295102	293198	(+) 1904	295102	293198	(+) 1904
Metal									
Lead	-	-	-	4432.82	4431.26	(+) 1.56	4432.82	4431.26	(+) 1.56
Zinc	-	-	-	9095.68	9095.68	No Change	9095.68	9095.68	No Change
Lead & Zinc metal	-	-	-	143.13	118.45	(+)24.68	143.13	118.45	(+)24.68
Leasehold (Private)									
Total : Ore	106116	102296	(+) 3820	254984	197903	(+) 57081	361100	300199	(+) 60901
Ore with (+) 10% Pb & Zn	54387	75710	(-) 21323	59360	53660	(+) 5700	113747	129370	(-) 15623
Ore with 5-10% Pb & Zn	51729	26586	(+) 25143	195378	143997	(+) 51381	247107	170583	(+) 76524
Ore with (-) 5% Pb & Zn	-	-	-	246	246	No Change	246	246	No Change
Metal									
Lead	2482.34	2089.31	(+) 393.03	5849.22	4873.12	(+) 976.10	8331.56	6962.43	(+) 1369.13
Zinc	9999.52	12143.40	(-) 2143.88	16878.11	15115.96	(+) 1762.15	26877.63	27259.36	(-) 381.73
Leasehold (Public)									
Total : Ore	-	6683	(-) 6683	7743	-	(+) 7743	7743	6683	(+) 1060
Ore with (+) 10% Pb & Zn	-	383	(-) 383	383	-	(+) 383	383	383	No Change
Ore with 5-10% Pb & Zn	-	6300	(-) 6300	7360	-	(+) 7360	7360	6300	(+) 1060
Metal									
Lead	-	155.7	(-) 155.7	239.32	-	(+) 239.32	239.32	155.7	(+) 83.62
Zinc	-	309.86	(-) 309.86	389.45	-	(+) 389.45	389.45	309.86	(+) 79.59

figures rounded off.

tonnes), Bihar (11.43 million tonnes), Maharashtra (9.27million tonnes), Gujarat (7.2 million tonnes), Uttarakhand (5.6 2 million tonnes), West Bengal (3.7 million tonnes), Odisha (1.75 million tonnes), Sikkim (0.95 million tonnes), Meghalaya (0.88 million tonnes) and Tamil Nadu (0.79 million tonnes). (Table-2).

A net increase of about 63.87 million tonnes of ore resources have been recorded in comparison to earlier inventory as on 1.4.2010. An increase of 1.45 million tonnes of lead metal and 0.02 million tonnes of lead & zinc metal have been recorded in comparison to earlier inventory as on 1.4.2010. Whereas a decrease of 0.30 million tonnes of zinc metal have been recorded in comparison to earlier inventory as on 1.4.2010. Out of the total increase in ore resources, about 62.81 million tonnes (98%) containing 1.37 million tonnes lead metal, have been accounted alone by Rajasthan, due to upward revision in resources of existing deposits in

Ajmer, Rajsamand and Udaipur districts and addition of 03 new freehold deposits (1.91 million tonnes). Besides, minor increase in resources has also been reported from Banaskantha district, Gujarat.

Of the total resources of lead & zinc ore, about 360 million tonnes (48%) has been estimated under inferred (333) and reconnaissance (334) categories, which are based on a very limited and preliminary exploration. If these areas are examined for further detailed exploration the confidence level of resource endowment in the country may improve.

A total of 81 deposits of lead & zinc ore have been covered in the National Mineral Inventory as on 1.4.2015, of which 71 deposits are in freehold area and 10 deposits in leasehold area. Out of these 7 are in private and 3 in public sector.

**Table – 2 : Total Resources of Lead & Zinc as on 1.4.2015 vis-à-vis 1.4.2010
(By States)**

(By States)			(In '000 tonnes)
State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Total			
Ore	749459	685593	(+)63866
Lead Metal	13003.70	11549.39	(+)1454.31
Zinc Metal	36362.76	36664.90	(-)302.14
Lead & Zinc Metal	143.13	118.45	(+)24.68
Andhra Pradesh			
Ore	22689	22689	No Change
Lead Metal	836.88	836.88	No Change
Zinc Metal	63.16	63.16	No Change
Bihar			
Ore	11435	11435	No Change
Lead Metal	24	24	No Change
Zinc Metal	38.75	38.75	No Change
Gujarat			
Ore	7189	6129	(+)1060
Lead Metal	209.70	126.08	(+)83.62
Zinc Metal	344.10	264.51	(+)79.59
Lead & Zinc Metal	0.9	0.9	No Change
Madhya Pradesh			
Ore	14841	14841	No Change
Lead Metal	36.29	36.29	No Change
Zinc Metal	453.74	453.74	No Change
Maharashtra			
Ore	9272	9272	No Change
Zinc Metal	589.67	589.67	No Change

(Contd.)

National Mineral Inventory - An Overview

Table - 2 (Concl'd.)

State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
Meghalaya			
Ore	880	880	No Change
Lead Metal	16.5	16.5	No Change
Zinc Metal	14	14	No Change
Odisha			
Ore	1750	1750	No Change
Lead Metal	76.96	76.96	No Change
Rajasthan			
Ore	670338	607532	(+) 62806
Lead Metal	11464.38	10093.69	(+)1370.69
Zinc Metal	34392.50	34774.23	(-) 381.73
Lead & Zinc Metal	142.23	117.55	(+)24.68
Sikkim			
Ore	950	950	No Change
Lead Metal	8.58	8.58	No Change
Zinc Metal	20.07	20.07	No Change
Tamil Nadu			
Ore	790	790	No Change
Lead Metal	7.74	7.74	No Change
Zinc Metal	36.52	36.52	No Change
Uttarakhand			
Ore	5620	5620	No Change
Lead Metal	182.6	182.6	No Change
Zinc Metal	266.83	266.83	No Change
West Bengal			
Ore	3706	3706	No Change
Lead Metal	140.07	140.07	No Change
Zinc Metal	143.42	143.42	No Change

figures rounded off.

Table - 3 : District wise Reserves/Resources of Lead & Zinc as on 1.4.2015

(In '000 tonnes)			
State/District	Reserves	Remaining Resources	Total Resources
All India : Total			
Ore	106116	643343	749549
Lead Metal	2482.34	10521.36	13003.70
Zinc Metal	9999.52	26363.24	36362.76
Lead & Zinc Metal	-	143.13	143.13
Andhra Pradesh			
Ore	-	22689	22689
Lead Metal	-	836.88	836.88
Zinc Metal	-	63.16	63.16

(Contd.)

National Mineral Inventory - An Overview

Table - 3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Cuddapah			
Ore	-	4310	4310
Lead Metal	-	95.16	95.16
Zinc Metal	-	58.36	58.36
Guntur			
Ore	-	18079	18079
Lead Metal	-	733.72	733.72
Zinc Metal	-	4.8	4.8
Prakasam (Ongole H.Q)			
Ore	-	300	300
Lead Metal	-	8	8
Bihar			
Ore	-	11435	11435
Lead Metal	-	24	24
Zinc Metal	-	38.75	38.75
Banka			
Ore	-	435	435
Zinc Metal	-	14.75	14.75
Rohtas			
Ore	-	11000	11000
Lead Metal	-	24	24
Zinc Metal	-	24	24
Gujarat			
Ore	-	7189	7189
Lead Metal	-	209.7	209.7
Zinc Metal	-	344.1	344.1
Lead & Zinc Metal	-	0.90	0.90
Banaskantha			
Ore	-	6989	6989
Lead Metal	-	209.7	209.7
Zinc Metal	-	344.1	344.1
Vadodara			
Ore	-	200	200
Lead & Zinc Metal	-	0.90	0.90
Madhya Pradesh			
Ore	-	14841	14841
Lead Metal	-	36.29	36.29
Zinc Metal	-	453.74	453.74
Betul			
Ore	-	10446	10446
Lead Metal	-	32.86	32.86
Zinc Metal	-	398.45	398.45

(Contd.)

National Mineral Inventory - An Overview

Table - 3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Chhindwara			
Ore	-	3920	3920
Zinc Metal	-	53.72	53.72
Katni			
Ore	-	476	476
Lead Metal	-	3.43	3.43
Zinc Metal	-	1.57	1.57
Maharashtra			
Ore	-	9272	9272
Zinc Metal	-	589.67	589.67
Nagpur			
Ore	-	9272	9272
Zinc Metal	-	589.67	589.67
Meghalaya			
Ore	-	880	880
Lead Metal	-	16.5	16.5
Zinc Metal	-	14	14
Khasi Hills East			
Ore	-	880	880
Lead Metal	-	16.5	16.5
Zinc Metal	-	14	14
Odisha			
Ore	-	1750	1750
Lead Metal	-	76.96	76.96
Sundargarh			
Ore	-	1750	1750
Lead Metal	-	76.96	76.96
Rajasthan			
Ore	106116	564221	670338
Lead Metal	2482.34	8982.04	11464.38
Zinc Metal	9999.52	24392.98	34392.50
Lead & Zinc Metal	-	142.23	142.23
Ajmer			
Ore	4887	32710	37597
Lead Metal	68	624.53	692.53
Zinc Metal	469	1453.45	1922.45
Bhilwara			
Ore	49500	86193	135693
Lead Metal	919.70	1385.26	2304.96
Zinc Metal	6949.32	6998.23	13947.55
Lead & Zinc Metal	-	24.68	24.68
Chittorgarh			
Ore	-	1200	1200
Lead Metal	-	64.8	64.8
Zinc Metal	-	4.8	4.8
Pali			
Ore	-	1997	1997
Lead Metal	-	2.29	2.29
Zinc Metal	-	106.25	106.25

(Contd.)

National Mineral Inventory - An Overview

Table - 3 (Contd.)

State/District	Reserves	Remaining Resources	Total Resources
Rajsamand			
Ore	38630	192679	231309
Lead Metal	1209.59	4002.72	5212.31
Zinc Metal	2135.31	8336.80	10472.11
Lead & Zinc Metal	-	84.25	84.25
Sikar			
Ore	-	650	650
Lead Metal	-	1.56	1.56
Sirohi			
Ore	-	6604	6604
Lead Metal	-	24.94	24.94
Zinc Metal	-	106.46	106.46
Lead & Zinc Metal	-	33.30	33.30
Udaipur			
Ore	13099	242189	255288
Lead Metal	285.05	2875.94	3160.99
Zinc Metal	445.89	7386.99	7832.88
Sikkim			
Ore	-	950	950
Lead Metal	-	8.58	8.58
Zinc Metal	-	20.07	20.07
Sikkim East			
Ore	-	950	950
Lead Metal	-	8.58	8.58
Zinc Metal	-	20.07	20.07
Tamil Nadu			
Ore	-	790	790
Lead Metal	-	7.74	7.74
Zinc Metal	-	36.52	36.52
Villupuram			
Ore	-	790	790
Lead Metal	-	7.74	7.74
Zinc Metal	-	36.52	36.52
Uttarakhand			
Ore	-	5620	5620
Lead Metal	-	182.60	182.60
Zinc Metal	-	266.83	266.83
Dehradun			
Ore	-	2290	2290
Lead Metal	-	36.75	36.75
Zinc Metal	-	107.99	107.99

(Contd.)

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Table - 3 (Concl.d.)

State/District	Reserves	Remaining Resources	Total Resources
Pithoragarh			
Ore	-	3330	3330
Lead Metal	-	145.85	145.85
Zinc Metal	-	158.84	158.84
West Bengal			
Ore	-	3706	3706
Lead Metal	-	140.07	140.07
Zinc Metal	-	143.42	143.42
Darjeeling			
Ore	-	3706	3706
Lead Metal	-	140.07	140.07
Zinc Metal	-	143.42	143.42

figures rounded off.

3.5 PLATINUM GROUP OF METALS

Introduction

Platinum and Palladium are the commercially important rare metals of the Platinum Group of Metals (PGM), which include iridium, osmium, rhodium and ruthenium. In India incidences of PGM have been reported from the Pre-cambrian mafic/ultramafic complexes in Sukinda and Nausahi sectors of Odisha, Sitampudi in Tamil Nadu, mafic/ultramafic complex of Shimoga schist belt in Karnataka and ultramafic rocks of Madawara igneous complex in Uttar Pradesh.

Since early times, the noble metals were valued as precious metals but their use as catalyst for control of emission especially from vehicle is now prominent. They are also used in electronics and medical field; viz dental and chemotherapy of cancer.

Basis of Grade Classification

The exploration agencies have reported only metal content of the rocks in the areas under exploration and hence resources have been reported in the inventory as on 1.4.2015 in terms of metal only.

Basis of Categorisation of Resources

As per United Nations Framework Classification

(UNFC), resources are broadly classified into 'reserves' and 'remaining resources'.

Accordingly, remaining resources of PGM have been placed under indicated (332) inferred (333) and reconnaissance (334) categories.

Salient Features of the Inventory

The occurrence of PGM is rare and its incidence in country rocks is measured in parts per million or even billion. There is no commercial production of ore or extraction of these metals in India.

There is an increase of 0.01 tonnes of resources of PGM reported from Uttar Pradesh state in comparison to earlier inventory as on 1.4.2010. These resources have been estimated in freehold areas (Tables - 1 and 2). In Table - 3 district wise reserves/resources as on 1.4.2015 have been given.

A total 3 deposits have been covered as on 1.4.2015 including addition of one new deposit with total resources of 0.01 tonnes in Lalitpur District, Uttar Pradesh.

Table – 2 : Total Resources of Platinum Group of Metals as on 1.4.2015 vis-à-vis 1.4.2010 (By States)

			(In tonne)
State	Total Resources		Net Change
	As on 1.4.2015	As on 1.4.2010	
All India : Metal	15.71	15.7	(+) 0.01
Karnataka : Metal	1.5	1.5	No Change
Odisha : Metal	14.2	14.2	No Change
Uttar Pradesh : Metal	0.01	-	(+) 0.01

figures rounded off.

Table - 3 : District wise Reserves/Resources of Platinum Group of Metals as on 1.4.2015

State/District	Reserves	Remaining Resources	(In tonne)
			Total Resources
All India : Total	-	15.71	15.71
Karnataka	-	1.5	1.5
Dawangere	-	1.5	1.5
Odisha	-	14.2	14.2
Keonjhar	-	14.2	14.2
Uttar Pradesh	-	0.01	0.01
Lalitpur	-	0.01	0.01

figures rounded off.

**Table - 1 : Reserves/Resources of Platinum Group of Metals as on 1.4.2015 vis-à-vis 1.4.2010
(By Lease Status/Grade)**

Lease status/Grade	Reserves		Remaining resources		Total resources	
	1.4.2015	1.4.2010	Net change	1.4.2015	1.4.2010	Net change
All India : Total				15.71	15.7	(+) 0.01
Metal	-	-	-	15.71	15.7	(+)0.01
Freehold : Metal	-	-	-	15.71	15.7	(+)0.01

figures rounded off.