CHAPTER 6

RESERVES OF BAUXITE

6.1 WORLD RESERVES[2]

6.1.1 Historical perspective

A number of attempts have been made to estimate the bauxite resources of the world since the turn of the century. The first global estimation indicating bauxite resources of 100 - 200 million tonnes was made in the first year of this century. The bauxite resources then were known only in Europe (France, Italy and Northern Ireland), USA and West Africa. FOX (1927) made an estimation of bauxite resources of several countries, placing the total at 200 million tonnes. The first complete and comprehensive estimation of world bauxite resources was made by Anderson (1936) who estimated ore grade bauxite reserves of the world as 964 million tonnes.

In the late fifties and afterwards a large number of scientific estimates of world bauxite reserves were published. Notable among these are U.S. Bureau of Mines (1950, 60, 82), Bardossy (1964), Hill and Ostojic (1981), Lotze (1978-84), Patterson (1967,86), de Weisse (1972) etc. The increased in bauxite reserves, since the late fifties, can be attributed to the increasing efficiency of bauxite discovered, exploration resulting due to the efforts of producing countries and large aluminium companies. The advancements made in the aluminium processing technology over the years, which allows utilisation of lower grade bauxite ores, is yet another reason for the increased world resources of bauxite.[2].

A number of major discoveries/extensions of known bauxite reserves have come to light through the following sustained exploration campaigns (2):

Country	Exploration period
Australia	1955 - 1960
Guyana	1910 - 1917
Suriname	1915 - 1920
Brazil etc (Amazon Basin)	1968 - 1973
France	1880 - 1900
Yugoslavia	1910 - 1920
Hungary	1925 - 1930
Greece	1933 - 1940
Guinea	1935 - 1950
Jamaica	1950 - 1955
Cameroon	1958 - 1972
East Coast (India)	1960 - 1985
West Kalimantan (Indonesia)	1969- 1974
Southern Vietnam	1977 - 1984

6.1.1 Categorization

Patterson (1986) who has made a recent world resources estimate has distinguished between reserves and resources (sub-economical and new discoveries). Potential resources as defined by Patterson, pertain to materials which can be used only after new technologies make it possible for these ores to be exploited economically. These include (A) grades which are useable today (B) Deposits located in very remote areas (C) Deposits occuring at a depths which are not economically mineable under present conditions.

The latest and most comprehensive estimation of world bauxite reserves and resources has of late been made by Bardossy and Aleva (1990) which is given in the table No. 6.1. This estimation has been made by the authors on the basis of their personal geological observations supported by selected published data, and makes a distinction between proved and probable reserves and hypothetical and sub-economical resources. According to these estimates the global bauxite reserves and resources are placed at 54,000 million metric tonnes which is reasonably close to the total reserves estimated by Patterson in 1986. These estimations distinguish more reserves and less sub-economic and hypothetical resources than Patterson and speculative resources have been excluded from the table.

6.1.3 World Distribution and Ranking

Largest bauxite resources are distributed in the following continents.

1. America
2. Africa
3. Asia
4. Australia
5. Europe.

Guinea followed by Australia have the largest reserves of bauxite in the world (9100 million metric tonnes and 8080 million metric tonnes(MT). respectively. They are closely followed by Brazil (4000 MT.), Vietnam (3300 MT.) India (3035 MT..)(3) Jamaica (2000 MT.) Indonesia (1760 MT.), Venezuela 1150 MT.. and Cameroon (1030 MT.).(2) According to these estimation 88% of the world bauxite resources

belong to lateritic type, 11.5% are Karstic bauxites and only 0.5% belong to Tikhvin type deposits.

The estimates for sub-economic and hypothetical resources could change considerably with further exploration and technological advancement. Majority of these speculative resources of lateritic bauxite are discovered in tropical forests while buried tertiary, mesozoic and paleozoic karstic bauxite deposits may occur in the orogenic mountain systems of central, east and south east Asia (Ref.No.2.).

So far as the Indian Bauxite reserves are concerned, the estimates of Bardossy and Aleva place these at 2420 million metric tonnes. But the currently estimated insitu reserves of bauxite in India are placed over 3037 million tonnes[3]. This is based on the provisional inventory prepared by the Indian Bureau of Mines as on 1.4.90 in concurrence with the Geological Survey of India and other exploration agencies.

Table 6.1

Estimated world bauxite reserves and resources in million metric tons of crude (unbeneficiated) ore

Continents/ Countries	Type of deposits K=Karstic L=Lateritic T=Tikhvin type	Proved/ Probable reserves	Possible reserves	Subeconomic & hypothetical resources	Total
I. Europe					
Albania	K	-	-	1	1
Austria	K	-	-	2	2
Czechoslovakia	K	-	-	5	5

Contd....

Table 6.1

Estimated world bauxite reserves and resources in million metric tons of crude (unbeneficiated) ore (Contd.)

Continents/ countries	Type of deposits K=Karstic L=Lateritic T=Tikhvin type	Proved/ Probable reserves	Possible reserves	Subeconomic & hypothetical resources	Total
Federal Rep.of Germany	L	-	2	-	2
France	K>L	30	200	5	235
Greece	K	300	200	200	700
Hungary	K	160	100	90	350
Italy	K	40	60	40	140
Poland	L>T	-	5	10	15
Romania	K	30	20	10	60
Spain	K	-	-	50	50
United Kingdom (Northern Ireland)	L	-	4	2	6
USSR(European part)	L>T>K	200	100	100	400
Yugoslavia	K	150	200	150	500
Sub-Total		910	891	665	2466
II. Asia					
Afganistan	K	-	-	5	5
Indonesia	L	760	1,000	300	2,060
Iran	K	10	60	30	100
Malaysia	L	20	80	80	180
Pakistan	K>L	20	50	50	120
Peoples Rep. of China	K>T>L	150	250	600	1000
(Taiwan)	L	-	-	60	60

Contd...

Table 6.1

Estimated world bauxite reserves and resources in million metric tons of crude (unbeneficiated) ore (Contd.).

Continents/ countries	Type of deposits K=Karstic L=Lateritic T=Tikhvin type	Proved/ Probable reserves	Possible reserves	Subeconomic & Hypothetical resources	Total
Philippines	L>K	-	20	180	200
Saudi Arabia	L	30	120	-	150
Turkey	K>L	30	200	30	260
USSR(Asian part)	K>L>T	50	200	50	300
Vietnam	L>K	300	3,000	1,400	4,700
Sub-Total		3,510	5,260	3085	11,855
III Africa					
Angola	L	-	-	10	10
Burkina Faso	L	-	-	20	20
Cameroon	L	680	350	300	1,330
Chad	L	-	-	10	10
Ghana	L	180	300	100	580
Guinea	L	2,600	6,500	1,000	10,100
Guinea-Bissau	L	30	130	-	160
Ivory Coast	L	-	120	180	300
Malagashi Rep.	L	-	550	50	600
Malawi	L	-	20	40	60
Mali	L	160	400	100	660
Mozambique	L	-	2	8	10
Sierra Leone	L	40	200	-	240
South African Republic	L	-	20	30	50
Togo	L	-	-	5	5
Zaire	L	-	-	100	100
Zimbabwe	L	-	5	5	10
sub-Total		3690	8,597	1,958	14,245

Contd....

Table 6.1

Estimated world bauxite reserves and resources in million metric tons of crude (unbeneficiated) ore (Contd.)

Continents/ Countries	Type of deposits K= Karstic L= Lateritic T= Tikhvin type.	Proved/ Probable	Possible	Subeconomic & hypothetical resources	Total
IV. America					
Brazil	L	500	3,500	500	4500
Colombia	L	-	50	50	100
Costa Rica	L	40	40	120	200
Cuba	L> K	-	10	10	20
Dominican Republic	K	30	20	-	50
French Guiana	L	40	100	30	170
Guyana	L	400	400	2,000	2,800
Haiti	K	10	40	-	50
Honduras	L	-	-	10	10
Jamaica	K	1,500	500	-	2,000
Mexico	L	-	-	50	50
Panama	L	-	-	70	70
Suriname	L	570	230	-	800
USA	L> K	30	10	280	320
Venezuela	L	350	800	5,000	6,150
Sub-Total		3,470	5,700	8,120	17,290

Contd.....

Table 6.1

Estimated world bauxite reserves and resources in million metric tons of crude (unbeneficiated) ore (Concld.)

Continents/ countries	Type of deposits K=Karstic L=Laterite T=Tikhvin type	Proved Probable	Possible	Subeconomic & hypothetical resources	Total
V. Australia Oceania					
Australia	L	3,530	4,550	-	8,080
Fiji	L	-	5	10	15
Manus Island	L	-	-	1	1
New Zealand	L	-	-	20	20
Polau Island	L	-	10	40	50
Solomon Island	K	50	10	-	60
Sub-Total		3,580	4,575	71	8,226
Total (rounded)		15,200	25,000	13,800	54,000

Note : According to Provisional National Mineral Inventory prepared by IBM as on 1.4.90 the total insitu reserves in India work out to be 3,035 million tonnes (30)

Abbreviations: L = Lateritic bauxite

K = Karst bauxite

T = Tikhvin type bauxite

6.2 INDIAN RESERVES

Even though the bauxite as an ore of aluminium was known in India before the nineteen twenties, the real impetus for prospecting, exploration, mining and evaluation of bauxite was made along with other minerals, after independence when the Industrial Policy Resolution was formulated in 1956. With the rapid strides made by India in the field of bauxite exploration newer magnificent discovaries were made in the Seventies like that of East Coast bauxite belt. This enabled India to make a quantum jump in terms of bauxite reserves. According to latest estimates, India ranks at Vth position both in World insitu reserves and annual production.

6.2.1 Bauxite Reserves estimation - Parameters and Modalities.

6.2.1.1 The Indian Bureau of Mines in concurrence with GSI and other agencies, has compiled the National Mineral Inventory of Bauxite as on 1.4.90. This inventory deals with the all India, statewise, districtwise, categorywise, gradewise and lease-status wise insitu and recoverable reserves, also the resources of bauxite. The basis for ore reserves categorization have been largely adopted from the national classification available with the GSI[4], which is given below:

A. RESERVES : These are "part of identified resource with calculable tonnage of ore or metal including, some that is believed to be present even though not conclusively demonstrated to exist within given boundaries". These have been divided into proved, probable & possible categories depending on degree of assurance of their existence. "Reserves are commercially significant under technoeconomic conditions at the time of their estimation or at a near future date thereafter".

(i) Proved Reserves : The proved reserves "refer to tonnages in ore bodies whose limits and average characteristics are sufficiently assured and changes of these

estimations going beyond reasonable limit, are so remote that mine planning can be made on the basis of these reserves". These reserves must satisfy certain specific conditions.

(ii) Probable Reserves

"These refer to tonnage having reasonable degree of geological assurance to permit choice of suitable parts for further detailed exploration", subject to satisfying certain specific conditions.

(iii) Possible Reserves

"Possible reserves are the first approximation into the realm of quantitive commercial evaluation of the ore body. It also represents the peripheral part of proved and probable category of reserves subject to satisfying certain specific conditions".

B. RESOURCES is "a quantifiable concentration of naturally occuring solid, liquid or gaseous material on earthy or other celestials bodies in such a form that commercial extraction of a usable commodity is possible within a foreseeable future".

(i) Conditional resources : These are a "part of identified resources which will become reserves with favourable changes of such conditions, single or combined, as cost of production, selling price, technology, market, infrastructural facilities etc." These conditional resources can be further sub-divided into paramarginal and submarginal categories.

(ii) Prospective resources These are "part of undiscovered resources comprising estimates not based on measurements of basic parameters but are made in known

mineral districts/belts on several premises like (a) Extrapolation beyond explored lateral and vertical limits on the strength of the knowledge of geological condition (b) Projections made on the basis of indirect evidences like geo-physical and geo-chemical anamolies".

6.2.1.2 The National Mineral Inventories(NMI) of bauxite as on 1.4.90 has identified 12 grades. But in the present tabulations these 12 grade categories have been simplified into the following.- However, a summary of grade specifications adopted by NMI'90 is tabulated in table No.6.6.

Sl. No.	Grades mentioned in the N.M.I.	Simplified grade classification adopted in the present publication
1.	Chemical	Chemical
2.	Refractory	Refractory
3.	Abrasive	Abrasive
4.	Metallurgical grade I	Metallurgical grade
5.	Metallurgical grade II	
6.	Metallurgical mixed	Mixed and lower grade
7.	Mixed grade excluding chemical/refractory	
8.	Chemical/refractory mixed with others	
9.	Low grade	
10.	Others	Unspecified grade
11.	Unclassified	
12.	Not known	

The insitu and recoverable reserves in each case have been tabulated in the three categories namely (A) Leasehold (B) Freehold (C) Leasehold/freehold (unspecified). The reserves and resources have been tabulated in 1,000 tonnes. The recovery and grade of bauxite in India may vary from sector to sector and deposit to deposit. The details of these are available in NMI'90.

6.2.2 All India reserves and resources of Bauxite as per the N.M.I. (1.4.90)

6.2.2.1 Insitu Reserves

The all India insitu reserves of all grades of bauxite in India are placed at 3037 million tonnes. These include 819745.500 tonnes(26.2%) proved reserves, 681256.900 (22.4%) probable reserves and 1536487 600 (50.6%) possible category of reserves (please refer table No.6.2). The All India statewise Insitu & Recoverable Reserves of Bauxite and the status of All India categorywise, gradewise Reserves/Resources of Bauxite is given in table 6.3 A & 6.3 B. respectively.

6.2.2.2 Recoverable reserves

The country has a total recoverable reserves of all grades placed at 2525338 400 tonnes, 668040 800 tonnes (26.5%) constitute proved reserves, 550469.900 tonnes(21.8%) probable reserves and 1306827 700 tonnes (51.7%) possible category of reserves (please refer table No.6.2). These recoverable reserves are distributed in the states of Orissa (57.11%), Andhra Pradesh (23.4%), Madhya Pradesh (5.54%), Gujarat (4.23%), Maharashtra (3.44%), Bihar (2.41%), Goa(1.10%) and Karnataka (1.06%). In addition to above states, small quantities of recoverable bauxite reserves are also distributed in Tamil Nadu, Uttar Pradesh, Kerala, Jammu & Kashmir, Meghalaya and Rajasthan states whose percentage in the overall India reserve ranges between 0.72% to 0.01% (pl. refer table No.6.3.A.

The gradewise and categorywise estimation of all India recoverable reserves of bauxite are summarised under table 6.4.

Table 6.4

Gradewise/Categorywise recoverable reserves of Bauxite as on 1.4.90 (for details please see table 1 & 2)

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Grades	Proved	Probable	Possible	Total (% of AI reserves)
Total of all grades	668040.8 (26.4%)	550469.9 (21.8%)	1306827.7 (51.7%)	2525338.4 (100%)
Chemical	5750.2 (51.5%)	285.2 (2.6%)	5127.2 (45.9%)	11162.6 (0.4%) (100%)
Refractory	10817.9 (42.1%)	369.0 (1.4%)	14531.1 (56.5%)	25718.0 (1.0%) (100%)
Abrasive	800.9 (67.3%)	Nil	388.3 (32.7%)	1189.2 (0.0%) (100%
Metallurgical Gr. I & II	582958.9 (26.5%)	484874.3 (22%)	1136040.6 (51.5%)	2203873.9 (87.27%) (100%
Mixed & low grade	53668.3 (45.62%)	18165.5 (5.44%)	45786.1 (38.92%)	117619.9 (4.6%) (100%
Unspecified	14044.5 (8.4%)	46776.0 (28.2%)	104954.3 (63.31%)	165774.8 (6.56%) (100%

A review of these figures reveal that 87.27% of Indian bauxite reserves are of metallurgical grade (Grade I & II), 4.6% of mixed and low grades, 6.56% of unspecified grade, 1.0% of refractory grade and 0.4% of chemical grade. The reserves of higher grades in the country (Chemical, refractory and abrasive) are rather scarce. The situation demands more vigrous efforts for exploration of newer prospects and more accurate evaluation of existing resources.

6.2.2.3 Bauxite resources : In addition to the above insitu and recoverable reserves the country also has 4,66,000 tonnes of conditional resources of unspecified grade. These have been categorised under possible category. Besides, 9,00,00,000 tonnes of probable resources are also available. These resources of unspecified grade have been categorised under possible category.

Both these resources are distributed in the freehold areas.

6.2.3 Distribution of statewise and districtwise recoverable reserves

The total all-India recoverable reserves as established in N.M.I. (1.4.90) are 252,53,38,000 tonnes. These reserves are distributed in 14 Indian states. Their statewise distribution is given below in order of their ranking (Refer table No.6.5).

6.2.3.1 Orissa : Orissa tops among all Indian states having reserves of bauxite and has a total recoverable reserves of 144,22,75,600 (57.17%). Of these 21.5% comprise proved reserves, 18.5% probable reserves and 60% comprise possible reserves. Of the total recoverable reserves of bauxite found in Orissa, 93.53% are of metallurgical grade, 6.1% of mixed & low grades 0.35% of unspecified grade and 0.0009% are of refractory grade.

The bauxite reserves in Orissa are distributed mainly in the districts of Phulbani, Bolangir, Kalahandi, Kaonjhar, Koraput and Sundergarh. The individual details of these are available in Table No. 4. Of these districts of Orissa, Koraput has the maximum reserves of 60.2% followed by Kalahandi with 25.6% and Bolangir with 11.6% of the state reserves.

6.2.3.2 Andhra Pradesh : Andhra Pradesh ranks at 2nd position among Indian states recording reserves of bauxite. The total recoverable reserves in A.P. are estimated at 59,20,01,200 tonnes (23.4% of all-India reserves), of which 28.7% are placed under proved category, 27.2% under probable category and 44.1% under possible category. All these recoverable reserves are of metallurgical grade. These reserves are distributed in the coastal district of Godavari East and Vishakhapatnam. T h e

break up of these grade-wise and c ategorywise reserves is given in table No.6.5.

6.2.3.3 Madhya Pradesh : Madhya Pradesh ranks at the 3rd position among Indian states having reserves of bauxite. The total recoverable reserves in M.P. amount to 14,07,91,000 (5.58% of all India). These recoverable reserves include 6,28,36,500 tonnes (44.6%) in proved category, 4,03,60,400 tonnes (28.7%) in probable category and 3,75,94,100 tonnes (26.7%) in possible categories. These reserves are distributed mainly in Balaghat, Baster, Bilaspur, Guna, Jabalpur, Mandla, Raigarh, Rajnandgaon, Riwa, Satna, Shahdol, Shivpuri, Sidhi, Surguja and Vidisha districts. Of these Surguja (40.8%) Rewa (18.4%) and Mandla (8.6%) of the state total) are the leading districts having maximum reserves of bauxite.

6.2.3.4 Gujarat : Gujarat ranks at the 4th position among Indian states possessing reserves of bauxite. It has a total recoverable reserves of 10774400 tonnes (4.16% of all India). Gujarat is reputed to be the state having major Indian reserves of high grade (Chemical, refractory and abrasive grades). The metallurgical and lower grades of bauxite are exported from this state in significant quantities. The major deposits of Gujarat are located in Jamnagar, Kutch, Kheda, Sabarkantha, Junagarh, Bhavnagar, Amreli and Valsad districts.

6.2.3.5 Maharashtra : Maharashtra with its total recoverable reserves of 8724900 tonnes (3.45% of all India) is ranked at the 5th position among the Indian states having bauxite reserves. The major reserves are located in Raigad, Kolhapur, Ratnagiri, Satara, Thane, and Sindhudurg, districts.

6.2.3.6 Bihar : Bihar is placed at the 6th rank among Indian bauxite bearing states. It has a total recoverable reserves of 61104100 tonnes accounting for 2.42% of the all-India percentage. The major bauxite reserves are located in Monghyr, Palamau, Rohtas, Gumla, Lohardaga and Dumka districts.

6.2.3.7 Goa : Goa account for 2808900 tonnes of recoverable reserves and contributes 1.11% of all India reserves. The important reserves are located in North and South Goa and other districts.

6.2.3.8 Karnataka : Karnataka is placed at the 8th ranking and has a recoverable reserves of 2741600 tonnes, accounted for 1.08% of the all India reserves. The important bauxite deposit of Karnataka are located in Belgaum, Chi-kmagalur, North Kanara and South Kanara districts.

6.2.3.9 Other states

Tamil Nadu, U.P., Kerala, J & K, Meghalaya and Rajasthan are other Indian states having minor reserves of bauxite, individually accounting for 0.72 to 0.01% of the all-India reserves. The detailed break ups of individual districts is given in table No.6.5.

6.3 Comparison of Reserve status as on 1.1.85 and 1.4.90

The status of Recoverable reserves statewise as per the National Mineral Inventory, as on 1.1.85 and 1.4.90, is given in Table No.6.7 and 6.8 respectively. It may be seen that all India recoverable reserves, have increased from 2333.4 million tonnes in 1985 to 2525.3 million tonnes in 1990, showing an increase of 8.2%.

In some of the states there is an increase in reserves in 1990 as compared to 1985. The states and the percentage increase in their reserves, is given below -

Orissa 5.2%, Andhra Pradesh 30% Madhya Pradesh 11%, Gujarat 22%, Karnataka 1.8% Tamil Nadu 6.3%.

TABLE NO. 6.2 ALL INDIA CATEGORYWISE AND GRADEWISE RESERVES AND RESOURCES OF BAUXITE

SOURCE : NATIONAL MINERAL INVENTORY AS ON 1.4.1990

('000 Tonnes)

	Categorywise and Gradewise reserves/resources in '000 tonnes				
	PROVED (%)	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
IN-SITU RESERVES	9913.2 (59.0) (1.2)	450.5(2.7) (0.1)	6443.3(38.3) (0.42)	16807.0(100%) (0.6)	Chemical
	19943.2 (49.1) (2.4)	656.6(1.6) (0.1)	20034.0(49.3) (1.3)	40633.8(100%) (1.3)	Refractory
	1294.0 (72.7) (0.2)	-	485.3(27.3) (0.03)	1779.3(100%) (0.1)	Abrasive
	694923.0 (27.02) (84.77)	580641.4(22.57) (85.2)	1295991.9(50.39) (84.34)	2571556.3(100%) (84.66)	Metallurgical(I & II)
	73000.6 (42.64) (8.9)	23666.7(13.82) (3.47)	74527.8(43.53) (4.8)	171195.1(100%) (5.63)	Mixed & low grade
	20671.3 (8.77) (2.52)	75941.8(32.20) (11.13)	139005.4(59.00) (9.0)	235518.5(100%) (7.75)	Unspecified grade
TOTAL OF IN-SITU RESERVES	819745.3 (26.9) (100%)	681257.0(22.4%) (100%)	1536487.7(50.6%) (100%)	3037490.0(100%)	
RECOVERABLE RESERVES	5750.2 (51.5) (0.9)	285.2(2.6) (0.1)	5127.2(45.9) (0.4)	11162.6(100%) (0.43)	Chemical
	10817.9 (42.1) (1.6)	369.0(1.4) (0.1)	14531.1(56.5) (1.1)	25718.0(100%) (1.0)	Refractory
	800.9 (67.3) (0.1)	-	388.3(32.7) (0.1)	1189.2(100%) (0.07)	Abrasive
	582958.9 (26.5) (87.26)	484874.3(22) (88.08)	1136040.6(51.5) (86.93)	2203873.9(100%) (87.27)	Metallurgical I & II
	53668.3 (45.62) (8.03)	18165.5(15.44) (3.3)	45786.1(38.92) (3.50)	117619.9(100%) (4.5)	Mixed & low grade
	14044.5 (8.4) (2.10)	46776.0(28.2) (8.49)	104954.3(63.31) (8.03)	165774.8(100%) (6.5)	Unspecified grade
TOTAL OF RECOVERABLE RESERVES	668040.8 (26.5) (100)	550469.9(21.8) (100)	1306827.7(51.7) (100)	2525338.4(100%) (100)	
CONDITIONAL RESOURCES	-	-	466.0(100) (100)	466.0(100%) (100)	Unspecified grade
TOTAL OF CONDITIONAL RESOURCES	-	-	466.0(100) (100)	466.0(100%) (100)	
PROSPECTIVE RESOURCES	-	-	9000.0(100) (100)	9000.0(100%) (100)	Unspecified grade
TOTAL OF PROSPECTIVE RESOURCES	-		9000.0(100) (100)	9000.0(100%) (100)	

NOTE : Figures in paranthesis relate to all India percentage.

TABLE NO. 6.3 A

ALL INDIA STATEWISE INSITU AND RECOVERABLE RESERVES OF BAUXITE

As on 1.4.1990.

(In order of All India Ranking) ('000 tonnes)

	STATE	INSITU RESERVES		RECOVERABLE RESERVES	
I.	Orissa	1606989.7	(52.90%)	1442275.6	(57.11%)
II.	Andhra Pradesh	657780.3	(21.65%)	592001.2	(23.42%)
III.	Madhya Pradesh	277759.0	(9.14%)	140791.0	(5.57%)
IV.	Gujarat	142048.0	(4.6%)	107743.8	(4.26%)
V.	Maharashtra	102883.5	(3.38%)	87249.9	(3.45%)
VI.	Bihar	111041.0	(3.65%)	61104.1	(2.41%)
VII.	Goa	35112.0	(1.15%)	28089.0	(1.11%)
VIII.	Karnataka	45495.0	(1.49%)	27416.1	(1.08%)
IX.	Tamil Nadu	22596.0	(0.74%)	18327.0	(0.72%)
X.	Uttar Pradesh	18907.5	(0.62%)	9420.0	(0.37%)
XI.	Kerala	13205.0	(0.43%)	7923.2	(0.31%)
XII.	Jammu & Kashmir	2025.0	(0.06%)	1783.0	(0.07%)
XIII.	Meghalaya	1120.0	(0.03%)	896.0	(0.03%)
XIV.	Rajasthan	528.0	(0.01%)	318.0	(0.01%)
	ALL INDIA TOTAL	3037490.0	(100%)	2525338.4	(100%)

NOTE : Figures in parenthesis relate to all India percentage.

TABLE No.6.3 B STATUS OF ALL INDIA CATEGORYWISE, GRADEWISE RESERVES/RESOURCES OF BAUXITE

('000 Tonnes)

	All India Categorywise, gradewise reserves/resources in 000' tonnes				
	PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
(1)	(2)	(3)	(4)	(5)	(6)
	a - 529.5	a - 222.1	a - 1,417.6	a - 2,169.2(100%)	Chemical
	b - 9,383.7	b - 228.3	b - 5,025.7	b - 14,637.7	
	c - -	c - -	c - -	c - -	
(A) INSITU RESERVES	a - 10,112.5	a - 512.6	a - 13,261.0	a - 23,886.1	Refractory
	b - 9,830.7	b - 144.0	b - 6,773.0	b - 16,747.7	
	c - -	c - -	c - -	c - -	
	a - 361.0	a - -	a - 31.2	a - 392.2	Abrasive
	b - 933.0	b - -	b - 454.1	b - 1,387.1	
	c - -	c - -	c - -	c - -	
	a - 205,740.9	a - 72,324.7	a - 258,831.0	a - 536,896.6	Metallurgical I & II
	b - 465,563.1	b - 508,316.7	b - 1033,123.9	b - 2,007,003.7	
	c - 23,619.0	c - -	c - 4,037.0	c - 27,656.0	
	a - 14,724.9	a - 15,668.0	a - 44,234.0	a - 34,816.3	Mixed & low grades
	b - 58,275.7	b - 7,750.7	b - 70,104.4	b - 136,130.8	
	c - -	c - 248.0	c - -	c - 248.0	
	a - 3,441.7	a - 12,257.8	a - 21,666.4	a - 37,365.9	Unspecified grade
	b - 17,230.0	b - 63,584.0	b - 117,339.1	b - 198.154.1	
	c - -	c - -	c - -	c - -	
Total of Insitu Reserves	a - 234,910.5	a - 100,985.2	a - 299,630.8	a - 635,526.1	
	b - 561,216.0	b - 580,025.7	b - 1,232,820.2	b - 2,374,059.9	
	c - 23,619.0	c - 248.0	c - 4,037.0	c - 27,904.0	
	a - 316.7	a - 148.2	a - 1,014.6	a - 1,479.5	Chemical
	b - 5,433.5	b - 137.0	b - 4,112.7	b - 9,683.2	
	c - -	c - -	c - -	c - -	
(B) RECOVERABLE RESERVES	a - 4,263.2	a - 293.0	a - 9,877.3	a - 14,433.5	Refractory
	b - 65,554.7	b - 76.0	b - 4,653.8	b - 11,284.5	
	c - -	c - -	c - -	c - -	

Contd..

Contd..Table 6.3B

(1)	(2)	(3)	(4)	(5)	(6)
	a - 253.0 b - 547.9 c - -	a - - b - - c - -	a - 25.0 b - 363.3 c - -	a - 278.0 b - 911.2 c - -	Abrasive
	a - 179,511.3 b - 382,190.5 c - 21,257.0	a - 49,485.0 b - 435,369.4 c - -	a - 223,249.2 b - 909,158.4 c - 3,633.0	a - 452,245.5 b - 1,726,738.3 c - 24,890.0	Metallurgical I & II
	a - 7,983.5 b - 45,684.9 c - -	a - 12,856.7 b - 5,072.0 c - 236	a - 2,697.9 b - 43,088.2 c - -	a - 23,538.1 b 93,845.1 c - -	Mixed & low grades
	a - 3,025.3 b - 11,019.2 c - -	a - 4,428.0 b - 42,348 c - -	a - 16,326.4 b - 88,627.2 c - -	a - 23,779.7 b - 141,994.4 c - -	Unspecified grade
Total of Recoverable Reserves	a - 195,353.1 b - 451,430.7 c - 21,257.0	a - 67,210.8 b - 483,023.2 c - 236.0	a - 253,190.3 b - 1,050,004.4 c - 3,633.0	a - 515,754.2 b - 1,984,458.3 c - 25,126.0	
(C) CONDITIONAL RESOURCES	a - - b - - c - -	a - - b - - c - -	a - - b - 466.0 c - -	a - - b - 466.0 c - -	Unspecified grade
(D) PROSPECTIVE RESOURCES	a - - b - - c - -	a - - b - - c - -	a - - b - - c - -	a - - b - 9,000.0 c - -	Unspecified grade

NOTE : a = Leasehold area
b = Freehold area
c = Leasehold/Freehold

TABLE NO. 6.5

STATEWISE DISTRICTWISE & CATEGORYWISE RECOVERABLE RESERVES OF BAUXITE IN LEASEHOLD & FREEHOLD AREAS (000' TONNES)

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADES	ABBREVIATION
I. ORISSA TOTAL :	310462.0 (21.5%)	266689.0 (18.5%)	865124.6 (60.0%)	1442275.6 (100%)		
	-	-	13.6	13.6 (0.0009%)	Refractory	
	277356.0	264144 .0	807462.0	1348962.0 (93.53%)	Metallurgical	
	33106.0	-	10842.0	43948.0 (1.3%)	Mixed & Low grade	
	-	2545.0	46807.0	49352.0 (3.4%)	Unspecified grade	
IA. Phulbani	b- -	b -	b - 16200.0	b- 16200.0	Metallurgical	
Total	b- -	b -	b - 16200.0	b- 16200.0		
IB. Bolangir	a- 33099.0 b- - c- 21257.0	a - - - b - 98808.0 c - -	a - 7183.0 b - 18056.0 c - 3633.0	a- 40282.0 b- 116864.0 c-24890.0	Metallurgical	
Total :	a- 33099.0 b- - c- 21257.0	a - - b - 98808.0 c - -	a - 7183.0 b - 18056.0 c - 3633.0	a- 40282.0 b- 116864.0 c-24890.0		
IC. Kalahandi	b- - b- 33106.0 b- -	b - - b - 65607.0 b - -	b - 3.6 b - 226656.0 b - 44321.0	b- 3.6 b- 292263.0 b-77,427.0	Refractory Metallurgical Mixed & Low grade	
Total :	b- 33106.0	b- 65607.0	b - 27,0980.6	b-369693.6		
ID.Keonjhar	b- -	b- 2545.0	b - 2455.0	b- 5000.0	Unspecified	
Total :	b- -	b- 2545.0	b - 2455.0	b- 5000.0		
IE.Koraput	a- 96037.0 b- 126963.0 b- - b- -	a- 23778.0 b- 75951.0 b- - b- -	a - 194472.0 b - 341208.0 b - 10800.0 b - 58.0	a-314287.0 b-544122.0 b-10800.0 b- 58.0	Metallurgical Mixed & Low grade Unspecified grade	
Total :	a- 96037.0 b- 126963.0	a- 23778.0 b- 75951.0	a - 194472.0 b - 352066.0	a-314287.0 b-554980.0		

STATE/DISTRICT		PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
IF-Sundergarh		a - -	a - -	a - 10.0	a - 10.0	Refractory
		a - -	a - -	a - 15.0	a - 15.0	Mixed & Low grade
		a - -	a -	a - 54.0	a - 54.0	Metallurgical
	Total :	a - -	a - -	a - 79.0	a - 79.0	
II.ANDHRA PRADESH						
	Total :	169848.0(28.7%)	161199.0 (27.2%)	260954.2 (44.1%)	592001.2 (100%)	Metallurgical
IIA-Godavari East		b - -	b --	b - 37962.2	b - 37962.2	Metallurgical
	Total :	b - -	b - -	b - 37962.2	b - 37962.2	
IIB-Visakhapatnam		b - 169848.0	b - 161199.0	b - 222992.0	b - 554039.0	Metallurgical
	Total :	b - 169848.0	b - 161199.0	b - 222992.0	b - 554039.0	
III-MADHYA PRADESH						
	Total :	62836.5(44.6%)	40360.4(28.7%)	37594.1(26.7%)	140791.0(100.0%)	
		226.7	75.1	432.0	733.7 (0.52%)	Chemical
		3816.0	160.0	2125.4	6101.4 (4.33%)	Refractory
		53227.4	36238.6	15807.9	105273.9 (74.7%)	Metallurgical
		5310.7	2754.0	12943.4	21008.1 (14.92%)	Mixed & Low grade
		255.7	1132.0	6285.3	7673.0 (5.43%)	Unspecified grade
IIIA.Balaghat		b - -	b - -	b - 211.0	b - 211.0	Chemical
		b - -	b - -	b - 577.0	b - 577.0	Refractory
		b - 365.0	b - 2946.0	b - 2104.0	b - 5415.0	Metallurgical
		b - 180.0	b -	b - 2215.0	b - 2395.0	Mixed & Low grades
	Total :	b - 545.0	b - 2946.0	b - 5107.0	b - 8598.0	
IIIB-Bastar		a - 3600.0	a - -	a - -	a - 3600.0	Refractory
		b - 200.0	b - -	b - -	b - 200.0	Chemical
		b - 392.0	b - -	b - -	b - 392.0	Mixed & Low grades
	Total :	a - 3600.0	a - -	a - -	a - 3600.0	
		b - 592.0	b - -	b - -	b - 592.0	

STATE/DISTRICT		PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
IIIC-Bilaspur	a -	134.0	a - 200.0	a - -	a - 334.0	Metallurgical
	b -	1,440.0	b - 309.5	b - 110.7	b - 1,860.2	
	b -	-	b - -	b - 10.5	b - 10.5	Chemical
	b -	-	b - -	b - 13.5	b - 13.5	Refractory
	b -	910.0	b - -	b - 40.0	b - 980.0	Mixed & Low grade
Total :	a -	134.0	a - 200.0	a - -	a - 334.0	
	b -	2,380.0	b - 309.5	b - 174.7	b - 2,864.2	
IIID Guna	b -	-	b - -	b - 8.0	b - 8.0	Refractory
	b -	-	b - -	b - 5.5	b - 5.5	Unspecified grade
	b -	-	b - -	b - 11.5	b - 11.5	Mixed & low grade
Total :	b -	-	b - -	b - 25.0	b - 25.0	
IIF-Jabalpur	a -	-	a - -	a - 2.4	a - 2.4	Chemical
	a -	15.6	a - 160.0	a - 478.1	a - 789.5	Refractory
	b -	64.6	b - -	b - -	b - 64.6	
	a -	90.8	a - 74.0	a - 215.2	a - 380.0	Mixed & Low grade
	b -	3.5	b - -	b - 21.0	b - 24.5	
	a -	466.1	a - 113.6	a - 351.4	a - 931.1	Metallurgical
	b -	-	b - -	b - 133.6	b - 133.6	
	a -	244.4	a - 973.9	a - 3283.5	a - 4501.8	Unspecified grade
	b -	-	b - -	b - 120.0	b - 120.0	
Total	a -	952.7	a - 1,321.5	a - 4,330.5	a - 6,604.7	
	b -	68.1	b - -	b - 274.6	b - 342.7	
IIIF-Mandla	a -	422.5	a -	a - -	a - 422.5	Metallurgical
	b -	3,695.0	b - 5,995.0	b - 1,948.0	b - 11,638.0	
	b -	-	b - -	b - 162.5	b - 162.5	Refractory
	b -	-	b - -	b - 20.0	b - 20.0	Mixed & Low grade
Total	a -	422.5	a - -	a - -	a - 422.5	
	b -	3,695.0	b - 5,995.0	b - 2130.5	b - 11,820.5	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SPECIFIED GRADE
IIG-Raigarh	b - -	b - -	b - 34.0	b - 34.0	Chemical
	b - -	b - -	b - 205.0	b - 205.0	Refractory
	b - -	b - -	b - 196.5	b - 196.5	Metallurgical
	b - 126.0	b - -	b - 4,359.5	b - 4,485.5	Mixed & Low grade
Total :	b - 126.0	b - -	b - 4,795.0	b - 4,921.0	
IIIH-Rajnandgaon	b - -	b - -	b - 11.0	b - 11.0	Chemical
	b - -	b - -	b - 461.0	b - 461.0	Metallurgical
	b - -	b - -	b - 2,815.0	b - 2,815.0	Mixed & Low grade
Total :	b - -	b - -	b - 3,287.0	b - 3,287.0	
III-I- Rewa	a - -	a - -	a - 13.8	a - 13.8	Metallurgical
	b - -	b - 12,945.0	b - 5,590.0	b - 18,535.0	
	b - -	b - -	b - 2,525.0	b - 2,525.0	Mixed & Low grade
	a - -	a - -	a - 2,429.0	a - 2,429.0	Unspecified
	b - -	b - 2,525.0	b - -	b - 2,525.0	
Total :	a - -	a - -	a - 2,442.8	a - 2,442.8	
	b - -	b - 15,470.0	b - 8,115.0	b - 23,585.0	
III-J-Satna	a - - 26.7	a - 75.1	a - 108.9	a - 210 6	Chemical
	b - -	b - -	b - 14.2	b - 14.2	
	a - -	a - -	a - 378.2	a - 378.2	Refractory
	a - -	a - 164.6	a - 3,436.4	a - 3601.0	Metallurgical
	b - 3,330.0	b - -	b - 427.0	b - 3,377.0	
	a - 147.1	a - 145.7	a - 652.7	a - 945.5	Mixed & low grade
	b - -	b - 10.0	b - 6.8	b - 16.8	
	a - - 11.3	a - 124.1	a - 26.5	a - 161.9	Unspecified grade
	b - -	b - 34.0	b - 40.8	b - 74.8	
Total :	a - 185.1	a - 509.5	a - 4602.3	a - 5296.8	
	b - 3,350.0	b - 44.0	b - 88.8	b - 3,482.8	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
III-K-Shahdol	a - 2151.3	a - -	a - -	a - 2151.3	Mixed & Low grade
	b - 1280.0	b - -	b - -	b - 1280.0	
	b - -	b - -	b - 25.0	b - 25.0	Chemical
	b - -	b - -	b - 199.0	b - 199.0	Refractory
	b - 1140.0	b - -	b - 35.0	b - 1175.5	Metallurgical
Total :	a - 2151.3	a - -	a - -	a - 2151.3	
	b - 2420.0	b - -	b - 259.0	b - 2679.5	
III-L-Shivpur	b - -	b - -	b - 15.0	b - 15.0	Chemical
	b - -	b - -	b - 15.0	b - 15.0	Unspecified grade
Total :	b -	b - -	b - 30.0	b - 30.0	
III-M-Sidhi	a - -	a - -	a - 104.2	a - 104.2	Refractory
	a - -	a - -	a - 61.8	a - 61.8	Mixed & low grade
Total :	a -	a -	a - 166.0	a - 166.0	
III-N-Surguja	a - -	a - 13565.0	a - -	a - 13565.0	Metallurgical
	b - 42214.9	b - -	b - 1400.0	b - 43614.9	
	b - -	b - -	b - 360.0	b - 360.0	Unspecified grade
Total :	a - -	a - 13565.0	a - -	a - 13565.0	
	b - 42214.9	b - -	b - 1760.0	b - 43974.9	
III-O-Vidisha	b - -	b - -	b - 5.0	b - 5.0	Unspecified grade
Total :	b - -	b - -	b - 5.0	b - 5.0	
IV- GUJARAT Total:	36422.7(33.8)	18967.2(17.6)	52353.9(48.6)	107743.8(100)	
	4362.5	137.0	494.3	4993.8	Chemical
	5813.1	16.0	10398.3	16227.4	Refractory
	800.9	-	388.3	1189.9	Abrasive
	7457.3	1239.4	14629.0	23325.8	Metallurgical
	12138.7	2286.8	4617.3	19042.8	Mixed & low grade
	5850.2	15288.0	21826.8	42965.0	Unspecified grade
IV-A-Amreli	a - 7.0	a - -	a - -	a - 7.0	Metallurgical
	b - -	b - 1.0	b - -	b - 1.0	
Total	a - 7.0	a - -	a - -	a - 7.0	
	b - -	b - 1.0	b - -	b - 1.0	
IV-B-Bhavnagar	a - -	a - -	a - 410.0	a - 410.0	
	b - 100.0	b - -	b - -	b - 100.0	Metallurgical
Total :	a - -	a - -	a - - 410.0	a - 410.0	
	b - 100.0	b - -	b -	b - 100.0	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
IV-C-Jamnagar	a - 274.0 b - 3142.7	a - - b - 137.0	a - 487.3 b - 7.0	a - 761.3) b - 3286.5)	Chemical
	a - - b - 1511.2	a - 16.0 b - -	a - 8312.8 b - -	a - 8328.7) b - 1511.2)	Refractory
	a - 704.0 b - 5303.4	a - 15.0 b - 319.0	a - 8434.1 b - 38.5	a - 9153.2) b - 5660.9)	Metallurgical
	a - - b - 60.3	a - - b - -	a - 25.0 b - 38.5	a - - 25.0) b - 5 98.8)	Abrasive
	a - - b - 2969.2	a - 125.0 b - 2161.8	a - 1171.4 b - 59.0	a - 1296.4) b - 5190.0)	Mixed & low grade
	a - - b - -	a - - b - -	a - 4374.1 b - 314.0	a - 4374.1) b - 314.0)	Unspecified grade
Total :	a - 978.0 b -129865.0	a - 156.0 b - 2617.8	a - 22804.6 b - 457.0	a - 23938.6 b - 16061.3	
IV-D-Junagarh	a - - b - -	a - - b - -	a - 880.7 b - 13493.0	a - 880.7) b - 13493.0)	Unspecified grade
	a - - b - -	a - - b - -	a - - b - 1288.0	a - -) b - 1288.0)	Metallurgical
Total :	a - - b - -	a - - b - -	a - 880.7 b - 14781.0	a - 880.7) b - 14781.0)	
IV-E-Kheda	a - - b - 162.5	a - - b - -	a - 103.5 b - -	a - 103.5) b - 162.5)	Refractory
	a - - b - 306.5	a - - b - -	a - 29.2 b - -	a - 29.2) b - -)	Metallurgical
	a - - b - -	a - - b - -	a - 118.5 b - -	a - 118.5) b - -)	Mixed & low grade
	a - - b - -	a - - b - -	a - 328.2 b - 35-0	a - 328.2) b - 35.0)	Unspecified grade
Total :	a - - b - 468.5	a - - b - -	a - 579.3 b - 35.0	a - 579.3 b - 35.0	
IV-F-Kutch	a - 16.0 b - 930.0	a - - b - -	a - - b - -	a - 16.0) b - 930.0)	Chemical
	a - 189.0 b - 3951.0	a - - b - -	a - - b - 1777.2	a - 189.0) b - 3728.2)	Refractory
	a - - b - 442.6	a - - b - -	a - - b - 324.8	a - -) b - 767.4)	Abrasive
	a - 2327.3 b - 6842.2	a - - b - -	a - - b - 3074.0	a - 2327.3) b - 9916.2)	Mixed & Low grade
	a - 589.0 b - 5257.2	a - - b - 32.0	a - - b - 2154.4	a - 589.0) b - 7443.6)	Unspecified grade
Total :	a - 3374.3 b - 18459.4	a - - b - 66.4	a - - b - 11759.6	a - 3374.3 b - 30285.4	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
IV-G-Sabarkantha	a - - b - -	a - - b - -	a - 204.8 b - -	a - 204.8 b - -	Refractory
	a - - b - -	a - - b - 504.0	a - 247.4 b - -	a - 247.4 b - 504.0	Unspecified grade
	a - - b - -	a - - b - 608.0	a - - b - -	a - - b - 608.0	Metallurgical
	a - - b - -	a - - b - 14752.0	a - 194.5 b - -	a - 194.5 b - 14752.0	Mixed & low grade
Total :	a - - b - -	a - - b - 15864.0	a - 646.7 b - -	a - 646.7 b - 15864.0	
IV-H-Valsad	a - - b - -	a - - b - 262.0	a - - b - -	a - - b - 262.0	Metallurgical
	a - - b - 45.0	a - - b - -	a - - b - -	a - - b - 45.0	Abrasive
Total :	a - - b - 45.0	a - - b - 262.0	a - - b - -	a - - b - 307.0	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SPECIFIED GRADE
(V) MAHARKSHTRA	58098.6 (66.6%)	11761.9 (13.5%)	17389.4 (19.9%)	87249.9 (100.0%)	
Total :	1161.0	73.1	3780.0	5014.1 (5.74%)	Chemical
	-	48.0	-	48.0	Refractory
	56797.6	4936.8	7067.0	68801.4 (78.8%)	Metallurgical
	140.0	6704.0	4293.0	11137.0 (12.76%)	Mixed & low grade
	-	-	2249.0	2249.0 (2.57%)	Unspecified grade
V-A-Raigad	a - -	a - 73.1	a - -	a - 73.1	Chemical
	b - -	b - -	b - 128.0	b - 128.0	
	a - 309.3	a - 263.3	a - 52.4	a - 624.9	Metallurgical
	b - 9659.0	b - 135.0	b - 279.0	b - 10073.0	
	b - -	b - 48.0	b - -	b - 48.0	Refractory
Total :	a - 309.3	a - 336.4	a - 52.4	a - 698.1	
	b - 9659.0	b - 135.0	b - 279.0	b - 10073.0	
V-B-Kolhapur	a - 39574.0	a - 4010.0	a - 1007.0	a - 44591.0	Metallurgical
	b - 5256.0	b - -	b - 4023.0	b - 9279.0	
	b - 1161.0	b - -	b - 2556.0	b - 3717.0	Chemical
	a - 140.0	a - -	a - -	a - 140.0	Mixed & Low grade
	b - -	b - -	b - 1629.0	b - 1629.0	
Total :	a - 39714.0	a - 4010.0	a - 1007.0	a - 44731.0	
	b - 6417.0	b - -	b - 8208.0	b - 14625.0	
V-C-Ratnagiri	a - -	a - 57.0	a - 124.0	a - 181.0	Metallurgical
	b - 568.0	b - 98.5	b - 524.0	b - 1190.5	
	b - -	b - -	b - 776.0	b - 776.0	Chemical
	b - -	b - -	b - 2264.0	b - 2264.0	Mixed & low grade
	b - -	b - -	b - 1098.0	b - 1098.0	Unspecified grade
Total :	a - -	a - 57.0	a - 124.0	a - 181.0	
	b - 568.0	b - 98.5	b - 4662.0	b - 5328.5	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SPECIFIED GRADE
V-D- SATARA	b - -	b - 290.0	b - -	b - 290.0	Metallurgical
	b - -	b - 6704.0	b - -	b - 6704.0	Mixed & low grade
Total :	b - -	b - 6994.0	b - -	b - 6994.0	
V-E-Thana	b - -	b - -	b - 320.0	b - 320.0	Chemical
	b - -	b - -	b - 400.0	b - 400.0	Mixed & low grade
Total :	b - -	b - -	b - 720.0	b - 720.0	
V-F-Sindhudurg	a - 1084.0	a - -	a - -	a - 1084.0	Metallurgical
Total :	a - 1084.0	a - -	a - -	a - 1084.0	
VI-BIHAR					
Total :	11892.7 (19.5 %)	13498.1 (22.1 %)	35713.4 (58.4%)	61104.1 (100 %)	
	-	-	5.0	5.0 (0.008%)	Chemical
	26.5	23.5	387.8	437.8 (0.71%)	Refractory
	7993.2	5964.6	18824.5	32782.3 (53.6%)	Metallurgical
	3177.0	7264.0	11637.8	22078.8 (36.1%)	Mixed & low grade
VI-A-Monghyr	b - -	b - -	b - 805.5	b - 805.5	Mixed & low grade
	b - -	b - -	b - 7.5	b - 7.5	Unspecified grade
Total :	b - -	b - -	b - 813.0	b - 813.0	
VI-B-Palamau	a - -	a - -	a - 1400.0	a - 1400.0	Metallurgical
	b - -	b - -	b - 733.6	b - 733.6	
	b - -	b - -	b - 1189.6	b - 1189.6	Mixed & low grade
Total :	a - -	a - -	a - 1400.0	a - 1400.0	
	b - -	b - -	b - 1923.1	b - 1923.2	

STATE/DISTRICT		PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
VI.C-Rohtas		b - -	b - -	b - 1,250.0	b - 1,250.0	Mixed & low grade
		b - -	b - -	b - 50.0	b - 50.0	Unspecified grade
	Total :	b - -	b - -	b - 1,300.0	b - 1,300.0	
VI-D-Gumla		a - -	a - -	a - 262.8	a - 262.8	Refractory
		b - -	b - -	b - 102.0	b - 102.0	
		a - 2,528.7	a - 3,370.1	a - 1,579.5	a - 7,478.3	Metallurgical
		b - 1,028.0	b - -	b - 13,359.1	b - 14,387.1	
		a - 281.0	a - 109.0	a - 28.0	a - 398.0	Mixed & low grade
		b - 36.0	b - 7,401.0	b - 3,628.0	b - 11,065.0	
		b - -	b - -	b - 5.0	b - 5.0	Chemical
		b - 660.0	b - -	b - 2,774.3	b - 3,434.3	Unspecified grade
	Total :	a - 2,789.7	a - 3,479.1	a - 1,870.3	a - 8,139.1	
		b - 1,724.0	b - 7,401.0	b - 19,868.4	b 28,993.4	
VI-E-Lohardaga		a - 26.5	a - 23.5	a - 23.0	a - 73.0	Refractory
		a - 3,161.5	a - 2,432.5	a - 1,671.3	a - 7,265.3	Metallurgical
		b - 1,275.0	b - 162.0	b - 81.0	b - 1,518.0	
		a - 1,500.0	a - -	a - -	a - 1,500.0	Mixed & low grade
		b - 1,416.0	b - -	b - 364.4	b - 1,782.4	
		b - -	b - -	b - 1.8	b - 1.8	Unspecified grade
	Total :	a - 4,688.0	a - 2,456.0	a - 1,694.3	a - 8838.3	
		b - 2,691.0	b - 162.0	b - 429.2	b - 3282.2	
VI-F-Dumka		b - -	b - -	b - 6,415.0	b - 6,415.0	Mixed & low grade
	Total :	b - -	b - -	b - 6,415.0	b - 6,415.0	
VII- GOA	Total	8,426.0 (30.0%)	9,885.0(35.2%)	9,778.0(34.8%)	28089.0 (100%)	
		-	-	1,504.0	1,504.0 (5.35%)	Refractory
		5,456.0	914.0	2,671.0	9,041.0 (32.18%)	Metallurgical
		2,970.0	8,971.8	2,765.0	14706.0 (52.3%)	Mixed & low grade
		-	-	2838.0	2838.0(10.10%)	

STATE/DISTRICT		PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
VII-A-North Goa		b - -	b - 210.0	b - 782.0	b - 992.0	Mixed & low grade
	Total:	b - -	b - 210.0	b - 782.0	b - 992.0	
VII-B-South Goa		a - -	a - 914.0	a - -	a - 914.0	Metallurgical
		a - 2,970.0	a - 8,761.0	a - 1,983.0	a - 13,714.0	Mixed & low grade
		a - -	a - -	a - 2,838.0	a - 2,838.0	Unspecified grade
	Total :	a - 2,970.0	a - 9,675.0	a - 4,821.0	a - 17,466.0	
VII-C-Unknown District		b - -	b - -	b - 1,504.0	b - 1,504.0	Refractory
		b - 5,456.0	b - -	b - 2,671.0	b - 8,127.0	Metallurgical
	Total :	b - 5,456.0	b - -	b - 4,175.0	b - 9,631.0	
VII. KARNATAKA	Total :	1,743.3(6.4 %))	6,001.4(21.9 %)	19,671.5 (71.8%)	27,416.1(100%)	
		296.3	93.5	102.0	491.7 (1.79%)	Refractory
		1,407.4	4,593.9	8,558.6	14,559.9 (53.10%)	Metallurgical
		39.6	1,314.0	7,729.3	9,082.9 (33.12%)	Mixed & low grade
		-	-	2,501.6	2,501.6 (0.09%)	Unspecified grade
VIII-A- Belgaum		a - 202.0	a - -	a - -	a - 202.0	Metallurgical
		b - -	b - 420.0	b - 263.0	b - 683.0	
		a - 39.6	a - 162.0	a - -	a - 201.6	Mixed & low grade
	Total :	a - 241.6	a - 162.0	a - -	a - 403.6	
		b - -	b - 420.0	b - 263.0	b - 683.0	
VIII-B-Chikamagalur		b - -	b - -	b - 120.0	b - 120.0	Metallurgical
	Total :	b - -	b - -	b - 120.0	b - 120.0	

STATE		PROVED	PROBABLE	POSSIBLE	TOTAL	SPECIFIED GRADE
VIII-C- North Kanara		b - -	b - -	b - 102.0	b - 102.0	Refractory
		b - -	b - 300.0	b - 4,477.0	b - 4,777.0	Metallurgical
		b - -	b - 720.0	b - 6,675.5	b - 7,395.5	Mixed & low grade
		b - -	b - -	b - 48.0	b - 48.0	Unspecified grade
	Total :	b - -	b - 1,020.0	b - 11,302.5	b - 12,322.5	
VIII-D-South Kanara		a - 296.3	a - 93.5	a - -	a - 389.8	Refractory
		a - 1,185.4	a - 373.9	a - 2,965.1	a - 4,524.4	Metallurgical
		b - 20.0	b - 3,500.0	b - 733.5	b - 4,253.5	
		b - -	b - 432.0	b - 1,833.8	b - 2,265.8	Mixed & low grade
		b - -	b - -	b - 2,453.6	b - 2,453.6	Unspecified grade
	Total :	a - 1,481.7	a - 467.4	a - 2,965.1	a - 4,914.2	
		b - 20.0	b - 3,932.0	b - 5,020.3	b - 8,972.9	
IX.- TAMIL NADU	Total :	1,359.0 (7.4 %)	15,064.0 (82.2 %)	1,904.0 (10.4 %)	18,327.0 (100 %)	
		-	28.0	-	28.0 (0.15%)	Refractory
		1,359.0	4,748.0	66.0	6,173.0 (33.6%)	Metallurgical
		-	10,288.0	498.0	10,786.0 (58.8%)	Mixed & low grade
		-	-	1,340.0	1,340.0 (7.31%)	Unspecified grade
IX-A-Madurai		b - -	b - -	b - 16.0	b - 16.0	Unspecified grade
	Total :	b - -	b - -	b - 16.0	b - 16.0	
IX-B-Nilgiris		a - -	a - -	a - 66.0	a - 66.0	Metallurgical
		b - -	b - 800.0	b - -	b - 800.0	
		a - -	a - 1,135.0	a - 50.0	a - 1,185.0	Mixed & low grade
		b - -	b - 4,072.0	b - 448.0	b - 4,520.0	
		b - -	b - 28.0	b - -	b - 28.0	Refractory
		b - -	b - -	b - 1,324.0	b - 1,324.0	Unspecified grade
	Total :	a - -	a - 1,135.0	a - 116.0	a - 1,251.0	
		b - -	b - 4,900.0	b - 1,772.0	b - 6,672.0	

STATE/DISTRICT		PROVED	PROBABLE	POSSIBLE	TOTAL	SPECIFIED GRADE
IX-C-Salem		a - 597.0 b - 762.0 a - - c - -	a - 228.0 b - 3720.0 a - 3480.0 c - 236.0	a - - b - - a - - c - -	a - 825.0 b - 4482.0 a - 3480.0 c - 236.0	Metallurgical Mixed & low grade
	Total :	a - 597.0 b - 762.0 c - -	a - 3708.0 b - 3720.0 c - 236.0	a - - b - - c - -	a - 4305.0 b - 4482.0 c - 236.0	
IX-D-Dindigul-Quid-e-Muleth		a - -	a - 1365.0	a - -	a - 1365.0	Mixed & low grade
	Total :	a - -	a - 1365.0	a - -	a - 1365.0	
X. UTTAR PRADESH	Total :	5193.0 (55.1 %) 810.0	250.0(2.7 %) -	3977.0(42.2 %) -	9420.0(100.0 %) 810.0 (8.59%)	Refractory
		1978.0	-	-	1978.0 (20.99%)	Metallurgical
		2405.0	250.0	3977.0	6632.0 (70.40%)	Mixed & low grade
X-A- Banda		a - - b - 2405.0 b - 810.0 b - 1978.0	a - - b - - b - - b - -	a - 127.0 b - 1850.0 b - - b - -	a - 127.0 b - 4255.0 b - 810.0 b - 1978.0	Mixed & low grade Refractory Metallurgical
	Total :	a - - b - 5193.0	a - - b - -	a - 127.0 b - 1850.0	a - 127.0 b - 7043.0	
X-B- Lalitpur		b - -	b - -	b - 2000.0	b - 2000.0	Mixed & low grade
	Total :	b - -	b - -	b - 2000.0	b - 2000.0	
X-C-Varanasi		b - -	b - 250.0	b - -	b - 250.0	Mixed & low grade
	Total :	b - -	b - 250.0	b - -	b - 250.0	

STATE/DISTRICT		PROVED	PROBABLE	POSSIBLE	TOTAL	SPECIFIED GRADE
XI. KERALA	Total :	1,220.0 (15.4%)	5,068.0 (64.0%)	1,633.2 (20.6%)	7,923.2 (100.0%)	
		56.0	-	-	56.0 (0.70%)	Refractory
		79.0	-	-	79.0 (0.99%)	Metallurgical
		1,087.0	5,068.0	1,633.2	7,788.2 (98.2%)	Mixed & low grade
XI-A Kannur		b - 331.0	b - 4,241.0	b - 424.2	b - 4,996.2	Mixed & low grade
	Total :	b - 331.0	b - 4,241.0	b - 424.2	b - 4,996.2	
XI.-B.-Kollam		b - 462.0	b - -	b - 1,209.0	b - 1,671.0	Mixed & low grade
	Total :	b - 462.0	b - -	b - 1,209.0	b - 1,671.0	
XI.C. -Thiruvananthapuram		b - 294.0	b - 264.0	b - -	b - 558.0	Mixed & low grade
	Total :	b - 294.0	b - 264.0	b - -	b - 558.0	
XI-D-Kasargod		b - 56.0	b - -	b - -	b - 56.0	Refractory
		b - 79.0	b - -	b - -	b - 79.0	Metallurgical
		b - -	b - 563.0	b - -	b - 563.0	Mixed & low grade
	Total :	b - 135.0	b - 563.0	b - -	b - 698.0	
XII.-JAMMU & KASHMIR	Total :	537.0 (30.1%)	830.0 (46.6%)	416.0 (23.2%)	1,783.0 (100.0%)	
		-	-	416.0	416.0 (23.33%)	Chemical
		387.0	665.0	-	1,052.0 (59.00%)	Mixed & low grade
		150.0	165.0	-	315.0 (17.6%)	Unspecified grade
XII-A-Udhampur		a - -	a - -	a - 416.0	a - 416.0	Chemical
		a - 387.0	a - 665.0	a - -	a - 1,052.0	Mixed & low grade
		a - 150.0	a - 165.0	a - -	a - 315.0	Unspecified grade
	Total :	a - 537.0	a - 830.0	a - 416.0	a - 1,783.0	

STATE/DISTRICT	PROVED	PROBABLE	POSSIBLE	TOTAL	SIMPLIFIED GRADE
XIII. MEGHALAYA					
Total :	-	896.0 (100.0 %)	-	896.0(100.0%)	
	-	896.0	-	896.0 (100%)	Metallurgical
XII-A- Khasi Hills East	b - -	b - 896.0	b - -	b - 896.0	Metallurgical grade
Total :	b - -	b - 896.0	b - -	b - 896.0	
XIV. RAJASTHAN					
Total :	-	-	- 318.5 (100.0%)	318.5(100.0%)	
	-	-	- 318.5	318.5 (100%)	Mixed & low grade
XIV-A- Kota	b - -	b - -	b - 318.5	b - 318.5	Mixed & low grade
Total :	b - -	b - -	b - 318.5	b - 318.5	

TABLE NO:6.6: GRADE SPECIFICATIONS ADOPTED IN NMI'90
(Based on Classification of Mineral Reserves according to end use)

Grade	Specifications			
	Al_2O_3	Fe_2O_3	SiO_2	CaO
(1) Chemical Grade	Min. 58%	Max. 2.5%	-	-
(2) Refractory*	Min. 55%	Max. 4.5%	-	1.5% Max.
(3) Abrasive	Min. 50%	Max. 4%	-	-
(4) Metallurgical I	45-50%	-	4% (Max.) Reactive 5% (Max.) (Total)	-
(5) Metallurgical II	40-45%	-	4% (Max.) Reactive 5% (Max.) (Total)	-
(6) Low Grade	40%			

*Note : Based on Sub Committee on Refractory raw materials of DGTD.

Recoverable Reserves of Bauxite (As on 1.1.85)

Sl.No.	Name of State	Reserves in million tonnes		
		Leasehold	Freehold	Total
1.	Orissa	294.978	1052.520	1370.453*
2.	Andhra Pradesh	-	455.838	455.838
3.	Madhya Pradesh	9.357	117.447	126.804
4.	Maharashtra	50.508	37.213	87.721
5.	Gujarat	25.376	62.047	87.423
6.	Bihar	22.441	41.078	63.519
7.	Uttar Pradesh	0.127	9.293	9.420
8.	Goa	22.628	9.631	32.259
9.	Jammu & Kashmir	1.416	1.874	3.290
10.	Karnataka	4.733	22.264	26.997
11.	Kerala	-	8.625	8.625
12.	Meghalaya	-	-	Not estimated
13.	Rajasthan	-	0.535	0.535
14.	Tamil Nadu	4.197	9.855	17.210***
	All India Total	435.762	1871.530	2333.406+

Note : * Orissa : It includes 22.955 million tonnes of Freehold & Leasehold Deposits (Common Deposit)

*** This includes 3.158 million tonnes of Freehold & Leasehold Deposits common.

\+ This includes 26.113 million tonnes for Freehold & Leasehold area.

Recoverable Reserves of Bauxite (As on 1.4.1990)

Sl.No.	Name of State	Reserves in million tonnes		
		Leasehold	Freehold	Total
1.	Orissa	354.648	1062.738	1442.276*
2.	Andhra Pradesh	-	592.001	592.001
3.	Madhya Pradesh	34.583	106.208	140.791
4.	Maharashtra	46.694	40.556	87.250
5.	Gujarat	29.837	77.907	107.744
6.	Bihar	18.377	42.727	61.104
7.	Uttar Pradesh	0.127	9.293	9.42
8.	Meghalaya	-	0.896	0.896
9.	Rajasthan	-	0.318	0.318
10.	Tamil Nadu	6.921	11.170	18.327**
11.	Goa	17.466	10.623	28.089
12.	Jammu & Kashmir	1.783	-	1.783
13.	Karnataka	5.318	22.098	27.416
14.	Kerala	-	7.923	7.923
	All India Total	515.754	1984.458	2525.338

Note : * It includes 24.890 million Tonnes of Freehold & Leasehold common deposits.

**This includes 0.236 million tonnes of freehold & Leasehold common deposits.

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