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MARKET SURVEY ON LEAD & ZINC

Mineral Economics Division
Indian Bureau of Mines, Nagpur
June 2011

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
MINERAL ECONOMICS DIVISION

LEAD & ZINC
A MARKET SURVEY

ISSUED BY

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PREFACE

The present report on 'Market Survey on Lead & Zinc" is the 34th publication in the series of Market Survey Reports brought out by the Mineral Economics Division of the Bureau in continuation to the Market Survey on Copper. The lead and zinc metals has also witnessed the volatility in prices like copper that attracts the attention to study the entire gamut of raw material security of resources, production scenario both on international as well as national front.

The upsurge in infrastructure development has resulted in increased demand of zinc whereas the requirement of lead acid batteries for automobiles as well as power back up systems has resulted in huge demand of lead. Looking at the domestic demand and the fact that HZL is the only primary supplier of lead and zinc, it was felt necessary to take up the study on lead and zinc metals.

In this survey, domestic demand has been forecast. The supply position analysing the resources and production in the country has been dealt with in detail. The scrap processing industry to augment the supply position for meeting both the domestic demand and export market is also discussed. An attempt has also been made to analyse the foreign markets.

The co-operation extended by various Central and State Government Departments, producers, processors and consumers of lead and zinc and the agencies concerned with trade, National laboratories and different manufacturers' associations who responded to our questionnaires is thankfully acknowledged. We are also thankful to Central Pollution Control Board, State Pollution Control Boards, Bombay Non Ferrous Metal Association Ltd., and India Lead-Zinc Development Association (ILZDA), New Delhi for their co-operation. Our thanks are also due to the Indian Embassies and Foreign Embassies in India who responded to our request for information.

It is hoped that this Market Survey Report on Lead & Zinc will be useful to the producers, exporters, processors, consumers and planners to formulate export strategies.

NAGPUR
Dated: 28 /6/2011

(C.S.GUNDEWAR)
Controller General
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Chapter 1. Introduction

The lead & zinc scenario in the country dates back to ancient times. India is acclaimed to be pioneer is extracting zinc and Zawar area in Udaipur district in Rajasthan has been recognized by the American Institute of Metallurgy as the first site where zinc was smelted. The lead & zinc attracts a lot of attention in respect of their production, uses and trade. The fast pace of development in developing countries have witnessed unprecedented development in infrastructure, growth in telecommunication both in fixed lines as well as mobile phones, sudden rise in production of cars and transport systems. All these activities have helped in the development of lead and zinc industry. Zinc which is an excellent protector of steel has seen an unprecedented growth. The galvanized steel has longer life thus used increasingly in infrastructure development.

Above all changing life styles due to enhanced income and demand for costlier fixtures, enhanced use of brass and galvanized products in buildings, airports and railways and switching over to the inverter and power backups for uninterrupted power supply for household as well as electronic equipments has resulted in increased demand for batteries using lead metal, opening up of world economy and the process of globalization has added new dimensions to mining and processing industry. The companies are rapidly expanding in terms of capacities both in mining and processing by take over and acquisition of properties world over. The trend of movement of ore and concentrates from one country to another and refining it near the markets is a recent phenomenon.

India is keeping pace in these activities. The acquisition of HZL, the only integrated producer of lead and zinc, by Sterlite Industries (India) Ltd. of Vedanta Resources Plc. has changed the scenario of lead & zinc production in India. Binani Zinc Ltd. is producing zinc from imported concentrates. The zinc production in the country is heading towards self sufficiency.

The scenario in the primary lead production is a matter of concern as the country's lead producing capacity is far below than the demand of lead. There is only one producer of lead namely HZL. To meet out the demand of lead there is a thriving industry of lead recycling which is contributing to a great extent in the total production of lead.

The recovery of lead & zinc metal from scrap is in itself a major activity apart from mining and the role of these industries in the overall availability of these metals have been studied in detail.

With this background, Indian Bureau of Mines has taken up a Market Survey Study on these metals. In this study an attempt has been made to study the availability of metal from primary as well as secondary sources and their role in overall development of end-user industry. An attempt has also been made to forecast the total demand of these metals. The demand of lead has been forecast to at 816 thousand tonnes and that of zinc to 2155 thousand tonnes by 2024-25. It is expected that this demand will be fulfilled by primary and secondary producers.

Chapter 2. Uses and Specifications

Lead is a very corrosion resistant, dense, ductile & malleable and blue-grey metal that is in use since 5000 years. Early uses of lead include building materials, pigment for glazing ceramics and pipes for transporting water. Its high density has proved effective for weights and anchors for boats and for ammunitions. These properties are used in lead radiation screening and sound proofing. Certain compounds of lead, particularly brightly coloured lead oxides, leaded glasses and leaded glazes on ceramics have been used for millennia. The use of most leaded paints has recently phased out but lead is still an important addition to some glasses and glazes. The electrochemical properties of lead enable it to be used in storage batteries in all motor vehicles and for some back-up power supplies.

The lead & zinc minerals mostly coexist in varying concentrations. A number of minerals are found to contain lead and zinc but the important ores of lead & zinc are found as sulphide, sulphates, carbonates, etc., most important of which are sulphides. The most important and abundant lead and zinc minerals are Galena (PbS) and Sphalerite or Zinc Blende (ZnS), respectively.

The important minerals containing lead and zinc along with their chemical composition is given in **Tables: 2.1 and 2.2.**

Table : 2.1 - Lead Minerals and their Chemical Composition

Name of the Lead bearing mineral	Composition	Metal Content (In %)	Specific gravity
Galena	PbS	86.6	7.4 -7.6
Anglesite	$PbSO_4$	68.3	6.1 -6.4
Cerussite	$PbCO_3$	77.5	6.4-6.6
Pyromorphite	$PbS(PO_4)_3Cl$	76.3	6.5- 7.1
Vanadite	$PbS(VO_4)_3Cl$	72.4	6.6 -7.1
Crocoite	$PbCrO_4$	63.9	5.9-6.1
Wulfenite	$PbMnO_4$	56.4	6.7-6.9

Table : 2.2 - Zinc Minerals and their Chemical Composition

Name of the zinc bearing Mineral	Composition	Metal content (In %)	Specific gravity
Zinc blende or sphalerite	ZnS	67.0	4.09
Smithsonite	$ZnCO_3$	52.0	4.43
Hemimorphite (Calamine)	$Zn_4SiO_7. (OH)_2. H_2O$	54.2	3.4 -3.5
Zincite	ZnO	30.3	5.68
Willimite	Zn_2SiO_4	58.5	3.9-4.2
Franklimite	(Fe, Zn, Mn). $(Fe, Mn)_2O_4$	15.20	5.07-5.22

2.1 LEAD

2.1.1 Uses

Though lead was well known since ancient times, its use was very limited. Being neither strong nor shiny lead was much less priced than copper, iron and other metals. It was mostly used for piping, lining of tanks, aqueducts, etc. It was also used in domestic cooking utensils, as an addition for bronze used in statues and some coins.

Applications of lead can be divided into two general categories. One as a metal or its alloys and the other as its compounds. The uses of lead are shown in **Figure : 2.1.** The most important sector where lead is used is storage batteries. The sector wise uses of lead are depicted in **Figure : 2.2.** As seen from the figure the battery industry consumes 74% of lead followed by pigments and compounds 9%, rolled and extruded products 8%, alloys 3%, cable sheathing 2% and the rest 4% is consumed by other industries various products of lead are given in **Plate-I**.

Figure : 2.1 - Uses of Lead Metal

Plate - I

DIFFERENT PRODUCTS OF LEAD

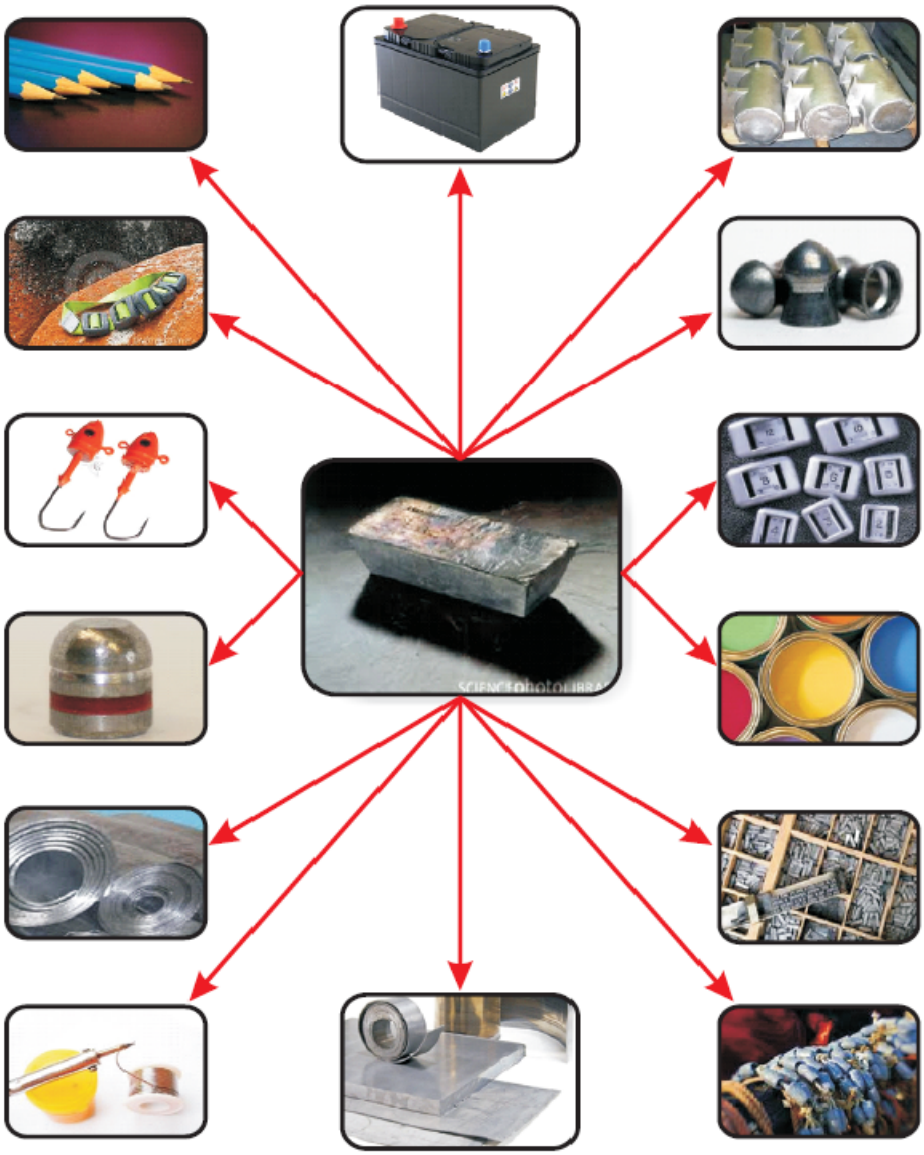
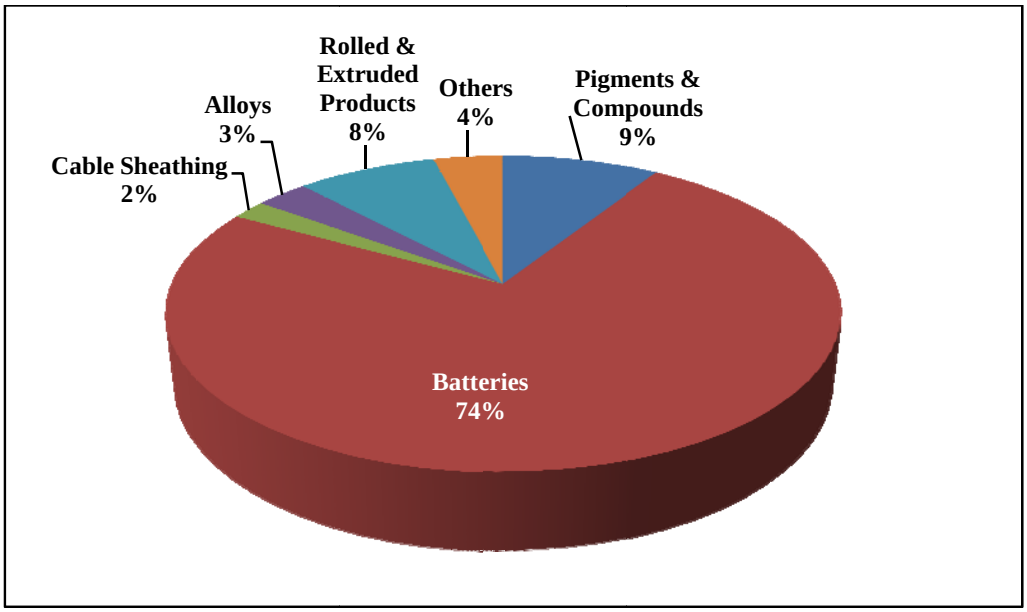


Figure : 2.2 - SECTOR WISE USES OF LEAD METAL



The major uses of lead are discussed below.

a) Storage batteries
b) Building Construction.
c) Cable sheathing
d) Radiation screening
e) Ammunition
f) Lead Alloys - Lead tin alloy
- Leaded bronze
- Leaded brass
- Leaded steel
g) Lead compounds
h) Petrol Additives
i) Other Uses

a) Storage Batteries: By far the largest use of lead is in the storage batteries worldwide. The principle was first discovered in 1850 by Siemens and first put to use by Plante in 1859. The lead acid batteries are mostly used in motor vehicles, electric powered vehicles and also in other fields such as computers and telecommunications. It is also used in inverters which are used as emergency power backup in case of power failure.

The simplest form of lead acid battery consists of two electrodes immersed in a tank of dilute sulphuric acid. The negative terminal is made of grey metallic lead and the positive terminal is made of various lead oxides. When these two electrodes are connected by an electrical conductor, an electric current will flow through the conductor powering any electrical appliance in the

circuit. The modern lead acid batteries consist of a grid of lead alloy which forms the negative terminal. The spaces in the grid are filled with a mixture of powdered lead and lead oxides which acts as a positive terminal. Sulphuric acid is used as an electrolyte in which the whole grid is immersed. The cage is made up of heavy duty polypropylene box. The battery is then formatted to be ready to use by charging with electricity thus building the lead oxide as positive terminal.

Batteries have been the largest consumer of lead since 1960 but nowadays their importance has increased many folds in power deficient countries as substitute power backup. As reported by International Lead Zinc Study Group (ILZSG) in a survey worldwide, about 70% of the lead is consumed in battery industry.

b) Building Construction: The use of lead sheets is mostly for roofing, cladding of vertical walls. Though the lead sheets are expensive at the times of installation, they prove to be cheaper in the long run due to its low maintenance cost. The lead sheets are also used for sound proofing or sound barriers in partitions and ceiling of offices schools and hotel building. Lead sheets also provide a completely watertight seal preventing rainwater thus avoiding adverse internal building environment. Architects have recognised these properties of lead sheets since long and used them in many cathedrals and historic building. The lead sheets are still used in many prominent buildings even nowadays.

c) Cable Sheathing: Lead is used for sheathing of cables used for electrical and telecommunication purpose due to its following properties.

i) Lead is completely impervious to water.
ii) Lead has very good corrosion resistance in a variety of media including sea water.
iii) Lead is ductile and can be easily joined by soldering.
iv) It can be coiled and uncoiled easily.

Lead is used for sheathing of cables which are used in petrochemical industry, under sea and underground high voltage cables. Though aluminium or stainless steel sheaths can be used for underground cables, no substitute has been found for under-sea cables, as stainless steel or aluminium does not have the same resistance to corrosion by salt water. Similarly, lead exhibits corrosion resistance by oils and hence is used in underground cables by the petrochemical industry.

d) Radiation Screening: Lead is used as a major screening material all over the world. Lead is the most impervious material to X-ray and gamma radiations. Lead is used for radiation screening mainly because of two properties namely, high density and atomic number. Lead is used in containers for radioactive material and as a component of lining for rooms containing X-ray equipments such as hospitals, dental clinics, etc. Nuclear industry is also a major user of lead. Lead also has an additional advantage of having extremely low level of absorption. Unlike many other elements, it does not become

radioactive itself to any significant degree, even after prolonged bombardment of radiations. Thus, it can be used as a durable radiation shielding material.

e) Ammunitions: Lead is no longer used in wartime ammunitions but it is still used in military training. Another use of lead is in sporting ammunition. The property of lead which makes it important in ammunition is its high density and it causes minimum abrasion to the gun barrel. It is relatively cheaper and also easy to form. Lead is a favoured choice because of its high density, hence the leaded projectiles have greater momentum longer range and greater destructive power than similar missile of less dense material. Lead shots are also used in shotgun cartridges.

f) Lead Alloys: Lead alloys find use for many purposes such as soldering, in bearings, in some bronzes (to reduce the melting point), pewter (which is used for ornaments and tablewares). The lead alloys are used to reduce the melting point and to increase the machineability of the alloy. Tin-lead alloy is used for soldering because of its low melting point and good flow characteristics. The alloy containing 38% lead and 62% tin, melts at 183^{o}C. This melting point of tin-lead alloy is lower than the melting point of either lead or tin individually.

The bearings are used to provide low friction between the moving parts of the machine. Bearings made of lead based alloys have an advantage of good lubrication and also low cost. Lead is also used in some bronzes to lower the melting point and increase the machineability. Some modern copper, aluminium and steel alloys use small additions of lead to improve machineability.

g) Lead Compounds: Many compounds of lead are strongly coloured and highly durable.

These properties of lead compounds make them useful in paint and pigments. White lead or basic lead carbonate is an intimate mixture of lead carbonate and lead hydroxide or lead oxide. It is very durable and has good external weathering properties and hence used in paints and pigments. The oxides of lead i.e. PbO, PbO_2 & Pb_3O_4 are mainly used as additives in glass and PVC. Pb_3O_4 i.e. red lead was historically used in paints and anticorrosive pigment in antirust primers used for protection of steelworks. Another important lead compound is basic lead silicate which is used in cathodic electro position primers for motor vehicles. Lead compounds are also used as stabilizers in PVC. All thermoplastics (plastics which soften on heating) require small amount of additives which are known as stabilizers to prevent degradation of the material.

Lead oxide is added to glasses and glazes since ancient time. The main advantage of addition of lead oxide is reduction in melting point. Addition of lead compounds to silica based glass can reduce the softening temperature considerably. 20-30% PbO glass has softening temperature of 660-670^{o}C, compared to pure silica which softens at 1600-1700^{o}C. Moreover, leaded glass

has an increased refractive index giving it a more attractive and sparkling appearance.

This is useful in optical glass used in binoculars, microscopes and spectacles. Leaded glass has a much higher X-ray absorption coefficient and hence is useful in radiation shielding TV tubes, etc. Leaded glass is also used in electrical and electronic devices for its relatively low specific electrical conductivity and dielectric losses.

Use of lead compounds in glazing has a considerably long history. It is used in glaze formulations such as ceramics, tableware, floor tiles, porcelain and sanitarywares such as toilets, wash basins, etc. The use of lead compounds in ceramics is due to the properties such as low melting temperature, good compatibility with substratum material and good electrical properties. Lead compounds have relatively lower cost. Some lead containing ceramics such as lead zirconate, lead titanate, etc. have piezo-electric properties. They find application in spark generators, sensors, electrical filters, etc.

h) Petrol additives: Since 1920's, organic compounds of lead such as tetra ethyl lead and tetra methyl lead have been added to petrol as an inexpensive way to improve performance. However, these have drastically been reduced in recent years and now account for only 1% of lead consumption. For comparison, in 1960 leaded gasoline accounted for over 9% of lead used and in 1972 its use peaked at approximately 11% of total lead used.

i) Other uses: Lead is also used for the purpose of increasing weight, because of its high density which enables smaller volumes to be used to provide desired weights. Durability is the other property for which lead is used in weights. Lead weights are used in wheel balances in motor cars, yacht keels, curtain weights and as weights in fishing lines.

Some minor uses of lead such as in toys, capsules for wine bottles and security seals are controlled by safety regulations and are replaced or substituted by aluminium or plastic. Lead powder is used in some plastics for protective clothing to screen from radiation and in some protective paints.

2.1.2 Specifications

The specifications for lead vary for different end-use industries. The physical as well as chemical properties of lead are important factors to be considered before deciding the end-use specifications of lead to be consumed in various industries. There are a number of industries where lead is consumed for various purposes. Obviously, the specifications of lead required by every industry are different. It is very difficult to arrive at uniform specifications for every lead consuming industry. The Bureau of Indian Standards (BIS) has developed and published standard specifications of lead which is being used in some major and important industries. The active BIS documents in respect of specifications of lead consumed in some important industries are listed in the **Table: 2.2.**

Table : 2.2 - BIS Specifications of Lead Consumed in Various Industries

Sl. No.	Document No.	Standard Title
1.	IS 27 : 1992 (Reaffirmed in May 2008)	Pig Lead Specification (Fourth Revision)
2.	IS 292 : 1983 (Reaffirmed in March 2004)	Specifications for Leaded Brass Ingots and Castings (Second Revision)
3.	IS 395 : 1962 (Inactive)	Lead Acid Storage Batteries for Motor Vehicles
4.	IS 404. Part 1 : 1993 (Reaffirmed in May 2008)	Lead Pipes- Specifications Part 1: Other Than Chemical Purposes (Third Revision)
5.	IS 404. Part 2 : 1993 (Reaffirmed in May 2008)	Lead Pipes- Specifications Part 2: for Chemical Purposes (Third Revision)
6.	IS 405. Part 1 : 1992 (Reaffirmed in May 2008)	Lead Sheets and Strips Specifications-Part 1: for Chemical Purposes(Third Revision)
7.	IS 405. Part 2 : 1992 (Reaffirmed in May 2008)	Lead Sheets and Strips Specifications-Part 1: for Other than Chemical Purposes(Third Revision)
8.	IS 531 : 1981 (Reaffirmed in 2006)	Leaded Brass Strips for Instrument Parts (Second Revision)
9.	IS 985 : 1962 (Inactive)	Lead Acid Storage Batteries for Motor Vehicles (Special)
10.	IS 1145 : 1980 (Reaffirmed in 2008)	Lead Acid Storage Batteries for Motor Cycles, Auto-rickshaws and Similar Vehicles (Second Revision)
11.	IS 1339 : 1992 (Reaffirmed in 2003)	Lead and Lead Alloys for Sheathing of Electric Cables (Third Revision)
12.	IS 1375:1991 (Reaffirmed in 2010)	Black Lead Pencil (First Revision)
13.	IS 1651 : 1991 (Reaffirmed in 2007)	Stationary cells and batteries, lead-acid type (Tubular Positive Plates) (Third Revision) (Superseding IS 541)
14.	IS 1652 : 1992 (Reaffirmed in 2007)	Stationary cells and batteries, lead-acid type with Plante Positive Plates (Third Revision) (Superseding IS 541)
15.	IS 1654 : 1992 (Reaffirmed in May 2008)	Lead antimony alloys(Third Revision)
16.	IS 1846 : 1992 (Inactive)	Lead Acid Aircraft Batteries (Aerobatic and non Aerobatic)
17.	IS 1992 : 1979 (Reaffirmed in 2006)	Electroplated coatings of lead (First Revision)
18.	IS 2604: 1988 (Reaffirmed in 2006)	Specifications for Lead anodes for electroplating (Second Revision)

Contd....

Sl. No.	Document No.	Standard Title
19.	IS 3717 : 1977 (Reaffirmed in May 2008)	Refined Secondary lead(First Revision)
20.	IS 4312 : 1967 (Reaffirmed in 2009)	Code of Safety for Lead and its compounds
21.	IS 5154 : 1980 (Reaffirmed in 2008)	Lead Acid Traction batteries(First Revision)
22.	IS 7352: 1974 (Reaffirmed in 2006)	Specification for X-ray Lead-rubber Protective Aprons
23.	IS 7372 : 1995 (Reaffirmed in 2007)	Lead Acid Storage batteries for motor vehicles-Specifications(First Revision) (Superseding IS 395& IS 985)
24.	IS 7602:1975 (Reaffirmed in 2008)	Lead chromate for explosive and pyrotechnic compositions (First Revision)
25.	IS 7624:1990 (Reaffirmed in 2008)	Lead-acid starter batteries for diesel locomotives and rail cars (First Revision)
26.	IS 7660:1988 (Reaffirmed in 2008)	Lead-acid batteries for electric locomotives and electrical multiple units (First Revision)
27.	IS 8063 : 1976 (Reaffirmed in 2005)	Red Lead for explosive and pyrotechnic industry
28.	IS 8475 : 1977 (Reaffirmed in May 2008)	Lead based antifriction bearing alloy for heavy duty applications
29.	IS 9147: 1979 (Reaffirmed in 2006)	Lead sheathed cables for highest system voltages from 12 KV upto and including 36 KV
30.	IS 9814:1981 (Reaffirmed in 2008)	Lead-acid storage batteries for marine use
31.	IS 10094 : Part-9 1984 (Reaffirmed in 2010)	Specification for cartridges for shotguns- Part 9: Lead shots
32.	IS 12013:1987 (Reaffirmed in 2007)	Lead-acid batteries for 110 volts train lighting system with monobloc containers
33.	IS 13189 : 1991 (Reaffirmed in 2008)	Lead Hammers-Specifications
34.	IS 12292:1988 (Reaffirmed in 2006)	Lead sub oxides (lead oxide) for lead-acid storage battery
35.	IS 13369 : 1992 (Reaffirmed in 2007)	Stationary lead acid batteries (With tubular positive plates) in monobloc containers
36.	IS 13514 : 1992 (Reaffirmed in 2007)	Lead acid batteries for electric road vehicles - Specifications
37.	IS 13568 : 1992 (Reaffirmed in 2007)	Lead acid light weight storages batteries for Motor Cycles and Similar Vehicles Fitted with AC Circuitry-Specifications

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Sl. No.	Document No.	Standard Title
38.	IS 13923 : 1993 (Reaffirmed in May 2007)	Lead Seal
39.	IS 14257:1995 (Reaffirmed in 2008)	Lead-acid storage batteries for motor vehicles with light weight and high cranking performance - Specification
40.	IS 14688 : 1999 (Reaffirmed in January 2005)	Lead Antimony alloy bricks for radiation shielding
41.	IS 15549:2005 (Reaffirmed in 2008)	Stationary Regulated Lead Acid Batteries - Specification

2.2 ZINC

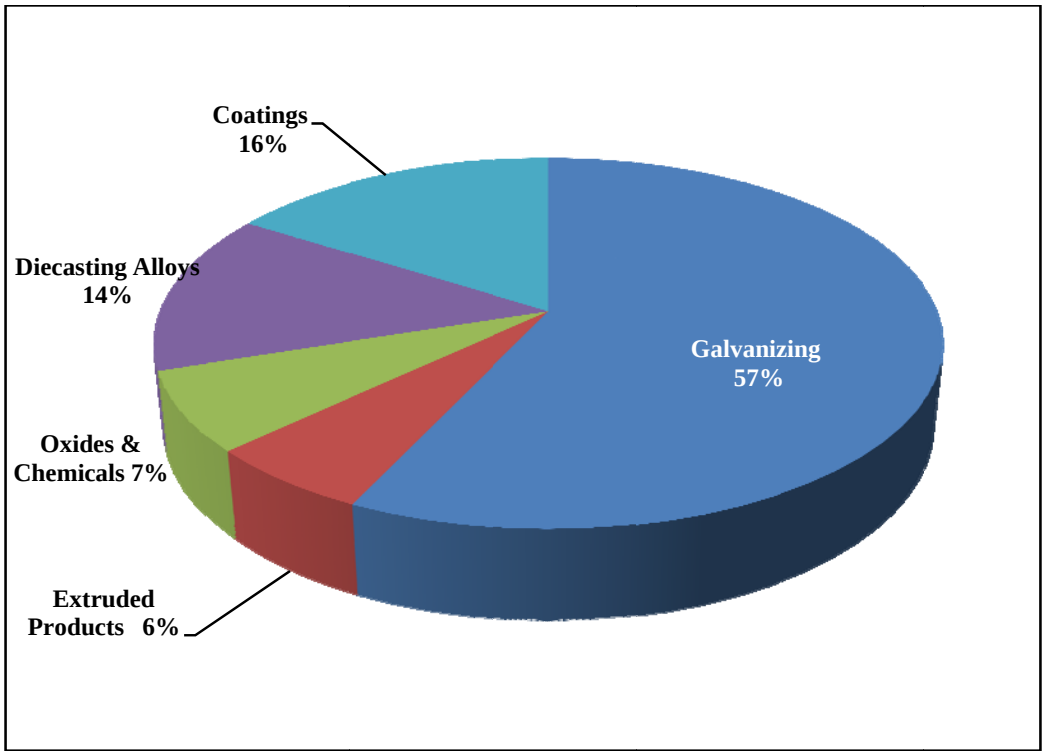
2.2.1 Uses

Zinc is silvery bluish grey metal with a relatively low melting point (419.5^{o}C) and boiling point (907^{o}C). Zinc is brittle at ordinary temperature but malleable at100^{o}C, and can then be readily rolled and hence unalloyed wrought zinc is used extensively for fully supported roofing. When unalloyed, its strength and hardness is greater than that of tin or lead, but appreciably less than that of aluminium or copper. The pure metal cannot be used in stressed applications due to low creep resistance. For these reasons most uses of zinc are after alloying with small amounts of other metals or after coating on to iron or steel. However, the most important property of zinc which has made it more useful is the excellent corrosion resistance in the atmosphere, in hard and fresh water, in salt water and in contact with many natural and synthetic substances. The major uses of zinc are given below. The sector wise uses of zinc are depicted in **Figure : 2.3.** As seen from the figure the galvanizing industry consumes 57% of zinc followed by coatings 16%, die casting alloys 14%, oxides and chemicals 7%, and extruded products 6%. Major uses of zinc in galvanizing, dry cell batteries, alloys, die-casting zinc compounds are discussed below. Various products of zinc are shown in **Plate-II**.

Plate - II

DIFFERENT PRODUCTS OF ZINC

Figure : 2.3 - SECTOR WISE USES OF ZINC METAL



a) Galvanizing

For over a century coating of zinc has enhanced the longevity and performance of steel. Zinc coating provides a continuous and impervious metallic barrier that does not allow moisture to contact the steel. Zinc coating is used for the protection of iron & steel products ranging from structural steel work for building and bridges to fasteners, strips, sheets, wires & tubes. Various galvanized products are shown in **Plate-III**. Zinc coating also protects steel at cut edges and at breaks in the coatings through a sacrificial electrochemical action. Coating of zinc or galvanizing offers unique combination of properties to steel which is unmatched by any other material. These properties are;

1. High strength
2. Formability
3. Light weight
4. Corrosion resistance
5. Aesthetics
6. Recyclability
7. Low cost.

The galvanized steel finds application in many fields where steel is exposed to corrosive environment such as electrical and telecommunication towers, building construction, transportation (in automobile vehicles), Refrigerators, Air conditioners, washing machines, etc. Galvanized steel is used

Plate - III

DIFFERENT GALVANIZED PRODUCTS

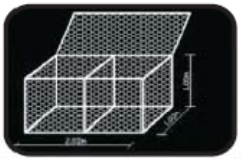


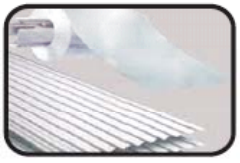












in electrical and telecommunication towers to increase the life of towers as these towers are erected in open air where they are exposed to atmosphere. The steel, if not galvanized, gets oxidised and the life of such towers is reduced. The galvanization considerably increases the life of such towers. The parts of the towers are galvanized before fabrication and constructions by hot dip galvanizing process. The fasteners used in the construction of the towers are also galvanized. Nowadays the use of galvanized bars in RCC structures is gaining importance in developed countries and in very corrosive environments. The galvanizing of iron and steel is achieved by two processes. Sections, bars, fasteners are galvanized by hot dip galvanizing process while sheets of iron and steel are galvanized by continuous galvanizing process. The sole aim of galvanizing is to clad the iron with zinc layers varying in thickness from 60 to 130 microns. The thickness of zinc layer required in dry weather is 60 microns and 130 microns in the humid weather i.e. along sea coast where the corrosion is faster. Normally the thickness of zinc layer is 60 to 80 microns i.e. 610 to 710 gms per square metre of steel surface. A small quantity of lead is also added to the zinc kettle to maintain the fluidity of molten zinc.

The life of galvanization is estimated on an average up to 30-35 years depending upon the thickness of coating and environment to which the steel is exposed.

Brief description of processes of galvanization is given below:

i) Hot Dip Galvanizing: In this process the zinc is melted in a pot or kettle and kept in molten form by adjusting temperature. Sections, bars and any other items of steel which is to be galvanized is cleaned or pickled and dried using aqueous solution. These sections are dipped in the molten zinc and taken out adjusting time of dipping by expert operators. This forms a coating of zinc over the articles dipped in the pot. The expertise of operators is utmost important in this type of galvanizing otherwise the coating of zinc will not be uniform in the products.

ii) Continuous Galvanizing: As the name indicates the coating of zinc is done in a continuous process by passing the steel (particularly sheets) through molten zinc or zinc alloy. The family of continuous zinc coating includes galvanized, electro galvanized galvanneal, galvalume and galfan coatings.

ii(a) Galvanized: Steel with pure zinc coating by a continuous galvanizing process is generally used in building panels, steel framings, agricultural applications, etc.

ii(b) Electrogalvanized: Steel sheets with electro plated zinc coating gets an ultra-smooth finish on the surface which are used in exterior body panels of automobiles. Pure zinc is generally used in electro galvanizing although alloys of zinc such as Zn-Ni or Zn-Fe are also used.

ii(c) Galvanneal: Continuous galvanizing with a coating of zinc-iron alloy is galvanneal. This improves the paintability, weldability and drawability of the

steel. It is preferentially used in automobile models which use strong and lighter grade of steel. It is also used in outer panels of refrigerator, air conditioner, washer and dryer, coolers, furniture, etc.

ii(d) Galvalume: Continuous galvanizing which uses coating of an alloy with aluminium is known as galvalume. It gives better corrosion resistance to the steel. The alloy contains 55% aluminium, 44% zinc and 10% silicon. The temperature of the molten alloy has to be maintained at 600^{o} C. The thick galvalume sheets are used for ducting, air conditioners, etc. and thin sheets are used for roofing and building panels. It is specially used in high temperature applications such as power trains, heat reflecting components, etc.

ii(e) Galfan: Galfan is a coating of alloy containing 95% zinc and 5% aluminium. This gives excellent formability to the steel and better adhesion with low friction coefficient. This leads primarily to improved ductility than galvanized coating.

There is also a technique of zinc coating which is known as **sherardizing**. This technique is named after the scientist Sherard Cowper-Coles. This technique is not widely used as it requires operating skill. It is a diffusion control process which produces a zinc-iron alloy coating. Small articles are charged in a drum with zinc powder and sand. The drum is rotated at a temperature just below the melting point of zinc (about 380^{o}C) for about 3 hours. Uniform, hard, abrasion resistant coating can be formed on complex parts.

b) Dry Cell Batteries: Malleability of zinc at a temperature of 100^{o}C is an important property of zinc which renders its use in the dry cell battery industry. The shell or cylinder of the dry cell battery is made of rolled zinc. The most well known of such batteries are primary zinc-carbon and alkaline batteries which together dominate the standard AAA, AA, C and D size consumer batteries. Zinc/Air and Zinc/Silver batteries are also widely used in the electrical industry for powering hearing aids, wrist watches, calculators, etc. Industrial Zinc/Silver and Zinc/Nickel batteries are of great importance in aeronautical and military applications. Larger Zinc/Air batteries have been developed to power electric vehicles and Remote Area Power Supply (RAPS) installations.

c) Zinc Alloys: Owing to low melting point of zinc, it can be easily alloyed with other metals to form a number of alloys. Zinc is alloyed with copper to form brass and bronze and alloyed with aluminium and a small quantity of copper, magnesium and other metals to form Zamak or Mazak which is mostly used in the die casting industry throughout the world. Brass and bronze are the alloys of zinc which are used in many industries in one or the other form. Brass is not a single unique alloy. The brasses comprise a family of copper-zinc alloys in which zinc is principal alloying metal. The amount of zinc present in these alloys varies from 10% to 40%. Magnesium, Cadmium and Lead are the other metals used to form these alloys. Brass has a natural colour and feel. It is a popular material amongst the architects and interior designers. It is used in door handles, knobs, railings and hardware. Brass is also hygienic and

hence is used in water taps, pipes and other building construction materials and cooking utensils because of its added advantage of being bacteriostatic. Brass is used in making statues due to its formability and aesthetic colour and feel. That convention notwithstanding, design parlance collectively identifies all the alloys as "bronzes" mainly because of their similar uses, colours and weathering characteristics. Designers and architects make use of "white bronze", "yellow bronze", "statuary bronze" and even "green bronze" (after weathering). In fact all these are alloys mainly of zinc and copper along with small quantities of magnesium, cadmium, iron, tin, lead, etc. Brass is one of the thoroughly and efficiently recyclable alloys amongst all the industrial alloys and the efficient recycling process is going on for centuries.

d) Die casting: Zinc alloys occupy a unique place in pressure die casting industry by virtue of their superior founding properties. Alloys with aluminium up to 4% and with minor quantities of copper, magnesium, iron, lead, tin and cadmium were developed which are known as 'Mazak' or 'Zamak'. They have become extremely popular in the pressure die casting industry all over the world. The important characteristics of these alloys are low melting temperature, excellent die casting and founding properties which render them suitable for producing complex shapes with good machineability and ability to take good finish. Due to the low maintained temperature they require less energy and hence are cost effective. These alloys show good corrosion resistance in a variety of environments.

e) Zinc compounds: Zinc oxide is the most commonly used compound in variety of industries mainly paints and pigments. The presence of zinc oxide in paint imparts toughness to the film. It also prevents yellowing of the paint. Zinc oxide is also used in coated electrostatic copying paper. Another important use of zinc oxide is as an essential ingredient of many rubber compositions both natural and synthetic. In rubber, zinc oxides serve to accelerate the vulcanizing process and strengthens rubber product. The car tyres contain about 5% zinc oxide. Another important zinc compound is Lithopone. Lithopone is a white pigment consisting of intimate mixture of zinc sulphide and barium sulphate. It is formed by double decomposition and it requires roasting treatment. Its peculiar characteristic is its ability to mask a dark background when applied in a thin coat.

Zinc dust or blue powder as it is properly known is used in sherardizing and as a reducing agent in the production of many chemicals. The most important use of zinc dust is in manufacturing of sodium hydrosulphite ($Na_2S_2O_4$) and various other derivatives which are used to bleach wood pulp for paper making. Zinc powder is also used in alkaline zinc batteries, which have a steel can and central zinc powder electrode. It is also used in silver-zinc miniature patterns. Zinc was the first metal used in cathodic protection, but zinc was not very pure those days. The impurities in zinc gave inconsistent results. Recently, due to high purity of zinc through technical developments, this problem is overcome. The iron content allowed in zinc is below 0.0015 percent. Ceramics, textiles, floor coverings and lubricants are minor applications of zinc

oxides. Zinc oxide serves as a starting point for a number of compounds containing zinc which finds specialised industrial applications.

2.2.2 Specifications

The specifications of zinc vary for different end-use industry. The physical as well as chemical parameters are important factors to be considered before arriving at the end use specifications of any industry. Although standard specifications of zinc have not been adopted by the industries consuming zinc, chemical purity and some physical parameters are closely controlled to meet the consumers' demand. It is very difficult to arrive at uniform specifications for every industry. The Bureau of Indian standards (BIS) has developed and published standard specifications for zinc consumed in some important industries. The active BIS documents in respect of specifications of zinc used in some major and important industries are listed in the **Table: 2.3.**

Table : 2.3 - BIS Specifications of Zinc Consumed in Various Industries

Sl. No.	Document No.	Standard Title
1.	IS 35 : 1975 (Reaffirmed in 2007)	Zinc Oxide for Paints (First Revision)
2.	IS 36 : 1979(Inactive)	Leaded Zinc Oxide for Paints
3.	IS 51: 1998 (Reaffirmed in 2009)	Zinc Chrome for Paints(Fourth Revision)
4.	IS 209 : 1992 (Reaffirmed in May 2007)	Zinc Ingot- Specification (Fourth Revision)
5.	IS 406 : 1964 (Reaffirmed in January 2005)	Methods for Chemical Analysis of Slab Zinc (Spelter)
6.	IS 713 : 1981 (Reaffirmed in May 2008)	Zinc base alloy ingots for die casting (Second Revision)
7.	IS 742 : 1981 (Reaffirmed in May 2008)	Zinc base alloy for die casting (Second Revision)
8.	IS 1573 : 1986 (Reaffirmed in 2006)	Specification for electroplated coatings of zinc on iron & steel (Second Revision)
9.	IS 1655 : 1991 (Reaffirmed in April 2006)	Zinc alloys-Code of practice for manufacture of pressure diecasting (Second Revision)
10.	IS 2258 : 1981 (Reaffirmed in May 2008)	Rolled zinc plate, sheet and strip (Second Revision)
11.	IS 2605 : 1985 (Reaffirmed in 2006)	Zinc Anodes for electroplating (First Revision)
12.	IS 4611 : 1991 (Reaffirmed in 2010)	Metallic zinc powder (Zinc dust) (Second Revision)

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Sl. No.	Document No.	Standard Title
13.	IS 4699 : 1984 (Reaffirmed in April 2006)	Refined Secondary zinc(First Revision)
14.	IS 4736 : 1986 (Reaffirmed in 2006)	Specification for Hot-dip Zinc Coatings on mild steel tubes(First Revision)
15.	IS 4759 : 1996 (Reaffirmed in 2006)	Hot-dip Zinc Coatings on structural steel and other allied products(Third Revision)
16.	IS 5905 : 1989 (Reaffirmed in 2006)	Sprayed aluminium & zinc coatings on iron and steel(First Revision)
17.	IS 12447 : 1988 (Reaffirmed in May 2008)	Zinc wire for Sprayed zinc coatings
18.	IS 12594 : 1988 (Reaffirmed in 2006)	Hot dip zinc coating on Structural Steel bars for concrete reinforcement-Specification
19.	IS 13229 : 1991 (Reaffirmed in May 2008)	Zinc for galvanizing
20.	IS 13982 : 1994 (Reaffirmed in 2006)	Zinc alloy for Hot Dip Coatings – Zinc – 5% aluminium – Mischmetal alloy - Specifications
21.	IS 14355 : 1996 (Reaffirmed in 2007)	Zinc dust pigments for paints - Specification
22.	IS 14721 : 1999 (Reaffirmed in 2010)	Zinc oxide for ceramic industry -Specification
23.	IS 3339 : 1993	Zinc oxide for Rubber industry

Chapter 3. Supply

Worldwide, the lead and zinc deposits invariably occur together. Very few deposits contain either lead or zinc as single metal. Galena (lead sulphide) and sphalerite (zinc sulphide) are the most commonly occurring minerals. The other minerals of lead are anglesite ($PbSO_4$), Cerussite ($PbCO_3$), etc. and other minerals of zinc are smithsonite ($ZnCO_3$), Zincite (ZnO), Hemimorphite (Zn_4SiO_7), Willemite (Zn_2SiO_4), etc.

India is endowed with large resources of lead & zinc ores. The occurrences of lead & zinc ore are distributed over 12 states. Rajasthan has the largest resources i.e. 90% of the total resources, followed by Bihar (2%), Maharashtra (2%) and Madhya Pradesh (1%). The balance resources are distributed in the remaining states as shown in **Table: 3.1** and depicted in **Figure- 3.1**. Presently Rajasthan is the only lead & zinc ore producing state. The details of present position of indigenous supply of lead & zinc ores, concentrates and metal along with the geological/geographical distribution of the ores, quantitative assessment of the resources, beneficiation and smelting processes of the ores are discussed in this chapter.

3.1 RESOURCES

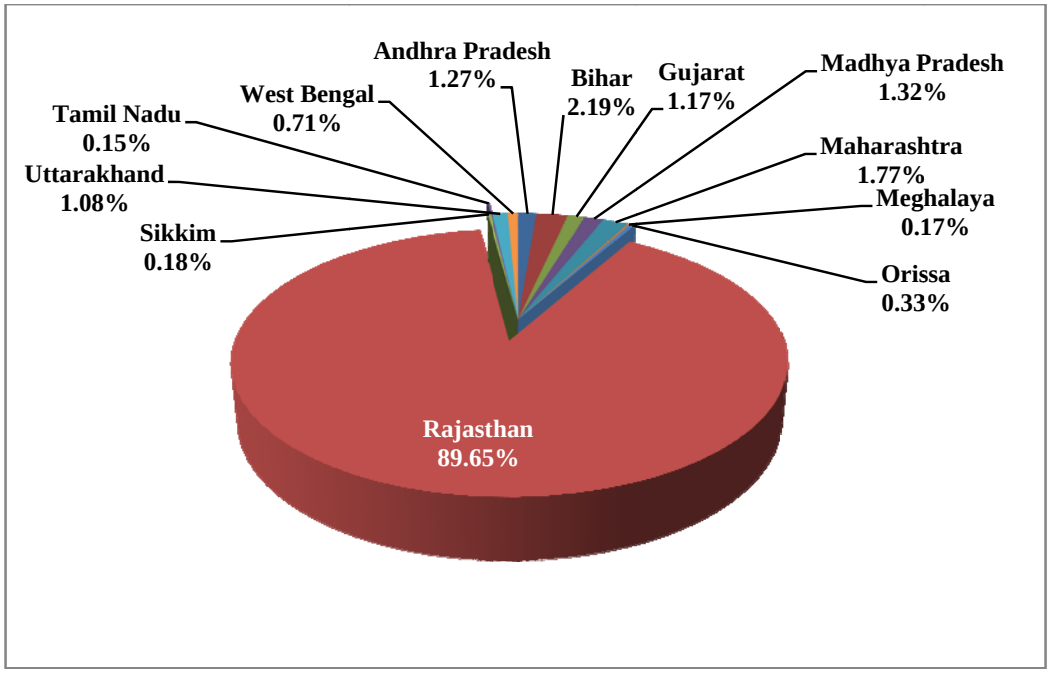
India is endowed with large resources of lead and zinc which are distributed over 12 states namely: Andhra Pradesh, Bihar, Gujarat, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Rajasthan, Sikkim, Tamil Nadu, Uttarakhand and West Bengal. The details of statewise/districtwise resources of lead & zinc ores and the districts where these are available are given in **Table: 3.2** and the statewise/districtwise list of lead & zinc deposits is given in **Table 3.3**.

Table : 3.1 - State wise Resources and District wise Occurrences of Lead and Zinc Ores

(In '000 tonnes)

Sl. No.	Name of State	Total Resources	Districts
1.	Andhra Pradesh	6,620	Cuddappah, Guntur, Prakasam
2.	Bihar	11,435	Banka, Rohtas
3.	Gujarat	6,129	Banaskantha,Vadodara
4.	Madhya Pradesh	6,920	Betul
5.	Maharashtra	9,272	Nagpur
6.	Meghalaya	880	Khasi Hills (East)
7.	Orissa	1,750	Sundergarh
8.	Rajasthan	468,509	Ajmer, Bhilwara, Chittorgarh, Pali, Rajsamand, Sirohi, Udaipur
9.	Sikkim	950	Sikkim (East)
10.	Tamil Nadu	790	Villupuram
11.	Uttarakhand	5,620	Dehradun, Pithoragarh
12.	West Bengal	3,706	Darjeeling

Figure : 3.1 - STATE WISE RESOURCES OF LEAD & ZINC
(As on 1.4.2005)



The total resources of lead-zinc ore as per National Mineral Inventory as on 1.4.2005 are estimated at 522.58 million tonnes). Of these, 125.75 million tonnes (i.e.24 %) fall under 'reserves' (proved and probable categories), while balance 396.83 million tonnes (i.e. 76%) are classified as remaining resources (feasibility, prefeasibility, measured, indicated, inferred and reconnaissance categories). Gradewise, the lead and zinc deposits have been estimated on the basis of average metal content in the ore in three grades namely (+)10% Pb & Zn, 5 to 10% Pb & Zn and (-)5% Pb & Zn.

The resources in the category of (+) 10% Pb & Zn have been placed at 86.82 million tonnes, 5 to 10% Pb & Zn at 144.67 million tonnes and (-) 5% Pb & Zn at 291.08 million tonnes.

On the basis of the total metal content, total resources of lead and zinc metal have been tabulated and total resources of lead metal are placed at 7.21 million tonnes, zinc metal 24.26 million tonnes and 118.45 million tonnes of lead & zinc metal. Out of this, 2.59 million tonnes of lead metal and 11.09 million tonnes of zinc metal are placed under the reserve category and the balance 13.16 million tonnes under remaining resources category. The details of grade wise resources of lead &zinc ores is given in **Table: 3.4.**

Table : 3.2 - District wise Reserves/Resources of Lead & Zinc as on 1.4.2005

(In '000 tonnes)

State/ District	Reserve	Remaining Resources	Total Resources
All India : Total			
Ore	**125754**	**396826**	**522580**
Lead Metal	**2590**	**4617**	**7207**
Zinc Metal	**11093**	**13167**	**24260**
Lead & Zinc Metal	**-**	**118**	**118**
Andhra Pradesh			
Ore	791	5829	6620
Lead Metal	30	170	200
Zinc Metal	-	63	63
Cuddapah			
Ore	-	4310	4310
Lead Metal	-	95	95
Zinc Metal	-	58	58
Guntur			
Ore	791	1219	2010
Lead Metal	30	67	97
Zinc Metal	-	5	5
Prakasam (Ongole H.Q.)			
Ore	-	300	300
Lead Metal	-	8	8
Bihar			
Ore	-	11435	11435
Lead Metal	-	24	24
Zinc Metal	-	39	39
Banka			
Ore	-	435	435
Zinc Metal	-	15	15
Rohtas			
Ore	-	11000	11000
Lead Metal	-	24	24
Zinc Metal	-	24	24
Gujarat			

Contd....

State/ District	Reserve	Remaining Resources	Total Resources
Ore	5800	329	6129
Lead Metal	122	4	126
Zinc Metal	263	1	264
Lead & Zinc Metal	-	1	1
Banaskantha			
Ore	5800	129	5929
Lead Metal	122	4	126
Zinc Metal	263	1	264
Vadodara			
Ore	-	200	200
Lead & Zinc Metal	-	1	1
Madhya Pradesh			
Ore	-	6920	6920
Lead Metal	-	26	26
Zinc Metal	-	339	339
Betul			
Ore	-	6920	6920
Lead Metal	-	26	26
Zinc Metal	-	339	339
Maharashtra			
Ore	-	9272	9272
Zinc Metal	-	590	590
Nagpur			
Ore	-	9272	9272
Zinc Metal	-	590	590
Meghalaya			
Ore	-	880	880
Lead Metal	-	17	17
Zinc Metal	-	14	14
Khasi Hills East			
Ore	-	880	880
Lead Metal	-	17	17
Zinc Metal	-	14	14
Orissa			

Contd....

State/ District	Reserve	Remaining Resources	Total Resources
Ore	1080	670	1750
Lead Metal	39	38	77
Sundergarh			
Ore	1080	670	1750
Lead Metal	39	38	77
Rajasthan			
Ore	117583	350925	468509
Lead Metal	2391	4008	6399
Zinc Metal	10813	11670	22483
Lead & Zinc Metal	-	118	118
Ajmer			
Ore	8764	23360	32124
Lead Metal	141	491	632
Zinc Metal	660	808	1468
Bhilwara			
Ore	50200	56378	106578
Lead Metal	976	690	1666
Zinc Metal	6404	3851	10255
Chittorgarh			
Ore	-	1200	1200
Lead Metal	-	65	65
Zinc Metal	-	5	5
Pali			
Ore	-	1997	1997
Lead Metal	-	2	2
Zinc Metal	-	106	106
Rajsamand			
Ore	22966	83044	106010
Lead Metal	568	1274	1842
Zinc Metal	1992	2679	4671
Lead & Zinc Metal	-	84	84
Sirohi			

Contd....

State/ District	Reserve	Remaining Resources	Total Resources
Ore	362	6220	6582
Zinc Metal	35	76	111
Lead & Zinc Metal	-	33	33
Udaipur			
Ore	35291	178726	214017
Lead Metal	706	1485	2192
Zinc Metal	1721	4145	5866
Sikkim			
Ore	500	450	950
Lead Metal	9	-	9
Zinc Metal	16	4	20
Sikkim East			
Ore	500	450	950
Lead Metal	9	-	9
Zinc Metal	16	4	20
Tamil Nadu			
Ore	-	790	790
Lead Metal	-	8	8
Zinc Metal	-	37	37
Villupuram			
Ore	-	790	790
Lead Metal	-	8	8
Zinc Metal	-	37	37
Uttarakhand			
Ore	-	5620	5620
Lead Metal	-	183	183
Zinc Metal	-	267	267
Dehradun			
Ore	-	2290	2290
Lead Metal	-	37	37
Zinc Metal	-	108	108
Pithoragarh			

Contd....

Concld...

State/ District	Reserve	Remaining Resources	Total Resources
Ore	-	3330	3330
Lead Metal	-	146	146
Zinc Metal	-	159	159
West Bengal			
Ore	-	3706	3706
Lead Metal	-	140	140
Zinc Metal	-	143	143
Darjeeling			
Ore	-	3706	3706
Lead Metal	-	140	140
Zinc Metal	-	143	143

Table : 3.3 - State wise and District Wise List of Lead Zinc Deposits

State	District	Deposit Name
Andhra Pradesh	Cuddapah	Gollapalle
		Angomara-Jupalle
	Guntur	Agnigundala Bandalamottu
		Dhukonda
		Kerempudi
	Prakasam Ongole H.Q.)	Agnigundala Belt-Vummudivaram Itammakuva
Bihar	Banka	Pindara
	Rohtas	Amjhore
Gujarat	Banaskantha	Ambamata (Ambaji Multi Metal)
		Sitlamata
	Vadodara	Khandia
Madhya Pradesh	Betul	Banskhapa Piparia
		Bhawra Tekra
		Biskhan-Khari Prospect
		Dehalwara Zinc Prospect
		Dehri Zinc Deposit
		Ghisi Prospect
		Kherli bazar Baragaon
		Muariya Block
	Chhindwara	BhuyarI

Contd....

State	District	Deposit Name
		Jangaldehri Zinc Prospect
		Koparpani Prospect
Maharashtra	Nagpur	Kolari(Zone III)
		Tambekhani-kolari-Bhanori
Meghalaya	Khasi Hills East	Umpyrtha Polymetallic
Orissa	Sundergarh	Sargipalli (Lokdega)
Rajasthan	Ajmer	Ghugra
		Sawar-TikhI-Ganeshpura-Bajta
		Kayar
		Kankriya
		Madarpura
	Bhilwara	Devpura
		Dedwas(North)
		Dedwas (South)
		Mahuakhurd-East (Pur Banera Belt)
		Mahuakhurd-West (Pur-Banera Belt)
		Malikhera Block (Pur Banera Belt)
		Nehru Cent. Pros./Jaliya/Devpura North.Extn.
		Rampura Agucha
		Samodi
		Tiranga (Pur-Banera-Belt)
	Chittorgarh	Rewara
	Pali	Birantiya Khurd
		Chitar
		Kalabar
		Nayakhera
	Rajsamand	Bamniakalan
		Bethumni Block
		Lathiya Khera
		North Sindeswar Ridge
		Rajpura dariba
		Sindesar khurd
		South Sindesor Ridge
	Sirohi	Basantgarh

Contd....

Concld...

State	District	Deposit Name
		Danva
		Deri
		Pipela
	Udaipur	Bova
		Hemeta Magra
		Mokanpura
		Paduna (North) Zawar Belt Block 1A
		Paduna Bara
		Rajpura B & C Block
		Sindesar Kalan (East)
		SIndesar Kalan(West)
		Sonaria Ruparia
		Zawar Group of Mines
Sikkim	Sikkim East	Bhotang (Rangpo)
		Dikchu
Tamil Nadu	Villupuram	Mamandur
Uttaranchal	Dehradun	Amtiargad
		ChamrI
		Dhanaula
	Pithoragarh	Askot
West Bengal	Darjeeling	Gorubathan

Table : 3.4 - Reserves/Resources of Lead & Zinc as on 1.4.2005 (By Grades)

(In '000 tonnes)

State	Reserve	Remaining Resources	Total Resources
All India Ore (Total)	**125754**	**396826**	**522580**
Ore with(+)10% Pb &Zn	55462	31359	86821
Ore with 5-10%Pb &Zn	70292	74385	144677
Ore with(-)5% Pb &Zn	-	291082	291082
Metal			
Lead	2590.55	4616.70	7207.25
Zinc	11092.89	13166.79	24259.68
Lead & Zinc	-	118.45	118.45

3.1.1 Geological /Geographical Distribution

Lead & Zinc mineralisation in India is mainly confined to pre-cambrian formation and to a small extent in lesser Himalayas. The occurrence of these ores are located in 2 main regions in India - Western region and Southern region, Smaller deposits also occur in Northern and Eastern region.

The description of important lead and zinc belts are discussed below:

a) Ajmer lead-zinc belt - This belt extends over a strike length of 30-40 km trending NNE-SSW from village Ghugra to Kharwa. The Major lead-zinc deposits occur in the southern outskirts of Ajmer city, i.e. Ghugra Lohakhan, Taragarh and Chandana Devi hills. The rocks associated with this belt belong to Ajabgarh group of Delhi Super Group and comprises quartzites, calc-silicates and schists which are intruded by igneous intrusions. The mineralisation is predominantly hosted in the calc-silicate rock. There are evidences of past mining in the form of deep and wide pits, trenches and a few inclines. Chief ores of lead and zinc occurring in this area are galena and sphalerite, respectively.

b) Zawar lead and zinc belt - In this belt, gneiss, schist, amphibolites of Archaean Age form the base. The Aravalli Group of rocks lies above uncomformably. This belt extends over a length of 20 km. and the mineralised zone extends over a length of 16 km from South to North (**Plate-IV**). The host rocks in this belt are dolomites and dolomitic rocks. The mineralisation is controlled by fractures and fissures. The entire belt is divided into 5 blocks namely Parshad, Bara, Paduna, Zawar and Hameta Magra. Hameta Magra and Zawar blocks comprise Mochia, Bawa, Balaria, Baroi Magra and Zawarmala as main ore bearing hills. The mineralisation is confined to main dolomite horizon. It occurs as veins, stringers and dissemination forming lenticular bodies, galena and sphalerite are the predominant economic sulphide minerals. Pyrite, native silver, chalcopyrite and pyrrhotite also occur in this deposit.

c) Rajpura-Dariba lead-zinc belt- This belt is located about 16 km NNE of Fatehnagar in Rajsamand district. It is 123 km away from Zawar mines. It extends from Bhinder in South to Banera in North (**Plate-V**). It comprises of a group of folded metasedimentary rocks belonging to Bhilwara super group of Pre-Aravali age. The belt is characterised by the presence of gossans. Ancient mine workings and slag dumps also give evidence of past mining and recovery of the metals. Biotite schist, graphite schist, dolomite, garnet-rich granulites and orthoquartzites are the main rock types of the area. Sphalerite and galena are the primary ores found in the area. Other trace elements found in the area are silver and cadmium. Pyrite and pyrrhotite are also found. Presence of antimony, arsenic and mercury is also reported.

d) Rampura Agucha lead-zinc belt – This deposit is located 15 km south-west of Gilabara in Bhilwara district. The deposit was discovered in 1977. The area containing the deposit represents gently sloping terrain having a thick soil cover. Gradewise, it is one of the richest deposits in India. The deposit forms a

Plate-IV

LITHOLOGICAL & STRUCTURAL MAP OF THE AREA AROUND ZAWAR, RAJASTHAN

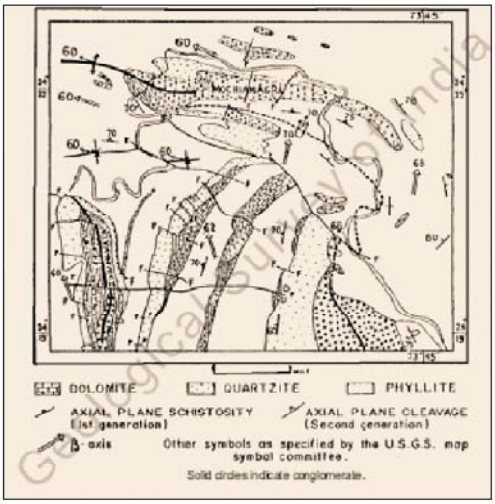
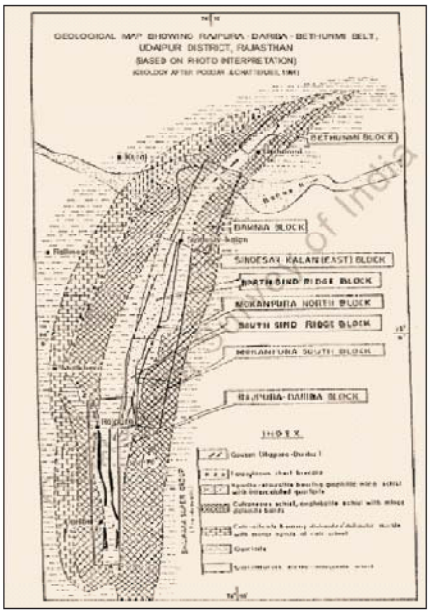


Plate-V

GEOLOGICAL MAP SHOWING RAJPURA - DARIBA - BETHUNMI BELT UDAIPUR DISTRICT, RAJASTHAN (based on photo interpretation)



Source:
Geological Survey of India

part of Banded Gneissic Complex of Pre-Aravalli age. The rocks associated in the area are mica-sillimanite gneiss and schist which are intruded by acidic and basic igneous intrusions. The rocks show NE-SW strike with steep dip. The mineralisation is predominantly associated with graphite mica gneiss/schist over a length of 1550 m. The economic minerals found in the area are sphalerite, galena, pyrite, pyrrhotite, etc.

e) Deri-Ambaji lead-zinc belt – This belt extends across the Rajasthan-Gujarat border from Sirohi, district, Rajasthan in the North to Banskantha district, Gujarat in the South, over a distance of about 10 km (**Plate-VI and Plate-VII**). The rock types occurring in the area belong to Ajabgarh series of Delhi Super Group. The rock types are represented by quartzite, quartz schist and biotite-sericite schist which are intruded by metabasic intrusions. The regional setting indicates a doubly plunging syncline. There are two major mineralised zones in the area, (1) The main zone at Ambamata, near the temple town of Ambaji in Banaskantha district, Gujarat and (2) the smaller zone at Deri in the adjoining Sirohi district, Rajasthan. The sulphide ore bodies occur as replacement zones at the contact of the schists. The sulphide ores occurring in the area are sphalerite, galena, chalcopyrite, pyrrhotite and pyrite. The sulphide ores occur as series of parallel to sub-parallel lenses separated by poor or barren zones.

f) Pur-Banera lead-zinc belt – This belt is considered as an extension of Rajpura-Dariba belt which falls in Bhilwara district. This belt extends from Pur in the south-west to Banera in the north-east over a length of 34 km and width of about 5 km. The rocks occurring in this belt represent the Bhilwara group, namely garnetiferous-mica schist, quartzite, calc-schist, gneiss, calc-silicate bearing marble, etc. The rocks are intruded by basic sills and dykes. There are two important lead zinc ore zones namely, South Dedwas and Devpura. The mineralised zone is confined to mica schist calc gneiss and quartz biotite gneiss. The sulphide minerals include mainly sphalerite followed by galena, pyrrhotite etc. This deposit is of low grade as compared to other deposits in Rajasthan.

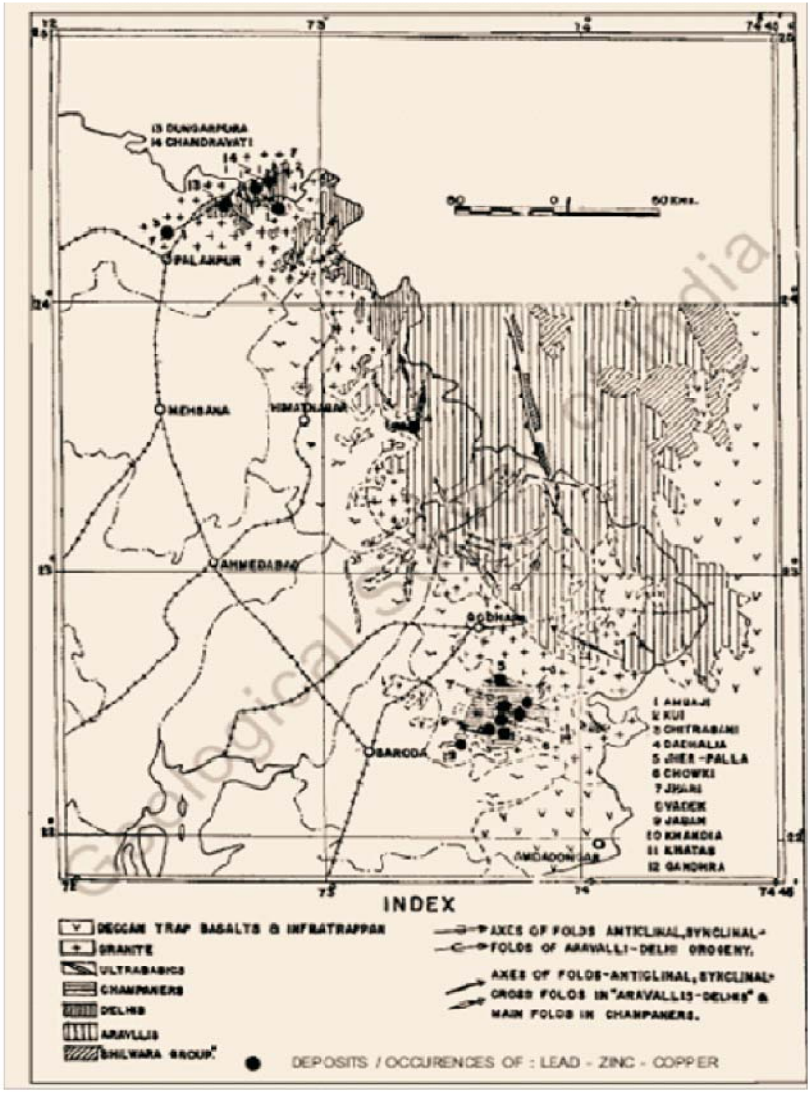
g) Rangpo lead-zinc-copper deposit, Sikkim –This deposit is situated in Rangpo, in Sikkim about 40 km south of Gangtok. The mineralized zone extends from Bhotang, Rangpo in East Sikkim district to Dikchu in North Sikkim district. The rock formations are represented by rocks of Daling group consisting of chlorite schist, chlorite-sericite phyllites, quartzites etc. intruded by metabasic rocks. The schists which host the mineralisation are highly folded and faulted. The sulphide minerals include chalcopyrite, pyrrhotite, sphalerite and galena.

3.2 BENEFICIATION

Beneficiation of lead and zinc ore is a very complex process as it involves separation of lead concentrates and zinc concentrates which have to be effectively treated in different smelters to win both the metals separately. Like other metallic ores, lead and zinc ore is also associated with other gangue minerals like silica, oxides and carbonates of other metals, etc. but the difference between other ores and lead

Plate-VI

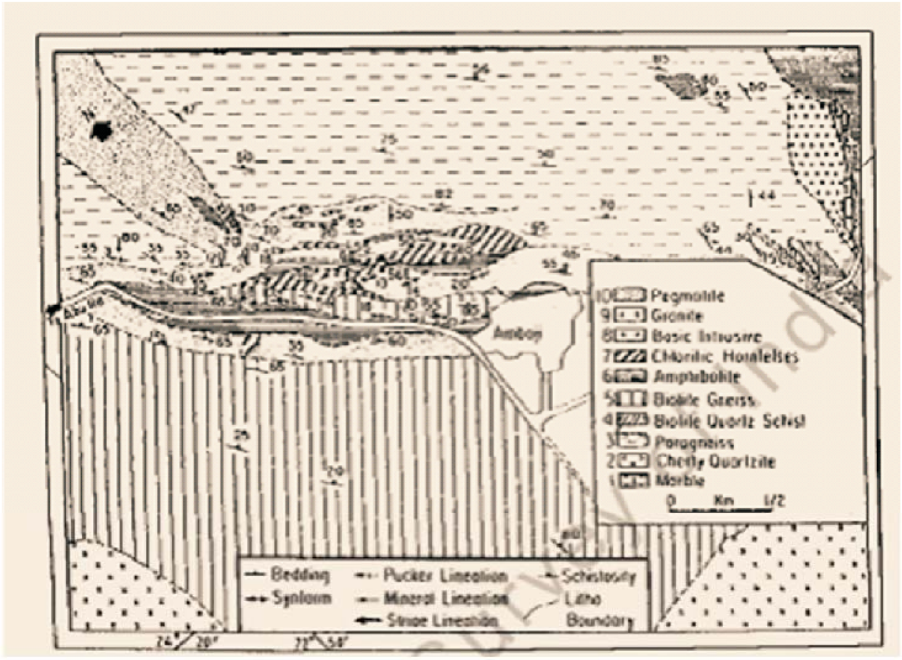
BASEMETAL MINERALISATION IN GUJARAT



Source:Geological Survey of India

Plate-VII

GEOLOGICAL MAP OF AMBAJI AREA, GUJARAT



Source:Geological Survey of India

zinc ores is that the concentrates of lead and zinc are required to be separated before treating them further to win the metals.

The compounds of zinc, copper, arsenic, silica antimony, bismuth, etc. are deleterious impurities in lead metallurgy, whereas compounds of lead, copper, arsenic bismuth, iron, silica, etc. are the deleterious impurities as far as zinc smelting is concerned. These deleterious impurities increase the cost of production and reduce the efficiency of smelting furnace. Maximum acceptable values of the contents of these deleterious impurities in the Indian lead metal are: zinc 5%, copper 0.5-2%, arsenic 0.1%, antimony 0.5% and bismuth 0.1 percent. Similarly, the maximum acceptable values of the contents of deleterious impurities in Indian zinc smelters are lead 0.05%, copper 1%, (Pb + SiO_2) 5% and iron 8 percent. Zinc content should be 48% minimum. There are some modern smelting processes where concentrates with low content of zinc and lead can also be smelted to win the metals. One such modern smelting process is Imperial Smelting Process (ISP). This process prescribes zinc 35.7%, Pb 17.1%, Cd 0.2%, Cu 1.5%, Fe 7.3%, SiO_2 5.9% and CaO 0.7% for the bulk lead zinc concentrates to be treated.

3.2.1 Processes Involved in Beneficiation

The process of beneficiation of lead and zinc ore to produce concentrates involves following processes: (1) Crushing, (2) Grinding and Classification, (3) Conditioning, (4) Flotation, (5) Thickening, Filtration and Drying.

i) Crushing: Run-of-mine ore (ROM) is crushed in 3 stages namely, primary, secondary, and tertiary. Sometimes, quaternary crushing is also done as it involves less energy consumption than grinding. Primary crushing is done by jaw crusher or gyratory crusher. Cone crushers are used in secondary crushing. Sometimes reduced gyratory crushers are also used. Tertiary crushing is done by short head cone crusher. Secondary and tertiary crushers are operated in closed circuits with double deck vibratory screens. If required, the quaternary crushing is done with the help of cone crushers or rod mills.

ii) Grinding & Classification: This process is important in the beneficiation of lead and zinc ores. The grinding of ore is to be done precisely because overgrinding of ore will result the galena ore into slimy particles. The slimy galena ore particles may result into low recovery of lead metal. In zinc concentrate, it may result into more contamination of lead.

Grinding of crushed ore is achieved by ball mills in closed circuit with spiral classifiers or cyclones. When cyclones are used, multi-stage classification is adopted. Some of the flotation reagents are added at the time of grinding. The final product of grinding and classification is in the form of slurry of finely ground material.

iii) Conditioning: This is the process adopted in beneficiation of lead and zinc ore to separate the lead ore and zinc ore from the complex ore. The finely ground ore in the form of slurry contains sulphide minerals like sphalerite,

galena, pyrite and pyrrhotite. Iron oxides, silica, dolomite, carbonaceous material and graphitic material are also present as gangue minerals. The precious metals like gold, silver etc. are also present. Proper conditioning of the material is required to separate these constituents by selective flotation. To achieve this, the reagents like selective depressants, activators, collectors and frothers are used. The reagents are added in different conditioners. Conditioners are cylindrical in shape with stirring mechanism.

iv) Flotation: The slurry after conditioning and adding various reagents like activators, collectors and frothers is then subjected to flotation. Flotation is carried out in flotation chambers. These chambers have impellers and arrangement to supply air bubbles. In lead zinc flotation chambers, rougher lead floatation and cleaner lead flotation along with rougher zinc flotation and cleaner zinc flotation are carried out. The chemical reagents used are modifiers like, lime, soda, gangue dispersants like sodium silicate, activators like copper sulphate, collectors like sodium isopropyl xanthate & aero floats and frothers like pine oil, cresilic acid, Methyl IsoButyl Carbinol (MIBC), etc.

v) Thickening, Filtration, Drying and Tailing Disposal: The concentrates of lead and zinc thus separated are thickened in thickeners and filtered in filters separately. Both these processes reduce the water content of the concentrate and recover the water for re-use. The tailings are subjected to cycloning to recover solids in a cyclone. The over-flow of cyclone is sent to thickeners and the tailings from the cyclone are sent to tailing dam. The tailing water can be reused after some necessary treatment before sending to tailing dam.

3.3 SMELTING

Smelting is a process by which lead and zinc concentrate is treated to produce lead and/or zinc metal. There are two types of smelting processes (1) pyrometallurgical process and (2) hydrometallurgical process. The process adopted depends upon the type of ore used as a charge. In pyrometallurgical process, ore concentrate containing lead or zinc or both is fed (in some cases after sintering) into a primary smelter (blast furnace). A blast of hot air or oxygen is used to oxidise the sulphur present in the feed to sulphur dioxide i.e SO_2. Hydrometallurgical processes are an alternative approach for obtaining lead metal. Unlike pyrometallurgical process, the hydrometallurgical process does not involve emission of harmful lead fumes and sulphur dioxide gas. In hydrometallurgical process waste solutions which are rich in salts of metal, which could be used as resources for the recovery of those metals. The basic principle of the hydrometallurgical process is that, the anodes of impure level are dissolved in suitable electrolyte solution and pure lead is deposited on the cathodes.

3.3.1 Lead smelting

a) Pyrometallurgical process: The conventional pyrometallurgical process for production of primary lead is carried out in 4 steps (1) sintering, (2) smelting, (3) drossing and (4) refining.

i) Sintering: The main feed for sintering process is the lead concentrates. Other materials such as iron, silica, limestone flux, coke, etc. are added to the sintering machine. The sinters are made out of the mixture of lead concentrate along with flux and other required material.

ii) Smelting: The sinters are then fed to a blast furnace with a blast of hot air or oxygen. The reactions that take place here is:

(1) $2\ PbS + 3O_2 \rightarrow 2\ PbO + 2SO_2$
(2) $2\ PbO + C \rightarrow 2\ Pb + CO_2$

The lead metal thus produced is in molten stage. The molten lead being heavy, settles at the bottom of the furnace. The other layers are speiss, which contains the lightest material like arsenic and antimony. The 'matte' contains copper sulphide and other metal sulphides and blast furnace slag which comprises silicates. The heaviest layer which contains 98% lead by weight is known as lead bullion.

iii) Drossing: The rough lead bullion obtained from blast furnace requires preliminary treatment before refining. This treatment is known as drossing. During drossing, the molten lead bullion is agitated in a drossing kettle and cooled to a temperature just above its freezing point (at 370^oC to 425^oC). The dross floats at top which is composed of lead oxide along with copper, antimony and other elements. The dross solidifies above the molten lead, which is removed and fed to a dross furnace for recovery of other metals.

iv) Refining: The lead bullion is subjected to pyrometallurgical process to remove non-lead materials such as gold, silver, bismuth, zinc and oxides of metal such as antimony, arsenic, tin and copper. The refining is done in cast iron kettles in four stages. In the first stage, antimony, tin and arsenic are removed. For this, the molten lead is churned with oxidising agent such as molten sodium hydroxide or sodium nitrate for few hours. The impurities such as antimony, arsenic and tin are suspended in the flux as sodium arsenate, antimonate and stannate. The flux and lead are separated. In the next stage, gold and silver are removed from molten lead with the help of zinc. The molten lead is heated with zinc. The precious metals i.e. gold and silver form an alloy with zinc which is then allowed to solidify which floats at the top and can be removed. The zinc is then separated from precious metals by heating the alloy under reduced pressure. Zinc evaporates (vacuum distillation) and is condensed at the cooled lid and can be recovered. The only impurity that may be left now is bismuth, although bismuth is not always present. Bismuth can be removed by electrolytic process. Alternatively, bismuth can be removed by production of stoechiometeric $CaMg_2Bi_2$ compound by adding calcium and magnesium as an alloy or individual metals, crystals and removed by skimming. The purity of the refined lead obtained by this process is 99.90% to 99.99%. The pyrometallurgical process has a major advantage that it incurs low cost as electricity consumption is less. But the fumes of lead and sulphur pose environmental problems. The level of purity of lead produced is low. To

overcome these problems a number of modern direct smelting processes are in operation such as Isasmelt, Kivcet, QSL, Outokompu, etc. These processes employ different furnace designs, methods of heat input and process control.

b) Hydrometallurgical Processes: These processes are also known as electrolytic processes. The main principle behind these processes is that the anodes of impure lead (lead bullion) are dissolved in an electrolyte and pure lead is deposited on cathode. The most important and largely adopted process amongst these is 'Betts Process'. This process is adopted after smelting and copper is removed from the lead bullion followed by softening. In the Betts process, large cast anodes (about 1 sq m) of lead bullion from which copper is already removed are used. Thin starter sheets of high purity lead are used as cathodes on which newly refined lead particles are deposited. Fluosilicate acid is used as an electrolyte. Other electrolyte such as nitrates and acetates does not allow deposition of lead successfully. When an electric current is passed through the electrolyte, the lead is deposited on cathode. Impurities in lead like bismuth, antimony, arsenic, gold and silver remain as anode slime which is treated separately to recover these metals.

There are few advantages of the hydrometallurgical (electrolytic) process over the conventional pyrometallurgical process. Firstly, the lead obtained by the electrolytic process has higher degree of purity secondly, any bismuth if present, is effectively removed. As high temperature is not required, dust fumes are also not evolved. Certain drawbacks are also involved in this process such as higher electrical energy is required, the electrolytic processes are more expensive and processes to extract other metals such as gold, silver, etc. could be complex. The disposal of solutions which are rich in other metals can also pose environmental problems.

3.3.2 Zinc Smelting

Zinc smelting is a process of recovering and refining zinc metal from zinc containing material i.e. zinc concentrates. There are two types of processes by which zinc is recovered and refined, namely:

a) Pyrometallurgical processes
b) Hydrometallurgical processes

In both the processes, the concentrates are roasted in a roasting furnace at a temperature of about $950^{o}C$. There are three types of roasters namely Multiple Hearth Roaster, Suspension Roaster and Fluidised Bed Roaster. Roasting of zinc sulphide concentrates convert it into zinc oxide known as ‘zinc calcine'. The chemical reactions taking place during roasting are:

$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ and
$2SO_2 + O_2 \rightarrow 2SO_3$

Sulphur dioxide (i.e. SO_2) evolved is a byproduct of the reaction which is further processed to manufacture sulphuric acid.

a) Pyrometallurgical Processes: The 'zinc calcine' thus obtained, contains zinc oxide which is reduced by pyrometallurgical processes using carbon, and then by distilling the metallic zinc in an atmosphere of carbon monoxide. There are four types of pyrometallurgical processes namely (1) Horizontal Retort Process, (2) Vertical Retort Process, (3) Blast Furnace Process and (4) St. Joseph Mineral Company Process. The chemical reaction which takes place at $1400^{o}C$ is as follows.

$ZnO + CO \rightarrow Zn\ (Vapour) + CO_2$

The zinc vapour and the carbon dioxide is then passed through a vacuum condenser, where zinc is recovered by bubbling through molten zinc bath. The carbon dioxide is regenerated with carbon and the carbon monoxide is recycled back to the retort furnace. The main disadvantage of pyrometallurgical processes is that the zinc produced by these processes is approximately 98% pure. The other deleterious components are lead 1.3% max., cadmium 0.2% max. and iron 0.03 percent max. This zinc may be pure enough for galvanizing but not enough for die-casting alloys, which requires special high grade zinc (i.e 99.995% purity). In order to reach this purity the zinc has to be refined.

b) Hydrometallurgical Process: This process is also known as electrolytic process or Roast-Leach-Electrowin (RLE) Process. It has become more popular than the hydrometallurgical process. There are three steps involved in this process after roasting, namely, (i) Leaching (ii) Purification and (iii) Electrolysis.

i) Leaching: The 'zinc calcine' yielded from roasting which is basically zinc oxide is subjected to leaching. Leaching is achieved by double leaching. Zinc calcine is first leached with a slightly acidic solution of sulphuric acid (H_2SO_4) in order to leach zinc out of zinc oxide. Subsequently, the 'zinc calcine' is treated with strong sulphuric acid to leach remaining zinc and zinc ferrite. The resultant products obtained by this process are in the form of solid and liquid. The liquid portion often contains zinc and is called 'leach product' which is zinc sulphate ($ZnSO_4$). The solid portion contains other metals such as lead and silver and is called 'leach residue'. The leach residue is sold as byproduct. The leach product contains iron which is removed in the intermediate step in the form of goethite, Jarosite and hematite alongwith cadmium, copper, arsenic, cobalt, antimony, etc. and needs purification.

ii) Purification: The zinc sulphate solution must be very pure to extract zinc efficiently by electrolysis and the purification is done by cementation. It uses zinc dust and steam to remove copper, cadmium, cobalt, nickel, etc. as these impurities may interfere with the electrolytic process. Purification is conducted in large agitated tanks at temperature ranging from 40 to $85^{o}C$ and pressure ranging from 1 to 2.4 atmospheres. The byproducts are subjected to further refining.

iii) Electrolysis: The process of electrolysis involves passing of electric current through the solution in a series of cells. There are two processes

commonly used for electrowinning of zinc metal. (i) Low current density process and (ii) High current density process. The former process uses 10% sulphuric acid as electrolyte with a current density of 270-375 amperes per sq. m. The later uses 22-28% sulphuric acid with a current density of about 1000 amperes per sq. m. The high current density process gives better purity and higher capacity of production of zinc metal. It has a disadvantage of being more corrosive to the vessel in which it is done and generation of more heat obviously due to high current density. The electric current causes zinc to deposit on the cathodes. These cathodes are aluminium sheets. Each cell is shut down within 24-48 hours and the zinc coated cathodes are removed and rinsed. The zinc deposited is mechanically stripped from the aluminium plates.

There are several hundred cells in the electrolytic zinc smelter. A portion of electric energy is converted to heat energy during the electrolysis. The electrolytic cells are operated at a temperature between 30 to 35^{o}C and at atmospheric pressure. Therefore, a portion of electrolyte is continuously circulated through cooling towers. The cooled electrolyte is then re-circulated to the cells.

3.3.2 Processes Adopted by Hindustan Zinc Limited for Lead & Zinc Smelters

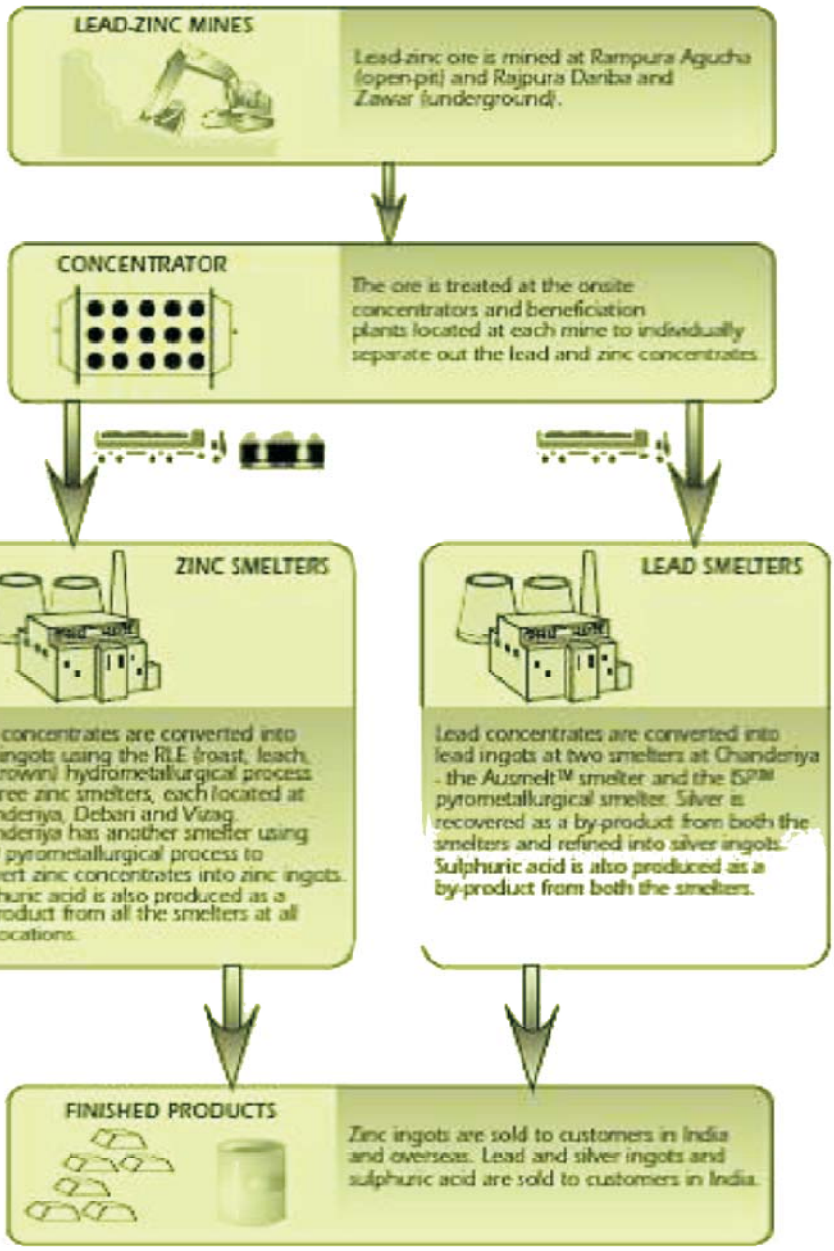
The processes adopted by Hindustan Zinc Limited (HZL) in their various plants are given below:

1) Chanderiya Lead & Zinc Smelter Complex: The Chanderiya Zinc Smelter uses one of the best proven technologies and is improving through innovations in operational and environmental performances. Chanderiya Smelter is located 110 km. north of Udaipur, Rajasthan. The plant was commissioned in 1991. The Chanderiya Smelter comprises of two hydrometallurgical zinc smelters Hydro-I and Hydro-II, one Lead –zinc Pyrometallurgical smelter and one Ausmelt lead smelter**. (Plate-VIII)**

i) Hydrometallurgical Zinc Smelters: The hydrometallurgical zinc smelters Hydro-I and Hydro-II employ Roast Leach Electro-winning (RLE) technology. The hydrometallurgical smelting process is a roast, leach and electro-winning (RLE) process. In this process zinc concentrate is first oxidized in the roaster and the gases generated are cleaned and sent to the sulphuric acid plant. The primary output from the roaster, called calcine, is sent to the leaching plant to produce zinc sulphate solution which is then passed through a cold/hot purification process to produce purified zinc sulphate solution. The purified zinc solution then goes through an electrolysis process to produce zinc cathodes. Finally, the zinc cathodes are melted and cast into zinc ingots.

Plate - VIII

GENERALISED FLOWSHEET OF LEAD & ZINC PRODUCTION OF HZL



ii) Pyrometallurgical Lead –Zinc Smelter: This smelter uses the Imperial Smelting process.

The process starts with sintering, where Lead and Zinc concentrates, bulk concentrates (a mixture of zinc and lead concentrates) are blended with oxidic secondaries and fluxes. The mixture is passed through the sinter machine to remove sulphur. The gas generated from the sintering process is sent to the sulphuric acid plant. The de-sulphurized output of the sinter machine is broken for size reduction before being fed into an Imperial Smelting Furnace, or ISF, where it is smelted with preheated met-coke and air.

The Imperial Smelting Furnace (ISF) is designed to simultaneously produce molten zinc and lead by smelting agglomerated sinters with preheated coke and preheated blast air. Chemical reaction between air and the coke produces carbon monoxide and generate heat to smelt the metallic oxide in the charge into the elemental metal. Molten Lead falls into the bottom of the furnace from where it is tapped and sent for refining process. At the temperature of operation, metallic zinc is formed as a vapour. Zinc vapour passes through the condenser where it gets absorbed by lead .The lead is cooled to separate zinc and the molten zinc is passed through double distillation column for further refining. Through this process, zinc is produced as a major product and by-product is Cadmium.

The waste gases of ISF leaving the condenser after zinc is condensed pass through a gas cleaning system where they are cooled and cleaned of particulate matter. These gases contain carbon monoxide of low calorific value. After cleaning, low calorific value is utilized in preheating the furnace blast air and in preheating the coke. Any remaining excess gases are passed through a Boiler for steam generation which is being utilized in plant operation. Lead removed from the pyrometallurgical process is sent for further refining where it passes through a series of processes to remove impurities. In this process, silver is also produced as a by-product. The refined lead is cast into lead ingots.

2) Chanderiya Lead Smelter

This plant uses Top Submerged Lance Technology (designed by M/S Ausmelt Ltd., Australia) where lead concentrate is smelted directly in a vertical furnace along with flux. Lead bullion produced in this process is then treated in the lead refinery plant to produce high purity lead ingots. Off-gas containing sulphur dioxide gas is then cleaned and treated in the sulphuric acid plant.

3) Vizag Zinc Smelter and Debari Zinc Smelters

The Vizag Zinc Smelter and the Debari Zinc Smelters of Hindustan Zinc Ltd. also use the Roast Leach Electro-winning (RLE) process. The general description of the process adopted in these two plants is similar to the process adopted in the hydrometallurgical zinc smelter at Chanderiya. In Debari zinc smelter cadmium is also recovered as by product.

3.4 PRODUCTION

3.4.1 Lead & Zinc Ore

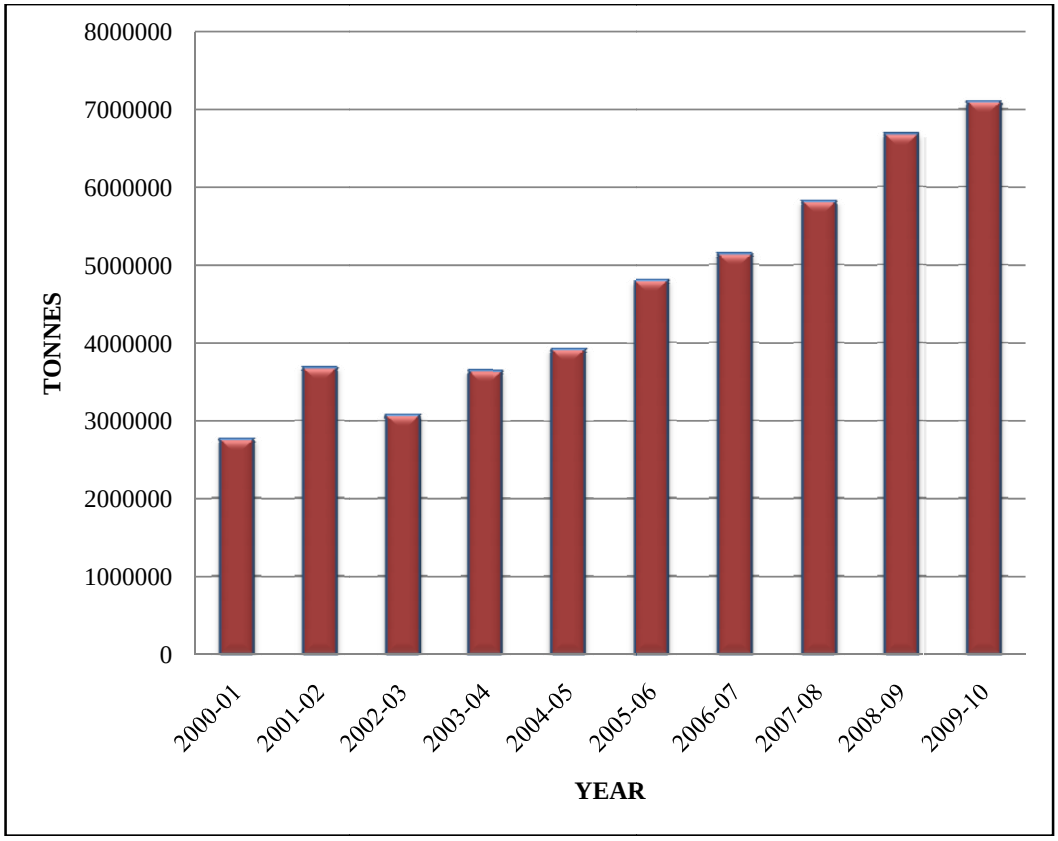
Lead and zinc are amongst the important non-ferrous metals produced in India. Though the resources of lead and zinc ore are reported from 12 states, presently Rajasthan is the only producing state. The metal contents of the ore produced vary from year to year. The All-India production of lead and zinc ore for last 10 years is given in **Table: 3.2** and depicted **Figure-3.2.**

Table : 3.5 - All-India Production of Lead & Zinc Ores, 2000-01 to 2009-10

(In tonnes)

Year	Ore produced
2000-01	2,760,365
2001-02	3,676,751
2002-03	3,074,864
2003-04	3,644,263
2004-05	3,928,500
2005-06	4,801,184
2006-07	5,139,915
2007-08	5,817,059
2008-09	6,680,698
2009-10	7,101,972

Figure : 3.2 - PRODUCTION OF LEAD & ZINC ORES
2000 -2001 TO 2009-10



The general trend of production of lead-zinc ore in India is increasing. The production of lead-zinc ore which was 2.75 million tonnes at the beginning of the present millennium has reached 7.1 million tonnes in 2009-10 recording an increase of about 142 percent. Earlier, the production of lead-zinc ore was reported from two states. Since 2004-05, Rajasthan is the sole producer of lead & zinc ore, from 3 districts namely (i) Bhilwlara (ii) Rajsamand and (iii) Udaipur.

i) **Bhilwara –** In this district Rampura-Agucha lead-zinc mine is the largest mine in India which had a production capacity of 3.75 million tonnes which was expanded to 5.00 million tonnes in 2008. Rampura-Agucha is an opencast mine and therefore has high ore recovery and low production cost.

ii) **Rajsamand District -** The production of lead-zinc ore in this district comes mainly from two mines viz. Rajpura-Dariba and Sindesar (Khurd). Both the mines are underground. The combined capacity of these two mines is 0.9 million tonnes per year.

iii) **Udaipur District** – The production of lead-zinc ore in this district is reported from Zawar group of mines. The Zawar group of mines

includes Mochia, Balaria, Zawar Mala and Baroi. The combined capacity of all the four mines is 1.20 million tonnes per year. All the mines in Zawar group of mines are underground mines.

3.4.2 Production of lead & zinc concentrates

HZL is the sole producer of lead and zinc concentrates in India. HZL has installed 3 main concentrator plants at Zawar, Rajpura-Dariba and Rampura-Agucha. The combined capacity of all the 3 concentrator plants is 10,140 tpd. Lead and zinc ore treated to produce lead and zinc concentrates for the last10 years is given in **Table: 3.3.**

Table : 3.3 - Lead & Zinc Ore Treated 2000-01 to 2008-09

(Quantity in tonnes)

Year	Lead & zinc ore treated	Metal content (%)	
		Lead	Zinc
2000-01	3,290,756	2.23	7.54
2001-02	3,164,933	1.88	9.35
2002-03	3,620,223	1.99	9.81
2003-04	3,958,846	2.01	10.04
2004-05	4,808,073	1.93	10.85
2005-06	4,992,655	2.00	10.90
2006-07	5,141,229	2.00	10.90
2007-08	5,784,068	2.00	10.44
2008-09	6,520,020	1.91	10.06
2009-10	7,087,129	1.82	10.54

The lead & zinc ore is treated to produce lead and zinc concentrates separately**.** The lead and zinc concentrates produced since last 10 years are given in **Table: 3.4** and depicted **Figure-3.3** and **Figure-3.4** respectively.

Table : 3.4 - Production of Lead and Zinc Concentrates 2000-01 to 2009-10

(Quantity in tonnes)

Year	Lead concentrates		Zinc concentrates	
	Quantity	Grade (%)	Quantity	Grade (%)
2000-01	54,487	63.45	366,095	54.29
2001-02	52,386	62.31	398,837	53.80
2002-03	59,107	59.46	486,162	54.92
2003-04	73,069	64.40	590,476	53.74
2004-05	81,673	63.80	666,424	53.21
2005-06	95,738	62.39	889,007	53.11
2006-07	107,334	62.76	947,387	53.29
2007-08	125,756	61.80	1,035,827	53.22
2008-09	133,768	60.37	1,224,077	52.91
2009-10	136,095	61.82	1,277,080	52.86

Figure : 3.3 - PRODUCTION OF LEAD CONCENTRATES 2000-2001 TO 2009-10

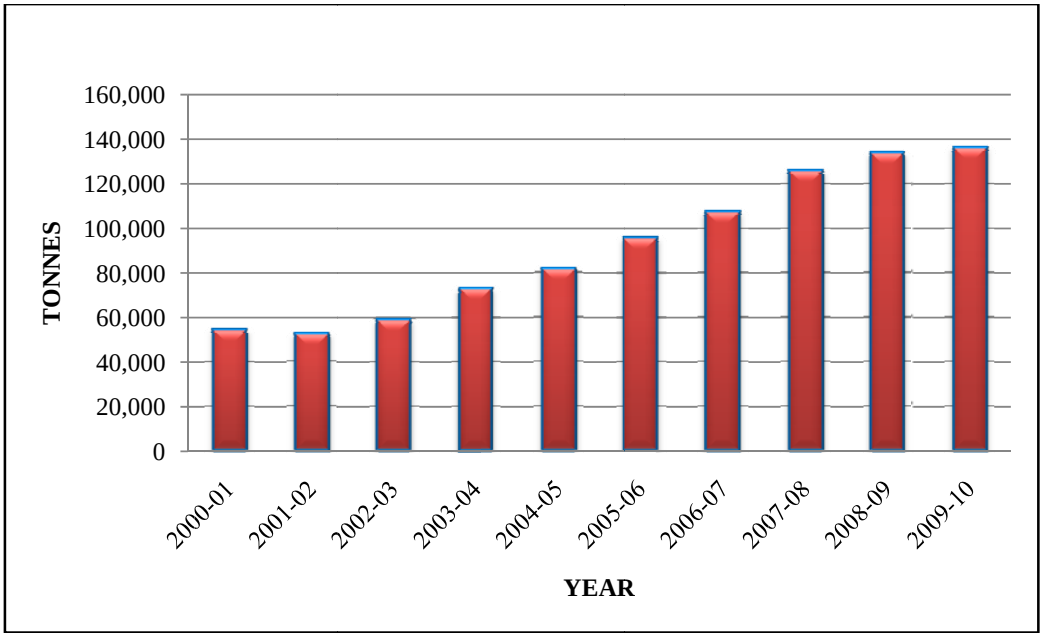
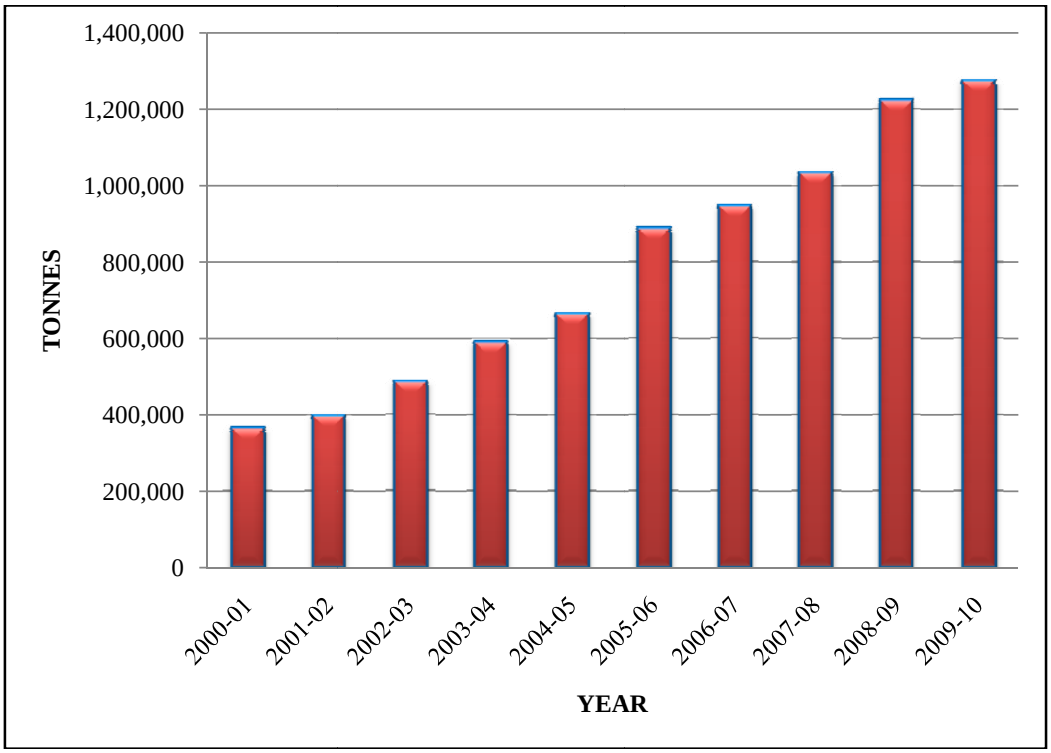


Figure : 3.4 - PRODUCTION OF ZINC CONCENTRATES 2000 - 2001 TO 2009-10



It is observed from the **Table: 3.4** that the production of zinc concentrates is increasing since the year 2000-01. The production of zinc which was 366 thousand tonnes in 2000- 01 has reached to 1,277 thousand tonnes in the year 2009-10.

In case of lead, the general trend in production of lead concentrates is also increasing except in the year, 2001-02 and 2002-03. It was decreased from 54 thousand tonnes to 52 thousand tonnes in 2001-02 and after that i.e. since 2002-03 it is continuously increasing. It has reached 96 thousand tonnes in 2005-06 and further to 136 thousand tonnes in 2009-10.

3.4.3 Production of Metals

(a) Lead Metal

Hindustan Zinc Ltd. (HZL) is the only producer of primary lead which operates three smelters having a total capacity of 93 thousand tonnes per year. Out of these three smelters, Vizag Lead Smelter was closed from 24.01.2001 and Tundoo Lead Smelter was closed from May, 2003 for economic reasons. Presently, the production of primary lead is reported only from Chanderiya Lead Smelter of HZL. Indian Lead Ltd. (ILL) has two units at Kolkata and Thane, each having a capacity of 12,000 tpy. Both the units are based on scrap. The company is yet to start production. The production of primary lead in India in the year 2009-10 was 72000 tonnes, as against 60,323 tonnes in 2008-09.

HZL has plans to set up a lead smelter with a capacity of 100,000 tpy at Rajpura Dariba in Rajasthan. The production of lead metal for last ten years is given in **Table: 3.5** and depicted in **Figure-3.5.**

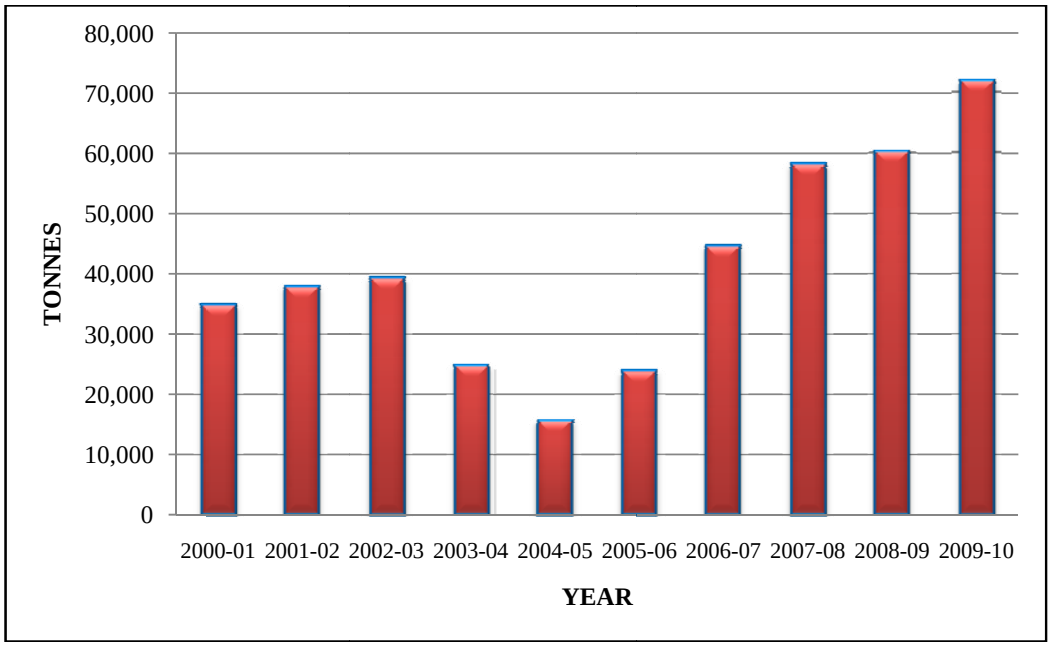
Table : 3.5 - Production of Lead Metal in India 2000-01 to 2009-10

(In tonnes)

Year	Production
2000-01	34,840
2001-02	37,860
2002-03	39,314
2003-04	24,737
2004-05	15,657
2005-06	23,817
2006-07	44,627
2007-08	58,246
2008-09	60,323
2009-10*	72,000

**Annual Report, 2009-10, HZL*

Figure : 3.5 - PRODUCTION OF LEAD METAL 2000 - 01 TO 2009-10



The production of lead metal reduced during 2004-05 due to closure of Vizag and Tundoo smelters due to economic reasons.

Lead is also produced through secondary route from scrap. Most of the secondary producers are in unorganized sector for which data is scarce. However an attempt has been made, later in this chapter, to quantify the production of lead from secondary sources.

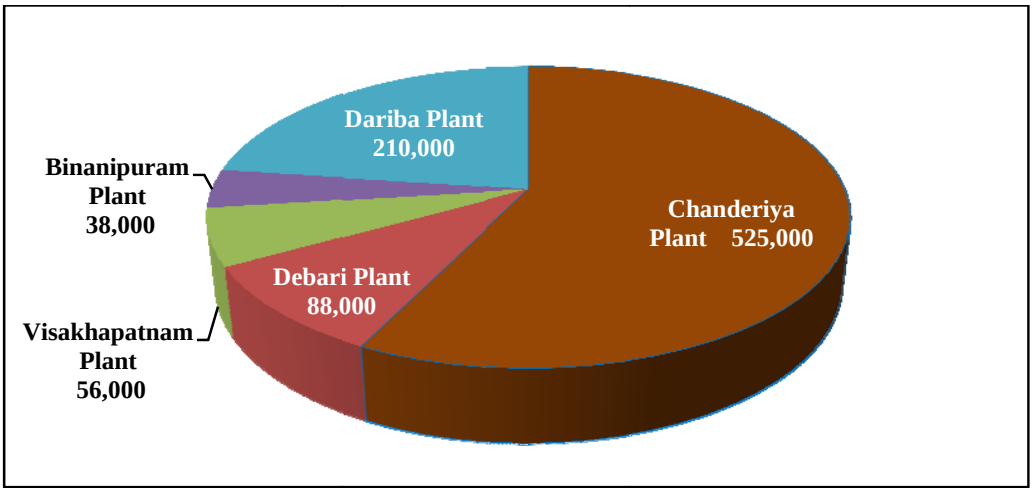
(b) Zinc Metal

Hindustan Zinc Ltd. (HZL) is the only producer of primary zinc which operates four zinc smelters at Debari, Chanderiya, Visakhapatnam and Dariba with a total capacity of 879,000 tonnes per year. Besides, Binani Zinc Ltd. (BZL) is also producing zinc from imported concentrates. The zinc smelting plant of BZL is situated at Binanipuram (Alwaye) in Kerala. The plantwise installed capacities of zinc is given in **Table: 3.6** and depicted in **Figure-3.6**.

Table : 3.6 - Plantwise Installed Capacities of Zinc Smelters, 2009-10

Sl. No.	Name of Plant	Capacity (in tpy)
1.	Chanderiya Plant of HZL	5,25,000
2.	Debari Plant of HZL	88,000
3.	Visakhapatnam Plant of HZL	56,000
4.	Dariba Plant of HZL	2,10,000
5.	Binanipuram Plant of BZL	38,000
	Total	**9,17,000**

Figure : 3.6 - PLANT WISE CAPACITIES OF ZINC SMELTERS, 2009-10



All the above plants are producing zinc by various methods. The Chanderiya Zinc Smelter complex has three smelters- i) Lead Zinc Smelter using imperial smelting technology, U.K. ii) Hydrometallurgical Zinc Smelter, Hydro-I and iii) Hydro-II. Both using Roast Leach Electrowinning Technology with conversion process. The Debari and Visakhapatnam Zinc smelters are hydrometallurgical smelters also using Roast Leach Electrowinning Technology with conversion process. HZL has successfully commissioned a hydrometallurgical plant for zinc smelting with a capacity of 210,000 tpy at Dariba in March, 2010.

Production of zinc metal in India in 2009-10 was 608,884 tonnes as compared to 579,091 tonnes in 2008-09. The production of zinc metal for last ten years since 2000-01 is given in **Table: 3.7** and depicted in **Figure-3.7**.

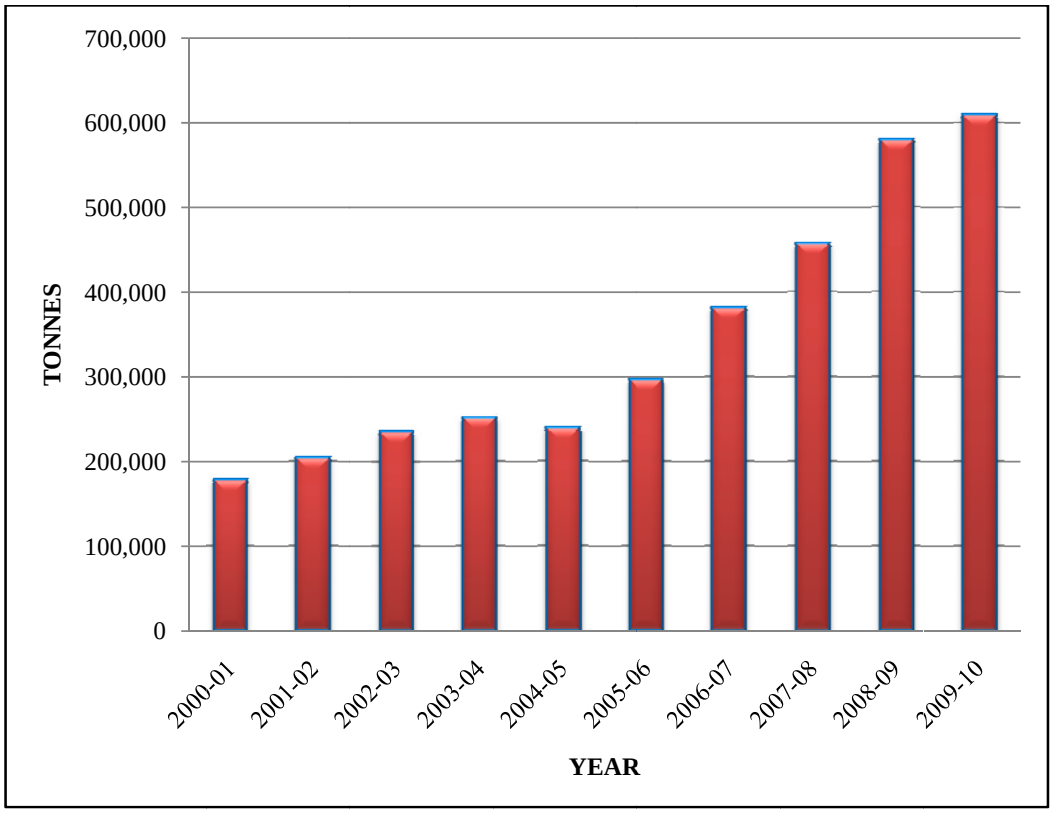
Table : 3.7- Production of Zinc Metal, 2000-01 to 2009-10

(In tonnes)

Year	Production of Zinc
2000-01	178,015
2001-02	204,209
2002-03	235,525
2003-04	251,754
2004-05	239,187
2005-06	296,460
2006-07	380,945
2007-08	457,075
2008-09	579,091
2009-10*	608,884

**Annual Report, 2009-10, HZL*

Figure : 3.7 - PRODUCTION OF ZINC METAL 2000-01 TO 2009-10



3.4.4 Scrap Recycling

Scrap recycling is an integral part of metal industry as the cost of recovering metal from scrap is much cheaper as well as much easier than the production from ore. Moreover, easy availability of scrap as a secondary source which can be effectively used after a long period from their first production from ore without compromising in quality.

The metals which do not corrode easily during their use are the most recyclable metals. Copper, zinc, and lead falls in this category. Therefore, huge quantities of copper, zinc and lead are recycled to produce these metals. The other very important factor is that these metals do not change their physical and chemical characteristics during recycling and can be recycled again and again. Of course, the proper technology and processes are involved for getting the pure metal from scrap.

(a) Lead Recycling

As it has already been stated that about 75% lead is used in the manufacture of Lead Acid Batteries (LAB) mostly in the form of lead plates. As the battery plates are sealed inside a case, there is hardly any loss of lead during its use, it being contained in the battery case in the form of spent battery plates and sludge even after the expiry of battery life and can be recovered and

recycled. The lead which is used as cable sheathing, pipes, plates and in any other form is also recovered and recycled. A generalized flow sheet for lead acid battery recycling is shown at **Plate-IX**.

There are certain uses of lead where it is not possible to recover it like lead additives in petrol, lead used as alloying materials, lead in rubber, paint and other lead compounds. The share of such uses forms only 10 % in the total use pattern.

Many countries depend on recycled lead for meeting out their demand of lead. However, world over, there is a major concern in respect of lead use, its handling and recycling due to its hazardous nature. It is known that when lead finds its way in the body and ultimately in blood stream, it cannot be discarded or used by the body hence causes many disorders and affects human growth and health adversely. Therefore, the lead scrap collection, trade, recycling comes under the vigil of environmental agencies. To minimize and stop the adverse effects of lead, every country has devised and formulated certain laws.

In India lead recycling industry comes under the watch of Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCB) which grant licenses for its recycling to the parties who are fulfilling the norms laid down by CPCB & SPCB as well as Ministry of Environment and Forest (MOEF).

Lead & its scrap is also traded world over as per the norms and nomenclature fixed by Institute of Scrap Recycling Industries, Inc. (ISRI). The trade names as well their details are enclosed as **Annexure: 3 - I**.

The lead & scrap is covered under various HS code as listed in **Annexure: 3 – II (A) and Annexure: 3 - II (B**).

In Indian Scenario with the enactment of Battery (Management & Handling) Rules, 2001, the availability of lead scrap in organized sector has increased many folds. The scrap LAB collected at various points is broken and lead contained in them is recycled. As on 13. 5.2010, there were about 316 lead waste re-processors in the country having a combined capacity of 1,097,876 tonnes/year for handling used LAB as well other scrap/dross/ashes etc. The state-wise capacities of lead waste re-processors are given in following **Table: 3.9** and the statewise details of lead waste processors are given at **Annexure: 3 - III**.

Plate - IX

GENERALISED FLOW DIAGRAM OF LEAD ACID BATTERY RECYCLING

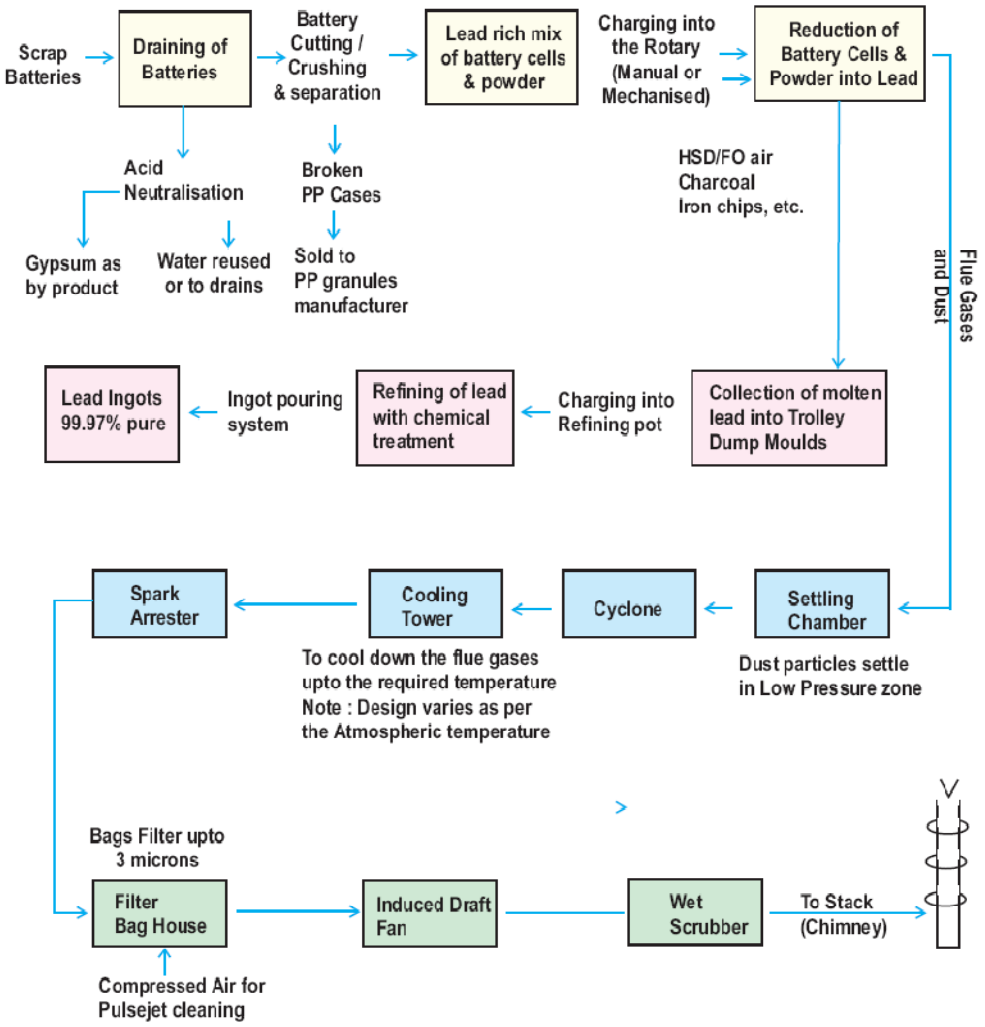


Table : 3.9 - State wise Capacities of Lead Waste Processors (Registration Granted by MOEF/CPCB as on 13.5.2010)

Sl. No.	State	No. of Unit	Capacity (Tonnes/year)
1.	Andhra Pradesh	12	80,120
2.	Assam	2	2,100
3.	Chhattisgarh	5	3300
4.	Gujarat	14	37,370
5.	Haryana	28	57,755
6.	Himachal Pradesh	2	25,100
7.	Jammu & Kashmir	9	74,960
8.	Karnataka	21	1,06,240
9.	Kerala	3	3,700
10.	Madhya Pradesh	29	75,315
11.	Maharashtra	41	1,26,762
12.	Punjab	26	20,420
13.	Rajasthan	43	1,82,940
14.	Tamil Nadu	13	72,620
15.	Uttar Pradesh	22	1,30,600
16.	West Bengal	46	98,566
	Total	**316**	**1,097,876**

Source: Website CPCB, New Delhi.

The capacities shown in **Table: 3.9** against each state as well against each unit in **Annexure: 3 – III (A)** is the maximum permissible limit of used battery intake. The lead acid battery has many components namely top cover, box, separators, oxide coatings as well as lead plates.

During the visit to the leading lead waste re processors plant and discussions with the experts in this field it is understood that on an average basis the availability of lead from a used LAB is about 50 to 55% of the battery weight and the rest goes to cover, box, separators, oxide paste etc. by weight. Various components of lead acid battery and used LAB are shown in **Plate-X(A) and X(B)**.

The lead plates after breaking the battery are removed, separated from the oxides both manually and mechanically and lead scrap thus obtained is melted in simple "Mandir type" Rotary furnace to obtain lead. The first melt in trade parlance is called as 'soft lead' which contains about 99% of lead. This soft lead is used for making 'lead oxide powder' by some processors. Slag generated during first melt is

Plate - X(A)

VARIOUS COMPONENTS OF LEAD ACID BATTERY

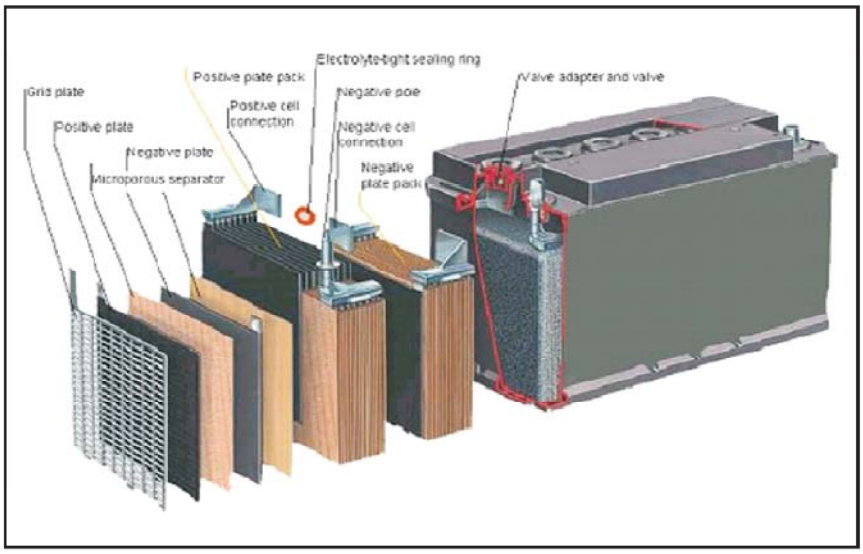


Plate - X(B)

USED LEAD ACID BATTERIES

remleted to obtain 'Dugadda' or Dogla lead containing about 97% Pb, 2.5 to 2.7% Antimony and 0.25% other impurities.

The waste generated during smelting for obtaining 'Dugadda' or Dogala is again remelted to get "Tigala' lead and 'Kita'. The left over waste or slag is not further useable and is sent to respective disposal sites.

The recovery of lead even after three to four times melting of scrap is not uniform in all the lead waste re-processor units. The recovery of lead is dependent upon the expertise of workers as well adaptability of the technology by individuals.

On study of data from 134 units as obtained from CPCB, New Delhi, the recovery of lead from lead scrap is as high as 100% and as low as 12%. The details of recovery of lead from various units across the country are given in **Annexure: 3 - IV.**

In view of the above discussion the availability of secondary lead obtained from lead waste reprocessing is discussed below:

As mentioned earlier and also given in **Annexure: 3 – III (A)**, the capacities granted by CPCB are the capacities of used battery intake by each unit. The total capacity of all the units is 1,097,876 tonnes as on 13.5.2010 and as per the views of experts the availability of lead in LAB is about 50-55%, so taking a conservative figure of 50%, the total scrap availability from used lead acid battery comes to about 548,938 tonnes. This scrap is melted in conventional Bhattis and secondary lead is recovered. The recovery, as already explained is shown in **Annexure: 3 - IV** in the range of 12% to 100%.

The discussion in field with officials and with the personal observation it is observed that the recovery from lead scrap to lead metal comes to around 75%. (On applying this recovery factor, the quantity of recycled lead produced in the country is about 411,703 tonnes, only when all the operating units are working with their full capacities).

It has also been observed during field visits that many a units are not working at all while other units are working far below their licensed capacities. On discussion with officials of CPCB and SPCB as well as associations and individuals it is understood that about 40% of the total units are in operation and the average capacity utilization is about 50%.

Therefore, the availability of lead metal which would be 411,703 tonnes when all the units are in operation comes to 164,681 tonnes with only 40% units are in operation. By taking in to consideration 50% capacity utilization, the quantity of recycled lead produced comes to be around 82,340 tonnes.

The production of recycled lead along with various factors applied for the calculation of production of secondary lead is given in the **Table: 3.10**.

Table : 3.10 - Production of Secondary Lead Based on the Capacities Registered with CPCB, New Delhi and Recovery Percentage.

(In tonnes)

Total Battery intake capacity	Lead scrap obtained @ 50% of recovery from battery	Units in operation (40%)	Secondary lead produced @ 75% recovery	Secondary lead produced based on capacity utilisation by the units (50%)
1,097,876	548,938	219,575	164,681	82,340

Total Production of Lead (Primary and Secondary)

According to estimates by Ministry of Environment and Forest world over, the secondary lead production accounts for 60% while in India the secondary production accounts for only 33%. As per the communication received from the Indian Lead and Zinc Development Association (ILZDA), the share of recycled lead in India is above 70%. The study conducted by IBM in field as well as literature survey revealed that in addition to primary production of 72 thousand tonnes in 2009-10, there is a sizeable production of secondary lead amounting to 82 thousand tonnes which is about 114% of the primary lead production. Considering that there will be some fluctuations in the production of secondary lead, because of the scarcity in availability of scrap and closure of some units a conservative share of production of secondary lead as 100% of the primary lead production has been adopted in our study. By applying the criteria as mentioned above, the estimated production of lead thus calculated by adding 100% of primary production is given in **Table: 3.11** below.

On this basis, estimated production of lead has been calculated by adding 100% of the primary production. The same is given in the **Table: 3.11.**

Table : 3.11 - Estimated Production of Lead Metal, 2000-01 to 2009-10

(In tonnes)

Year	Production (primary)	Estimated Production (By adding 100% Secondary Production to Primary Production)
2000-01	34,840	69,680
2001-02	37,860	75,720
2002-03	39,314	78,628
2003-04	24,737	49,474
2004-05	15,657	31,314
2005-06	23,817	47,634
2006-07	44,627	89,254
2007-08	58,246	116,492
2008-09	60,323	120,646
2009-10	72,000	144,000

Legislation on Battery Scrap

In order to regulate collection of lead acid batteries and channelize batteries scrap to recycling facilities adopting environmentally sound processing technologies, the Batteries (Management & Handling) Rules, 2001 have been notified. The salient features of Rules are as follows**:**

1. Consumers to return used batteries and manufacturers/assembles/ re-conditioners /importers responsible for collection of batteries and transport to registered recyclers.
2. Auction of used batteries only in favour of registered recyclers
3. Dealers are also responsible for collection.
4. Level playing field.
5. Collection of batteries 50% in the first year, 75% in the second year and 90% from the third year onwards.
6. Batteries have been categorised.

Since 1999, a scheme for registration for re-processors of used lead acid batteries has been operationalised. Prior to grant of registration, inspection of facility is a must and in at least 10% cases, a second inspection is also undertaken. In addition to compliance with the regulatory standards, reprocessing units are required to follow the prescribed code of practice for Environmentally Sound Management (ESM) of lead acid batteries and possess proper facilities for disposal of wastes, the sludge, in particular. Air pollution control system stipulated in the ESM code would ensure that stack emission would not exceed 10 mg/Nm^3 for lead and 50 mg/Nm^3 for total particulate matter. Secured land fill facility for disposal of sludge should have a leachate collection system and meet the tolerance limit prescribed for heavy metals, namely cadmium, lead and nickel. The sludge produced by the reduction of lead in the furnace has to be reprocessed at least twice so as to bring down the lead content in sludge and render it fit for disposal in a landfill.

As earlier stated the scheme for registration of the recyclers has been in operation for about two years. Till now 35 units have been granted registration following the procedure described above. As a result, today there is a fair distribution of units with environmentally sound reprocessing capability in the country. This has helped avoid transportation of lead metal scrap over long distances.

The new legislation enforced in tandem with the registration scheme would ensure that battery scrap is processed only by units possessing ESM facilities. In addition, unauthorised backyard smelters and traders have been barred from taking part in auctions of battery scrap thereby choking supply of backyard smelting which poses serious problems by way of uncontrolled lead emissions and discharge of acid into the open ground/sewers. It is well recognised that poor lead recovery in the backyard smelters (around 30-40%) has been the primary cause of the lower share of secondary lead production in the country. The rules also provide for an elaborate reporting system, which would help keep track flow of lead in the economy. It is significant to note that the new legislation has already spurred substantial capacity

addition in the organised sector of the secondary smelting. Hindustan Zinc Limited and Binani Zinc Limited have announced plans to set up secondary smelters of capacity 35,000 tonnes and 25,000 tonnes, respectively.

(b) Zinc Recycling

Major consumption of zinc throughout the world is in coating and galvanizing industry and about 75% of zinc is consumed in galvanizing of steel. The second largest use of zinc is in making brass and die casting alloys which accounts for 14%. As already stated, the collection of zinc scrap is generally in unorganised sector. However, the recycling of zinc comes under control of state pollution control boards and the zinc ash/skimmings generated during galvanizing is to be sold to the licence recyclers only. Moreover the zinc which is used for galvanizing is lost forever, as it is practically not possible to recover zinc from used galvanized structures during remelting of steel. Brass industry consumes brass scrap for making new brass hence the zinc, copper and other metals are not recovered in their original form during recycling of brass. A generalized flow diagram of zinc recycling is shown at **Plate-XI**.

In the process of hot dip zinc galvanizing of iron, zinc along with little quantities of other metals such as lead & aluminium is melted in a kettle and kept in liquid form by heating it continuously. The top layer of molten zinc comes directly in contact with atmosphere and the top layer cools down to form the film of zinc over the molten zinc surface. This film is necessarily to be removed before dipping iron bars and sections for galvanizing. The thin film which is removed periodically is known as 'skimmings'/ash is kept aside. This skimming and ash contains zinc ranging from 15 to 25%.

During the process of galvanizing some iron and other impurities are continuously added by default to the liquid zinc with the dipping of iron bars and sections, which tend to settle at the bottom of kettle. During cleaning of kettle this impure zinc containing up to 90% Zn is removed and sold as 'Dross'. The skimming/ ash and dross are sold to the zinc recyclers for the recovery of zinc metal as well to the units producing zinc sulphate.

Some of the zinc recyclers use scrap zinc and dross to recover zinc metal, during this process, some zinc ash and zinc skimming is generated which again comes in recycling route.

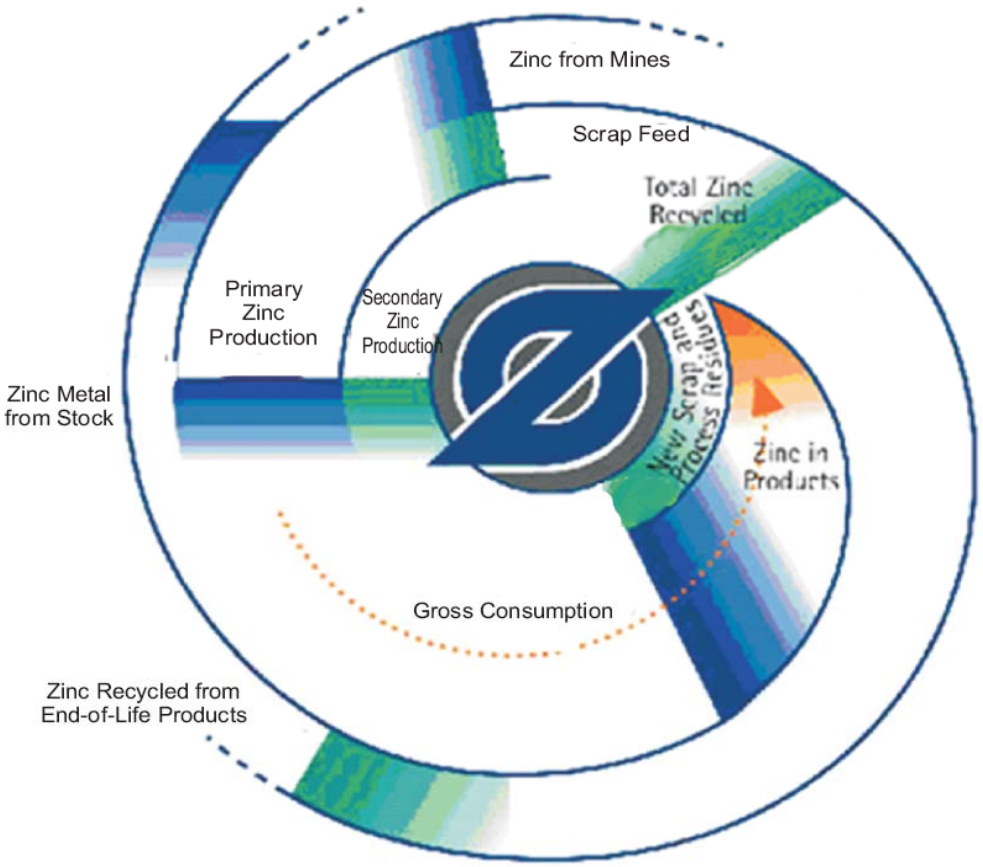
In addition to the zinc scrap, zinc ash and zinc skimming generated within the country, large quantities of zinc scrap is also imported to meet out the requirement of the reprocessing units.

The trade of zinc scrap is being done as per the norms fixed by ISRI vide their specification circular-2009. The same is given at **Annexure: 3 - V**.

The exports & imports of zinc and zinc scrap as well other articles is made as per HS Code is given in **Annexure: 3 - VI(A) and Annexure:3 - VI (B)**.

Plate - XI

GENERALISED FLOW DIAGRAM OF ZINC RECYCLING



It is also understood that about 75% of the total zinc used in galvanizing industry is lost and cannot be recovered as well the zinc used in the manufacture of oxides and chemicals is also lost, while the zinc used in dry batteries, die cast etc. is recoverable which amounts to about 15% of zinc metal use.

Zinc recycling/reprocessor units come under the purview of MOEF and CPCB. They have approved 170 licences as on 13.5.10 for zinc ash, zinc skimming and zinc dross processing units with a total capacity of 402, 463 tonnes/annum. The same is given in **Annexure: 3 - VII**.

The state wise capacities of zinc recyclers are given in **Table: 3.12.**

Table : 3.12 - State wise capacities of Zinc Waste Reprocessing Units as Registered with CPCB and MOEF as on 13.5.2010

Sl. No.	State	No. of Units	Capacity
1.	Andhra Pradesh	6	6731
2.	Bihar	1	900
3	Chandigarh	3	2850
4	Chhattisgarh	1	400
5	Daman, Diu, Dadra & Nagar Haveli	4	16020
6	Gujarat	20	63464
7	Haryana	22	68815
8	Himachal Pradesh	3	8800
9	Jammu & Kashmir	5	29500
10	Jharkhand	3	4620
11	Karnataka	4	5640
12	Madhya Pradesh	1	1800
13	Maharashtra	11	14682
14	Orissa	2	5892
15	Pondicherry	1	3000
16	Punjab	34	65052
17	Rajasthan	8	8530
18	Tamil Nadu	5	3280
19	Uttar Pradesh	15	64855
20	West Bengal	21	27632
	Total	**170**	**402463**

Table : 3.13 - Statewise Capacities of Recyclers of Zinc along with Other Metals. Registered with CPCB and MOEF as on 13.5.10

Sl. No.	State	No. of Units	Capacity(TPA)
1.	Andhra Pradesh	2	10780
2.	Chattisgarh	1	300
3.	Daman, Diu, Dadra & Nagar Haveli	10	71540
4.	Gujarat	43	104096
5.	Haryana	4	18115
6.	Jammu & Kashmir	6	46960
7.	Karnataka	6	13108
8.	Madhya Pradesh	5	9960
9.	Maharashtra	26	76981
10.	Punjab	3	18870
11.	Rajasthan	10	46775
12.	Tamil Nadu	2	21000
13.	Uttar Pradesh	10	77680
14.	West Bengal	4	1350
	Total	**132**	**517,515**

In addition to there are some recyclers which also reprocess zinc alongwith other metals namely brass, nickel and copper. The list of such recyclers which reprocess zinc along with other metals is given at **Annexure: 3 – III (B)**. The state wise capacities of reprocessors of zinc along with other metals are given in **Table: 3.13.**

As it is seen from the above **Table: 3.12 and Table: 3.13**, there are substantial capacities of zinc recycling in India. These units recycle zinc from the zinc scrap, dross, zinc skimming and zinc ash available from the various galvanizing plants within the country as well from imported scrap and dross.

During the field visit to various re-processing plants and discussions held with the officials of Central Pollution Control Board, State Pollution Control Boards, various associations and organizations and the data obtained from the returns submitted to CPCB, New Delhi, it is understood that about 40% of the reprocessing units are in operation and the capacity utilization is about 30%. These units, as mentioned earlier, consume zinc skimming, zinc ash, zinc dross as well as zinc scrap to produce secondary zinc metal, zinc ash, zinc oxide and zinc sulphate. The production of zinc is more when the reprocessors use zinc scrap or dross as raw feed as it contains more than 90% of zinc. When zinc ash and zinc skimming which contains about 25% of zinc are used as raw feed, the recovery of Zn is low. Moreover,

some of ash generated during the recycling of Zn scrap and zinc dross as well the ash left over after the recovery of zinc from skimming directly goes for the manufacture of zinc sulphate ($ZnSO_4$).

The other factor which affects the recovery of zinc in the process of treating skimming is when the direct melt in furnace gives zinc recovery of 50% and the zinc recovery through electrolytic leaching process is about 80 to 90%.

However, from the data made available by the individual processors to CPCB the average recovery of zinc with varying feed material end processes comes to about 50%.

In view of the above findings in respect to the working in reprocessing units, the recovery of secondary zinc metal from scrap etc is discussed below.

The CPCB and MOEF have granted registration to 170 units as on 13.5.2010 for processing zinc scrap, zinc dross, zinc skimming and zinc ash to produce zinc metal & other zinc chemicals. The total capacity of these units is 402,463 tonnes per annum. Taking in to consideration that only 40% units are operating the capacity for processing zinc scrap etc. comes to about 160,985 tonnes/year. During the field visits as well as the data made available by the CPCB, New Delhi, it has been noticed that the processing units are operating much below their permitted capacities. The average capacity utilization by these units is about 30% and thus the capacity of scrap intake is further reduced to 48,295 tonnes/year. Considering 50% average recovery of zinc from scrap etc. the production of secondary zinc from reprocessing units comes to be 24,148 tonnes/ year as shown in **Table: 3.14**.

Table : 3.14 - Production of Secondary Zinc by the Zinc Reprocessors only based on the Registered Capacities by CPCB, New Delhi and Recovery Percentage

(In tonnes/year)

Total Scrap/Dross/ Skimming/ash intake capacity	Operating Units 40%	Capacity utilization 30%	Secondary zinc metal production based on 50% zinc metal recovery
402,463	160,985	48,295	24,148

Some of the reprocessing units have been permitted to use mixed scrap of zinc, copper, brass, and other metal as well. These units have been categorized as 'other non-ferrous metal waste reprocessors' for the sake of description and analysis and is placed at **Annexure:3 – III (B).**

The total capacity of these units comes to about 517,515 tonnes per year. By applying the factor of 40% operating units the capacity comes to about 207,006 tonnes/year. The capacity utilization of 30% of these units further reduced the capacity to 62,102 tonnes per year. The metal recovery from these units was 31051 tonnes/year by applying 50% recovery of metals from waste.

As these units use scrap of mixed nature therefore it is assumed that the secondary metal produced by these units will also be of mixed nature. Considering that share of zinc will be 45% in the total metal produced by these units the production of zinc comes to about 13,973 tonnes/year as shown in **Table: 3.15.**

Table : 3.15 - Production of Secondary Zinc by the Other Non-Ferrous Metals Waste Reprocessors based on the Registered Capacities with CPCB, New Delhi and Recovery Percentages

(In tonnes/year)

Total Capacity*	Operating units 40%	Capacity utilization 30%	Recovery of All Metals 50%	Percentage of Zinc in All Metals 45%
517,515	207,006	62,102	31,051	13,973

*Zinc scrap/Dross/ ash/ Skimming; copper Scrap/Slag/Cables/Dross/ Oxides/ Alloys/Mill Scale/Reverts/Cakes/Residues/Druids/Ash/ Skimming; Brass/Dross/Scrap/ Spent Catalyst Containing Copper, Nickel and Zinc.

3.4.5 Total Production of Zinc metal (Primary and Secondary)

As discussed in the preceding paragraphs and also given in **Table: 3.14** and **Table: 3.15** the production of secondary zinc from both types of reprocessors comes to about 38,121 tonnes/year. When compared with the production of primary zinc production in the year 2009-10 at 608,884 tonnes the production of secondary zinc comes to about 6.3% of the primary zinc production. It is also mentioned here that the zinc metal produced by the reprocessors generally is of inferior grade when compared with the virgin zinc. Hence, the secondary zinc is consumed generally by the brass manufacturing units. The galvanizing units which consume more than 75% of zinc generally prefer virgin zinc.

As per International Lead Zinc Study Group (ILZSG), about 30% of the zinc supply comes from the recycled source. However, as per the communication received from India Lead Zinc Development Association, about 10% of zinc comes from recycled sources. This Market Survey study adopted a conservative figure of 10% of recycled zinc. Based on this figure an estimated production of zinc has been arrived at by adding 10% of recycled zinc with the primary zinc production. The apparent production of zinc is given in **Table: 3.16**.

Table : 3.16 - Estimated Production of Zinc Metal, 2000-01 to 2009-10

(In tonnes)

Year	Production of Zinc (Primary)	Secondary Production (Estimated)	Total Production
2000-01	178,015	17,801	195,816
2001-02	204,209	20,421	224,630
2002-03	235,525	23,552	259,077
2003-04	251,754	25,175	276,929
2004-05	239,187	23,919	263,106
2005-06	296,460	29,646	326,106
2006-07	380,945	38,095	419,040
2007-08	457,075	45,708	502,783
2008-09	579,091	57,909	637,000
2009-10	608,884	60,888	669,772

Chapter 4. Foreign Market

Lead and Zinc are the two most important non-ferrous metals traded in the world. During 2009, the exports of lead and zinc were 1.67 and 3.80 million tonnes respectively. In the following paragraphs the world resource position, world production pattern and world trade in respect of these metals is discussed.

4.1 LEAD

Lead is the fourth important non ferrous metal traded worldwide. Most important use of lead is in the acid batteries which are used in automobiles, inverters etc. Lead is also used in making alloys, chemicals etc. Recently, a movement in world economy and industrial production in many developed and developing countries, consequently a turbulent activity is observed in all the fields of lead globally. It is intended here to study the trends in production, imports, exports etc. in the global scenario with a particular emphasis on the major countries dealing with lead. China, Australia, USA, Peru and Mexico are the major countries in the production and trade of lead ores & concentrates and metal in the world.

4.1.1 World Resources

Lead resources of the world total more than 1.5 billion tonnes, however based on the information released by the producers in respective countries, the world reserves of lead are placed at 80 million tonnes as per the Mineral Commodity Summaries, 2011. About 70% of the world reserves are located in Australia, China, Russia, USA. Australia has the largest reserves of lead at 27 million tonnes followed by China (13 million tonnes), Russia (9 millon tonnes), USA (7 million tonnes), Peru (6 million tonnes), and Mexico (5.6million tonnes). The remaining reserves are distributed in other countries. The countrywise reserves of lead are given in **Annexure: 4 -I** and depicted in **Figure: 4.1**.

4.1.2 World Production

(a) World Mine Production of Lead

Lead is produced by 40 countries in the world. Five countries namely China, Australia, USA, Peru & Mexico produced about 80% of the world production in 2009. Each of the five countries produces over 100,000 tonnes of lead every year. The world mine production of lead which was 3,200 thousand tonnes in 2003 increased to 4,100 thousand tonnes in 2009 registering an increase of 28% in 6 years. China was the top producing country with 1,908 thousand tonnes of production in 2009 contributing 47% of the world mine production of lead. Other major producing countries were Australia (566 thousand tonnes, USA (400 thousand tonnes), Peru (302 thousand tonnes), and Mexico (140 thousand tonnes). India was placed at sixth position with a production of 83 thousand tonnes in 2009. Details of country wise mine production of lead by principal countries are given in **Annexure: 4-II** and depicted in **Figure: 4.2**.

Figure : 4.1 - WORLD RESERVES OF LEAD, 2011
(By Principal Countries)

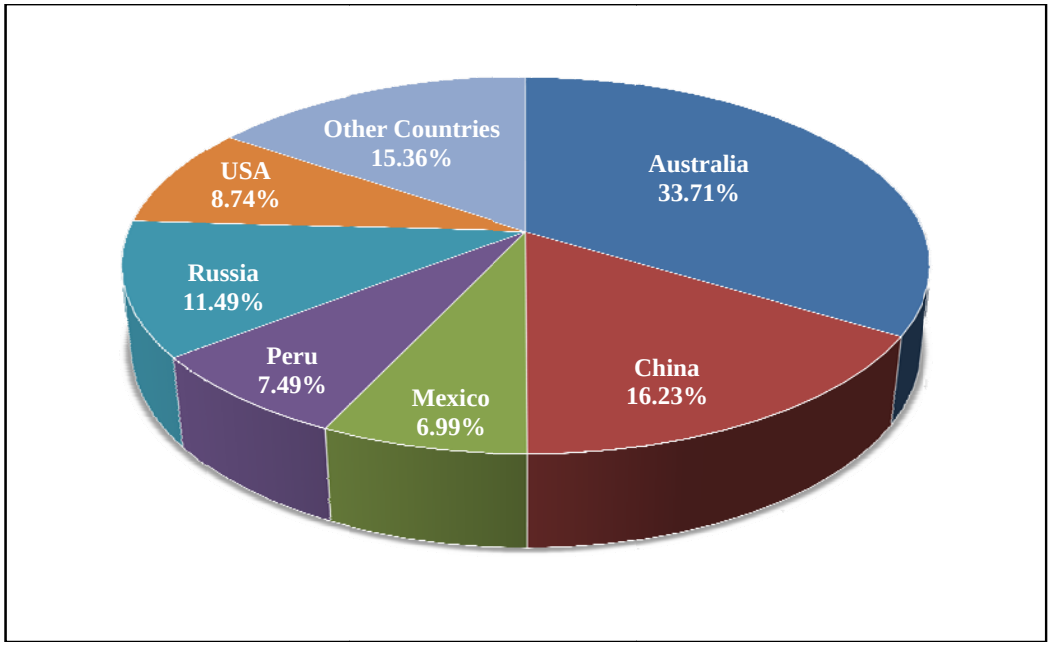
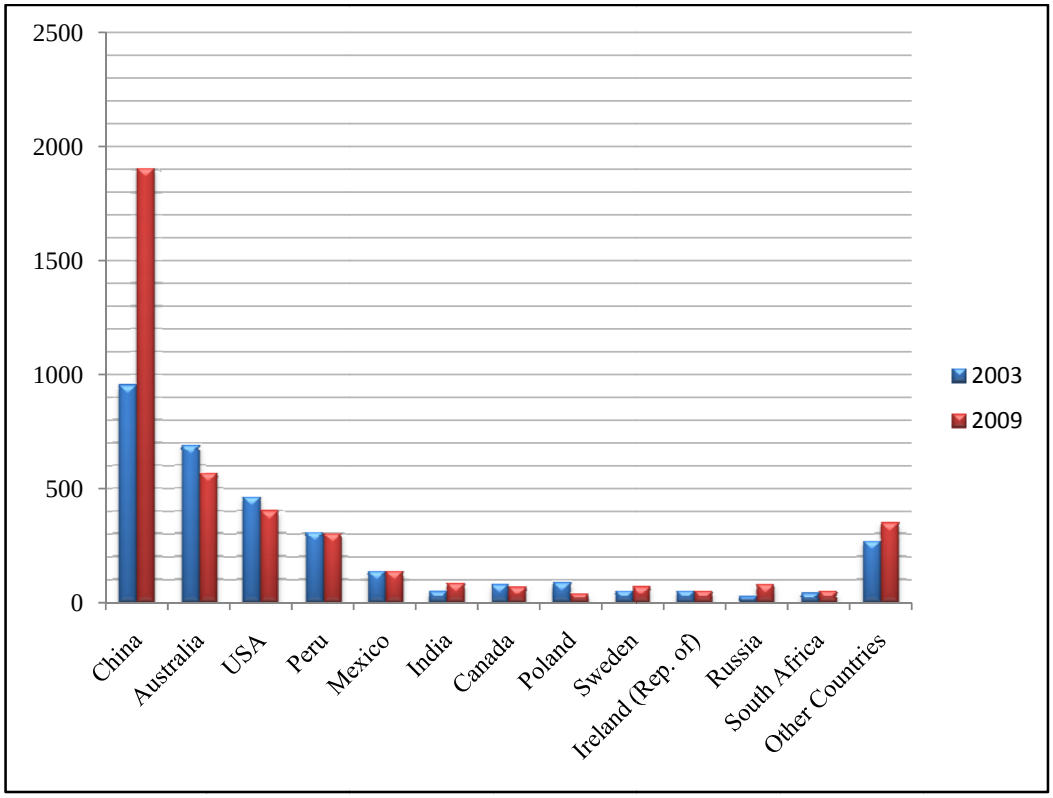


Figure : 4.2 - COUNTRY WISE MINE PRODUCTION OF LEAD
(2003 V/s 2009) (By Principal Countries)



(b) World Production of Refined Lead

The world production of refined lead was 6,900 thousand tonnes in 2003. It reached to 8854 thousand tonnes in 2009 registering an overall increase of about 28% in 6 years. China continued to be the top producer of refined lead with a production of 3,708 thousand tonnes of refined lead in 2009 contributing 42% to the world's total production of refined lead followed by USA (1,235 thousand tonnes), Germany (390 thousand tonnes), Japan (248 thousand tonnes) and U.K. (302 thousand tonnes). The production of refined lead in China increased substantially owing to the demand from the consuming industries like storage batteries. The production of refined lead in China was only 1,564 thousand tonnes in 2003, it increased to 3,708 tonnes in 2009 registering an overall increase of 137% in just 6 years. India produced 72 thousand tonnes of primary refined lead in 2009.

As per WMS there was a total production of refined lead at 138 thousand tonnes in 2009 which includes 76 thousand tonnes of secondary lead as against 47 thousand tonnes in 2003. Country wise mine production of refined lead from 2003 to 2009 given at **Annexure: 4-III** and depicted in **Figure: 4.3**.

The world production of refined lead was higher than the mine production of lead apperantly due to reporting of recycled material with the primary production. The production of refined lead from recycled material is cheaper as it requires only about one third energy as compared to that required to extract it from ores. No conclusive data on recycled production is available; however, about half of the production of lead comes from recycling, worldwide.

4.1.3 World Exports of Refined Lead

Total world exports of refined lead showed an increasing trend during the period. In 2007 it came down to 1.78 million tonnes and further to 1.59 million tonnes in 2008. It again increased to 1.67 million tonnes in 2009. China continued to be the top exporter of refined lead upto 2007. In the year 2009 the exports of refined lead from Australia was 247 thousand tonnes followed by Germany (163 thousand tonnes), Canada (130 thousand tonnes), United Kingdom (128 thousand tonnes) and Belgium (108 thousand tonnes). The Country wise exports of refined lead from 2003 to 2009 are given at **Annexure: 4-IV** and depicted in **Figure: 4.4**.

4.1.4 World Imports of Refined Lead

The world imports of refined lead showed a mixed trend. In 2003 the imports were 1,709 thousand tonnes. It increased in 2006 to 2,026 thousand tonnes. USA continued to be the top importer of refined lead with 251 thousand tonnes in 2009 which was 14% of the total world imports, followed by South Korea (131thousand tonnes), Spain (118 thousand tonnes) & India (116 thousand tonnes). Remaining imports were contributed by Taiwan, Germany, Indonesia, and other countries. The country wise imports of refined lead from 2003 to 2009 are given at **Annexure: 4-V** and depicted in **Figure: 4.5**.

Figure : 4.3 - COUNTRY WISE PRODUCTION OF REFINED LEAD (2003 V/s 2009) (By Principal Countries)

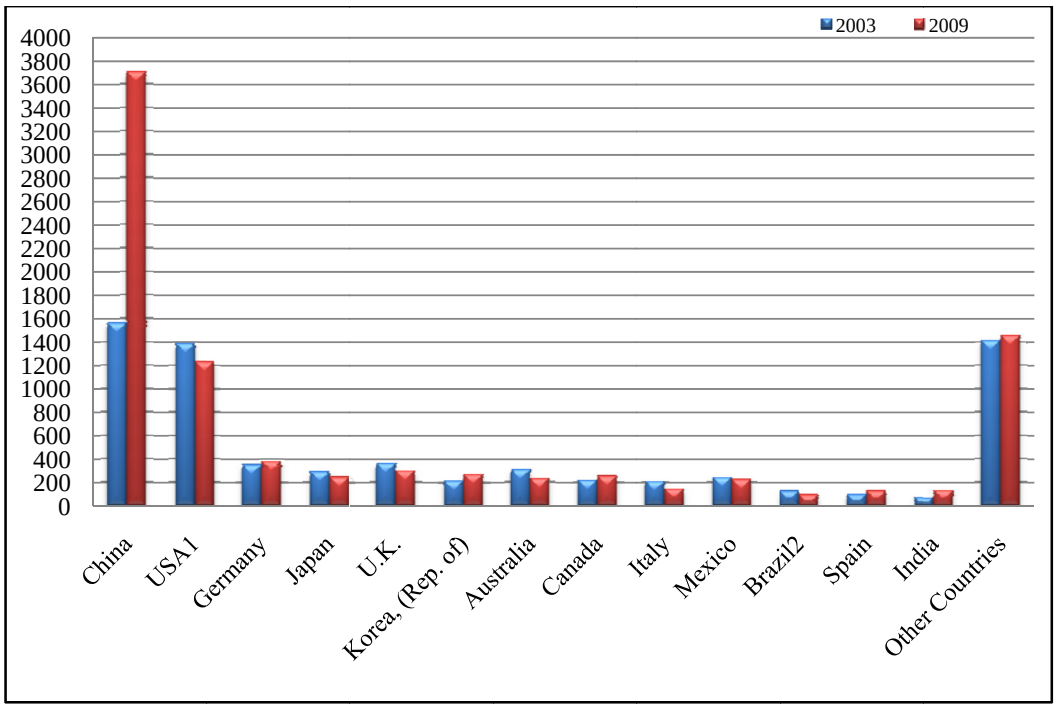


Figure : 4.4 - COUNTRY WISE EXPORTS OF REFINED LEAD (2003 V/s 2009) (By Principal Countries)

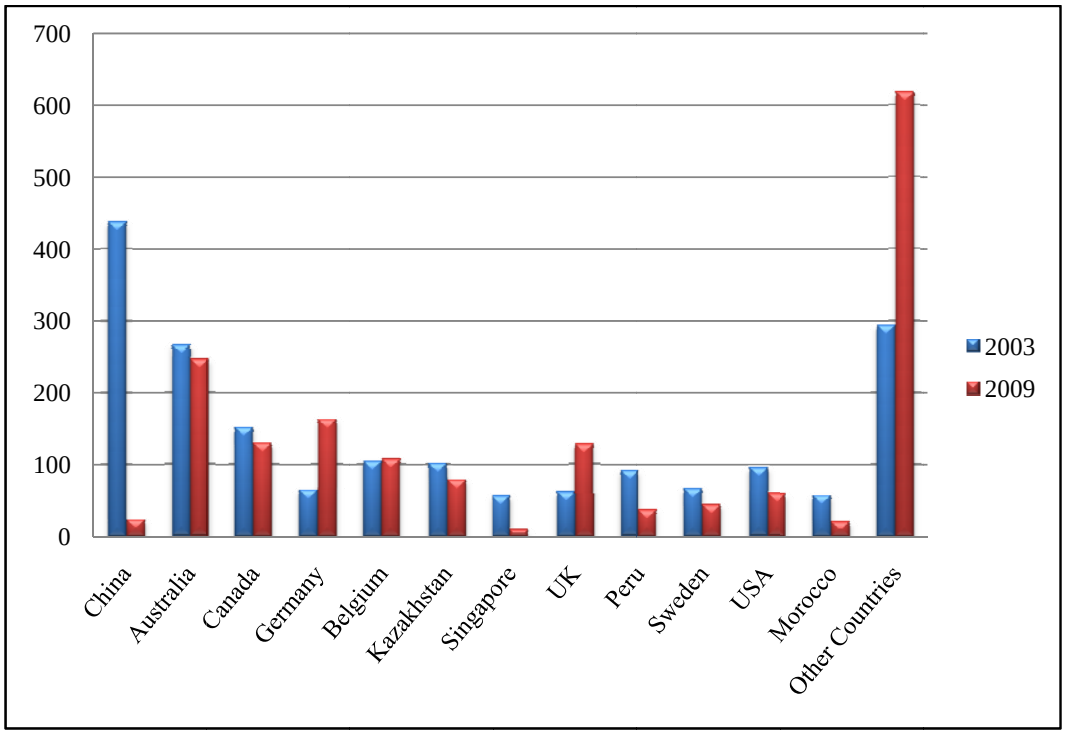


Figure : 4.5 - COUNTRY WISE IMPORTS OF REFINED LEAD (2003 V/s 2009) (By Principal Countries)

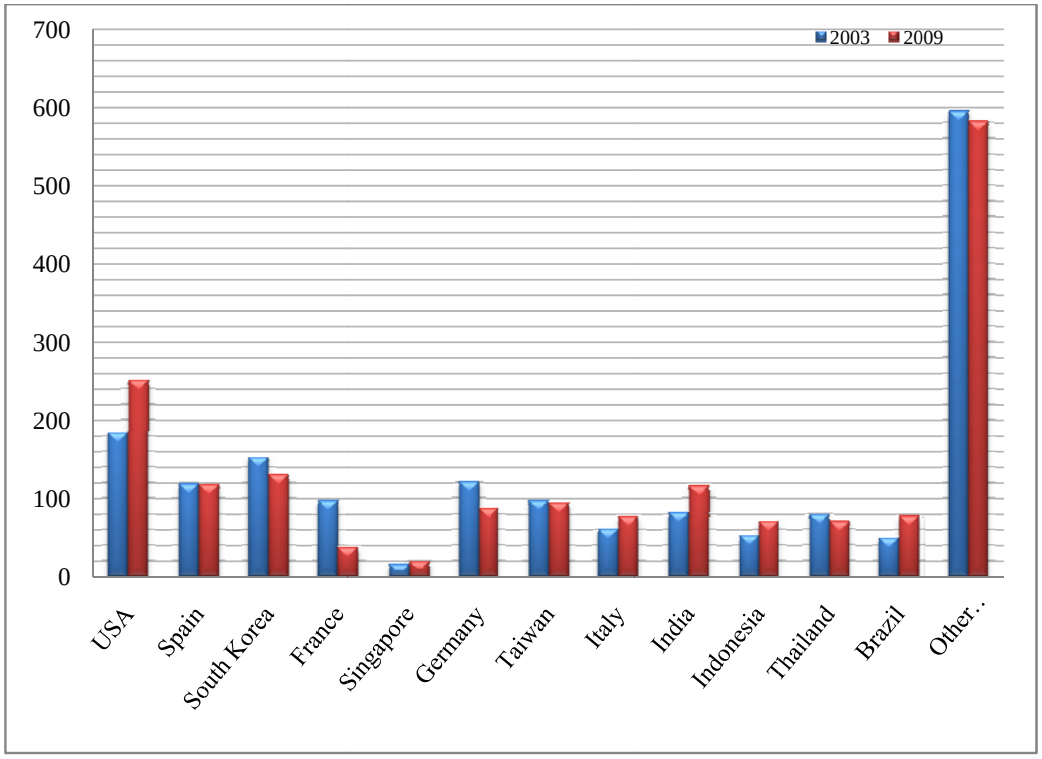
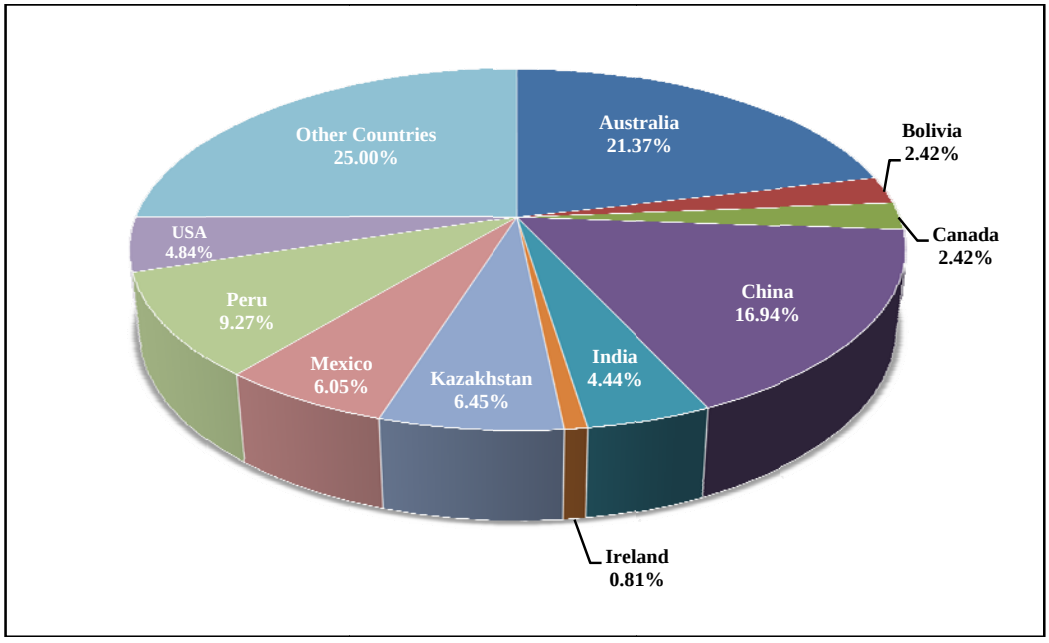


Figure : 4.6 - WORLD RESERVES OF ZINC, 2011 (By Principal Countries)



4.2 ZINC

Zinc is the third most important nonferrous metal after aluminium & copper which is traded worldwide. The most important use of zinc is in galvanizing steel surface to protect it from rusting. Zinc has some of the unique properties which make it important in the industrial usage. The demand of zinc is directly related to the developments in the industrial sectors like telecommunication, automobile, consumer goods, construction etc. where zinc is used to protect the steel surfaces. The coating of zinc considerably increases the life of steel. Zinc is also used in alloys, die-casting, chemicals, dry cell batteries etc. Zinc as other non-ferrous metals has experienced turbulent activity in the world market in the past few years. The main reason is attributed to the fast growing economy of some Asian countries and some developed western countries. China and USA were mainly responsible for the activities in all fields of zinc namely production, consumption, import and export.

4.2.1 World Resources

The zinc resources of the world are about 1.9 billion tonnes, however based on the commercially available database of reserves and resources of mines and potential mines, the world reserves of zinc as per Mineral Commodity Summaries, 2011 are placed at 250 million tonnes. About 53% of the world reserves of zinc are located in China, Australia, Peru and Kazakhstan. Australia has the largest reserves of zinc at 53 million tonnes followed by China (42 million tonnes), Peru(23 million tonnes), Kazakhstan(16 million tonnes), Mexico(15 million tonnes)and India(11 million tonnes). The remaining is contributed by other countries. The countrywise reserves of zinc are given in **Annexure: 4-VI** and depicted in **Figure: 4.6**.

4.2.2 World Production

(a) World Mine Production of Zinc

Zinc is mined in about 40 countries. China, Australia and Peru tops in zinc production. They together contribute 52% of the world's total mine production of zinc. The total mine production of zinc (in terms of zinc content) in the world stood at 11.30 million tonnes in 2009 which decreased by about 4% as compared to the production in 2008. The mine production of zinc in 2003 was 9.6 million tonnes and rose to 11.8 million tonnes in 2009 registering an increase of about 23% in 6 years. China produced about 3.09 million tonnes contributing 27% of world's total production (in terms of zinc content) in 2009. Peru was the second major country which produced 1.51 million tonnes of zinc which was 13% of the world production in 2009. Australia followed with 1.29 million tonnes (11%). Production from Canada was 699 thousand tonnes, USA (690 thousand tonnes) and India (681 thousand tonnes). Mexico, Ireland, Kazakhstan, Sweden, Bolivia, Namibia and other countries contributed the remaining production of mined zinc.

As per WMS, India’s production of mined zinc in 2003 was 318 thousand tonnes has improved its position and in 2009 the production was 681 thousand tonnes showing an increase of 114% in just 6 years. However, as per

the data compiled by IBM, the lead & zinc ore produced in 2003-04 was 3644 thousand tonnes which rose by 94.88% at 7102 thousand tonnes in 2009-10. Country wise mine production of zinc from 2003 to 2009 is given in **Annexure: 4-VII** and depicted in **Figure: 4.7**.

(b) World Production of Slab Zinc

The country wise production of slab zinc from 2003 to 2009 is given in **Annexure: 4-VIII** and depicted in **Figure: 4.8**. The world total production of slab zinc was 11.4 million tonnes in 2009 which registered an increase of 2.5% over the production of previous year. China continued to be the top producer of slab zinc in the world with 4.36 million tonnes of production in 2009. Its contribution in the world production was 38%. Canada was the second top producer with a production of 685 thousand tonnes contributing 6% in the world's total production followed by Korea, Rep. of (660 thousand tonnes), India (615 thousand tonnes), Japan (541 thousand tonnes), Australia (525 thousand tonnes) and Spain (517 thousand tonnes). Mexico, Kazakhstan, Finland, Brazil, Russia, USA, Germany, Belgium and other countries contributed the remaining production of slab zinc in the world.

4.2.3 World Exports of Slab Zinc

The total world exports of slab zinc stood at 3.80 million tonnes in 2009. Canada was the top exporter of slab zinc in the world with 592 thousand tonnes, contributing 16% of the total world exports of slab zinc, followed by Australia (356 thousand tonnes), South Korea (330 thousand tonnes), Kazakhstan (295 thousand tonnes), Finland (269 thousand tonnes), Spain (270 thousand tonnes),and Mexico (225 thousand tonnes) . Norway, India, Peru and other countries contributed the remaining exports of slab zinc. India with 177 thousand tonnes contributed 5% in the total world exports of slab zinc. The country wise exports of slab zinc are given in **Annexure: 4-IX** and depicted in **Figure: 4.9**.

4.2.4 World Imports of Slab Zinc

World imports of slab zinc were 3.66 million tonnes in 2009. USA continued to be the top importer of slab zinc with 686 thousand tonnes contributing 19% of the world's total imports. China followed with 670 thousand tonnes (18%), Germany (286 thousand tonnes), Belgium (237 thousand tonnes) and Taiwan (192 thousand tonnes), Netherlands, France, Italy, India, Belgium, UK, Indonesia and other countries contributed the remaining imports. India imported 94 thousand tonnes of slab zinc in 2009 contributing 3% of the total world's import of slab zinc. The country wise imports of slab zinc are given in **Annexure: 4-X** and depicted in **Figure: 4.10**.

Figure : 4.7 - COUNTRY WISE MINE PRODUCTION OF ZINC (2003 V/s 2009) (By Principal Countries)

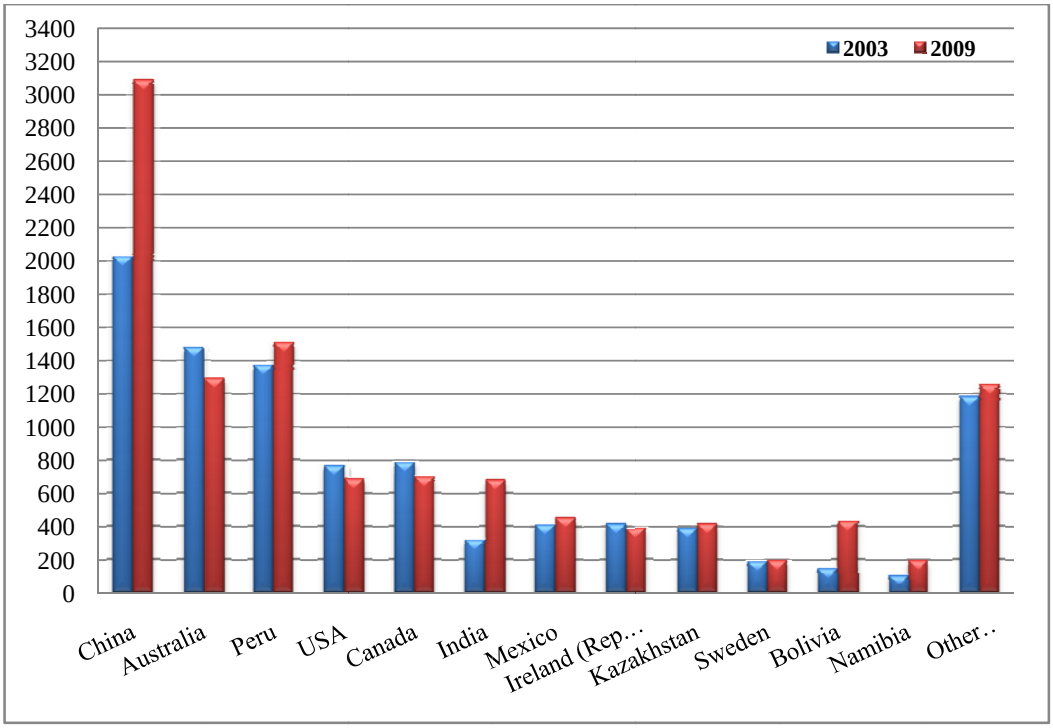


Figure : 4.8 - COUNTRY WISE PRODUCTION OF SLAB ZINC (2003 V/s 2009) (By Principal Countries)

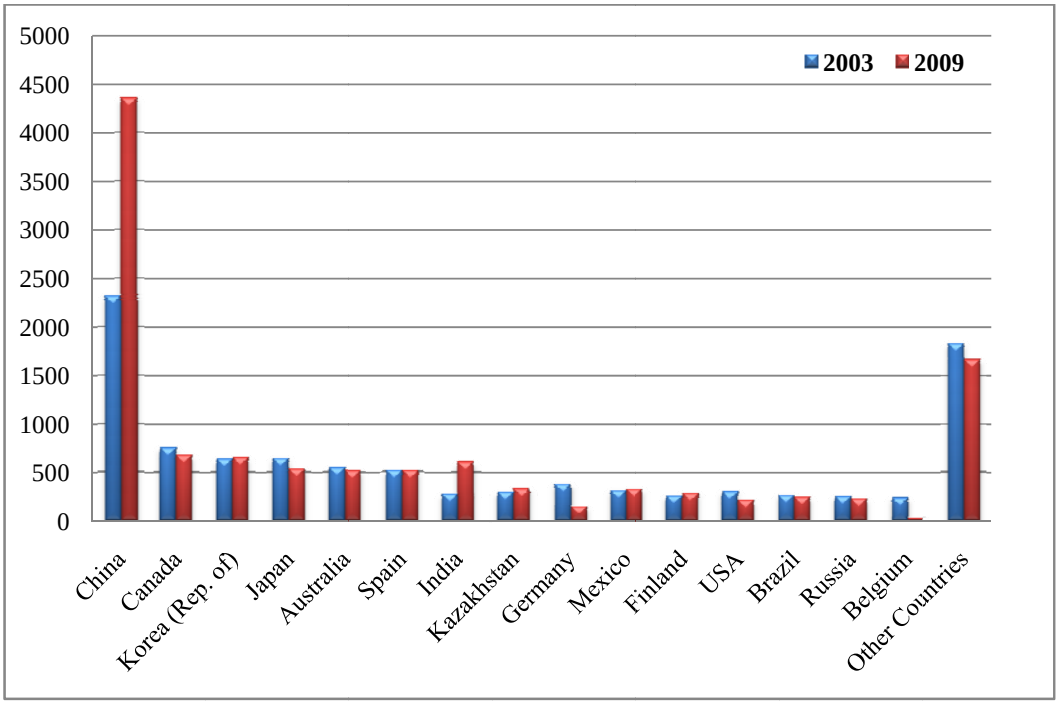


Figure : 4.9 - COUNTRY WISE EXPORTS OF SLAB ZINC
(2003 V/s 2009) (By Principal Countries)

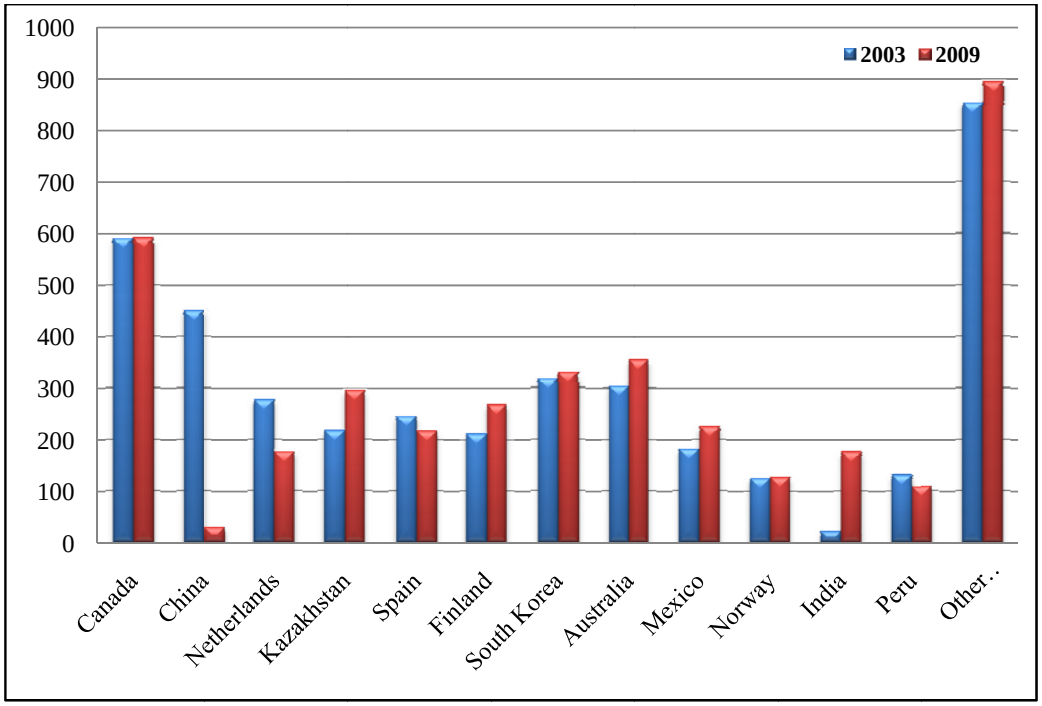
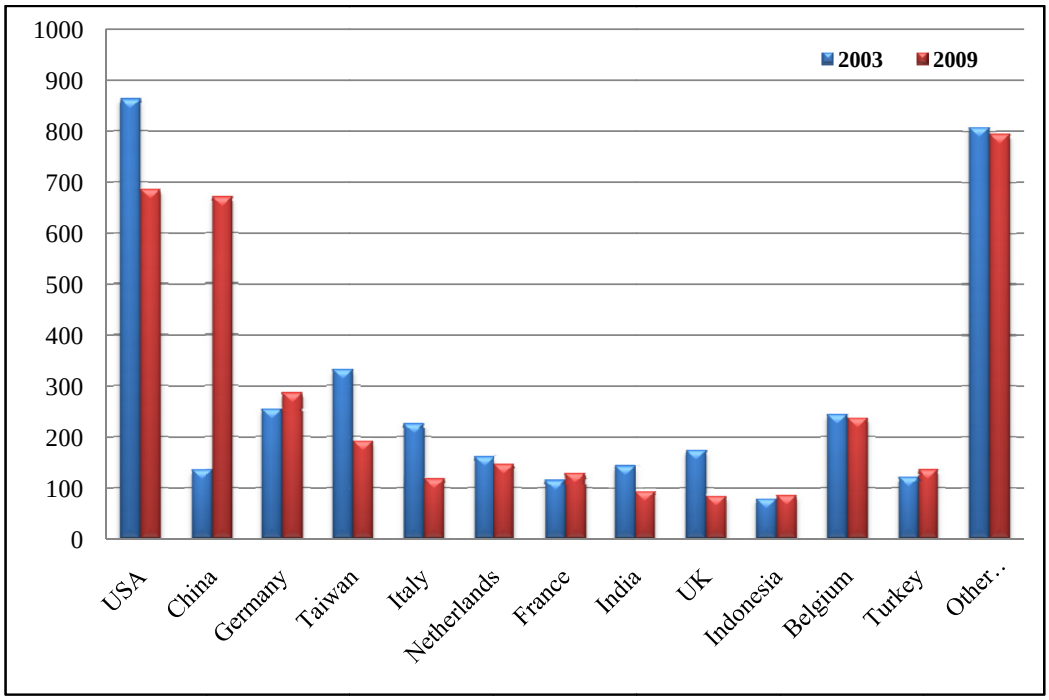


Figure : 4.10 - COUNTRY WISE IMPORTS OF SLAB ZINC
(2003 V/s 2009) (By Principal Countries)



There are a number of lead and zinc producing countries. The list of top 10 lead and zinc mining companies as well as lead and zinc smelting companies are given in **Tables: 4.1** to **Tables: 4.4.** A comprehensive world wide list of lead and zinc producing companies, lead zinc producing countries, list of mines producing lead and zinc, zinc smelters and refineries and lead smelters and refineries are given at **Annexure:4-XXVII to Annexure: 4 - XXXI**. The details of important lead & zinc mines are given at **Annexure: 4 - XXXII.**

Table : 4.1- List of Top 10 Zinc Mining Companies

Position	Name of Company
1	Xstrata plc.
2	OZ Minerals
3	Teck Cominco Ltd.
4	Glencore
5	Hindustan Zinc
6	Anglo American
7	Volcan Compania Minera S. A. A.
8	Boliden AB
9	Votorantim Metals Ltd.
10	Lundin Mining Corporation

Table : 4.2 – List of Top 10 Lead Mines

Position	Name of Mine	Country
1	Cannington	Australia
2	Red Dog	Alaska, USA
3	Mount Isa	Australia
4	Lucky Friday	USA
5	Broken Hill	Australia
6	Greens Creek	Alaska, USA
7	Brunswik 12	Canada
8	Magellan	Australia
9	Century	Australia
10	Black Mountain	South Africa

Table : 4.3 - List of Top 10 Lead Mining Companies

Position	Name of Company
1	Xstrata Plc.
2	BHP Billiton
3	Doe Run Company
4	Teck Cominco
5	Volcan Compania Minera S. A. A.
6	Glencore International AG
7	OZ Minerals
8	Hindustan Zinc
9	Anglo American Plc.
10	Industrias Penoles S.A. de C.V.
10	Fresnilo Plc.

Table : 4.4 - List of Top 10 Zinc Mines

Position	Name of Mine	Country
1	Century	Austalia
2	Rampura Agucha	India
3	Red Dog	Alaska, USA
4	Iscaycruz	Peru
5	Brunswik 12	Canada
6	Greens Creek	Alaska, USA
7	Mount Isa	Austalia
8	Tara Mine	Ireland
9	Lisheen	Ireland
10	Antamina	Peru

4.3 COUNTRY WISE ANALYSIS

Australia, China, Frgance, Germany, Italy, Kazakhstan, Mexico, Peru, South Korea, Japan, UK, and USA are the important producers of lead & zinc metals in the world. Their details are presented below

i) Australia

Australia is an important country as far as non ferrous metals are concerned. Australia with reserves of 23 million tonnes of lead is placed at first position. Australia's mine production of lead was 566 thousand tonnes (in terms of lead content) in 2009 making it second largest producer in the world. Australia's lead - zinc mines are based on the ore bodies where zinc is a major component; BHP Billiton's Camington mine in Queensland is the only exception where lead is predominant. The Jaguar mine owned by Jabiru Metals Ltd. commenced operations in 2007. The mine has reserves of 1.15 million tonnes under proved and probable categories with 8% Zinc, 2.8% copper. The Angas mine of Terramin Australia Ltd. located 60 km southeast of Adelaide in South Australia started operations in 2008. The mine has a reserve of 3.04 million tonnes with 11.1% lead-zinc, 34 g/t silver and 0.5 g/t gold. The company also has a plant to treat the ore with a capacity of 400,000 tpy.

The mine production of lead which was 650 thousand tonnes in 2008 decreased to 566 thousand tonnes in 2009. Australia was second largest producer of lead concentrates. Production of lead concentrates in Australia was 566 thousand tonnes in 2009 in terms of lead content as against 650 thousand tonnes in 2008. The production of refined lead is also decreasing since 2003. The production of refined lead in 2008 was 260 thousand tonnes decreased to 234 thousand tonnes in 2008 registering a decrease of 10%.

Zinc resources in Australia have been placed at 21 million tonnes which contributes 10.5% to the world's total zinc resources. Australia was third largest producer of mined zinc in 2009 with a production of 1290 thousand tonnes of production in terms of metal content after China & Peru. The annual zinc smelting capacity of Australia is about 550 thousand tonnes. The production of

slab zinc in Australia was 525 thousand tonnes in 2009, contributing 4.6% of the total world production.

In the International trade, Australia is net exporter of lead & zinc concentrates, refined lead and slab zinc. Australia was the top exporter of lead concentrate and second largest exporter of zinc concentrate in the world. It was second largest exporter of refined lead and 5th largest exporter of slab zinc in the world. The internal consumption of refined lead was 19 thousand tonnes and that of slab zinc was 169 thousand tonnes in 2009.

ii) China

China occupies a dominant position in lead and zinc namely resources, mine production, concentrates production, refined metal production and consumption of both lead and zinc. China's position is second in the world with 12 million tonnes of lead reserves contributing 15.18% of the world reserves of lead and 33 million tonnes of zinc reserves contributing 16.5% of the world reserves. In 2009, the mine production of lead in China was 1,908 thousand tonnes (47% of the total world production) and the mine production of zinc was 3,092 thousand tonnes (27% of the total world production). More than 50% of the lead refining capacities of China are located in Henan Province. Yunnan, Gungxi, Hubei are the other important provinces where lead smelters are located. China was the largest producer of refined lead with a production of 3,708 thousand tonnes contributing 42% of the total world production and also largest producer of slab zinc in the world with a production of 4,357 thousand tonnes contributing 38% of the total world production in 2009. China was also leading producer of lead & zinc concentrates in the world. It produced 1.91 million tonnes of lead concentrates and 3.09 million tonnes of zinc concentrates in 2009. Yuguang Gold-Lead Co. Ltd., Xuzhou Chunxine Alloy Co. Ltd., Yubei Metal Co. etc. are the major companies engaged in lead smelting in China.

Hunan, Liaoning, Gungxi and Yunnan are the provinces where most of the zinc smelters (50%) capacities are located. Zhuye Torch Metal Co. Ltd., Huludao Nonferrous Metal Group Co. Ltd., Zijin Bayannur Co. Ltd., Dongling Zinc Industry Co. Ltd. etc. are the major players in zinc smelting industry in China.

In the world trade China was the largest exporter of refined lead in the world with 244 thousand tonnes of exports in 2007. The exports were down to 24 thousand tonnes in 2009. China was the second largest exporter of slab zinc with 325 thousand tonnes of exports in 2006. It started decreasing since 2007 and reached 29 thousand tonnes in 2009.

The demand of refined lead in China is also increasing. It was 1,155 thousand tonnes in 2003 which increased to 3,860 thousand tonnes in 2009 showing a whopping increase of 243%. In 2006, China contributed 28% of the total demand of refined lead in the world. The demand of slab zinc in China also showed a similar growth. The demand of slab zinc in 2003 was 2,003

thousand tonnes which increased to 4888 thousand tonnes in 2009 showing a net increase of 144% in just 6 years. China's contribution to the world demand in 2009 was 43 percent.

iii) France

There are no significant resources of both lead and zinc in France. The country imports lead & zinc concentrates and refined lead & zinc from various countries. The annual consumption of refined lead in France was around 200 thousand tonnes till 2008. In 2009, it suddenly came down to 87 thousand tonnes. The consumption of slab zinc in France was around 250-275 thousand tonnes since last 5 years. In 2009 the production of refined lead and slab zinc was about 61 thousand tonnes and 161 thousand tonnes respectively. The gap in the demand and supply of lead is fulfilled through imports. France imports lead concentrates from Australia, Germany and Morocco etc. and refined lead from Australia, Belgium, Germany etc. The zinc concentrates are imported from Belgium and Morocco. Slab zinc in France is imported from Belgium, Finland, Germany, Netherlands and other countries.

The lead and zinc scrap also plays an important role in the lead-zinc scenario in France. France imported 14 thousand tonnes and exported 21 thousand tonnes of lead scrap in 2009. The exports of slab zinc from France are increasing steadily and stood at 65 thousand tonnes in 2009.

iv) Germany

Germany, like France is devoid of any significant resources of both lead and zinc. Therefore, Germany is dependent on imports of lead & zinc concentrates to fulfill the demand of its lead and zinc smelters. In 2009 the production of refined lead was 390 thousand tonnes contributing 4% to the world’s production, while the production of slab zinc was 151 thousand tonnes. It imported 234 thousand tonnes of lead concentrates and 271 thousand tonnes of zinc concentrates in 2009 in terms of gross weight.

Germany has a capacity of about 550 thousand tonnes/year for primary lead metal production. Berzelius Metall GmbH (Eco- Bat) Technologies Ltd. has a primary lead smelter at Stolberg and two other secondary lead smelters with a total capacity of 200 thousand tpy. Weser Metall GmbH is the other lead metal producer with a capacity of 145 thousand tpy.

Zinc producing capacity of Germany is about 400 thousand tpy. Metaleurop Zinkbetriels GmbH (Xstrata plc. 100%) and Ruhr-Zink GmbH (GEA Group AG 100%) are the companies producing zinc with capacities of 150 thousand tpy and 140 thousand tpy.

Germany is net importer of slab zinc. It imported 286 thousand tonnes in 2009 contributing 8% of the world's total imports of refined lead in 2009. The consumption of refined lead in Germany is almost steady at about 314 thousand tonnes and that of slab zinc at around 378 thousand tonnes in 2009.

Germany was the second important country in the exports of refined lead in the world and exported 163 thousand tonnes of refined lead in 2009 contributing 10% of the world's total export. Germany also imported 87 thousand tonnes of refined lead in 2009.

v) Italy

The country does not have significant resources of lead & zinc and is mostly dependent on imports of lead and zinc concentrates. Adequate data regarding lead concentrates and metal is not available. However, the production of refined lead stood at 149 thousand tonnes in 2009. The consumption in 2009 was 205 thousand tonnes. The total imports of refined lead was 77 thousand tonnes in 2009.

Glencore International AG is the major company producing lead in Italy with 2 plants at San Gavino and Porto Vesme in Sardinia region of the country with a total capacity of about 200 thousand tpy. Glencore International AG also has a zinc smelter with a capacity of 120 thousand tpy at Porto Vesme in Sardinia region.

In case of slab zinc it mostly depends on imports. The production of slab zinc in Italy was around 103 thousand tonnes in 2009, where as the consumption of slab zinc stands around 217 thousand tonnes in 2009. Italy imported 118 thousand tonnes of slab zinc contributing 3% to the world's total imports in 2009.

vi) Kazakhstan

Kazakhstan enjoys a very good position in the zinc reserves. The country with reserves of 17 million tonnes contributes 8.5% to the total world reserves. Kazakhstan produces lead concentrate but is not adequate to fulfill the demand of its lead smelters. The production of zinc concentrate in Kazakhstan is sufficient to fulfill the indigenous demand. It also exports a small quantity of zinc concentrates. In 2009, Kazakhstan exported 20 thousand tonnes of lead concentrates (gross weight). The mine production of lead in 2009 was 39 thousand tonnes, all time low since 2003 whereas the production of refined lead was 88 thousand tonnes in 2009, due to addition of secondary lead production.

Kazzinc JSC is the major in lead ore mining as well as lead metal production in Kazakhstan. The annual mining capacity of the country is about 3 million tonnes of lead and zinc ore. The lead and zinc deposits are located mostly in East Kazakhstan and Kyzylorda regions. The annual capacity of lead metal production of the country is 250 thousand tpy. The annual capacity of zinc metal production of the country is about 400 thousand tpy. Kazzinc JSC is the major company engaged in production of zinc metal.

Kazakhstan is net exporter of refined lead. The production of refined lead was 88 thousand tonnes in 2009. It exported 80 thousand tonnes contributing 5% to the world's total export of refined lead. The consumption of refined lead in the country is estimated at 9 thousand tonnes in 2009.

Kazakhstan has a very good position as far as zinc is concerned. It is a net exporter of slab zinc and exported 295 thousand tonnes of slab zinc contributing 8% of the world's total exports in 2009.

The mine production of zinc was 419 thousand tonnes in 2008. The slab zinc production was 366 thousand tonnes in 2008 which slightly decreased to 329 thousand tonnes in 2009. The production was more than sufficient to fulfill the estimated annual internal demand of 34 thousand tonnes.

vii) Mexico

Mexico is endowed with good reserves of lead & zinc ores. The lead ore reserves of Mexico are of the order of 5 million tonnes contributing 6% to the world's total reserves of lead. The reserves of zinc are placed at 14 million tonnes contributing 7% to the world's total reserves.

There are 2 companies engaged in mining and smelting of lead & zinc in Mexico namely (i)Industrial Mineral Mexico, S.A.de C.V.(IMMSA) having mines at San Martin, Santa Eulalia, Santa Barbara and lead refinery at Monterrey with a capacity of 70,000 tpy and a zinc refinery at Charcas S.L.P. with a capacity of 110,000 tpy (ii) Industrials Penales S.A. de C.V. having mines at La Encantada Fresnillo, Ray da Plata and a metallurgical complex at Torreon having a capacity of 180,000 tpy of lead smelting and 240,000 tpy of zinc smelting.

The mine production of lead in Mexico is about 140 thousand tonnes since last 6 years with a minor fluctuation. The mine production of lead in 2009 was 140 thousand tonnes (3.4% of total world production). The production of refined lead in Mexico was 229 thousand tonnes in 2009. The internal demand of refined lead in Mexico is just fulfilled by the indigenous production and hence Mexico participates in world trade of refined lead to a very small extent.

The mine production of zinc in Mexico is showing an increasing trend since last six years. In 2009 it was about 458 thousand tonnes. The slab zinc production in Mexico was 335 thousand tonnes in 2009, slightly more than the previous year. The internal demand of slab zinc was 112 thousand tonnes in 2009. Mexico exported 225 thousand tonnes of slab zinc in 2009 which was 11% higher than 203 thousand tonnes exported in the previous year.

viii) Peru

Peru is at a comfortable position as far as lead & zinc ore reserves are concerned. Peru has 6 million tonnes of lead reserves contributing 7.59% to the world's total reserves and 19 million tonnes of zinc reserves contributing 9.5% to the world's total reserves of zinc. The mine production of lead in Peru stands around 300-325 thousand tonnes since last six years. The mine production of lead in 2009 was 302 thousand tonnes and decreased by 14% as compared to previous year’s production of 345 thousand tonnes. Refined lead production in 2009 was 26 thousand tonnes as against 114 thousand tonnes in 2008. The production of lead concentrates in Peru is around 300-320 thousand tonnes.

Lead concentrates are exported to various countries. China is the main destination of Peruvian lead ores and concentrates followed by South Korea, Japan, Italy and other countries.

Doe Run Peru S. R. Ltd. a Private Company is the biggest player in refining and smelting of lead in Peru with facilities at La Oraya with a capacities of 150,000 tpy for smelting and 125,000 tpy of Refining of lead metal. Volcana Compania Minera S.A.A., Compania Minera Atacocha S.A., Compania Santa Luisa S.A. etc. are the companies engaged in mining of lead ore in Peru.

Doe Run Peru S.R. Ltd. has a zinc refinery also at La Oraya with a capacity of 70,000 tpy and Sociedad Minera Refineria de zinc Cajamarquilla S.A. has a zinc Refinery at Caja Marquilla with a capacity of 130,000 tpy. Volcana Compania Minera S.A.A. and Compania Mineral Antamina are the major Companies engaged in lead & zinc mining and concentration having mines and plants at Cerro de Pasco and Antamina respectively.

The production of refined lead in Peru was at about 120 thousand tonnes since last five years. It came down drastically to 26 thousand tones in 2009. The internal demand of refined copper was very low at about 48 thousand tonnes during the same period. Refined lead was exported to various countries namely Brazil, Chile, China, Colombia, Italy and other countries.

In the year 2009 Peru was the leading country in the mine production of zinc and produced 1.50 million tonnes contributing 13% to the world total production. In the last 7 years the mine production of zinc in Peru ranged between 1.20 and 1.60 million tonnes. A major part of the production of zinc ores and concentrates was exported from Peru to various countries namely, Spain, China, South Korea, Belgium, Japan, Canada, and other countries. The production of slab zinc in 2009 was 149 thousand tonnesas against 190 thousand tonnes in 2008. The production of slab zinc in Peru is about 149 thousand tonnes and the surplus zinc after fulfilling the internal demand is exported to various countries like Colombia, Brazil, Chile, USA etc. The total exports of slab zinc are about 100 thousand tonnes since last three years.

ix) South Korea

There are no significant resources of either lead or zinc in South Korea. The country is totally dependent on imports of lead and zinc ores and concentrates. The annual demand of lead concentrates of the country is about 240-260 thousand tonnes and is fulfilled totally by imports from Australia, Peru, USA, Bolivia and other countries. The production of refined lead in 2009 was 278 thousand tonnes. The annual internal demand of the country is about 325-350 thousand tonnes which is partly fulfilled by indigenous production and partly by imports.

Korea Zinc Co. Ltd is the biggest company having lead production capacity of 200,000 tpy at Kangwon and zinc metal production capacity of

45,000 tonnes at Onsan. There is one more producer of zinc metal namely Young Poong Corp. having a capacity of 300,000 tonnes at Sukpo.

South Korea is the second largest importer of zinc concentrates in the world. The annual demand of zinc ores and concentrates in South Korea is about 1.3 million tonnes which is fulfilled completely by imports. The major countries from which zinc ores and concentrates are imported are Peru, Russia, Chile, Australia, USA, Bolivia and other countries. The annual production of slab zinc in South Korea is increasing since last few years but in 2009 the production of slab zinc was 660 thousand tonnes as against 739 thousand tonnes in 2008. The production is more than sufficient to cater to the internal demand of the country which is around 450-500 thousand tonnes annually. The surplus slab zinc is exported to various countries. The exports of slab zinc are increasing since 2006. The exports of slab zinc from South Korea were 215 thousand tonnes in 2007 which increased to 329 thousand tonnes in 2008. The major countries to which the South Korean slab zinc is exported are Taiwan, India, Indonesia, Vietnam and other countries.

x) Japan

There are very limited resources of lead and zinc ore in Japan, hence the country is almost fully dependant on imports of lead and zinc ores and concentrates. The demand of lead ores and concentrates is fulfilled by imports mainly from, Australia, USA, Bolivia and other countries. Japan is a major country producing refined lead in the world. The annual production of refined lead in Japan is around 270-280 thousand tonnes till 2008. It came down to 248 thousand tonnes in 2009 with a decrease of 11%. This production is a little short of the annual demand which is fulfilled by imports. Refined lead is imported mainly from Peru, China and other countries.

The country has a very good capacity of producing lead & zinc metals. The country has a lead metal production capacity of around 300,000 tpy (both primary & secondary). The major companies producing lead metal are Toho Zinc Co. Ltd. having a plant at Chigirishima in Hiroshima Prefacture, Mitsui Mining & Smelting Co. Ltd at Takehara also in Hiroshima Prefacture.

The zinc metal producing capacity of 650,000 tonnes is mainly held by (i) Akita smelting Co. Ltd. with 200,000 tpy at Iijima, in Akita Prefacture, (ii) Toho Zinc Co. Ltd. with 140,000 tpy at Annaka in Gunma Prefacture and (iii) Hachinohe Smelting Co. Ltd. with 120,000 tpy at Hachinohe in Aomori Prefacture.

There was no mine production of zinc in 2007 and 2008. The demand of zinc ores and concentrate is mostly met with by imports. The major countries supplying zinc ores and concentrates to Japan are Australia, Peru, Bolivia, Mexico, and USA. The total imports of zinc ores & concentrates in Japan are around 885thousand tonnes annually. Japan is the second largest importer of zinc ores and concentrates in the world after China. The country is fifth largest producer of slab zinc in the world with a production of 541thousand

tonnes in 2009 contributing 5% to the world's total. The internal demand of zinc in the country is 433 thousand tonnes in 2009. The production is more than sufficient to fulfill the internal demand and the surplus is exported to various countries namely, Taiwan, Indonesia, Vietnam etc. Japan exported 156 thousand tonnes of slab zinc every year. A small quantity of 27 thousand tonnes of slab zinc was also imported by Japan in 2009.

xi) U.K.

UK is not having significant resources of either lead or zinc ores. The production of lead ores and concentrates in UK is around 100 tonnes annually and there is no production of zinc ores & concentrates in U.K.

The primary refined lead in UK is produced from imported lead bullion. The imports of lead bullion to UK are around 130 thousand tonnes in 2009. The imports are mainly from Australia. The production of secondary refined lead is very important in UK. About 48% of the total production of refined lead comes from secondary source and remaining 52% is from primary source. The total production of refined lead in 2009 (both primary and secondary) was 202 thousand tonnes in 2009. In the international trade UK exported 128 thousand tonnes of refined lead and the major countries to which UK is exporting refined lead are France, Germany, Spain and other countries. UK also imported 15 thousand tonnes of refined lead in 2009.

As far as zinc production is concerned, UK is in a very peculiar position. There is no production of slab zinc in UK. UK is completely dependent on imports of slab zinc. The important countries supplying slab zinc to UK are Norway, Spain, Finland and other countries. The consumption of slab zinc is about 99 thousand tonnes.

xii) USA

USA is endowed with very good reserves of both lead and zinc ores. There are 7.70 million tonnes of lead reserves contributing 9.74% of world's total reserves. It is third major country after Australia and China in the world as far as lead reserves are concerned. In the case of zinc, USA has 14 million tonnes of reserves contributing 7% to the world's reserves.

Mine production of lead in USA was 400 thousand tonnes contributing about 10% to the world's production in 2009. The production of refined lead in USA is around 1.2 to 1.3 million tonnes since last 6 years. The production of refined lead was 1235 thousand tonnes in 2009. USA is the second largest consumer of refined lead in the world after China. The annual consumption of refined lead in USA is around 1.5 million tonnes. This gap in the demand and supply position is fulfilled by imports. USA imports about 200-300 thousand tonnes of refined lead. USA also exports about 40-60 thousand tonnes of refined lead and 300 thousand tonnes of lead ores & concentrates annually.

USA enjoys a very strategic position in the mine production of zinc. The mine production of zinc in 2009 was 690 thousand tonnes. USA produced

690 thousand tonnes and imported 74 thousand tonnes of zinc ores & concentrates in2009. The export of zinc ores and concentrates is about 785 thousand tonnes in 2009. The annual demand of slab zinc in USA is around one million tonnes. However, the slab zinc production in 2009 was 215 thousand tonnes. The share of imported slab zinc in the demand of zinc is about 75 percent. The indigenous production fulfills only 25% of the total annual demand of USA.

4.4 INDIA'S TRADE

India's trade of lead and zinc metal depends on the production capacities of the HZL and Binani Zinc Limited. The HZL is the only primary producer of lead while zinc is produced by HZL as well as BZL. HZL produces zinc and lead from its own mine while BZL is wholly dependent on imported concentrates of zinc. Since the acquisition of HZL by Sterlite Industries Limited in 2002-03, there was a marked enhancement in the production capacity of zinc as well as lead in HZL. BZL has also increased its capacity. The production of lead metal which was 35 thousand tonnes in 1999-2000 has increased to 72 thousand tonnes in 2009-10. Similarly production of zinc has also increased from 175 thousand tonnes in 1999-2000 to 609 thousand tonnes in 2009-10. Presently India imports lead and zinc in the form of ores and concentrates, metal and alloys products of lead and zinc as well as scrap for meeting out its internal demand. The brief analysis of India's trade is given below.

The trade data presented below is not giving the full coverage of India's trade as it includes metal, alloys and other forms of products of lead and zinc. Therefore the same has not been considered for arriving at any conclusions.

4.4.1 Exports

Indian Trade Analysis Based on DGCI &S data compiled under various HS Codes

The trade data from DGCI&S is in respect of lead and zinc metal and articles thereof was compiled and analysed as per HS codes. The same is given at **Annexures: 4-XXIII to 4-XXVI**, it will be seen from these annexures that lead and zinc metals are traded in various forms represented by different H S Codes.

To analyse the data in respect of metals in its purest form the HS Codes 78011000- Refined Lead, 78019910 – Pig lead, 78019920 – Unrefined Lead, NES and 78042000 - Lead Powder and Flakes were considered for analysing trade data for lead metal. In a similar way HS Codes 79011100 - Zinc not alloyed containing by weight > = 99.99 % Zn and 79011200 - Zinc not alloyed were considered for zinc metal.

The analysis of data for the year 2003-04 versus 2009-10 in respect of imports and exports of lead and zinc as per H S Codes considered for anlysis are given in **Tables : 4.5 to 4.8** below.

(a) Lead

(i) Lead Exports

Exports of refined lead from India has shown an increasing trend since 2003-04 from a small quantity of one thousand tonne to 27 thousand tonnes in 2009-10. This increase can be attributed to increase in production capacities of both primary and secondary or recycled lead. The increase in exports is also noticed in respect of pig lead, unrefined lead NES **Table : 4.5.** In addition to this there are exports of lead in various forms covered under different HS Codes which have not been considered for analysis. The same are given at **Annexure: 4- XXIII.**

Table : 4.5 - Exports of Lead as per HS Codes, 2003-04 v/s 2009-10

(In tonnes)

Sl. No.	HS Codes	Items	2003-04	2009-10
1.	78011000	Refined Lead	1191.18	26970.21
2.	78019910	Pig lead	20.00	120.00
3.	78019920	Unrefined Lead, NES	48.00	300.90
4.	78042000	Lead Powder & Flakes	48.79	18.50
5.	26070000	Lead Ores & Concentrates	541.73	36475.68

(ii) Lead Imports

Imports of lead metal as mentioned earlier is in the from of Refined lead, Unwrought lead, Pig lead, Unrefined lead and Lead powder of flakes. There was an appreciable increase in the imports of refined lead from 87 thousand tonnes in 2003-04 to 110 thousand tonnes in 2009-10 as also in unrefined lead from 4 thousand tonnes in 2003-04 to 12 thousand tonnes in 2009-10 **Table-4.6.** In addition to this there are imports of lead under different HS Codes which have not been considered for analysis. The same are given in **Annexure: 4-XXIV.**

Table : 4.6 - Imports of Lead as per HS Codes, 2003-04 v/s 2009-10

(In tonnes)

Sl. No.	HS Codes	Items	2003-04	2009-10
1.	78011000	Refined Lead	87335.55	110201.49
2.	78019910	Pig lead	18539.83	1693.90
3.	78019920	Unrefined Lead, NES	4125.63	12305.90
4.	78042000	Lead Powder & Flakes	9.31	4.48
5.	26070000	Lead Ores & Concentrates	8266.29	6944.07

(b) Zinc

(ii) Zinc Exports

As mentioned earlier, there was an appreciable enhancement in zinc productions capacity in the country which has translated in the increased exports of zinc not alloyed contained > = 99.99 Zn as well as Zinc, not alloyed and in the year 2003-04 the exports of these two commodities were only 25 thousand tonnes and 55 tonnes respectively which rose to 156 thousand tonnes and 14 thousand respectively in 2009-10 **Table: 4.7.** In addition to this there are imports of zinc in various forms under different HS Codes which have not been considered for analysis. The same are given in **Annexure: 4-XXV.**

Table : 4.7 - Exports of Zinc as per HS Codes, 2003-04 v/s 2009-10

(In tonnes)

Sl. No.	HS Codes	Items	2003-04	2009-10
1.	79011100	Zinc Not Alloyed Containing by Weight>=99.99% Zinc	24770.00	156433.03
2.	79011200	Zinc Not Alloyed	55.06	14409.28
3.	26080000	Zinc Ores & Concentrates	62040.56	191960.09

ii) Zinc Imports

Imports of zinc with 99.99 Zn in the country is only 76 thousand tonnes in 2009-10 as against 80 thousand tonnes. This is because of the fact that the production capacity of Zn has increased many folds in the country. However, in 2005-06 the imports touched a high of 119 thousand tonnes. Binani Zinc Ltd. produced zinc from imported concentrates therefore the imports of copper ores a concentrates remains a major item for imports. However, there was a fall in imports of zinc ores in concentrates from a level of 103 thousand tonnes in 2003-04 to 60 thousand tonnes in 2009-10 **Table 4.8.** In addition to this there are imports of zinc in other forms covered under different HS Codes which have not been considered for analysis. The same are given in **Annexure: 4-XXVI.**

Table : 4.8 - Imports of Zinc as per HS Codes, 2003-04 v/s 2009-10

(In tonnes)

Sl. No.	HS Codes	Items	2003-04	2009-10
1.	79011100	Zinc Not Alloyed Containing by Weight>=99.99% Zinc	80027.49	76307.59
2.	79011200	Zinc Not Alloyed	31206.33	27165.51
3.	26080000	Zinc Ores & Concentrates	103007.00	59857.17

4.5 EXPORT-IMPORT POLICY

The export- import (Exim) policy of lead and zinc metals is decided by the Ministry of commerce, Government of India As per the export policy 2009-14 Lead and zinc metal and their alloys are freely exportable without conditions. The gist of the policy is given below.

4.5.1 Lead

i) Export Policy for Lead

The lead metal and its alloys are not included in the export licensing schedule and hence are deemed to be freely exportable.

ii) Import Policy for Lead

The import policy of Lead for years 2009-14 is given in **Table 4. 9**.

Table : 4.9 - Import Policy for Lead, 2009-14 with Duty Structure (2010-11)

Exim Code	Policy	Policy Condition	Basic duty	Pref. duty	CVD+E. Ed. Cess	Custom Ed. Cess	Spl. CVD	Total Duty %
Items of lead under Exim Code 7801, 7802 and 7804 (Except the following)	Free	-	5	-	10.3	2+1	4	20.94103
Exim Code No 7802 00 90	Restricted	-	5	-	10.3	2+1	4	20.94103
Items of lead under Exim Code 7806	Free	-	10	-	10.3	2+1	4	26.84870

4.5.2 Zinc

i) Export Policy for Zinc

The zinc metal and its alloys are not included in the export licensing schedule and hence are deemed to be freely exportable.

ii) Import Policy for Zinc

The import policy of zinc for the years 2009-14 is given in **Table 4.10.**

Table : 4.10 - Import Policy for Zinc, 2009-14 with Duty Structure (2010-11)

Exim Code	Policy	Policy Condition	Basic duty	Pref. duty	CVD+E. Ed.Cess	Custom Ed.Cess	Spl. CVD	Total Duty %
Items of zinc under Exim Code 7901to 7905 (Except the following)	Free	-	5	-	10.3	2+1	4	20.94103
7902 00 90	Restricted	-	5	-	10.3	2+1	4	20.94103
Items of lead under Exim Code 7907	Free	-	10	-	10.3	2+1	4	26.84870

4.6 FUTURE SCENARIO

4.6.1 Lead

Lead is an important metal used in making lead acid batteries (LAB). India's requirement of lead is met through imports. The demand of lead in India is also increasing owing to the growth in automobile sector and consequently in lead acid batteries.

The only lead smelting plant at Chanderiya of Hindustan zinc Ltd. has a capacity to produce 85,000 of lead metal. As against this capacity, the production in 2009-10 was 72,000 tonnes which was 19% higher than that produced in 2008-09. The production of lead metal in India is showing an increasing trend. If Chanderiya plant will run with full capacity and the plants of Indian Lead Ltd. are commissioned, the production of lead in India is poised to increase with a good pace. The estimated production of secondary lead from recycling plants is equal to the primary production from HZL and it is presumed that with more organised recycling there will be rise in secondary lead production also. In addition to this HZL has advanced plans to commission a 100,000 tpy lead smelter at Dariba, Rajasthan. There is an equally matching capacity of recycling industry of lead. The estimated production of secondary lead from recycling plants is equal to the primary production from HZL. It is presumed that with more organized recycling there will be a rise in the secondary production. This is also supported by the fact that the imports of lead are decreasing as the demand being fulfilled indigenously. The generation of lead scrap is also expected to increase in India. It would be seen from the above discussion that India will move towards self sufficiency in the coming years. However, the country should explore the avenues for producing primary lead from the imported concentrates as it is being done in the case of copper. This will further enhance the primary lead availability.

4.6.2 Zinc:

The zinc smelting facility in India is distributed amongst five plants. Four plants namely Chanderiya, Debari, Dariba & Vizag belong to Hindustan Zinc Ltd. and the fifth plant at Binanipuram, Alwaye is operated by Binani Zinc Ltd. The total capacity of HZL to produce zinc is 879 thousand tonnes and that of BZL is 38 thousand tonnes. The total capacity of production of zinc in India is 917 thousand tonnes. The total production of zinc was 609 thousand tonnes in 2009-10. If these plants produce zinc with their full capacity the production of zinc in India will increase to a good extent. The demand of zinc in India is also increasing due to the fast growth of Indian industries particularly in the infrastructure, Automobile and consumer goods-sectors. There seems to be no problem in supplies of zinc and India should look forward for enhancing exports to the nearby countries.

4.7 WORLD FUTURE SCENARIO BEYOND 2010

To forecast the future scenario in respect of lead and zinc consumption in the entire world, the world consumption data of lead and zinc from 2001 to 2010 has been compiled from World Metal Statistics in respect of Europe, Africa Asia, America and Oceania region This data has been analysed to find out rise and fall in respect of lead

and zinc consumption on year- to- year basis to arrive at a CAGR. The CAGR thus calculated is utilized in forecasting the demand of lead and zinc till 2024-25. The same is given below:

4.7.1 Lead

There are wide variations in economic conditions of various regions as well as countries grouped under the same region. The list of countries included under different regions is given at **Table: 4.11.**

Table : 4.11 - Countries Included in Different Regions Consuming Lead

EUROPE	Ukraine
Albania	United kingdom
Austria	Other Europe
Belgium	**AFRICA**
Bosnia	Algeria
Bulgaria	Egypt
Croatia	Morocco
Czech Republic	Nigeria
Denmark	South Africa
Estonia	Tunisia
Finland	Zambia
France	Other Africa
Germany	**ASIA**
Greece	China
Hungary	Hong Kong
Ireland	India
Italy	Indonesia
Macedonia	Iran
Netherlands	Israel
Norway	Japan
Poland	Kazakhstan
Portugal	Malaysia
Romania	North Korea
Russia	Pakistan
Serbia	Philippines
Slovakia	Saudi Arabia
Slovenia	Singapore
Spain	South Korea
Sweden	Taiwan
Switzerland	Thailand
Turkey	Cuba
Vietnam	Mexico
Other Asia	U.S.A.
AMERICA	Venezuela
Argentina	Other America
Brazil	**OCEANIA**
Canada	Australia
Chile	New Zealand
Colombia	Other Oceania

As it will be seen that there is a long list of countries included under one region, hence it is difficult to analyse the consumption pattern of lead in each country. It is, therefore felt necessary to analyse the consumption data of lead on regional basis. The data on consumption of lead on regional basis from 2001 to 2010 is given in **Table: 4.12**.

Table : 4.12 - World Consumption of Refined Lead, 2001 to 2010

(In'000 tonnes)

Year	World	Europe	Africa	Asia	America	Oceania
2001	6551.2	2053.9	116.5	2137.7	2191.7	51.4
2002	6861.1	2075.8	118.3	2418.4	2203.3	45.3
2003	6997.3	1948.5	120.1	2839.2	2043.5	46.0
2004	7067.8	2001.4	120.2	2947.7	1956.0	42.4
2005	7659.6	1985.1	113.0	3495.0	2033.0	33.5
2006	8054.2	2015.3	114.3	3779.0	2114.1	31.5
2007	8381.9	1885.7	98.0	4181.1	2179.1	37.1
2008	8964.0	1767.1	103.3	4993.9	2070.3	29.4
2009	8941.3	1518.6	88.8	5337.0	1972.5	24.4
2010	9333.5	1624.4	91.2	5627.2	1963.0	28.0
CAGR%	(+)4.04	(-)2.38	(-)2.43	(+)11.49	(-)1.13	(-)5.94

Source: World Metal Statistics

On the basis of region wise consumption data, region wise CAGR were calculated .The same are given in **Table: 4.13**.

Table : 4.13 - Compounded annual Growth of Refined Lead Consumption, 2001 to 2010

	CAGR (%)
World	(+)4.04
Europe	(-)2.38
Africa	(-)2.43
Asia	(+)11.49
America	(-)1.13
Oceania	(-)5.94

It will be seen from the above table that there is a positive growth of 4.04% in respect of entire World as well as in Asia at 11.49%. In all other regions there is a negative growth in consumption of refined lead.

On the basis of CAGR calculated in respect of all the regions, a forecast from 2011 to 2025 has been made. The same is given in **Table 4.14**.

Table : 4.14 - Estimated Area wise Consumption of Refined Lead, 2010 to 2025

(In'000 tonnes)

Year	Europe CAGR- (-)2.38%	Africa CAGR- (-)2.43%	Asia CAGR- (+)11.49	America CAGR- (-)1.13	Oceania CAGR- (-)5.94	World Total
2010	1624.4	91.2	5627.2	1963.0	28.0	9333.8
2011	1585.7	89.0	6273.8	1940.8	26.3	9915.6
2012	1548.0	86.8	6994.7	1918.9	24.7	10573.1
2013	1511.2	84.7	7798.4	1897.2	23.2	11314.7
2014	1475.2	82.6	8694.4	1875.8	21.8	12149.8
2015	1440.1	80.6	9693.3	1854.6	20.5	13089.1
2016	1405.8	78.6	10807.1	1833.6	19.3	14144.4
2017	1372.3	76.7	12048.8	1812.9	18.2	15328.9
2018	1339.6	74.8	13433.2	1792.4	17.1	16657.1
2019	1307.7	73.0	14976.7	1772.1	16.1	18145.6
2020	1276.6	71.2	16697.5	1752.1	15.1	19182.5
2021	1246.2	69.5	18616.0	1732.3	14.2	21678.2
2022	1216.5	67.8	20755.0	1712.7	13.3	23765.3
2023	1187.5	66.2	23139.7	1693.3	12.5	26099.2
2024	1159.2	64.6	25798.4	1674.2	11.8	28708.2
2025	1131.6	63.0	28762.6	1655.3	11.1	31623.6

**As given in Table-4.13 World-(+) 4.04 %, Europe (-) 2.38 %, Africa (-) 2.43 %, Asia (+) 11.49 %,, America(-)1.13 %, Oceania (-)5.94 %*

It will be seen from the **Table: 4.14** that on the basis of region wise growth there will be a huge demand of about 32 million tonnes of refined lead in 2025 in the entire world and the major consuming region will be Asia where the demand will be about 29 million tonnes. However if the CAGR of the entire world is considered which is (+)4.04% there will be a demand of about 17 million tonnes of refined lead in 2025. The comparison of demand forecast of refined lead calculated on the basis of region wise CAGRs and World's CAGRis given in **Table: 4.15**.

Table : 4.15 - Estimated World Consumption of Refined Lead 2010 to 2025

(In'000 tonnes)

Year	World Total Consumption (As per CAGR (+) 4.04 %)	World Total Consumption (estimated on the basis of area wise CAGRs*)
2010	9333.5	9333.8
2011	9710.6	9915.6
2012	10102.9	10573.1
2013	10511.1	11314.7
2014	10935.7	12149.8
2015	11377.5	13089.1
2016	11837.1	14144.4
2017	12315.3	15328.9
2018	12812.8	16657.1

Year	World Total Consumption (As per CAGR (+) 4.04 %)	World Total Consumption (estimated on the basis of area wise CAGRs*)
2019	13330.4	18145.6
2020	13868.9	19182.5
2021	14429.2	21678.2
2022	15012.1	23765.3
2023	15618.6	26099.2
2024	16249.6	28708.2
2025	16906.1	31623.6

**As given in Table-4.13 World (+) 4.04 %, Europe (-) 2.38 %, Africa (-) 2.43 %, Asia (+) 11.49 %, America (-) 1.13 %, Oceania (-) 5.94 %*

The demand of refined lead at about 17 million tonnes on the basis of CAGR of (+) 4.04% seems to be more realistic as the world economy is poised to grow at 3.3% in 2011 and 3.5% in 2012.

4.7.2 Zinc

The consumption of zinc is closely associated with production of steel and development of infrastructure. The zinc for its consumption is mainly traded as slab zinc. Therefore the consumption data of slab zinc has been taken as a parameter for forecasting the future demand till 2025.

There are wide variations in the consumption of slab zinc world wide. Presently, the Asia region is the largest consumer of slab zinc. As mentioned earlier in the discussion on lead there are a number of countries included under each region. The detailed list of countries included under each region is given in **Table: 4.16**.

Table : 4.16 - Countries Included in Different Regions Consuming Zinc

EUROPE	ASIA
Austria	Bangladesh
Belgium	China
Bosnia	Hong Kong
Bulgaria	India
Croatia	Indonesia
Czech Republic	Iran
Denmark	Israel
Finland	Japan
France	Kazakhstan
Germany	Malaysia
Greece	North Korea
Hungary	Pakistan
Ireland	Philippines
Italy	Saudi Arabia
Macedonia	Singapore

EUROPE	ASIA
Netherlands	South Korea
Norway	Taiwan
Poland	Thailand
Portugal	Turkey
Romania	United Arab Emirates
Russia	Uzbekistan
Serbia	Vietnam
Slovakia	Other Asia
Slovenia	**AMERICA**
Spain	Argentina
Sweden	Brazil
Switzerland	Canada
Ukraine	Chile
United Kingdom	Colombia
Other Europe	Costa Rica
	Cuba
AFRICA	Guatemala
Algeria	Mexico
Egypt	Peru
Kenya	U.S.A.
Morocco	Venezuela
Nigeria	Other America
South Africa & Namibia	**OCEANIA**
Tunisia	Australia
Other Africa	New Zealand
	Other Oceania

Based on the region wise consumption data from 2001 to 2010 as given **Table: 4.17**, a CAGR is calculated in respect of world as well as in respect of different regions. The same is given in **Table: 4.18**.

Table : 4.17 - World Consumption of Slab Zinc, 2001 to 2010

(In'000 tonnes)

Year	World	Europe	Africa	Asia	America	Oceania
2001	8806.9	2768.8	189.2	3773.9	1847.2	227.8
2002	9330.7	2730.7	208.5	4066.0	2088.1	238.4
2003	9831.4	2758.3	191.1	4749.7	1870.0	262.4
2004	10237.9	2845.2	169.4	5017.5	1950.4	255.4
2005	10491.6	2643.6	178.7	5526.2	1890.4	252.7
2006	10823.9	2736.8	189.2	5667.5	1938.5	291. 9
2007	11320.8	2867.5	184.1	6215.9	1801.8	251.6
2008	11556.2	2674.3	172.5	6736.1	1757.5	215.8
2009	11188.1	2041.3	166.4	7221.9	1579.7	178.8
2010	12376.5	2332.7	171.6	8109.1	1553.2	209.8
CAGR%	(+)3.91	(-)1.33	(-)0.84	(+)8.94	(-)1.67	(-)0.15

Source: World Metal Statistics

Table : 4.18 - Compounded annual Growth of Refined Zinc Consumption, 2001 to 2010

	CAGR (%)
World	(+)3.91
Europe	(-)1.33
Africa	(-)0.84
Asia	(+)8.94
America	(-)1.67
Oceania	(-)0.15

It will be seen from the above tables that a positive growth of 3.91% in respect of entire World as well as for Asia at 8.94%. In all other regions there is a negative growth.

On the basis of region wise CAGR the forecast of slab zinc consumption has been made till 2025. The same is given in **Table: 4.19**.

Table : 4.19 - Estimated Area wise Consumption of Slab Zinc, 2010 to 2025

(In'000 tonnes)

Year	Europe (CAGR- (-) 1.33%	Africa (CAGR- (-) 0.84%	Asia (CAGR- (+)8.94%	America (CAGR- (-) 1.67%	Oceania (CAGR- (-) 0.15%	World Total
2010	2332.7	171.6	8109.1	1553.2	209.8	12376.5
2011	2301.7	170.2	8834.1	1527.3	209.2	13042.5
2012	2271.1	168.8	9623.9	1501.8	208.6	13774.2
2013	2240.9	167.4	10484.3	1476.7	208.0	14577.9
2014	2211.1	166.0	11421.6	1452.0	207.4	15458.1
2015	2181.7	164.6	12442.7	1427.8	206.8	16423.6
2016	2152.7	163.2	13555.1	1404.0	206.2	17481.2
2017	2124.1	161.8	14766.9	1380.6	205.6	18639.0
2018	2095.8	160.4	16087.1	1357.5	205.0	19905.8
2019	2067.9	159.0	17525.3	1334.8	204.4	21291.4
2020	2040.4	157.7	19092.1	1312.5	203.8	22806.5
2021	2013.3	156.4	20798.9	1290.6	203.2	24462.4
2022	1986.5	155.1	22658.3	1269.0	202.6	26271.5
2023	1960.1	153.8	24684.0	1247.8	202.0	28247.7
2024	1934.0	152.5	26890.7	1227.0	201.4	30405.6
2025	1908.3	151.2	29294.7	1206.5	200.8	32761.5

**As given in Table-4.18 World- (+) 3.9 %, Europe (-) 1.33%, Africa (-) 0.84 %, Asia (+) 8.94%, America (-) 1.67 %, Oceania (-) 0.15%*

It will be seen that there will be a demand of about 33 million tonnes of zinc in 2025 by all regions and in Asia the demand will be about 29 million tonnes. However, on the basis of world's CAGR of (+)3.91% the demand for slab zinc in the world will be about 22 million tonnes, which seems to be more realistic. As per World Bank, the World economy is poised to grow at 3.3% in

2011 and at 3.5% in 2012. The comparison of demand of slab zinc arrived on the basis of region wise CAGR and World's CAGR is given in **Table: 4.20**.

Table : 4.20 - Estimated World Consumption of Slab Zinc, 2010 to 2025

(In'000 tonnes)

Year	World Total Consumption (As per CAGR (+) 3.91%)	Total Consumption estimated on the basis of Area wise CAGRs*
2010	12376.5	12376.5
2011	12851.0	13042.5
2012	13353.5	13774.2
2013	13875.6	14577.9
2014	14418.1	15458.1
2015	14981.8	16423.6
2016	15567.6	17481.2
2017	16176.3	18639.0
2018	16808.8	19905.8
2019	17466.0	21291.4
2020	18148.9	22806.5
2021	18858.5	24462.4
2022	19595.9	26271.5
2023	20362.1	28247.7
2024	21158.3	30405.6
2025	21985.6	32761.5

**As given in Table-4.18 World- (+) 3.9 %, Europe (-) 1.33%, Africa (-) 0.84 %, Asia (+)8.94%, America (-) 1.67 %, Oceania (-) 0.15%*

Chapter 5. Prices

5.1 LEAD

Lead is traded in the domestic market in forms such as ingots, soft, scrap etc. lead ores and concentrates are also traded in the International Market. Lead scrap trade has gained a lot of attention as it is easy to recycle and saves huge amount of energy. The scrap is traded as per Institute of Scrap Recycling Industries Inc. (ISRI) Norms as given in **Annexure: 3 – I.**

There are many factors which affect the prices of lead amongst which purity of lead, the form in which it is traded and the percentages of deleterious constituents. The demand and supply position of lead is also an important factor which decides the trend of lead prices. Transportation cost, import and export duties also play an important role in fixing the lead prices. The ever increasing demand of lead acid batteries in the automotive industry and low availability of lead scrap for recycling, are the two important factors which have increased the demand of primary lead in many countries. Lead is the most recycled material of all the non-ferrous metals.

Lead as any other merchandise is traded between producers and consumers. Producers sell their present and future production to the consumers. Lead as other non ferrous metals like copper is traded in two ways. One of the very important ways of trading lead is the settlement of price for the present day which is known as 'spot price' and the other way of trading is settlement of price for future days. The commodity exchanges play an important role in the trading of lead. The exchanges facilitate to make a transparent settlement of prices. There are exchanges where overseas trading of lead metal takes place. London Metal Exchange (LME) is the most important exchange.

In the exchanges prices are settled by bid and offer. These prices reflect the perception of demand and supply of lead on a particular day. These exchanges also provide facilities to trade in future contracts. The future contract defines the size of lot, grade or quantity of the product, date of delivery and other important details of the trading process.

5.1.1 Domestic Prices:

There are two major markets of lead on the domestic front, namely, Delhi and Mumbai. The prices in both of these markets are quoted in rupees per quintal and the grades are of two types namely, Ingot and soft. The prices of both the grades of lead for last ten years are given in **Table: 5.1**. The average monthly prices of lead (ingots) and Zinc (slab) (BME) are given in **Annexure: 5-I.**

Table : 5.1 - Prices of Lead in Domestic Markets, 1999-2000 to 2008-09

(In Rs. per quintal)

Year	Prices	
	Ingot (Mumbai Market)	**Soft** (Delhi Market)
1999-2000	3949	3360
2000-01	3797	3325
2001-02	4056	3590
2002-03	3903	3491
2003-04	5221	4092
2004-05	5125	4650
2005-06	6281	5557
2006-07	8745	10259
2007-08	12974	11916
2008-09	8795	8433

As seen from the above **Table: 5.1**, there was an increasing trend in prices of lead during 2003-04 to 2007-08 (except a very low decrease in the year 2004-05for ingot in Mumbai Market) however, in 2006-07, the prices sharply rose by 84.61% over 2005-06 for 'soft' in Delhi market. During the year 2008-09 there was a fall in prices in both the commodities. The rise in the prices of ingot was 39.23% in 2006-07 over 2005-06 in Mumbai market.

5.1.2 International Market:

The average annual prices of lead recorded an increasing trend in the international market during the period 2003-2007. However during the period 2007-10, the prices fluctuated between $1719.2 per tonne and $ 2147.56per tonne. As in the case of other non-ferrous metals London Metal Exchange is the main exchange for lead metal and the fluctuation of prices in LME reflects in other International Markets also. The main reason for this upsurge in lead prices is attributed to the imbalance in demand and supply scenario especially in the Asian markets particularly China. Automobile industry in China showed a significant development in positive direction which had an obvious impact on demand of lead which is consumed in the lead acid automobile batteries. The London Metal Exchange prices of lead (Highest, Lowest and Average for last 20 years are given in **Table: 5.2.**

Table : 5.2 - London Metal Exchange Prices of Lead, 1991 to 2010

(In $ per tonne)

Sl. No.	Year	Highest	Lowest	Yearly Average
1.	1991	364.00	274.00	315.44
2.	1992	356.00	274.00	306.57
3.	1993	485.50	254.00	338.02
4.	1994	684.00	424.50	549.01
5.	1995	773.00	505.00	630.51
6.	1996	902.00	660.00	773.96
7.	1997	725.00	510.00	624.08
8.	1998	615.00	477.50	528.42
9.	1999	559.50	463.00	502.24
10.	2000	518.50	399.00	454.22
11.	2001	522.50	430.50	476.00
12.	2002	538.00	402.50	452.58
13.	2003	739.50	428.00	515.66
14.	2004	1056.00	696.50	888.33
15.	2005	1185.50	824.00	975.65
16.	2006	1809.00	914.50	1287.96
17.	2007	3980.00	1575.00	2594.96
18.	2008	3460.00	880.00	2090.66
19.	2009	2447.50	991.50	1719.27
20	2010	N.A.	N.A.	2147.56

The average monthly settlement LME prices of lead for the years 2001 to 2010 are presented in **Annexure : 5-IV** and also depicted in **Figure : 5.1** and the comparative prices during 2007 and 2010 are depicted in **Figure: 5.2**.

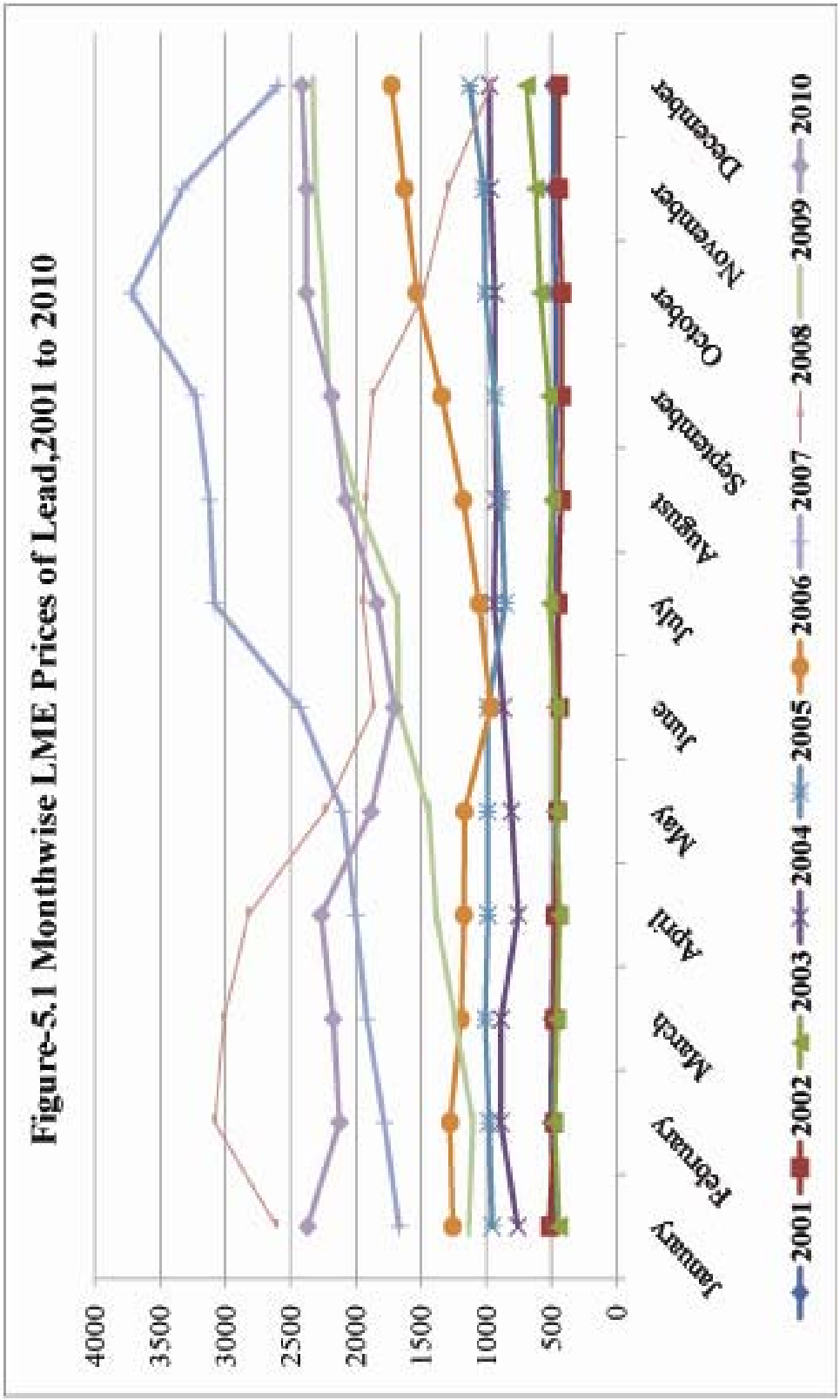


Figure-5.1 Monthwise LME Prices of Lead,2001 to 2010
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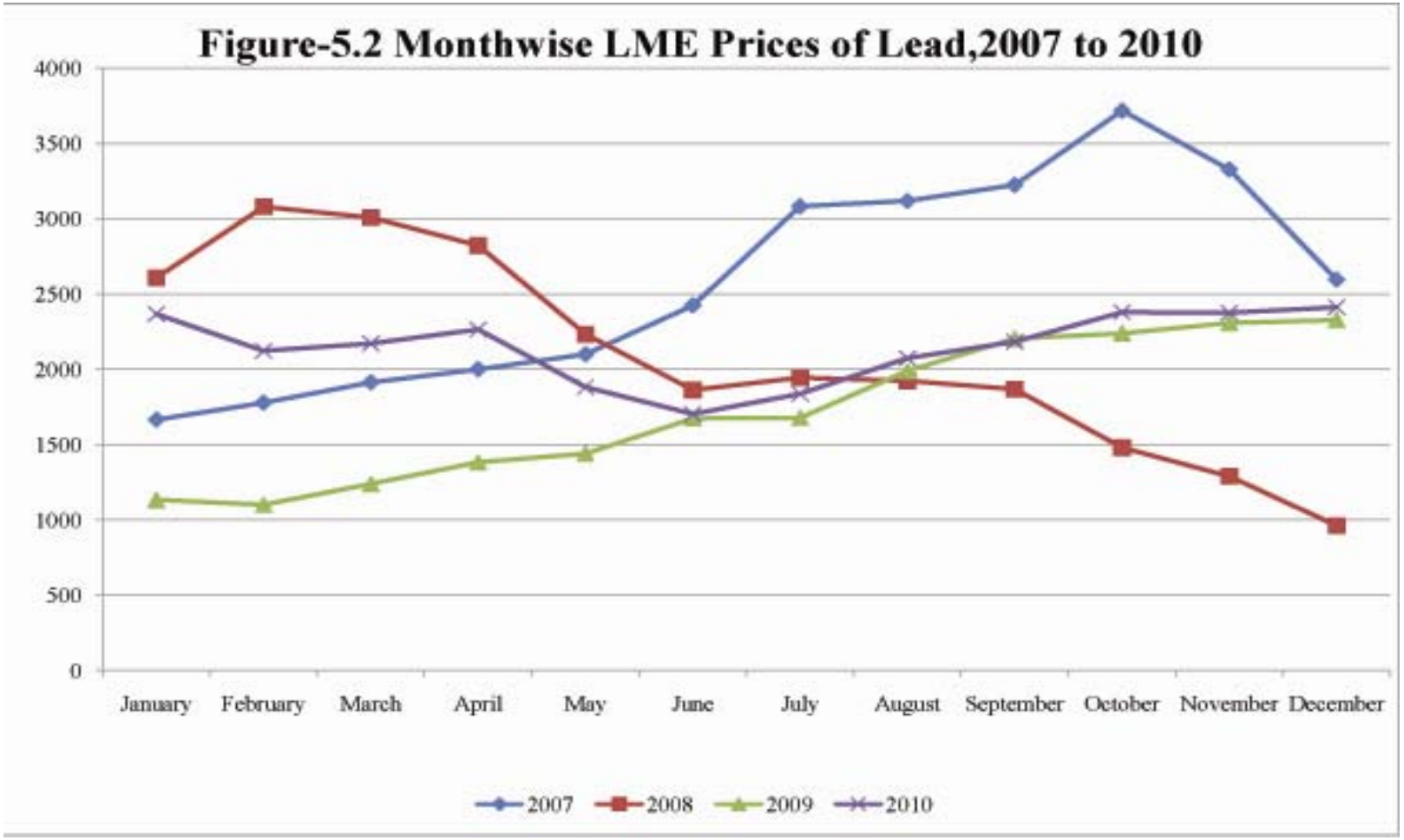
Figure-5.2 Monthwise LME Prices of Lead,2007 to 2010
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5.1.3 Royalty and other Taxes (Lead)

i) Royalty

In exercise of the powers conferred by Sub-section (3) of the Section 9 of the Mines and Minerals Development and Regulation (MMDR) Act, 1957, the Government of India notifies rates of royalty in respect of minerals applicable in all states and Union Territories (Except in the State of West Bengal). The holder of the mining lease is liable to pay royalty in respect of all minerals removed or consumed from the leased area at the rates specified in the Second Schedule of MMDR Act, 1957. The Central Government is empowered to increase or reduce the rates of royalty, but it cannot increase the rate in respect of a mineral more than once during a period of three years. The royalty is to be paid at such a time and in such a manner as the State Government may prescribe.

The rate of royalty on lead is levied on the basis of contained lead metal in the ore and concentrate produced. The royalty rate applicable in case of ore is 'Seven per cent of London Metal Exchange'. Lead metal price chargeable on the contained lead metal in case of ore produced, whereas in case of concentrates, the rate of royalty is levied on the basis of lead metal in the concentrates. The royalty rate applicable is 'Twelve Point Seven Percent of London Metal Exchange' Lead metal price chargeable on the contained lead metal in concentrate produced.

ii) Dead Rent

The holder of a mining lease must pay to the State Government dead rent annually at such a rate as may be specified in the MMDR Act, 1957, for areas included in the mining lease.

(1) Presently the rate of dead rent applicable to the leases granted for low value minerals are as under

Rates of Dead Rent in Rupees per Hectare per Annum

From 2nd year of lease	3rd & 4th year	Fifth year onwards
200/-	500/-	1000/-

(2) Two times the rate specified in paragraph (1) above in the case of lease granted for medium value minerals.

(3) Three times the rate specified in paragraph (1) above in the case of lease granted for High Valued Minerals

(4) Four times the rate specified in paragraph (1) above in the case of lease granted for precious metals and stones.

Copper, lead and zinc are termed as high value minerals and the rates are three times that specified in Paragraph (1).

iii) Surface Rent

The lessee is required to pay surface rent for the surface area used for mining operation at a rate not exceeding the land revenue as may be specified by the State Government in the Mining Lease. The rates of surface rents are specified by the State Governments and hence vary from state to state.

5.2 ZINC

Zinc is traded in the market in different forms such as ingots, soft, dross, alloys etc. Zinc ores and concentrates are also traded in the International Market. Zinc and its scrap is also traded world wide as per the norms laid down by ISRI (**Annexure: 3 – V)**.

There are various factors which affect the prices of zinc amongst which purity of zinc, the form in which it is traded and the percentages of deleterious constituents are the most important factors. Demand and supply position of zinc in the market is also an important factor which decides the trend of zinc prices. Transportation cost, import and export duties also play an important role in fixing of zinc prices. Presently, the demand and supply position of zinc in the Asian countries like China, India etc. plays an important role in the zinc market. A robust growth in the infrastructure sector and low availability of zinc scrap in these countries has increased the demand of primary zinc in these countries.

Zinc as any other merchandise is traded between producers and consumers. Producers sell their present and future production to the consumers. Zinc as other non-ferrous metals like copper and lead is traded in two ways. One of the very important ways of trading zinc is the settlement of price for the present day which is known as 'spot price' and the other way of trading is settlement of price for future days. The commodity exchanges play an important role in the trading of zinc. The exchanges facilitate to make a transparent settlement of prices. London Metal Exchange is the most important exchange. The prices settled in LME are considered as a base in many other markets. The metal exchanges also provide facilities to trade in future. These prices reflect the perception of demand supply position of zinc in the market. The future contracts define the size of lot, grade or quality of zinc, date of delivery and other important details of the trading process.

5.2.1 Domestic Prices

There are two main markets in the country where zinc is traded namely, Delhi and Mumbai. The prices of zinc are quoted in Rupees per quintal in these markets. There are 3 grades of zinc which are traded in these markets namely, Zinc ingot, zinc soft and zinc dross. Zinc ash is also sold but not in open market. Zinc ash is traded directly between producers and consumers. The manufacturers of artifacts and utensils of brass and bronze are the main consumers of zinc ash.

The prices of all the 3 grades traded in both the domestic markets for last ten years are given in **Table: 5.3.**

Table : 5.3 - Prices of Zinc in Domestic Markets, 199-2000 to 2008-09

(In Rs. per quintal)

Year	Prices		
	Ingot (Mumbai Market)	**Soft** (Delhi Market)	**Dross** (Delhi Market)
1999-2000	8451	8298	5904
2000-01	8679	8461	6433
2001-02	7087	6875	5717
2002-03	6416	6170	5239
2003-04	7185	7152	5352
2004-05	8325	8355	6180
2005-06	12969	12824	9890
2006-07	18355	19395	14105
2007-08	13416	14389	11205
2008-09	8776	8290	6824

As seen from the above table, there was an upsurge in the prices of zinc ingot during 2005-06 and 2006-07 and the prices increased from Rs. 8325 per quintal for zinc ingot in 2004-05 to Rs 12969 per quintal in 2005-06 registering an increase of about 56% and further increase to Rs.18355 per quintal in 2006-07, an increase of about 42 percent. Similar trend was seen in respect of 'soft' and 'dross' however, there was a marked fall in prices in 2008-09 as shown in **Table: 5.3** above.

5.2.2 International Market:

The average annual prices of zinc in the international markets showed an increasing trend. As in the case of other non-ferrous metals, London Metal Exchange is the main exchange where zinc is traded actively. The impact of the fluctuation in prices of zinc is observed in other international Exchanges also. The main reason for the increase in prices of zinc is attributed to the demand and supply position globally as well as in domestic markets. The demand of zinc had increased in the infrastructure sector in some countries particularly the developing countries. The highest, lowest and average annual prices of zinc traded in London Metal Exchange for the last 20 years are given in **Table: 5.4**.

Table : 5.4 - London Metal Exchange Prices of Zinc, 1991 to 2010

(In $ per tonne)

Sl. No.	Year	Highest	Lowest	Yearly Average
1.	1991	1433.00	973.00	1115.31
2.	1992	1453.00	1012.00	1239.57
3.	1993	1109.00	859.00	960.65
4.	1994	1181.00	903.00	998.45
5.	1995	1206.50	949.00	1030.80
6.	1996	1097.00	978.00	1025.03
7.	1997	1760.00	1035.50	1313.27
8.	1998	1143.00	916.00	1023.26
9.	1999	1239.00	900.00	1077.32
10.	2000	1277.00	1021.00	1128.11
11.	2001	1063.00	732.50	886.27
12.	2002	842.50	725.50	778.56
13.	2003	1008.00	741.00	828.39
14.	2004	1270.00	943.00	1047.83
15.	2005	1915.00	1165.00	1381.55
16.	2006	4619.50	1912.00	3272.62
17.	2007	4259.00	2214.00	3250.30
18.	2008	2511.00	1101.00	1874.71
19.	2009	2570.00	1059.50	1655.11
20.	2010	N.A.	N.A.	2158.86

The average monthly settlement LME prices of zinc for the years 2001 to 2010 are presented in **Annexure : 5-V** and also depicted in **Figure : 5.3** and the comparative prices during 2007 and 2010 are depicted in **Figure : 5.4**.

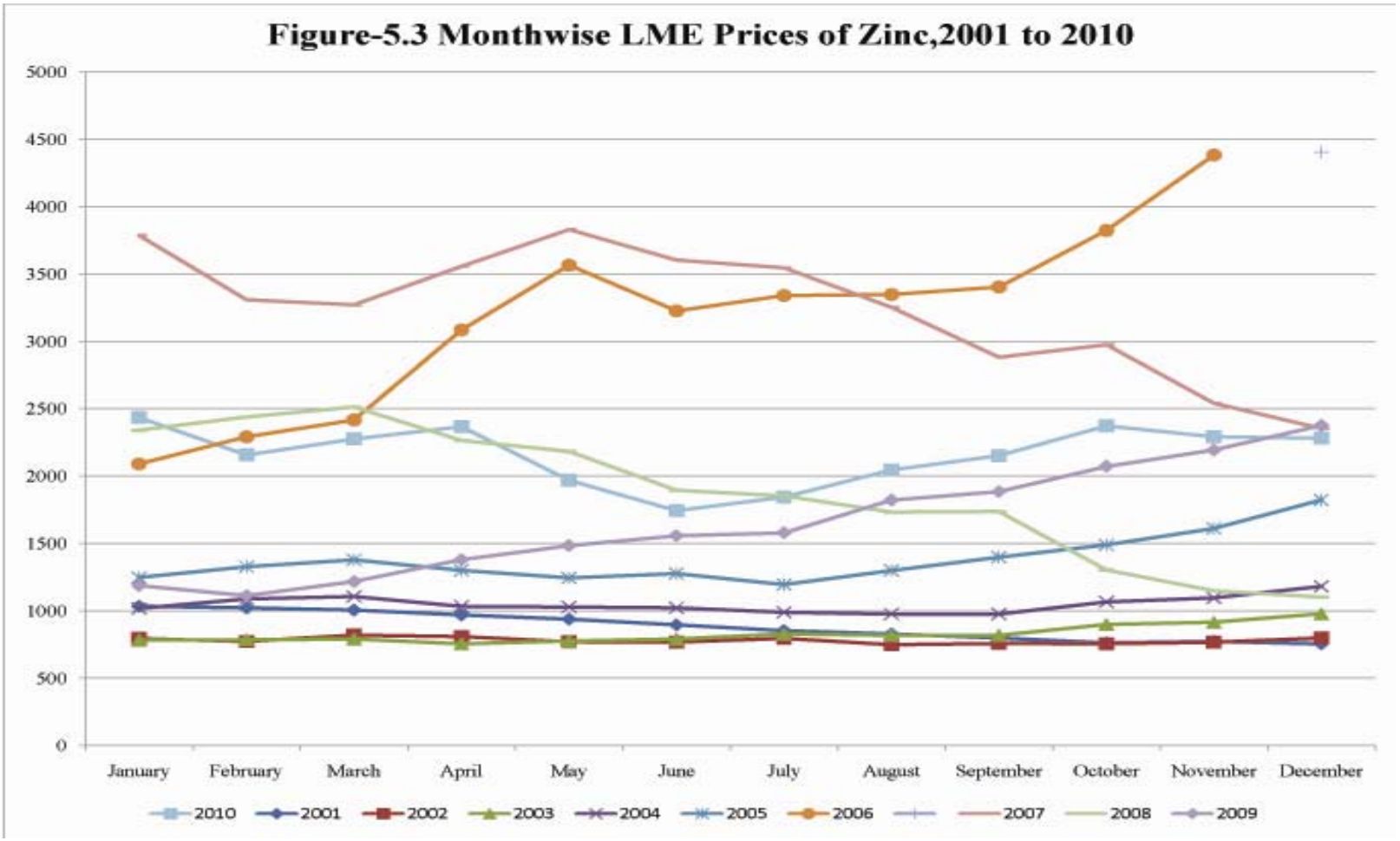
Figure-5.3 Monthwise LME Prices of Zinc,2001 to 2010
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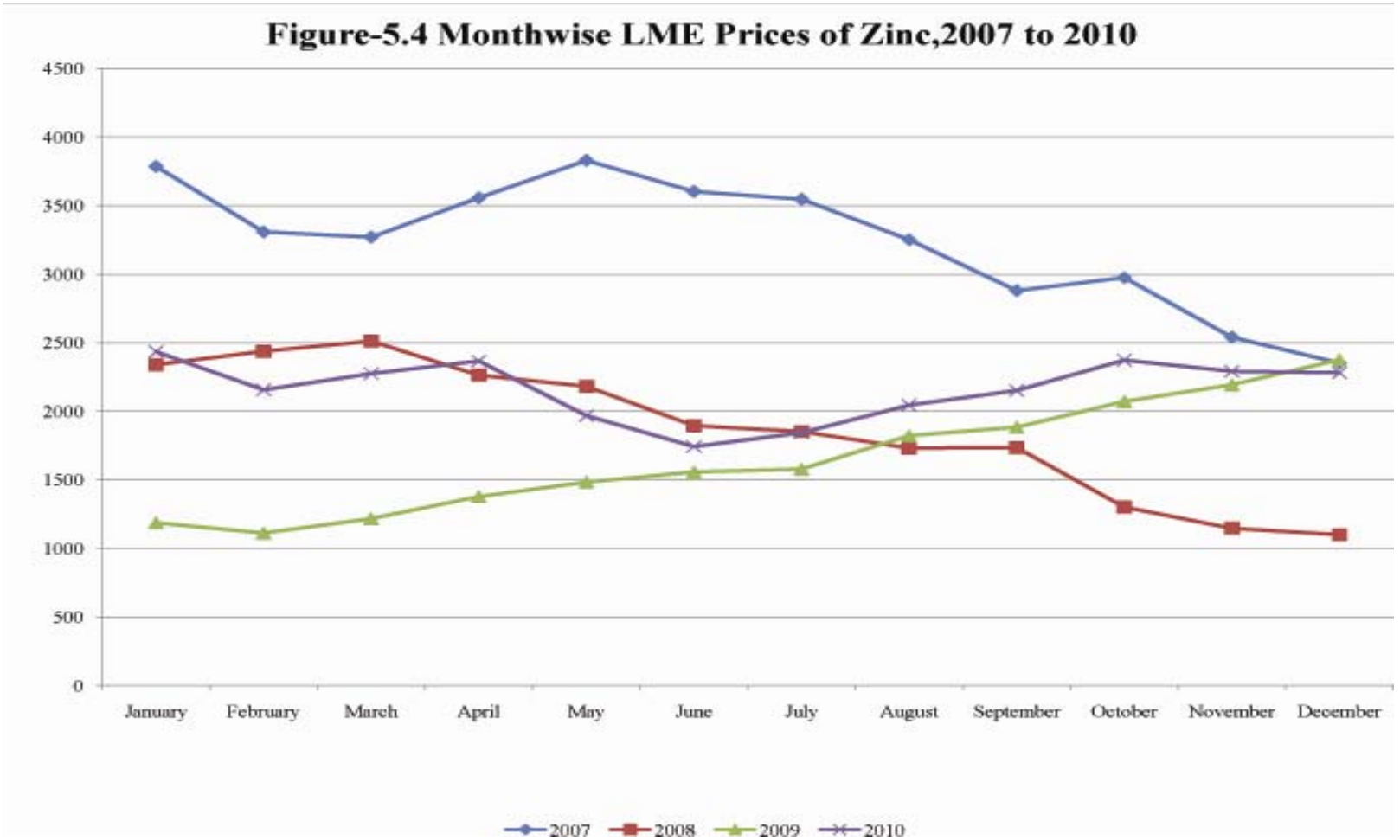
Figure-5.4 Monthwise LME Prices of Zinc,2007 to 2010
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The price of zinc which was 828.39 per tonne in the year 2003 steadily increased for 2 years i.e. in 2004 and 2005 and reached to $1047.83 per tonne and $ 1381.55 per tonne registering an increase of 26.50% and 31.85% respectively. A sudden spurt in zinc price by 136.88% was registered in 2006 and the zinc price was quoted at $ 3272.62 per tonne. However, in 2007 the zinc price showed slight decrease of 0.68% at $ 3250.30 per tonne. There was a sharp fall in 2008 and the prices settled at $ 1874.71 per tonne registering a steep decrease of 42.46%. It further decreased to $1655.11 in 2009.

5.2.3 Royalty and Other Taxes (Zinc)

i) Royalty

The rate of royalty on zinc is levied on the basis of contained zinc metal in the ore produced. The rate of royalty applicable is 'Eight percent of London Metal Exchange' Zinc metal price on ad valorem basis chargeable on contained zinc metal in the ore produced. Whereas rate of royalty on zinc concentrate is levied on the basis of contained zinc metal in the concentrate produced. The rate of royalty applicable is 'Eight Point Four Percent' of London Metal Exchange Zinc Metal Price on ad valorem basis chargeable on contained zinc metal in the concentrate produced.

ii) Dead Rent

The holder of a mining lease must pay to the State Government dead rent annually at such a rate as may be specified in the MMDR Act, 1957, for areas included in the mining lease.

(1) Presently the rate of dead rent applicable to the leases granted for low value minerals are as under;

Rates of Dead Rent in Rupees per Hectare per Annum

From 2nd year of lease	3rd & 4th year	Fifth year onwards
200/-	500/-	1000/-

(2) Two times the rate specified in paragraph (1) above in the case of lease granted for medium value minerals.

(3) Three times the rate specified in paragraph (1) above in the case of lease granted for High Value Minerals

(4) Four times the rate specified in paragraph (1) above in the case of lease granted for precious metals and stones

Zinc being included in the list of High Value Minerals the rate of dead rent chargeable for zinc is three times the above rates i.e. Rs. 600/- per hectare per annum from second year of lease, Rs. 1500/- per hectare per annum in 3rd and 4th year and Rs. 3000 per hectare per annum from 5th year onwards.

iii) Surface Rent

The lessee is required to pay surface rent for the surface area used for mining operation at a rate not exceeding the land revenue as may be specified by the State Government in the Mining Lease. The rates of surface rents are specified by the State Governments and hence vary from state to state.

5.3 FUTURE FORECAST OF LEAD AND ZINC PRICES

The unprecedented volatility in lead and zinc market makes it very difficult to forecast the future price range. However analyst worldwide forecast the prices. The same are given in **Annexures : 5-V** and **5-VI.**

Chapter 6. Demand and Supply

The only similarity amongst zinc and lead lies in that the zinc and lead minerals occur together in varying proportions, apart from this there is hardly any similarity in their use. The use of zinc is maximum in the steel galvanizing industry while lead consumption is maximum in lead acid batteries. It is thus implied that the demand and supply relationship as well as the internal demand is dependent upon these two major industries namely galvanizing for zinc and lead acid batteries for lead. However, an attempt has been made in this chapter to discuss the present and future internal demand as well as demand & supply relationship of these metals**.** In the following paragraphs the demand-supply analysis of lead and zinc metals is discussed.

6.1 LEAD

6.1.1 Internal Demand

6.1.1.1 Present Demand

i) Reported Consumption

Lead metal is used in various applications, especially in the manufacture of lead acid battery which consume about 74% of lead in the country. The balance 26% demand is in cable sheathing, alloys, pigments & compounds and other products such as sheets etc.

Lead, presently is not substituted by any other metal in the production of lead acid batteries, which are vital for automobiles. Lead acid battery is also used as power back-up especially in power deficient countries. Lead batteries are finding newer applications such as inverter battery, battery operated mopeds, battery operated cars, battery operated forklifts, and even mass transport vehicles especially where there is a concern for cleaner atmosphere. Now-a-days battery operated small vehicles are used in railway stations and airports, for carrying luggage as well as passengers for short distances and big industries.

However, plant wise data of lead consumed in lead acid battery units as well as other end product uses is not available since most of the lead consuming industries are in unorganised sector. An attempt has been made in this survey to compile data on lead consumption by end-use industry on non statutory basis through correspondence. The data thus compiled is given at **Table: 6.1.**

Table: 6.1- Industry wise Consumption of Lead Metal 2004-05 to 2008-09

(In tonnes)

End use Industry	2004-05	2005-06	2006-07	2007-08	2008-09
Cable Sheathing	2880	3202	3661	3603	6749
Storage battery	67188	69865	77828	77595	80621
Paint	2428	1434	2119	2668	3164
Chemicals	1607	2415	2586	2586	2295
Alloys	2915	971	1338	2129	966
Other	1377	1436	1761	1519	1572
Total (A) Metal	**78395**	**79322**	**89293**	**90100**	**95367**
Scrap (B)	2201	3868	861	639	593
Grand Total (A+B)	**80596**	**83191**	**90154**	**90739**	**95960**

The data in the above table represents the industries responded to our queries being non statutory returns and the coverage is not complete, thus does not reflect the realistic consumption of lead metal in the country.

Consuming industries covered for end-use data collection were cable & sheathing, storage battery, paint, chemicals, alloys as well as scrap consumption in these industries. In the year 2008-09 battery industry alone consumed 84% of lead while rest of the industries consumed 16% of lead. The share of scrap in the total consumption was only 0.6% while 99% of lead consumed by these industries was primary lead.

As far as the percentage of lead consumed by individual industry is concerned, 84% consumption by battery industry seems to be on higher side due to incomplete coverage of other industries. As per the literature survey and personal communication with industry, present market survey adopted consumption figures of 74% in Battery Industry, 9% in Pigments & Compounds, 8% in rolled extruded products 3% in alloys and 2% in Cable Sheathing.

ii) Apparent Consumption

The apparent consumption is arrived by taking into consideration the estimated production, imports and exports. The same is given in the **Table 6.2.** It is to be made clear here that the estimated production was arrived at by adding production of secondary lead with primary lead production.

Table: 6.2- Apparent Consumption of Lead, 2003-04 to 2009-10

(In Tonnes)

Year	Estimated Production (Inclusive of Secondary production)	Imports	Total Availa--bility	Exports	Apparent Consumption	% Growth/Fall
1	**2**	**3**	**2+3=4**	**5**	**4-5=6**	**7**
2003-04	49474	87335	136809	1191	135618	
2004-05	31314	106814	138128	2584	135544	(-) 0.05
2005-06	47634	86660	134294	2300	131994	(-) 2.62
2006-07	89254	99678	188932	3457	185475	(+)40.52
2007-08	116492	71827	188319	6649	181670	(-) 2.05
2008-09	120646	103254	223900	7021	216879	(+)19.38
2009-10	144000	110201	254201	26970	227231	(+) 4.77

It is seen from the table that there was an average annual growth of 10% in the apparent consumption of lead by all the industries and in 2009-10 the consumption was 2.27 lakh tonnes.

6.1.1.2 Future Demand

Lead acid battery is the biggest consumer of lead with a share of 74% in total consumption of lead and the growth of battery industry is closely linked with the growth of automobile industry as well as power back up industry. Therefore, the rise in automobile industry will have a positive effect on the battery industry. To forecast the demand of lead in the battery industry, the major consumer, have been studied in detail as given in the following paragraphs. The demand based on the overall growth in GDP has also been dealt with as given under.

1. Demand Forecast Based on CAGR and GDP Growth

The apparent consumption of lead is growing at 10% CAGR (based on growth from 2004-05 to 2009-10) and is utilized for projecting future demand beyond 2009-10 to 2024-25. The apparent consumption during 2009-10 has been estimated at 2.27 lakh tonnes which is considered as base year for the projection of the demand.

The country is estimated to have recorded an annual growth of rate of 8.2% during 2010-11 and likely to continue for next year i.e. 2011-12 as was declared in the full meeting of for 12th Five Year Plan (2012-17) recently, while the Planning Commission is aiming an economic growth rate (GDP) of 9-9.5% for 12th Five Year Plan.

In view of this the demand forecast has been calculated on the basis of GDP 8.2% for 2010-11 & 2011-12 and from 2012-13 onwards a conservative growth rate of 9% aimed for 12th five year plan by planning commission of India have been adopted. The same is given in **Table 6.3**.

Table- 6.3: Estimated Demand Forecast of Lead 2010-11 to 2024-25 (Base Year 2009-10 demand of 227 thousand tonnes)

(In '000 tonnes)

Year	Estimated Demand At CAGR 10%	Estimated Demand GDP Growth
2010-11	250	246
2011-12	275	266
2012-13	303	290
2013-14	333	316
2014-15	366	344
2015-16	403	375
2016-17	443	409
2017-18	487	446
2018-19	536	486
2019-20	590	530
2020-21	649	578
2021-22	714	630
2022-23	785	687
2023-24	865	749
2024-25	950	816

It will be seen from the table that as per the CAGR of 10% calculated the apparent demand in 2024-25 has been arrived at 950 thousand tonnes while on the basis of 8.2% GDP growth of 11th Five Year Plan and GDP growth in 12th plan of 9% the demand in 2024-25 comes to 816 thousand tonnes.

2. Demand Projections Based on Sector Wise Growth

(a) Storage Batteries

i) Present Demand

It has already been explained that about 74% of lead is consumed in the manufacture of Storage or Lead Acid Batteries which are used for ignition and lighting in the vehicles as well as power backups. As per the data made available by the Department of Industrial Policy and Promotion, Ministry of Commerce the production of storage batteries in 2004-05 was 383.03 lakh units which decreased to 356.70 lakh units in 2005-06 registering a fall of 6.94%, since then there was a continuous increase in the production and in 2009-10 the production rose by 18.30%over the previous year and the production was 509.30 lakh units. By taking the overall growth pattern from 2004-05 to 2009-10 an average growth rate of 6.2% was observed. The same has been taken for projecting future production of storage batteries.

It is known that there are a number of types of storage batteries, such as batteries used in Dumpers, Wheel Mounted Dump Loaders, Commercial Vehicles, Jeep Type Vehicles, Passenger Cars, Auto Rickshaws, Scooters & Mopeds and Motor Cycles, in addition to this, batteries are also used in power backups. Lead used in the manufacture of different types of batteries varies from 0.5 kg in case of batteries used in scooters & mopeds etc. to 44 kg for batteries used in dumpers etc. Therefore to arrive at a figure of average lead used in the manufacture of batteries was arrived at by taking an arithmetic average of lead used in different types of batteries. This was also discussed with the manufacturers and re-processors of lead and they have agreed to a figure of 17 kgs of lead per battery which was taken to arrive at the lead used in the production of storage batteries.

The quantity of lead used in the production of storage batteries is tabulated by applying 17 kgs. of average lead used in the batteries. The same is given in **Table: 6.4.**

Table: 6.4 - Consumption of Lead in the Production of Storage Batteries, 2004-05 to 2009-10

Item	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Production of Storage Batteries **(lakh Nos.)**	383.30	356.70	401.12	409.89	430.52	509.30
Lead used at the rate of 17kgs. average lead consumption for each battery **(tonnes)**	651,610	606,390	681,904	696,813	731,884	865,810

Note: Based on the data on production of storage batteries as obtained from Department of Industrial Policy and Promotion, Ministry of Commerce, New Delhi.

As shown in the table, the present consumption of lead metal in the production of storage batteries comes to around 8.65 lakh tonnes in 2009-10.

Battery industry represents 74% of the total consumption of lead and the rest 26% of lead is consumed by other industries. Thus by adding 26% to 8.66 thousand tonnes, lead consumed by battery industry, the present total demand of lead comes out to about 10.91 lakh tonnes in the year 2009-10.

ii) Future Demand

The battery industry is growing with a rapid pace mainly due to the increase in the production of all types of vehicles as well as more and more storage batteries are used as power backups. One more aspect is added in the demand of batteries is the cleaner fuel for vehicles which are used in the places where pollution is to be kept at the minimum. Moreover development of hybrid type of electric vehicles demands more and more storage batteries.

It is observed that there was a healthy average growth of 6.2% in last six years from 2004-05 to 2009-10. Considering the average growth of 6.2% for storage battery production, the future demand of lead is arrived by applying the average content of lead acid batteries i.e. 17kg. lead per battery. The demand of lead is estimated from 2010-11 to 2024-25. The same is given in **Table: 6.5.**

Table: 6.5 - Future Demand of Lead for Production of Storage Batteries (Base Year 2009-10 battery production 509.30 lakh nos.)

Lead demand	2010-11	2015-16	2020-21	2024-25
Battery Production **(Lakh Nos.)**	540.88	730.67	987.05	1255.56
Lead demand **(Tonnes)**	919,496	1,242,139	1,677,985	2,134,452

It is seen from the above table the consumption of lead during 2010-11 is about 9 lakh tonnes which will reach a level of 12 lakh tonnes in 2015-16 and 21 lakh tonnes in 2024-25.

As mentioned earlier, by adding 26% of lead required by other industries to the requirement of battery industry (74%) in future the total consumption of lead in 2010-11 will be 11.58 thousand tonnes, 15.65 thousand tonnes in 2015-16, 21.14 lakh tonnes in 2020-21 thousand tonnes and 26.89 lakh tonnes in 2024-25.

(b) Vehicles

i) Present Demand

A**s** it is known that almost all the vehicles running on petrol or diesel require battery for ignition and lighting leaving some models of scooter and mopeds where batteries are not required. The batteries used in vehicles differ in size as per the requirement of vehicle engine. Therefore, the lead used in such battery varies from 0.5 kg in case of scooters and motorcycles to 44 kg in case of battery used in dumpers and wheel mounted dump loaders. Therefore to arrive at the quantity of lead used in the manufacturing of batteries used in vehicles, the quantity of lead used in particular type of battery was multiplied with the number of vehicles produced in that year.

Based on the data on production of different vehicles as provided by Department of Industrial Policy and Promotion, Ministry of Commerce, Government of India and the data collected through interaction with the producers of batteries, the consumption of lead in the production of batteries for different types of vehicles has been arrived considering that each vehicle will use at least one battery. The same is given in the **Annexure: 6-I.**

It is seen from the **Annexure: 6-I** that there is a continuous increase in the lead consumption since 2004-05 to 2009-10. The consumption of lead in 2004-05 was 24 thousand tonnes which reached to 43 thousand tonnes in 2009-10. The compounded annual growth rate of lead consumption in the manufacture of lead acid batteries for vehicles produced was 11.24%. The same is given in the following **Table: 6.6**.

Table: 6.6 - Consumption of Lead in the Manufacture of Batteries Based on Assumption of One Battery per Vehicle

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	CAGR (%)
Batteries/ vehicles produced (Nos.)	8,392,307	9,739,879	11,059,881	10,826,050	11,103,477	14,033,669	
Annual Growth (%)		(+)16.06	(+)13.55	(-)2.11	(+)2.56	(+)26.30	(+)11.27
Total lead consumed (tonnes)	24387	26990	33050	35702	33228	43194	
Annual Growth (%)		(+)10.67	(+)22.45	(+)8.02	(-)6.92	(+)21.99	(+)11.24

ii) Future Demand:

It will be seen from the above **Table 6.6** that there is a healthy growth in the manufacture of all types of vehicles. This growth directly translates in the manufacture of batteries to be used in these vehicles ultimately increase in consumption of lead.

The production of all types of vehicles in 2004-05 was 8.39 million numbers which rose to 14.03 million numbers in 2009-10 registering an increase of 67.22% over 2004-05. The average growth rate in production of batteries/vehicles was 11.27%. In a similar way the lead consumption in 2004-05 was 24.38 thousand tonnes increased to 43.19 thousand tonnes in 2009-10 registering an overall increase of 77.11% over 2004-05. The average growth rate in consumption of lead was 11.24%.

On the basis of average growth of 11.27% in production of batteries/vehicles and 11.24% in total lead consumed, future production of batteries as well as lead consumed in the manufacture of batteries till 2024-25 have been arrived. The same is given in **Table 6.7**.

Table : 6.7 - Future Demand of Lead Based on Production of Different Types of Vehicles

	2010-11	2015-16	2020-21	2024-25
Batteries/Vehicles **(Nos.)**	15,615,263	26,634,205	45,428,687	69,637,398
Lead Consumption **(tonnes)**	48,049	81,845	139,410	213,471

By adopting the similar pattern adopted earlier of lead consumption as 74% by battery industry and 26% consumption by other industries, the total lead demand in 2010-11 will be about 60,542 tonnes and in 2024-25 the demand of lead will be 368,973 tonnes.

(c) Demand Forecast on the Basis of Ratio of Production of Storage Batteries and Production of Vehicles

i) Present Demand

The data on production of batteries as well as various types of vehicles was obtained from Department of Industrial Policy and Promotion, Ministry of Commerce, Govt. of India. It has already been explained that each vehicle requires batteries for ignition and lighting. The batteries produced during the years 2004-05 to 2009-10 is triple in number than the vehicles produced during the same period. This is because of the fact that the life of batteries used in vehicles last for 1-3 years. Therefore, the battery production has to be such that it can provide batteries throughout the life of the vehicle say 15 years. It is also known that the different types of vehicles require different types of batteries consuming different quantities of lead.

By the exercise which was attempted to arrive at the consumption of lead for the production of batteries taking an average lead consumption of 17 kgs per battery gives the lead consumption as high as 6.5 lakh tonnes in 2004-05 to 21.34 lakh tonnes in 2024-25 which is on the higher side hence, not adopted in this report for forecasting the future demand. Now an exercise is being done to estimate the lead consumption proportionate to the production of vehicles using different types of batteries consuming different quantities of lead per unit.

It has been observed from the data that the production of dumper was only 2300 in 2004-05 which rose to 2546 units in 2009-10, using the battery with 44 kg of lead whereas the production of motor cycles which was 234 lakhs units in 2004-05 rose to 306 lakh units, using battery with only 0.5 kg lead. Hence, by observing a non uniform growth in production of different types of vehicles, it was felt necessary to arrive at ratio of production of various types of batteries for different types of vehicles. On the basis of percentage of production of a particular vehicle in the total vehicles produced was allotted to the number of batteries produced considering that each vehicle will use at least one battery. In this way, the present demand of lead in the manufacture of battery was calculated. The same is given in **Table 6.8**.

Table 6.8 - Lead Consumption on the Basis of Ratio of Production of Storage Batteries and Production of Vehicles

Sl. No.	Type of Vehicle	2004-05				2005-06			2006-07		
		% Share in Total Vehicles	Lead Consumed in Each Battery	No. of LAB produced	Estimated Consumption of lead (kg)	%Share in Total Vehicles	No. of LAB produced	Estimated Consumption of lead (kg)	%Share in Total Vehicles	No. of LAB produced	Estimated Consumption of lead (kg)
1.	Dumper	0.006	44	2300	101200	0.007	2497	109868	0.006	2407	105908
2.	Wheel mounted dump Loaders	0.015	44	5749	252956	0.014	4994	219736	0.014	5616	247104
3.	Commercial Vehicles	4.17	25	1598361	39959025	4.01	1430367	35759175	4.70	1885264	47131600
4.	Jeep Type Vehicles	2.97	10	1138401	11384010	2.70	963090	9630900	2.77	1111102	11111020
5.	Passenger Cars	11.50	10	4407950	44079500	10.75	3834525	38345250	11.20	4492544	44925440
6.	Auto Rickshaws	4.42	0.5	1694186	847093	4.46	1590882	795441	5.03	2017634	1008817
7.	Scooters & Mopeds	15.88	0.5	6086804	3043402	14.38	5129346	2564673	11.97	4801406	2400703
8.	Motor Cycles	61.03	0.5	23392799	11696399	63.69	22718223	11359111	64.31	25796027	12898013
	Total				**111363585**			**98784154**			**119828605**

Table: 6.8 - Lead Consumption on the Basis of Ratio of Production of Storage Batteries and Production of Vehicles (Concld.)

Sl. No.	Type of Vehicle	2007-08				2008-09			2009-10		
		% Share in Total Vehicles	Lead Consumed in Each Battery	No. of LAB produced (kg)	Estimated Consumption of lead	%share in Total Vehicles	No. of LAB produced (kg)	Estimated Consumption of lead	% share in Total Vehicles	No. of LAB produced	Estimated Consumption of lead (kg)
1.	Dumper	0.006	44	2459	108196	0.007	3014	132616	0.005	2546	112024
2.	Wheel mounted dump Loaders	0.002	44	8198	360712	0.019	8180	359920	0.013	6621	291324
3.	Commercial Vehicles	5.03	25	2061747	51543675	3.75	1614450	40361250	4.04	2057572	51439300
4.	Jeep Type Vehicles	3.19	10	1307549	13075490	2.78	1196846	11968460	3.02	1538086	15380860
5.	Passenger Cars	13.13	10	5381856	53818560	13.66	5880903	58809030	13.61	6931573	69315730
6.	Auto Rickshaws	4.62	0.5	1893692	946846	4.47	1924424	962212	4.41	2246013	1123006
7.	Scooters & Mopeds	13.91	0.5	5701570	2850785	14.04	6044501	3022250	14.72	7496896	3748448
8.	Motor Cycles	60.07	0.5	24622092	12311046	61.26	26373655	13186828	60.18	30649674	15324837

Therefore to allot a ratio for lead consumption, the growth pattern of each vehicles was calculated on year to year basis and the same was utilized for arriving at the consumption of lead for the years 2004-05 to 2009-10 (**Table: 6.8**) and forecast for the year 2010-11 to 2012-13.

ii) Future Demand

Future demand of lead consumption in the manufacture of batteries for vehicles produced in the preceding paragraph on the basis of total lead consumed without giving consideration for the growth in the manufacture of different types of vehicles. Therefore it was felt necessary to forecast the future demand by taking into consideration the growth in the manufacture of each type of vehicles. This has become necessary because, each vehicle uses a battery with different lead content.

The average growth pattern of each vehicle was calculated on the basis of data available from 2004-05 to 2009-10.

There was a minimum annual average growth of 2.81% in case of dumpers while the maximum growth of 10.22% was registered in the passenger cars production. The average growth of different types of vehicles is given below in **Table: 6.9**.

Table: 6.9 - Growth Rate of Productions of Different Vehicles

Sl. No.	Name of vehicle	Average growth %
1.	Dumper	2.83
2.	Wheel mounted dump loaders	5.20
3.	Commercial vehicles	7.28
4.	Jeep type vehicles	7.54
5.	Passenger Cars	10.22
6.	Auto Rickshaws	6.58
7.	Scooters & Mopeds	5.33
8.	Motor Cycles	5.89

On the basis of average growth of vehicles as shown in **Table: 6.9** the production of batteries equal to vehicle production was considered and the lead content in a particular type of battery was calculated. The same is given in **Table: 6.10**.

Table :6.10- Future Estimation of Lead on the Basis of Battery Produced

Sl. No.	Type of Vehicle	Lead Consumed in Each Battery	2010-11		2015-16		2020-21		2024-25	
			No. of LAB produced	Estimated Consumption of lead (kg)	No. of LAB produced	Estimated Consumption of lead (kg)	No. of LAB produced	Estimated Consumption of lead (kg)	No. of LAB produced	Estimated Consumption of lead (kg)
1.	Dumper	44	2618	115192	3010	132440	3461	152284	3870	170280
2.	Wheel mounted ump Loaders	44	6965	306460	8975	394900	11565	508860	14165	623260
3.	Commer-cial Vehicles	25	2207363	55184075	3136661	78416525	4457193	111429825	5903866	147596650
4.	Jeep Type Vehicles	10	1654058	16540580	2379035	23790350	3421770	34217700	457647	4576470
5.	Passenger Cars	10	7639980	76399800	12427800	124278000	20216049	202160490	29835815	298358150
6.	Auto Rickshaws	0.5	2393801	1196900	3292052	1646026	4527363	2263682	5841819	2920910
7.	Scooters & Mopeds	0.5	7896481	3948240	10237501	5118750	13272550	6636275	16336639	8168320
8.	Motor Cycles	0.5	32454940	16227470	43207144	21603572	57521513	28760757	72318613	36159307
	Total			**168721817**		**255380563**		**386129873**		**498573347**

Comparison of Future Demand of Lead Based on Batteries, Production of Vehicles and Ratio of Production of Vehicles and Batteries

It is seen from the preceding paragraphs that there is huge difference in the demand forecast made on the basis of production of batteries and the demand forecast made on the basis of production of vehicles as well as ratio of production of batteries and production of vehicles. The demand forecast made by all the three methods is given below in **Table: 6.11.**

Table: 6.11 – Comparative Statement of Consumption of Lead for the Manufacture of Batteries

(In '000 tonnes)

Methods	Year	2010-11	2015-16	2020-21	2024-25
I	Demand based on storage batteries of all types	919	1242	1678	2134
II	Demand based on vehicle of all types	48	82	139	213
III	Demand based on the basis of ratio of storage battery production and production of vehicles	169	255	386	499

Demand based on the basis of production of storage batteries, production of vehicles and ratio of production of storage batteries and production of vehicles is given in the **Table: 6.11.** It is seen from the above **Table: 6.11** that the requirement of lead for the manufacture of storage batteries of all types in 2010-11 will be 919 thousand tonnes by method-I as compared to requirement of lead by method-II at 48 thousand tonnes and 169 thousand tonnes based on Method-III.

It is known that the battery used in a vehicle has a life span of ranging from one year to three years and during the life time of vehicle say 15 years; it requires 5 to 6 batteries. Therefore, each year the production of batteries is to be increased to commensurate the battery required changing in the older vehicle hence the total battery produced in a particular year gives a fair idea of lead consumption in the battery industry. The consumption of lead in the manufacture of batteries for the vehicles produced gives an idea about the batteries required for new vehicles but do not represent the total batteries produced. Hence, the demand of lead by method-I seems to be more near to the factual demand. By adding 26% of lead required by other industries the total demand of lead in 2010-11 comes out to be 1158 thousand tonnes, 1565 thousand tonnes in 2015-16, 2114 thousand tonnes in 2020-21 and 2689 thousand tonnes in 2024-25.

ZINC

Zinc is a versatile metal used primarily to protect steel from the curse of rust or corrosion as well used in making brass and other zinc based alloys to cater to casting industry. Significant amounts are also used for compounds such as zinc oxides and zinc sulphate and in many other ways. The details of its use and application are dealt in detail in **'Uses and Specifications' Chapter.**

6.2 INTERNAL DEMAND:

6.2.1 Present Demand

i) Reported Consumption

The data on quantitative consumption of zinc is not readily available. However data on industry wise consumption of zinc is compiled on non-statutory basis hence the coverage is partial and only indicative. The same is given in **Table: 6.12.**

Table: 6.12- Industry wise Consumption of Zinc Metal, 2004-05 to 2008-0

(In tonnes)

End-use Industry	2004-05	2005-06	2006-07	2007-08	2008-09
Galvanizing	60545	69472	277185	267929	272042
Dry Battery	25814	29777	37865	35701	31887
Semis & Alloys	3472	19081	52291	50432	51865
Chemicals	8478	8517	13096	15185	21526
Die-Casting	2522	2430	1327	1177	2235
Others	7966	7771	24998	26176	26867
Total Metals (A)	**108797**	**137048**	**406762**	**396600**	**406423**
Scrap (B)	2268	3571	6042	9027	11933
Grand Total (A+B)	**111065**	**140620**	**412804**	**405627**	**418357**

As per the data presented in **Table: 6.12** it is seen that about 65% of zinc is consumed by galvanizing industry followed by Semis & Alloys (12%), Dry Batteries (8%) and Chemicals (5%). Many of the industries require primary Zinc for their consumption, especially galvanizing industry, however, sizeable quantities of zinc is recycled from scrap and utilized in industries especially in alloys and die casting industries. Although as per the data presented above, 97% zinc consumed comes from primary source while the ratio of scrap is only 3%.

The other point which is to be noted from the table is that the total consumption of metal (both primary & scrap) in country during 2008-09 comes

to about 4.18 lakh tonnes which is less than the primary metal production of 5.79 lakh tonnes during the same period representing only 72.19%. In addition to this, the imports of zinc spelter & scrap was about 79 thousand tonnes in 2008-09 as well as it has been estimated that 10% scrap is also added in the present production. Thus the apparent production in 2008-09 is estimated at 6.37 lakh tonnes. Against this apparent production the consumption of zinc comes to be around 65.62%. With this analysis it will be seen that as per the consumption data compiled, no inference could be drawn hence not utilised for industry wise demand projection as well as forecast.

ii) Apparent Consumption

As already explained in section dealing with lead, the constraints faced in data collection, there was very little response from zinc consuming industry. In absence of authentic industry, sector wise consumption data of zinc an apparent consumption data based on production, imports and exports is tabulated and presented in **Table: 6.13.**

Zinc is being traded in various forms covered by different HS codes as already given in **'Supply' Chapter, Annexure: 3 - II (A) & Annexure: 3 - II (B).** All these articles contain zinc in various forms and in some cases zinc is alloyed with other metals, therefore, does not necessarily represent the pure zinc containing 99.99% Zn. Therefore, two articles namely, Zinc not alloyed containing by weight 99.99 % Zn and Zinc not alloyed under HS code 79011100, and 79011200 respectively have been considered for arriving at apparent demand.

Table: 6.13- Apparent Consumption of Zinc, 2004-05 to 2009-10

(In Tonnes)

Year	Estimated Production of Zinc (Inclusive of Secondary production)	Imports	Total Availa-bility	Exports	Apparent Consumption	Percentage Growth/ Fall
1	2	3	2+3=4	5	4-5=6	7
2003-04	276929	111234	388163	24825	363338	
2004-05	263106	129797	392903	17580	375323	(+) 3.3
2005-06	326106	145957	472063	12214	459849	(+)22.5
2006-07	419040	107540	526580	138861	387719	(-)15.7
2007-08	502783	55345	558128	71391	486737	(+)25.5
2008-09	637000	64628	701628	204485	497143	(+) 2.1
2009-10	669772	103473	773245	170842	602403	(+)21.2

It is seen from the table that the apparent production of zinc was 2.76 lakh tonnes in 2003-04 registered an impressive increase of 142% at 6.69 lakh tonnes in 2009-10 easing out the supply position and by eliminating a deficit in

supply from 2003-04 till 2005-06. Now the production has surpassed the apparent demand since 2007-08 and the trend is continuing.

It will also be seen from the **Table: 6.13** that there is a fluctuating trend in imports as well as in exports of zinc.

In the year 2003-04, the imports of zinc were 1.11 lakh tonnes which remained at 1.03 lakh tonnes in spite of the fact that during the same period the apparent production increased from 2.76 lakhs tonnes in 2003-04 to 6.69 lakh tonnes in 2009-10, an increase of 142%. However the average annual growth in imports is 5.10 %. The exports of zinc in 2003-04 was 24 thousand tonnes which rose to1.70 lakh tonnes in 2009-10 registering an impressive increase of 588%, however, the average annual growth is 183%. The overall rise and fall in exports could not be linked with any specific reason hence taken as such for arriving at an Apparent Demand.

The total Apparent Demand in 2009-10 has been estimated at 6.02 lakh tonnes. This has been adopted as base year for forecasting the future demand.

The demand of zinc in the country is lower than the apparent production in 2009-10 hence, there seems to be no problem in supply. As already stated that in absence of authentic industry wise data industry wise internal demand could not be calculated.

As per the CRISIL Research report domestic demand for zinc is likely to remain flat in 2009-10 as production of galvanized sheet is expected to remain more or less same.

6.2.2 Future Demand

A. Demand Forecast Based on CAGR and GDP Growth

The galvanizing is the single largest consumer of zinc to a tune of 57% and along with coating it comes to 73% of the total zinc consumption. The zinc is utilized to galvanize the steel angles, girders, pales, mats, fasteners and sheets. There is a healthy growth in the production of primary zinc as explained in **Supply Chapter** and the availability of recycled zinc or secondary zinc is only 10% of the primary zinc production. The estimated production of primary and secondary zinc comes to 670 thousand tonnes in 2009-10.

In absence of All India capacity of steel galvanizing an apparent consumption in respect of all the consuming industries have been calculated by adding estimated production and imports. The apparent demand of zinc in the country has been arrived at 602 thousand tonnes. On the basis of the CAGR 9.82% calculated on the basis of growth in the last seven years. i.e. from 2004-05 to 2009-10 the future demand beyond 2009-10 till 2024-25 have been calculated. The same is given in **Table: 6.14.**

The GDP growth of 8.2% for 11th Plan has been used to forecast the demand till 2011-12. However, as per the full meeting for 12th Five Year Plan

(2012-17) the estimated GDP growth at 9-9.5% have also been considered and taking into consideration a conservative estimate of 9% to forecast the demand from 2012-13 to 2024-25 as given in **Table: 6.14.**

Table: 6.14- Demand Forecast for Zinc, 2010-11 to 2024-25
(Base Year 2009-10 demand of 602 thousand tonnes)

(In '000 tonnes)

Year	Estimated Demand At CAGR 9.82%	Estimated Demand GDP Growth
2010-11	661	651
2011-12	726	704
2012-13	797	767
2013-14	875	836
2014-15	961	911
2015-16	1055	993
2016-17	1159	1082
2017-18	1273	1179
2018-19	1398	1285
2019-20	1535	1401
2020-21	1686	1527
2021-22	1852	1664
2022-23	2034	1814
2023-24	2234	1977
2024-25	2453	2155

It is seen from the **Table: 6.14** that the demand calculated on the basis of CAGR 9.82% comes to 2.5 million tonnes while considering GDP growth of 9% for 12th Plan the demand comes to about 2.2 million tonnes**.**

B. Demand Projection Based on Sector wise Growth

There is a bright future of increasing zinc consumption in India as well as for exports. The steel production capacities are slated to increase in years to come. It is presumed that a large amount of steel produced will be galvanized to cater to infrastructure including power and telecommunication industries. Galvanizing along with coatings consumes about 73% of the total available zinc hence any rise in capacities of these industries will directly result in the enhanced consumption of zinc.

XI Five Year Plan (2007-2012) proposed to invest in upgrading infrastructure and planned to spend Rs.666525 crores in power sector, Rs.258439 crores in Telecom sector, Rs. 314152 crores in Roads, Rs. 87995 crores in Ports and Rs. 30968 crores in Aviation. All these sectors heavily depend upon the lead & zinc metals along with other metals and materials.

Power transmission towers use galvanized steel structures; Telecom Sector requires communications towers which are made with galvanized steel. The teledensity in India is only 30% which is bound to increase in leaps and bounds. The demand of galvanized steel structures is also linked with this progress. National highway projects are engaged in upgrading present highways by converting them to four lanes drive as well making new world class highways. The guard rails, crash barriers, lighting columns demand galvanized steel, this demand of galvanized steel will further add to the increasing demand for zinc.

New areas such as street lighting poles should be galvanized instead of painting as well other small or big steel structures, should use galvanized steel for increased life of steel. This will create new markets for zinc.

Another peculiar thing with zinc consumption is concerned is that the zinc which is used for galvanizing is lost almost forever, and this amounts to loss of 73% of zinc unlike, lead & copper which are recycled in large quantities. Therefore, only 20% of zinc is recycled and will be available for re-use.

The automobile industry is growing in leaps and bound as already discussed and whole body galvanizing is in vogue to protect the car body against corrosion.

While summing up, in absence of data on all India galvanizing and coating capacities, it is presumed that the future of zinc is bright and there will be increased consumption of zinc both in galvanizing and coating industries as well as other industries. There will be no shortage in supply in the near future.

6.3 FUTURE SUPPLY SCENARIO

6.3.1. Resources

Resources of lead & zinc in the country are mainly located in the state of Rajasthan, which accounted for about 90% of the total resources available at 522580 thousand tonnes as on 1.4.2005.

In terms of metal the total resources of all types of lead are placed at 7207 thousand tonnes and that of zinc are placed at 24260 thousand tonnes. As far as the grade of mined ore is concerned the content of zinc varies from 3.66% to as high as 14.23% while the content of lead varies from 1.40% to 2.95%.

There are four mines of lead & zinc operated by HZL in the state of Rajasthan, namely Rampura-Agucha Mines second largest lead & zinc mine in the world, Sindesar Khurd mine, Rajpura Dariba mine and the Zawar mines. The Rampura Agucha mine is an open cast mine while other three mines are underground mines.

These mines together produced 7.10 million tonnes of lead & zinc ore in 2009-10 to cater to the concentrator and smelters of HZL. There is a marked enhancement in reserves and resource position of HZL at 33.70 million tonnes prior to depletion of 7.10 million tonnes in 2010.

In addition to this Binani Industries Ltd.(BIL) is planning to start commercial productions at its three copper and zinc mines allocated by Gujarat and Rajasthan governments. The mining is to be carried out by RBG minerals Industries, a joint venture company promoted by Rajasthan State Mines & Minerals (RSMM), Gujarat Mineral Development Corporation (GMDC) and Binani Zinc Ltd.

The projects with an overall production capacity of 1 lakh tonnes of copper zinc and lead concentrates. These mines exist in Deri and Basantgarh in Rajasthan and Ambaji in Gujarat. The average grades of ore have been estimated at Zn- 8%, Pb-3% and Copper 1%. The estimated reserves in terms of metal have been placed at 10 million tonnes.

The company will invest Rs. 300 crore to set up a zinc smelter in Rajasthan to utilize the ore produced by these mines.

There is another company namely Ind Synergy Ltd. planning to produce zinc ore of grade ranging between 4.04 to 5.80% Zn to a tune of 6609 tonnes from its mine at Dehri Zinc Deposit in Betul District, M.P. The total reserves estimated at Dehri zinc deposit is 3 lakh tonnes.

6.3.2. Production of Lead & Zinc Ore

The production of lead & zinc ore is from the State of Rajasthan only. The HZL is the sole producer of lead & zinc ores from its mines namely Rampura Agucha Mine, Sindesar, Khurd Mine, Rajpura Dariba Mine and Zawar Mines.

The productions of ore from HZL has seen an unprecedented rise in recent years specially from the year 2004-05 when the production recorded a rise of 8% over 2003-04. Since then there is a continuous increase in production of lead & zinc ores and presently HZL is the one of the top company in the world.

On the basis of CAGR 12.50% calculated on the basis of production of lead & zinc ores from 2000-01 to 2009-10, the lead & zinc ore productions have been forecasted till the year 2024-25. The same is given at **Table: 6.15**.

Table: 6.15- Production of Lead & Zinc Ore, 2010-11 to 2024-25 by applying CAGR of 12.15% (Base Year 2009-10 production of 7.10 million tonnes)

(In million tonnes)

Year	Production
2010-11	7.96
2011-12	8.93
2012-13	10.01
2013-14	11.23
2014-15	12.59
2015-16	14.12
2016-17	15.84
2017-18	17.76
2018-19	19.92
2019-20	22.34
2020-21	25.05
2021-22	28.09
2022-23	31.50
2023-24	35.33
2024-25	39.32

6.3.3 Production of Primary Lead

Presently the production of primary lead is from the only plant at Chanderiya of HZL. The present capacity of the plant is 85,000 tonnes/annum. The production of primary lead during 2000-01 was only 35 thousand tonnes which reached to 72,000 tonnes in 2009-10.

There was an appreciable rise in the production of primary lead from the year 2005-06 at 24 thousand tonnes a rise of 52.12% over 2004-05.

On the basis of production from 2000-01 to 2009-10 a CAGR of 14.62% have been calculated and is applied for the future estimation of production till 2024-25. During 2024-25 the production of lead will reach to a level of 5.6 lakh tonnes. The future production of primary lead metal from 2010-11 to 2024-25 is given in **Table: 6. 16**.

HZL has a plan to set up a lead smelter with a capacity of 1 lakh tonnes at Rajpura Dariba in 2011-12.

Table: 6.16- Production of Primary Lead, 2009-10 to 2024-25 by applying CAGR 14.62%

(Base Year 2009-10 production of 72 thousand tonnes)

(In '000 tonnes)

Year	Production
2010-11	83
2011-12	95
2012-13	109
2013-14	125
2014-15	143
2015-16	164
2016-17	188
2017-18	215
2018-19	246
2019-20	282
2020-21	323
2021-22	370
2022-23	424
2023-24	486
2024-25	557

6.3.4 Production of Primary Zinc

There are two companies namely HZL and Binani zinc involved in the production zinc metal in the country. The HZL produces zinc from the concentrates produced at its own plants while HZL produces zinc from imported concentrates. There is another company namely Indian Lead Limited (ILL) which is yet to commence production.

The total zinc production capacity in the country is 917 thousand tonnes out of this the capacity of HZL is 879 thousand tonnes distributed among four plants at Chanderiya, Debari, Visakhapatnam and Dariba. The production capacity at Binani zinc is 38000 tonnes. The production of primary zinc in 2000-01 was at 178 thousand tonnes which rose to 609 thousand tonnes in 2009-10.

In the year 2005-06 there was a rise in production of primary zinc by 24% at 296 thousand tonnes over the previous year and till 2009-10 there is an appreciable rise every year. The rise in production of primary zinc from 2000-01 to 2009-10 has resulted in a healthy CAGR of 15.13%. On the basis of CAGR 15.13% the production of primary zinc has been arrived at 5 million tonnes in 2024-25, **Table: 6.17.**

Table: 6.17- Production of Primary Zinc, 2009-10 to 2024-25 by applying CAGR 15.13%
(Base Year 2009-10 production of 609 thousand tonnes)

(In '000 tonnes)

Year	Production
2010-11	701
2011-12	807
2012-13	929
2013-14	1,070
2014-15	1,232
2015-16	1,418
2016-17	1,633
2017-18	1,880
2018-19	2,164
2019-20	2,491
2020-21	2,868
2021-22	3,302
2022-23	3,802
2023-24	4,377
2024-25	5,039

6.3.5 Production of Secondary Lead & Zinc

It has already been emphasized in the earlier chapters that the secondary production of lead played a vital role in the overall availability of lead metal for all types of industries and especially for lead acid battery industry. The lead acid battery industry is the single largest user of lead and consumes about 74% of the total consumption.

In case of zinc, it is once again retreated that the single largest use of zinc is in galvanizing of steel with a share of 57% and along with coating the share is 73% in total consumption. The zinc used in galvanizing is almost lost forever as it is very difficult to recover zinc during galvanized steel recycling same is the case of zinc used in brass making. It is viable to make new brass from brass scrap but to recover the metals used in making brass is not viable. The zinc used in die-casting and in other form is recyclable. Therefore, the availability of secondary lead has been considered as 100% of the total primary production while the share of secondary zinc is 10% of the primary production.

a) Lead

The present capacity of lead recycling is about 1 million tonnes which will increase further in view of the more organized recycling industry and impact of Battery management Rule will show its effect on the LAB collection and recycling. Based on the scenario it has been presumed that in secondary lead production there will be a quinquennial increase by 25% as the demand of battery is expected to increase with the increase in automobile sector as well as

power back up industry. All these batteries have a fixed life time, say up to three years, and the spent batteries will come back for recycling which will result in increased production of secondary lead.

Considering the above parameters, the estimated production of lead has been forecast till 2024-25 the same is given in **Table: 6.18.**

Table: 6.18- Estimated Production of Lead, 2010-11 to 2024-25
(Base Year 2009-10 Primary Lead Production 72,000 tonnes)
(In '000 tonnes)

Year	Primary Lead CAGR-14.62%	Estimated Production	Remarks
2010-11	83	166	adding 100% secondary production
2015-16	164	369	adding 125% secondary production
2020-21	323	808	adding 150% secondary production
2024-25	557	1532	adding 175% secondary production

b) Zinc

The recycling capacity of zinc is about 4 lakh tonnes for zinc only and the capacity of zinc recovered along with other metals is 5 lakh tonnes. The availability of secondary zinc has been estimated at 10% of the total primary zinc production. It is presumed that with more organized collection of recyclable zinc and development in the processes of recovery of zinc will be beneficial in increasing availability of secondary zinc. However, as it has already discussed earlier that recycled zinc is more utilized for making brass and is lost in the sense that brass cannot be used neither at places where zinc is required nor it can be utilized for recycling. Hence, with this background the availability of secondary zinc will be with a quinquennial increase of 5%. The apparent production based on above parameters is given in **Table: 6.19.**

Table: 6.19- Estimated Production of Zinc, 2010-11 to 2024-25
(Base Year 2009-10 Primary Zinc Production of 609,000 tonnes)
(In '000 tonnes)

Year	Primary Zinc CAGR-15.13%	Estimated Production	Remarks
2010-11	701	771	adding 10% secondary production
2015-16	1418	1631	adding 15% secondary production
2020-21	2868	3442	adding 20% secondary production
2024-25	5039	6299	adding 25% secondary production

6.4 DEMAND & SUPPLY RELATIONSHIP

a) Lead

The demand of lead from 2010-11 to 2024-25 has been forecast by using various methods/parameters as discussed earlier in the chapter.

The results obtained through analysis of various methods, the demand projections made by using GDP growth of 9% as adopted in the 12th five year plan have been found to represent the demand more realistic hence adopted in this report. Based on the forecast thus made, a brief analysis in respect of demand and supply follows.

The demand in 2015-16 has increased to 375 thousand tonnes against an envisaged production of 328 thousand tonnes leaving a gap of 47 thousand tonnes.

To meet out the gap in near future, say 2010-11 till 2015-16 it is hoped that the commissioning of lead smelter by HZL having a capacity of one lakh tonnes will be in schedule as envisaged by HZL. With the commissioning of HZL's plant there seems to be no shortage of lead in the country. There are new mines coming up in the state of Madhya Pradesh and will contribute in the production of lead. Secondly, the recycling industry is coming up in a big way and with the impact of Battery Management Rules there will be more organised recycling industry which will further ease out the pressure in supply position.

To meet the demand of battery industry some batteries under HS code 85071000 i.e. Lead Acid Accumulators of a Kind used for starting piston Engines and

HS code 85072000 i.e. other Lead Acid Accumulators are being imported as well as exported. The details of imports and exports of such batteries from 2003-04 to 2009-10 is given in **Annexure: 6-II** and **Annexure: 6-III.**

In the scenario beyond 2020-21 till 2024-25 there seems to be no problems as far as supply of lead is concerned. In 2020-21 there will be a estimated production of lead to a tune of 646 thousand tonnes against a demand of 630 thousand tonnes leaving a marginal surplus but in 2024-25 there will be a production of 1114 thousand tonnes against a demand of 816 thousand tonnes with a surplus of 298 thousand tonnes which the country can exports.

b) Zinc

The demand of zinc have been forecast on the basis of apparent consumption of 602 thousand tonnes in 2009-10 as the authentic data on capacities of galvanizing and coatings, the largest consumer of zinc, for sectoral forecasting is not available.

Based on apparent consumption the demand forecast in 2010-11 has been arrived at 651 thousand tonnes against an estimated production of 771 thousand tonnes from primary as well as secondary sources leaving a surplus of 120 thousand tonnes.

The production of zinc is more than the demand and the situation will be continuing till 2024-25 with a demand of 2155 thousand tonnes against a production of 6299 thousand tonnes.

It is thus summarised that that there will be no problem in respect of supply of zinc in near as well as far future. The production is expected from proposed plans of Binani Zinc Ltd. to set up a 38000 tpa zinc production unit in Jodhpur, Rajasthan as well Tamal Metals has also proposed to set up a new zinc metal and alloys unit in Jammu & Kashmir.

Therefore, the country is going to emerge as an important exporter of zinc metal in near future.

Chapter 7. Summary

Lead and zinc, important non ferrous metals, are of utmost importance to the industry since ancient times. Zinc in association with copper makes alloys namely brass and bronzes. Brass look alike gold was sought by the nobles in ancient past and bronze was used to cast statues and other articles as it bears the vagaries of atmosphere better than other metals. Zinc look alike silver has attracted civilizations since ancient times.

Lead and zinc ore occurs together but in its metal state they are having different properties and uses. Zinc is having excellent properties of corrosion resistance whereas electrical properties of lead are unparalleled. In the country zinc is used to an extent of 73% for galvanizing and coating of steel which forms the backbone of infrastructure sector. Lead is mainly consumed up to 74% in making lead acid storage batteries, required by automobile and power back up industries. The industries require these metals in their purest form as per BIS specifications laid down for various industries.

India is endowed with the resources of these metals and the production of ores, concentrates and metals is being done in varying proportions. The occurrences of lead & zinc ore have been reported from a number of states, however, the production of lead & zinc ores is concentrated to only one state namely Rajasthan. In recent past with privatisation of HZL, the production of lead & zinc has increased manifolds.

In case of zinc metal production the country has almost achieved self sufficiency in meeting out the internal demand and excess is exported. The zinc metal production has reached to 609 thousand tonnes in 2009-10 from a level of 178 thousand tonnes in 2000-2001. In case of lead, there is a deficiency in production as compared with the ever increasing demand, though the production has increased from a level of 35 thousand tonnes in 2000-01 to 72 thousand tonnes in 2009-10.

There is a thriving industry of recycling of these metals especially lead which is contributing equally to the total production, still India imported sizeable quantities of refined lead to a tune of 110 thousand tonnes in 2009-10 along with other items of lead metal to meet out the domestic demand.

India's exports of zinc were mainly in the form of ores & concentrate and zinc (not alloyed) with 99.99% Zn purity. During 2009-10 the exports of ore & concentrate were 192 thousand tonnes, increased by 117% as compared to 2008-09 at 88 thousand tonnes. The exports of zinc (not alloyed), with 99.99% purity were to the tune of 1.56 lakh tonnes. The exports were solely to China.

In the case of lead, India partially depends on imports. The imports were in the form of refined lead, lead & alloys and lead scrap. The imports of refined lead were 110 thousand tonnes in 2009-10 as against 103 thousand tonnes in 2008-09. There was a marked increase of 60% in imports of lead scrap in 2009-10 at 40 thousand tonnes as against 25 thousand tonnes in 2008-09.

There are number of industries based on lead and zinc in the country. In case of zinc, the increased production from HZL, after privatization, has tremendously enhanced the availability of zinc in the country. The availability of zinc from scrap recycling further improved the situation. Against an estimated production of 670 thousand tonnes in 2009-10 of zinc metal, there was an apparent consumption of 602 thousand tonnes. The total demand of zinc based on GDP growth of 9% in 2024-25 has been estimated at 2155 thousand tonnes against a projected production of 6299 thousand tonnes. It is expected that as at present the domestic demand will be comfortably met in future. There are plans of new plants to be set up in future to further enhance the zinc capacity in the country.

The forecast in respect of slab zinc consumption in world have been arrived by calculating the compounded annual growth rate of slab zinc consumption from the year 2001 to 2010 in respect of World, Europe, America, Africa, Asia and Oceania. It has been observed that the average growth of slab zinc consumption in the world is 3.91% while area-wise growth rates are negative in Europe, Africa, America and Oceania. The growth rate in Asia is on the positive side and there is a healthy growth rate of 8.94%.

The World Bank projected a GDP growth of 3.3% in 2010 and 2011 while in 2012 the forecast is 3.5% from a level of negative growth of (-) 2.1% in 2009.

On the basis of these growth rates the consumption of slab zinc in the World has been arrived at 22 million tonnes (CAGR 3.91%) in respect of entire World.

The situation in lead availability is still a matter of concern as the production of primary lead is far below than the internal demand. However, with the enactment of Battery Management Rules 2001 the lead recycling industry has come up in a big way contributing equal quantity of recycled lead to the total primary lead production. Against an estimated production of 144 thousand tonnes in 2009-10 of lead there was a demand of 227 thousand tonnes. The country has to depend upon imports for meeting out its demand and imports were 110 thousand tonnes during the period.

In case of lead the total demand forecast in 2010-11 is 246 thousand tonnes against a production of 166 thousand tonnes leaving a gap of 80 thousand tonnes. The present production capacity of the only primary producer of lead HZL is 85,000 tonnes. HZL has plans to produce additional 100 thousand tonnes of lead in coming year with the commissioning of a lead smelter in Dariba, Rajasthan. In addition to the primary production, there is an equal production of secondary lead, presently. However, in 2024-25 the demand of lead has been forecast on the basis of GDP growth of 9% at 816 thousand tonnes against a production of 1114 thousand tonnes. The production from HZL and secondary producers as well as BZL are expected to fulfill the demand of lead in near future, till then the country has to rely on the imports of lead metal. As an alternate arrangement in future the avenues for producing primary lead from imported lead concentrates should be explored as already being done in case of copper.

The forecast in respect of Lead consumption in world have been arrived by calculating the compounded annual growth rate of refined lead consumption from the

year 2001 to 2010 in respect of World, Europe, America, Africa, Asia and Oceania. It has been observed that the average growth of refined lead consumption in the world is 4.04% while area-wise growth rates are negative in Europe, Africa, America and Oceania. The growth rate of consumption in Asia is on the positive side and there is a healthy growth rate of 11.49%.

The World Bank projected a GDP growth of 3.3% in 2010 and 2011 while in 2012 the forecast is 3.5% from a level of negative growth of (-) 2.1% in 2009.

On the basis of these growth rates the consumption of refined lead in the World has been arrived at 17 million tonnes (CAGR 4.04%) in respect of entire World.

Worldwide, lead & zinc are being produced in a number of countries. China is the leading country in the mine production as well as metal production of lead & zinc. There is a thriving trade of these metals in various forms throughout the world. In case of zinc, Canada was the leading exporter of slab zinc. Out of total world exports of 3798 thousand tonnes, its contribution in 2009 to the total world's exports was 16% at 592 thousand tonnes. The USA was the leading importer with 686 thousand tonnes of slab zinc in 2009 contributing 19% to the total world's imports of 3660 thousand tonnes. In refined lead scenario Australia's exports were maximum at 247 thousand tonnes in 2009 with a contribution of 15% to the total world's exports of 1669 thousand tonnes. The USA was the leading importer of refined lead to a tune of 251 thousand tonnes during the same year with 15% contribution to the world's import of 1734 thousand tonnes.

The prices of lead and zinc are based on the prices quoted at the LME. In the past there were wide fluctuations in prices of lead as well as zinc. The LME prices of lead were highest at $ 3980 per tonne in 2007 while the lowest prices were quoted at $ 254 per tonne in 1993. The LME prices of zinc were highest at $ 4620 per tonne in 2006 while the lowest prices were quoted at $ 726 per tonne in 2002.

Annexure: 3 – I

GUIDE LINES FOR NONFERROUS SCRAP, 2009, INSTITUTE OF SCRAP RECYCLING INDUSTRIES INC. (ISRI) (FOR LEAD)

RACK

Scrap-Lead-Soft shall consist of clean soft scrap lead, free of other material such as dresses, battery plates, lead covered cable hard lead, collapsible tubes, foil, type metals, aluminium, zinc, iron and brass fittings, dirty chemical lead and radioactive materials. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

RADIO

Mixed Hard/Soft Scrap lead shall consist of clean lead solids, free of other materials, such as drosses, battery plates, lead covered cable, collapsible tubes, type metals, aluminium, zinc, iron and brass fittings, dirty chemical lead and radioactive materials. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

RAILS

Lead Battery Plates specify whether automotive industrial or mixed. Also whether they are groups or loose. The only other metallic that might be included could be lead connectors. To be free of non-metallic, i.e. plastic or rubber, with the exception that separators may be included. Material to be dry. May be bought on an assay basis or a flat price. Submarine plates subject to negotiation. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

RAINS

Scrap Drained/Dry Whole Intact lead to be free of any liquid. Cases to be either plastic or rubber and be complete include caps. Non-lead (ni-cad, ni-fe, carbonaire, etc.) not acceptable. Industrial steel cased aircraft (aluminium cased) and partial, cracked or broken batteries and batteries without caps subject to special agreement. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

RAKES

Battery lugs to be free of scrap lead, wheel weights, battery plates, rubber and/or plastic case material and other foreign material. A minimum of 97% metallic content is required. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

Contd....

RELAY

Lead Covered Copper Cable free of armored covered cable and foreign material.

RENTS

Lead Dross **s**hould be clean and reasonable free of other materials such as iron, dirt harmful chemicals of other metals. To be free of radioactive materials, alminium and zinc. May be bought on an assay basis or as agreed to by buyer and seller. Other metals present such as antimony, tin, etc. to be accounted for as agreed between buyer and seller. Material to be readily dumped from drums. An extra charge may be assessed if material has to be mechanically removed. Review packaging specification and regulatory status pertaining to shipping with buyer prior to sale.

RINK

Scrap Wet Whole Intact Lead Batteries consisting of SLI (Starting, lighting & ignition), automotive, truck, 8-D and commercial golf cart and marine-type batteries. Cases to be either plastic or rubber and to be complete. Non-lead (i.e ni-cad, ni-fe, carbonaire, etc.) not acceptable. Other types i.e. aircraft(aluminium) gel-cel, lawnmower etc. and partial, cracked or broken batteries or batteries without caps and the amount of liquid content and any variations to be specifications subject to special agreement. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

RONO

Scrap Industrial Intact Lead Cells consisting of plates enclosed by some from of complete plastic case. Partial, cracked or broken cells, cells without caps and the amount of liquid content and any variations to the specifications subject to special agreement. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

ROPER

Scrap Whole Intact Industrial Lead Batteries consisting of bus, diesel, locomotive, telephone and/or steel cased batteries. Submarine batteries subject to negotiation. Partial, cracked, broken batteries or batteries without caps and the amount of liquid content and any variations to the specifications subject to special agreement. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

ROPES

Wheel Weights to consist of lead tire balances with or without iron clips. Not to include scrap lead, lugs or plates unless specifically agreed to. To be free of foreign material. Review packaging specifications and regulatory status pertaining to shipping with buyer prior to sale.

Contd....

Annexure: 3 - II

H S CODES OF LEAD AND OTHER ITEMS

S. No.	H S Code	Commodity
1.	26070000	LEAD ORES & CONCENTRATES
2.	78011000	REFINED LEAD
3.	78019910	PIG LEAD
4.	78019920	UNREFINED LEAD,N.E.S.
5.	78020010	LEAD SCRAP COVERED BY ISRI CODE RACKS, RADIO,RELAY,ROPES,ROSES
6.	78020090	OTHER LEAD SCRAP
7.	78030011	HOLLOW BARS OF LEAD
8.	78030019	OTHER BARS OF LEAD
9.	78030029	OTHER PROFILES OF LEAD
10.	78030030	LEAD WIRE
11.	78041110	SHEETS & STRIP OF LEAD
12.	78041120	LEAD FOIL
13.	78041910	LEAD PLATES
14.	78041990	OTHER SHEETS, STRIP & FOIL OF THICKNS (EXCL ANY BACKING) EXCDNG 0.2MM
15.	78042000	LEAD POWDERS & FLAKES
16.	78050010	LEAD TUBES AND PIPES

Contd....

Annexure: 3 – III (A)

LIST OF THE LEAD WASTE RE-PROCESSOR UNITS REGISTERED WITH MOEF/CPCB AS RECYCLERS/REPROCESSORS HAVING ENVIRONMENTALLY SOUND MANAGEMENT FACILITIES
As on: 13th May, 2010

Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
I	**ANDHRA PRADESH**		
1.	Anantha Lead Private Limited, 148-150, IE Medchal, RR District Andhra Pradesh – 501 401.	1000	Lead Acid Battery Plates or Lead Scrap only
2.	Aman Industries, Plot No.47, Phase I & II, Indira Autonagar, Guntur, Andhra Pradesh – 522 001.	700	Lead Acid Battery Plates Lead Scrap/Ashes/ Residues only
3.	Nile Limited, Survey No. 556, Panthagani(Village), Choutuppal(Mandal), Nalgonda Distt. Andhra Pradesh – 508 242	9600	Lead Acid Battery Plates and other lead bearing Lead Scrap
4.	Powertrek Industries, No.16, Phase-III, Autonagar, Guntur – 522 001. Andhra Pradesh	2000	Lead Acid Battery Plates and other Lead bearing Scrap only
5.	HBL Nife Power System Ltd. Sr.No.64-67 & 77-81, Nandigaon(V), Kothur (M), Mehboob Nagar, Dist. - 509 223, Andhra Pradesh	12000	Lead Acid Battery Plates and other Lead Scrap/Ashes/Residues
6.	HBL Power Systems Ltd. Survey No. 123-126,138 (P)-1444(P), Kandivalasa Village, Pusapati Rega Mandal, Vizianagram district, Andhra Pradesh – 509 382	11000	Lead Acid Battery Plates and other Lead Scrap/Ashes/Residues
8.	Shree Ram Battery Industries Survey No.339 A, Boothpur, Boothpur Mandal, Distt. Mahabub Nagar Andhra Pradesh- 535 204	3600	Lead Acid Battery Plates and other Lead Scrap/Ashes/Residues only

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
9.	Nile Limited, Plot No.38 & 40, (Sy.No.1206,1209 & 1248/2), A.P.I.I.C. Industrial Park Gagulmandyam(Village), Renigunta(Mandal), Chittor (district) Andhra Pradesh	10000 14420	Lead Acid Battery Plates Lead Scrap
10.	Powertrek Industries (Unit-II), Block No.19, Phase-IV, Auto Nagar, Guntur -522 001, Andhra Pradesh	5000	Lead Acid Battery Plates and Lead Scrap
11.	Supreme Batteries (P) Ltd., Sy.No. 76/A & 76/B, Raikal Village, Shadnagar Mandal, Mahaboob Nagar District, Andhra Pradesh	5000	Lead Acid Battery Plates, Lead Scrap/Ashes/ Residues
12.	Gochem Metals & Alloys 384//13/1,Bonthugutta, Chintapally(Vill)., Miryalguda(Mandal), Nalgonda, Dist. Andhra Pradesh	2400	Lead Acid Battery Plates or Lead Scrap/Ashes/Residues
	Total	**58320**	
II	**ASSAM**		
1.	Royal Industreis, 15th Mile, Village-Burni, P.O.Jorabat, Distt.Kamrup – 793 101, Assam	900	Lead Acid Battery Plates and Lead Scrap
2.	Nirmaan Industries, D-7, DICC Campus, Numalijalah, P.S.L.Amingao, Guwahati, dist. Kamrup, Assam	1200	Lead Acid Battery Plates and Lead Scrap
	Total	**2100**	
III	**CHHATTISGARH**		
1.	Power Pack Industries, 32/D-Light Industrial Area, Bhilai, Dist.-Durg, Chhattisgarh	1000	Lead Acid Battery Plates and Lead Scrap
2.	Shreyansh Industries, 14-A, Light Industrial Area, Bhilai, Dist. Durg,Chhattisgarh	1200	Lead Acid Battery Plates and Lead Scrap

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
3.	Vinay Industries, 45-B, Industrial Area, Korba, Chhattisgarh	240	Lead Acid Battery Plates/ Lead Scrap
4.	R. K. Industries, Ring Road No.2, Gondwara, Raipur, Chhattisgarh	300	Lead Acid Battery Plates/ Lead Scrap
5.	Accumulator Industries, Bhanpur Industrial Area, Raipur. Chhattisgarh	568	Lead Acid Battery Plates/ Lead Scrap
	Total	**3308**	
IV	**GUJARAT**		
1.	Ravi Metals, Plot No.1505, GIDC Sarigam, Dist. Valsad,Gujarat	480	Lead Acid Battery Plates and Lead Scrap
2.	Rajkot Industries, Near Shri Bavishi Weigh Bridge, Aji GIDC Main Road, Plot No. 0379-A,Rajkot-360 003, Gujarat.	4800	Lead Acid Battery Plates/ Lead Scrap
3.	Gold Star Battery Pvt. Ltd. Behind Ravi Petrol Pump, Rajkot Road,Hapa- 361 120, Dist. Jamnagar, Gujarat.	6300	Lead Acid Battery Plates and Lead Scrap
4.	Blaze Metal Works, Plot No. 20, Maha Gujarat Industrial Estate, Sarkhej Bavla Road , Moraiya, Ahmedabad , Gujarat.	1560	Lead Acid Battery Plates and Lead Scrap
5.	S. K. Metal Industries, Survey No. 206 ,Plot No. 1, Veraval Rajkot Gondal Highway, Rajkot, Gujarat.	3300	Lead Acid Battery Plates and Lead Scrap
6.	Vishal Alloys , Plot No. 1902, Phase-II, GIDC Chhatral, Dist. Gandhinagar, Gujarat.	600	Lead Acid Battery Plates and Lead Scrap
7.	Sabnam Enterprise, Plot No. 87 GIDC, Anjar, Kutch– 370 110,Gujarat	1800	Lead Acid Battery Plates/ Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
8.	Sitaram Metals, Kadvani Forging Street, Opp. Kisan Auto Ltd. Plot No., G/1338, Gate No. 3, GIDC Metoda, Tq.Lodhika, Dist.Rajkot, Gujarat.	2050	Lead Acid Battery Plates/ Lead Scrap
9.	Kaycee Industries, 1649/1-2,GIDC, Sarigam, Dist.Valsad- 39 6115, Gujarat.	2400	Lead Acid Battery Plates and Lead Scrap
10.	Global Associates , Plot No.3001, GIDC Estate , Panoli -394 116, Distt. Bharuch, Gujarat.	1200	Lead Acid Battery Plates and Lead Scrap
11.	Bharat Metal Oxide, 171/A, Mahagujarat Industrial Estate , Sarkhej-Bavla Road, Moraiya , Distt. Ahmedabad , Gujarat.	1680	Lead Acid Battery Plates and Lead Scrap
12.	Mateshwari Metals, Plot No.56 to 62, Block No.501, Jay Maa Ji Indl.Estate, Village-Olpad, Distt.Surat, Gujarat.	5000	Lead Acid Battery Plates and Lead Scrap
13.	Harsan Enterprise, Survey No.59, Plot No.46, Village - Mamsa, Taluka -Ghogha Distt. Bhavnagar, Gujarat.	1200	Lead Acid Battery Plates and Lead Scrap
14.	Mez Alloys Pvt.Ltd., Plot No.C-1B/714, GIDC Estate, Sarigam, Distt.-Valsad, Gujarat – 396155.	5000	Lead Acid Battery Plates/lead Ash/ Lead Residues
	Total	**37370**	
V	**HARYANA**		
1.	Om Enterprises, B-9 Prem Colony, Kundli, Distt. Sonepat, Haryana-131 028.	3000	Lead Acid Battery Plates/ Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
2.	Shivam Metal Works, Near Gas Godown, Sadhaura Road, Barara, Dist. Ambala, Haryana.	900	Lead Acid Battery Plates/ Lead Scrap
3.	Guru Nanak Enterprises, Singhpura Road, Rohtak, Haryana.	1400	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residue
4.	Shri Guru Nanak Auto Industries Corporation, 169- IDC, Hissar Road, Rohtak, Haryana.	1400	Lead Acid Battery Plates/ Lead Scrap
5.	Relsons Engineers, 2 K.M. -Kurukshetra Road, Kaithal – 136027, Haryana.	900	Lead Acid Battery Plates and Lead Scrap
6.	Ace Metals, Village-Kahanaur, Tehsil & Dist. Rohtak, Haryana.	1800	Lead Acid Battery Plates/ Lead Scrap
7.	Krishna Industries, Plot No. 58 & 58/1 MIE, Bahadurgarh, Dist. Jhajjar, Haryana.	5000	Lead Acid Battery Plates/ Lead Scrap
8.	Onkar Metal Industries, Beri Road, Village-Baland Dist. Rohtak, Haryana.	1200	Lead Acid Battery Plates/ Lead Scrap
9.	Master Metal , Village-Baland, Tehsil & Dist. Rohtak, Haryana.	180	Lead Acid Battery Plates/Lead Scrap
10.	Shri Balaji Enterprises, Village Baland, Tehsil & Dist. Rohtak, Haryana.	165	Lead Acid Battery Plates/ and Lead Scrap
11.	Versatile Metals, Near Baba Budha Mandir, Village-Asoudh, Tehsil-Bahadurgarh, Dist. Jhajjar, Haryana.	1200	Lead Acid Battery Plates/ Lead Scrap
12.	Sonu Metal, Village-Baland, Tehsil & Dist. Rohtak, Haryana.	1080	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
13.	Baba Metal Company, Beri Road, Village-Baland, Dist. Rohtak, Haryana.	1200	Lead Acid Battery Plates and Lead Scrap
14.	Karam Yogi Refinery, Beri Road Village-Baland, Dist. Rohtak, Haryana.	1200	Lead Acid Battery Plates/ Lead Scrap
15.	Deep Metal, Village-Baland, Tehsil & Dist. Rohtak, Haryana.	1080	Lead Acid Battery Plates/ Lead Scrap
16.	Sumit Metals, Nizampur Road,Village-Parnala Bahadurgarh, Distt.Jhajjar Haryana.	1000	Lead Acid Battery Plates and Lead Scrap
17.	S.R.Metals, Nizampur Road, Village-Parnala, Bahadurgarh-124 507 Distt.Jhajjar, Haryana.	1800	Lead Acid Battery Plates and Lead Scrap
18.	Durga Metals Industry, Sunarian Road,Village-Baland, Distt.Rohtak, Haryana.	900	Lead Acid Battery Plates and Lead Scrap
19.	Hema Metal, Village-Jamalpur, Tehsil- Tohana, Distt.Fatehabad, Haryana.	600	Lead Acid Battery Plates and Lead Scrap
20.	Chetna Enterprises, Plot No.119, IDC, Hisar Road, Distt. Rohtak, Haryana.	2400	Lead Acid Battery Plates and Lead Scrap
21.	Arora Enterprises, Plot No.2324, IDC, Hisar Road, Distt. Rohtak, Haryana.	2250	Lead Acid Battery Plates and Lead Scrap
22.	Baweja Industries, Plot No.29. IDC, Hisar Road, Distt.Rohtak, Haryana.	2400	Lead Acid Battery Plates and Lead Scrap
23.	Bhagwati Industries, Plot No.126, Sector-27-28, Indl. Area Hissar, Hissar -125 001, Haryana.	10200	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residues

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
24.	Ridhi Sidhi Dhoop & Metal Industries, 21, Industrial Area, HSIDC, Jind – 126 102, Haryana.	1200	Lead Acid Battery Plates and Lead Scrap
25.	Shree Gopala Metals, Plot No.37, I.D.C, Hisar, Haryana.	3000	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residues
26.	Varun Enterprises(India), Prem Colony, Aggarwal Industrial Area, Narela Road, Kundli, Sonepat, Haryana.	5000	Lead Acid Battery Plates and Lead Scrap
27.	Brown Industries, Village – Khairpur, Tehsil –Bahadurgarh, Distt. Jhajjar, Haryana.	5000	Lead Acid Battery Plates and Lead Scrap
28.	Guru Jyot Metal, Plot No.34-35, HSIDC Industrial Area, Distt. Jind, Haryana.	300	Lead Acid Battery Plates and Lead Scrap
	Total	**57755**	
VI	**HIMACHAL PRADESH**		
1.	Ekta Enterprises, Plot No.43, Industrial Area, Trilokpur Road, Kala Amb, Distt.Sirmour, Himachal Pradesh.	5000	Lead Acid Battery Plates/ Lead Scrap
2.	Himachal Forgings, Village Buranwala, Tehsil Kasauli, District Solan, Himachal Pradesh.	20100	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residues
	Total	**25100**	
VII	**JAMMU & KASHMIR**		
1.	Bhawani Wire & Cable, Lane No. 3, Phase-I, SIDCO Complex, Bari Brahmana, Jammu-181 133, J&K.	5000	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
2.	Metal Inc., Plot No.25, SICOP Industrial Area, Kathua (J&K), Jammu.	3460	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residue
3.	Bharat Udyog, SICOP Industrial Area, Kathua ,(J&K), Jammu.	4500	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residue
4.	Jammu Pigments Pvt. Ltd., Logate More, Village Logate, Tehsil & Dist. Kathua, (J &K).	5000	Lead Acid Battery Plates, Lead Scrap, Lead Ash and Lead Residue
5.	D. M. Alloys Industries, SIDCO Industrial Complex Phase-I, I.G. C. Samba, (J &K).	5000	Lead Acid Battery Plates/Lead Scrap
6.	Akal Metal Works, Plot No.24-A, Phase-III, 9/A, Industrial Estate, Gangyal, J & K.	5000	Lead Acid Battery Plates and Lead Scrap
7.	Met Trade India Ltd., 152, SICOP Industrial Area, Kathua, (J&K).	44700	Lead Acid Battery Plates, Lead Scrap (covered under ISRI Code as per Schedule IV), Lead Ash and Lead Residue.
8.	Radha Industries, I I D Center, Battal Ballian, Udhampur, (J&K).	1800	Lead Acid Battery Plates and Lead Scrap
9.	Shankit Metal Works, SIDCO Industrial Complex, IGC, Samba, Jammu, (J&K).	500	Lead Acid Battery Plates and Lead Scrap
	Total	**74960**	
VIII	**KARNATAKA**		
1.	Bhawani Industries, No. 362, 7th Main, 10th Cross, Peenya Industrial Area,Bangalore, Karnataka.	100	Lead Acid Battery Plates/Lead Scrap/ashes/Residues
2.	Sri Saraswathi Industries, Shed B-40,Veerasandara Indl.Estate, Hosur Road, Anekal Taluk, Bangalore, Karnataka.	3200	Lead Acid Battery Plates and other Lead Scrap/ashes/residues

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
3.	Eswari Metal Industries, Plot No. 101/A, Baikampady Indl. Area, Mangalore-575 001, Karanataka.	4230	Lead Acid Battery Plates/Lead Scrap
4.	Mekala Metal Works Pvt. Ltd., B-152, Peenya Industrial Estate, IInd Stage, Bangalore-560 058, Karnataka.	3000	Lead Acid Battery Plates or Lead Scrap
5.	Maharanjani Metal Mart, Plot No. 81, 3rd Cross Malur, 2nd Phase, Malur Indl. Area, Kolar-563130, Karnataka.	5000	Lead Acid Battery Plates/Lead Scrap
6.	Leadage Alloys India Ltd., No. 60/2, Seethanayakanahalli, Malur Taluk, Kolar Dist. -563 130, Karnataka.	24000	Lead acid Battery plates and other lead scrap/ ashes/ residues
7.	B.T. Soldiers Pvt. Ltd., 89, KRS Road, Metagalli, Mysore – 560 058, Karnataka.	400	Lead Scrap
8.	Sri Ponni Industries, Plot No. 24, 4th Phase, Bommasandra Industrial Area, Anekal (Taluk), Bangalore- 560 099, Karnataka.	5000	Lead Acid Battery Plates and Lead Scrap and other Lead Scrap/Ashes/ Residues
9.	Ananda Metal Corporation, C-81, III Stage, Peenya Indl. Estate, Bangalore – 560 058, Karnataka.	1500	Lead Acid Battery Plates and Lead Scrap
10.	Mahaveera Metal Works, NH-13, Baradi Cross Road, Post Kanthavara-574 129, Karkala Tq., Udipi Dist., Karnataka.	360	Lead Acid Battery Plates and Lead Scrap
11.	G. N. Industries, 490/D, 4th Phase, Peenya Industrial Area, Bangalore-560 058, Karnataka.	1200	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
12.	Sapthagiri Metal Refinery, Plot No. 37, Kallur Mandli Indl. Area, Shimoga, Karnataka.	850	Lead Acid Battery Plates/Lead Scrap
13.	Eswari Metal Industries (Unit-II), Plot No. 96 & 97, Baikampady Industrial Area, Mangalore – 575 001 Karnataka.	5000	Lead Acid Battery Plates and Lead Scrap
14.	A.R. Industries, Sankalpur Industrial Area Plot No. C.A. Part-3 Bellary Road, Hospet, Karnataka.	720	Lead Battery Plates Lead Scrap and other lead bearing waste
15.	Balaji Smelters and Alloys, Sy. No. 138/P9, Hulimangala,Hoskote, Village Lakkur Hobli, Malur (TK), Kolar District Karnatka.	3600	Lead Acid Battery Plates
16.	Evershine Smelting Alloys Pvt. Ltd., 15-C Zone No.2, Attibele Industrial Area Bangalore, Karnataka-562 107	3200	Lead Acid Battery Plates and other Lead Scrap/Ashes/ Residues
17.	Jayvel Enterprise, Plot No.26-A, KIADB Industrial Area, Malur Kolar, Karnataka.	6000	Lead Acid Battery Plates and other Lead Scrap/Ashes/ Residues
18.	Selvam Metals & Alloys, Plot No.37, 2nd KIADB Industrial Area Malur, Kolar Distt. -563 130, Karnataka.	2400	Lead Acid Battery Plates and other Lead Scrap/Ashes/ Residues
19.	Om Shiva Shakthi Metal Industries, No.B-196, II Stage, Peenya Industrial Estate, Bangalore-58, Karnataka.	480	Lead Acid Battery Plates and other Lead Scrap/Ashes/ Residues

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
20.	Sandeep Lead Alloys(India) Pvt.Ltd. Plot No.19, KIADB Industrial Area, 1st Phase, Malur -563 130, Kolar Distt.,Karnataka.	18000	Lead Acid Battery Plates and other Lead Scrap/Ashes/ Residues
21.	Veeranarayana Metal Alloys Pvt. Ltd., Survey No.81/2, Bhadrapura, Lakkenahalli Village & Post Kunigal Road, Solur Hobli, Magadi Taluk, Ramanagara, District – 561101, Karnataka.	18000	Lead Acid Battery Plates/Lead Scrap only
	Total	**106240**	
IX	**KERALA**		
1	Perfect Alloys, IDP No. 16, Mundancavu, Chenganpur-689 121, Kerala.	1650	Lead Acid Battery Plates and Lead Scrap only
2.	Peejaye Enterprises, Kuttoor ,P.O Thiruvalla-689106, Kerala.	1800	Lead Acid Battery Plates and Lead Scrap only
3.	A.S.I Refinery, 11-527, Mambra, Pirayiri Village, Kodunthirappully, P.O Palakkad-4 Kerala.	250	Lead Acid Battery Plates and other Lead Scrap/ashes/Residues
	Total	**3700**	
X	**MADHYA PRADESH**		
1.	Manoj Industries, Plot No. 15 16-D Sector-6, Sanwar Road, Industrial Estate, Indore, Madhya Pradesh.	720	Lead Acid Battery Plates/ and Lead Scrap
2.	M.S. Metals, Plot No. 300, Sector-F Industrial Estate, Sanwar Road, Indore, Madhya Pradesh.	3600	Lead Acid Battery Plates and Lead Scrap
3.	Ganpati Metals, Survery No. 308, Vyas Khedi Road, (Opp. to Ashram) Mangliya, Near A. B. Road, Indore, Madhya Pradesh.	5400	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
4.	EM-ES Battery & Allied Products (P) Ltd. , A-42 Indl. Area Mandideep, Dist. Raisen, Madhya Pradesh.	600	Lead Acid Battery Plates and Lead Scrap
5.	A.K. Industries, A.B. Road Purani Chawani Gwalior, Madhya Pradesh.	600	Lead Acid Battery Plates/Lead Scrap
6.	A.M. Industries 96-B Sector F Sanwar Road Indore – 452 015, Madhya Pradesh.	2000	Lead Acid Battery Plates/Lead Scrap
7.	Piyush Metal Industries, Plot No. 30(Part) Baraghatta, Industrial Area, Jhansi Road, Gwalior Madhya Pradesh.	900	Lead Acid Battery Plates/Lead Scrap
8.	Priti Industries, 95/A 96/C Sector – F, Sanwar Road, Industrial Area,Indore – 452 015, Madhya Pradesh.	3600	Lead Acid Battery Plates/Lead Scrap
9.	Hemal Industries, 299 , Sector – F, Sanwar Road, Industrial Area, Indore – 452 015, Madhya Pradesh.	3000	Lead Acid Battery Plates/Lead Scrap
10.	Metachem Industries, 16/17, Industrial Growth Centre, Maneri, Distt.Mandla, Madhya Pradesh.	1200	Lead Acid Battery Plates and Lead Scrap
11.	Shanti Industries, Plot No. 5 II Phase, Baraghatta, Industrial Area, Jhansi,Gwalior Madhya Pradesh.	600	Lead Acid Battery Plates and Lead Scrap
12.	Vijay Metal Industries, Plot No.5, Near Power House, Baraghata Industrial Estate, Jhansi Road, Gwalior, Madhya Pradesh.	860	Lead Acid Battery Plates and Lead Scrap
13.	Electro Batteries, Plot No.E-16B/E, 17-A, Sector-C, Industrial Area, Sanwar Road, Indore - 452 015, Madhya Pradesh.	1200	Lead Acid Battery Plates/ Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
14.	Shri Maa Narmada Metal, Plot No.127, Industrial Area, Rachhai, Jabalpur, Madhya Pradesh.	1600	Lead Acid Battery Plates and Lead Scrap
15.	Kanti Metal Industries Plot No.2, Industrial Area, Katni, Madhya Pradesh.	600	Lead Acid Battery Plates /Lead Scrap
16.	Shivam Industries, Village – Morgongri, Tehsil-Pandhurna, District-Chhindwara - 480 334, Madhya Pradesh.	900	Lead Acid Battery Plates/Lead Scrap
17.	Pradeep Metal Industry, Industrial Area, Main Road, Richhai, Jabalpur, Madhya Pradesh.	335	Lead Acid Battery Plates and Lead Scrap
18.	Shivalik Vyapar Pvt.Ltd., Khasra No.69/1/1, 69/1/2 Gram Panchderia,Sanwar Road, Indore - 452 003, Madhya Pradesh.	5000	Lead Acid Battery Plates/Lead Scrap
19.	Mahamaya Batteries, E-32, Sector-C, Sanwar Road Industrial Estate, Indore, Madhya Pradesh - 452 015.	3600	Lead Acid Battery Plates and Lead Scrap
20.	Neha Industries, Plot No.327-328, Sector – F Sanwar Road, Industrial Area, Indore ,Madhya Pradesh.	6000	Lead Acid Battery Plates and Lead Scrap
21.	Noble Industries, 296 B, Sector – F, Industrial Estate, Sanwar Road, Indore, Madhya Pradesh.	3000	Lead Acid Battery Plates and Lead Scrap
22.	A.P. Metal Industries, 42, Industrial State, Richai Distt. Jabalpur, Madhya Pradesh.	1200	Lead Acid Battery Plates/Lead Scrap
23.	Aggarwal Metal Industries, Plot No. 251/A, Sector-E Industrial Area, Sanwar Road, Indore - 452 015, Madhya Pradesh.	2000	Lead Acid Battery Plates/Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
24.	Krishna Iron & Metal Industries, Plot No.19, Baraghat, Industrial Area, Jhansi Road, Gwalior, Madhya Pradesh.	1000	Lead Acid Battery Plates/Lead Scrap
25.	Krishna Metal Agency, Plot No.158B, Industrial Area, Sector-F, Sanwar Road, Indore, Madhya Pradesh.	1800	Lead Acid Battery Plates/Lead Scrap
26.	Gwalior Metal Industries, Shankarpur, Transport Nagar, Gwalior, Madhya Pradesh.	1800	Lead Acid Battery
27.	Paliwal Metals, 235-B/236, Sector-F, Sanwar Road Industrial Area, Indore ,Madhya Pradesh.	4200	Lead Acid Battery Plates/Lead Scrap
28.	Aman Enterprises, Plot No.A-10, Sector-E, Industrial Area, Sanwar Road, Indore, Madhya Pradesh.	7200	Lead Acid Battery Plates/Lead Scrap
29.	Varun Enterprises, 290-B, Sector-E, Sanwer Road, Industrial Area, Indore, Madhya Pradesh.	10800	Lead Acid Battery Plates/Lead Scrap o
	Total	**75315**	
XI	**MAHARASHTRA**		
1.	Pooja Pigments, Khasra No.100, Behind Kalamna Kamptee Octroi, Kalamna, Nagpur, Maharashtra.	2100	Lead Acid Battery Plates and Lead Scrap
2.	Hans Enterprises, 1 Meera Golani Complex, Opp. Vasai Vajreshwari Road, Vasai (East), Dist. Thane, Maharashtra - 401 208.	1800	Lead Acid Battery Plates and Lead Scrap
3.	N.V. Metals and Alloys, Plot No. 310, Near Shri Hari Fabric, Village- Umroli, Taluka Palghar, (Palghar Boisar Road), Dist. Thane - 401 404, Maharashtra.	600	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
4.	Saurabh Metal Refinery, Gat No. 143 Plot No. B/4, At. Sapronda, P.O. Kudus, Tal. Wada, Dist. Thane, Maharashtra.	440	Lead Acid Battery Plates and Lead Scrap
5.	Swastik Industries, Plot No. 27 S.N. 161/1, Sahkari Audyogik Vasahat Maryadit Bhusaval, Maharashtra.	1160	Lead Acid Battery Plates and Lead Scrap
6.	MRJS Lead Pvt. Ltd., Gat No. 72, Village Dhanore, Behind PCS Industries Ltd. Alandi-Markal Road, Tal. Khed, Distt. Pune-412 105. Maharashtra.	1500	Lead Acid Battery Plates and Lead Scrap
7.	Nayan Metal Pvt. Ltd., D-6 MIDC, Lote Parshuram, Tal. Khed, Dist. Ratnagiri - 415 722, Maharashtra.	960	Lead Acid Battery Plates and Lead Scrap
8.	Sharshi Metals, S.N. 28/1, Part Village Sharshi Taluka – Wada, Dist. Thane, Maharashtra.	1200	Lead Acid Battery Plates and Lead Scrap
9.	Simplex India, 4 Sativali Nagar, Khakhami Industrial Complex, Ahmedabad Bombay Highway, Vasai, Dist. Thane,Maharashtra.	600	Lead Acid Battery Plates and Lead Scrap
10.	Kadri Metal Refinery, Plot No. E-94, MIDC Awdhan & Lalling, Dhule-424 311, Maharashtra.	600	Lead Acid Battery Plates and Lead Scrap
11.	Nikhil Metals Works, At. Village Umroli, Taluka Palghar, Boisar Road, Plot No. 313, Near Shri Hari Fabrics, Distt. Thane,Maharashtra.	720	Lead Acid Battery Plates and Lead Scrap
12.	Krishna Metal Refinery, Plot No. 143/1-2, Sapronde Village, P.O. Uchat, Taluka – Wada, Distt. Thane – 421 030, Maharashtra.	3000	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
13.	D.K. Metal Works, Gut No. 100, At- Kondla Road, Village-Kudus P.O. Kudus , Taluka-Wada Dist. Thane-421312, Maharashtra.	4250	Lead Acid Battery Plates and Lead Scrap
14.	Bharat Industries, Plot No. L-135, MIDC Area, Dist. Ahmad Nagar, Maharashtra.	1200	Lead Acid Battery Plates and Lead Scrap
15.	Satwai Industries, E-38 MIDC Hingna, Nagpur, Maharashtra.	360	Lead Acid Battery Plates and Lead Scrap
16.	Sterling Lead Pvt. Ltd., Plot No. A-210, Kagal-Hatkanangale, Five Star Indl. Estate, Halasavade, Tal. Karveer, Dist. Kolhapur, Maharashtra.	7200	Lead Acid Battery Plates/Lead Scrap
17.	Kothari Metallurgical Export Pvt. Ltd., 56 At. Post – Chandivali, Wada – Shahpur Road, Taluka-Wada, Dist. Thane -421 303, Maharashtra.	7200	Lead Acid Battery Plates/Lead Scrap
18.	New Metal Refinery, Arvind Brothers Compound, Ganpati Pada, Old Thane - Belapur Road, Dighe, Navi Mumbai – 400 065 Maharashtra.	3000	Lead Acid Battery Plates/Lead Scrap
19.	Jarsons Metal, 18, Ganesh Industrial Estate, National Highway No. 8, Walive Tungar Phata, Post Sativali, Vasai (East), Dist. Thane – 401 208, Maharashtra.	6000	Lead Acid Battery Plates/Lead Scrap
20.	Rohini Metal Alloys, B-56, Kagal Hatkanangale Industrial Area,Kolhapur, Maharashtra.	960	Lead Scrap (excluding Lead Acid Batteries)
21.	Singh Metal Works, Khasra No.64, Old Khasala, Tal. Kamptee, Distt. Nagpur, Maharashtra.	100	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
22.	Shakti Metal Industries, S.No.261, Village - Abidghar, Taluka Wada, Distt.Thane Maharashtra.	5000	Lead Acid Battery Plates and Lead Scrap
23.	RHT Steel India Pvt. Ltd., GUT No.40/12, A. B. Road, Village-Ajande (KH), Taluka-Shirpur, Distt. Dhule-425 405, Maharashtra.	4800	Lead Acid Battery Plates and lead Scrap
24.	Tandon Metal Pvt. Ltd., Gat No.1242, Markal, Taluka-Khed, Distt.Pune, Maharashtra-412 105.	24000	Lead Acid Battery Plates, Lead Scrap, Lead Ashes and Residues
25.	Shree Metals (Mujbi)Private Ltd., Plot No.312/2, AT.Mujbi, P.O-Bela, Tah./Dist. Bhandara - 441 904, Maharashtra.	4932	Lead Acid Battery Plates and Lead Scrap
26.	Ajay Metal Refinery, Gut No.390/6, S.No.1060, Village & Post Kondhle, Tal.Wada, Distt. Thane Maharashtra.	2800	Lead Acid Battery Plates and Lead Scrap
27.	Ranchal Industries, Gut No.49, Village-Gunj (Kudus), Post-Kupari, Taluka – Wada, Distt.Thane - 421 312, Maharashtra.	1200	Lead Acid Battery Plates and Lead Scrap
28.	R. K. Metal Refinery, Gat No. 293 & 294, Village-Usar, Kondla Road, P.O. Kudus, Tal.Wada Distt.Thane - 421 312, Maharashtra.	4800	Lead Acid Battery Plates/Lead Scrap
29.	Nashik Metal Refinery, S.No.429/430, Village – Gonde, Tq.Igatpuri, Distt.Nashik, Maharashtra.	900	Lead Acid Battery Plates and Lead Scrap
30.	Mahalaxmi Metal Works & Alloys, Plot No.127, Savroli, Tal.Talsari, Distt.Thane, Maharashtra.	2200	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
31.	S.S.Enterprises, Gat No.98, Kondla Road, Village-Kudus, Taluka – Wada, Distt.Thane-421 312, Maharashtra.	4800	Lead Acid Battery Plates/Lead Scrap
32.	Shree Ram Metals, Plot No.B-4/14, MIDC Butibori, Tahsil – Hingna, Distt. – Nagpur, Maharashtra.	360	Lead Acid Battery Plates and Lead Scrap
33.	Deshmukh Lead Pvt. Ltd., S.No.63/4/1B, Wada – Manor Road, At.Post Varale, Taluka – Wada, Distt. Thane – 421 303, Maharashtra.	8000	Lead Acid Battery Plates and Lead Scrap
34.	Shanti Metal Refinery, Near Service Station, Kaman Road Sativali, Vasai(East), Dist. – Thane, Maharashtra – 401 202.	1500	Lead Acid Battery Plates and Lead Scrap
35.	Sethi Pigments Pvt. Ltd., Plot No.39, Wanjra Layout, Kamptee Road, Nagpur, Maharashtra – 400 026.	840	Lead Acid Battery Plates/Lead Scrap
36.	G. N.Metal Refinery, Survey No.125, Ghonsai, Tal. Wada, Distt.Thane, Maharashtra – 421 312.	2880	Lead Acid Battery Plates/Lead Scrap
37.	Indore Metal Corporation, Survey No.397/p, Dinkar Pada, Kondla Road, Kudus, Taluka - Wada, Distt. Thane, Maharashtra.	3600	Lead Acid Battery Plates/Lead Scrap
38.	Rishabh Meta Process, Gat No.27/1, Village Jamni(Dhaba), Station Road, Tah - Distt. Bhandara, Maharashtra – 441 904.	1800	Lead Acid Battery Plates and Lead Scrap
39.	Maharashtra Metal Industries, Plot No.14, Arkosh Industrial Estate, Village Dheku, Tal. Khalapur, District - Raigad, Maharashtra.	3600	Lead Acid Battery Plates/Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
40.	S. K.Agency, S.R.No,152/1, Plot No.41, Chatanaya Nagar, Basmath, Tq. Basmath, Distt. Hingoli, Maharashtra.	800	Lead Acid Battery Plates/Lead Scrap
41.	Samrat Udyog, Plot No.147, Village-Sapronda , Post . Kudus, Tal.Wada, Distt: Thane, Maharashtra.	3000	Lead Acid Battery Plates/Lead Scrap
	Total	**126762**	
X.	**PUNJAB**		
1.	A.R. Industries (Unit-II), 45 A, Behind Industrial Estate, Bye Pass, Jalandhar, Punjab.	500	Lead Acid Battery Plates and Lead Scrap
2.	A. R. Industries, 51-A, Behind Industrial Estate, Bye Pass Road, Jalandhar, Punjab.	1200	Lead Acid Battery Plates and Lead Scrap
3.	Imperial Alloy Industries, Gali No. 5, VPO Randhwan, Mansanda, Back Side of Focal Point, Gadaipur Jalandhar City, Punjab.	720	Lead Acid Battery Plates and Lead Scrap
4.	Namdev Battery Industry, D-20 D-31, (Near Pani Wali Tanki), Focal Point, Moga – 142 001, Punjab.	450	Lead Acid Battery Plates/Lead Scrap
5.	Shiv Shakti Udyog, Vill. Sheikhu Road, Malout - 152 107, Dist. Muktsar, Punjab.	500	Lead Acid Battery Plates/Lead Scrap
6.	Guru Metal Works , Plot No. 22, Longwal Colony, Near Loutay Dharam Kanta, Dhandari Kalan, Ludhiana, Punjab.	1200	Lead Acid Battery Plates/Lead Scrap
7.	Sant Metal Industries , Vill. Sheikhu Road, Tah. Malout, Dist. Muktsar, Punjab.	500	Lead Acid Battery Plates/Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
8.	Shiva Electronics, Vill. Ramdittewala, Road Mansa – 151 505, Punjab.	500	Lead Acid Battery Plates/Lead Scrap
9.	M. T. Metals, Ibban Kalan, Chabbal Road, Amritsar – 143 006, Punjab.	1800	Lead Acid Battery Plates/Lead Scrap
10.	Asha Metal industries, Bhaini Jassa Road, Handiaya, Tehsil Barnala, Dist. Sangrur, Punjab.	750	Lead Acid Battery Plates/Lead Scrap
11.	Hero Battery Industries, 358, Focal Point, Amritsar, Punjab.	450	Lead Acid Battery Plates/Lead Scrap
12.	Vinayak Industrial Corporation, Canal Road, Industrial Area, Jalandhar City, Punjab.	600	Lead Acid Battery Plates/Lead Scrap
13.	Asian Alloys, 848/9, Industrial Area 'A', Ludhiana, Punjab.	600	Lead Acid Battery Plates and Lead Scrap
14.	Kapoor Industries, D-98, Focal Point Extn. Jalandar,Punjab.	600	Lead Acid Battery Plates and Lead Scrap
15.	Joginder Electrical & Auto Parts, Ramgarh, GT Road Phillour, District, Jalandhar Punjab.	300	Lead Acid Battery Plates and Lead Scrap
16.	Nipan Metal Industries C-3, Industrial Focal Point, Sangrur- 148 001, Punjab.	750	Lead Acid Battery Plates/Lead Scrap
17.	Dashmesh Metal, Village-Jammu, PO-Sujanpur, Jammu Road, Pathankot, Distt. Gurdaspur Punjab.	720	Lead Acid Battery Plates and Lead Scrap
18.	Shubham Power Pack Products, V.P.O - Khosa Pando, Distt. Moga, Punjab -142 001.	450	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
19.	The Shivom Gram Udyog Samiti, (Regd.), E-17/18, Focal Point, Mandi Govindgarh – 147 301, Punjab.	1200	Lead Acid Battery Plates and Lead Scrap
20.	Jyoti Industries. Industrial Area – C, Dhandari Kalan, Ludhiana – 141 003, Punjab.	720	Lead Acid Battery Plates and Lead Scrap
21.	Paarth Industries, Humbran Industrial Area, Mulanpur, Humbran Road, Distt.Ludhiana, Punjab.	3000	Lead Acid Battery Plates and Lead Scrap
22.	Bishamber Nath & Sons, GT Road, Sirhind Side, Mandi Gobindgarh, Distt. Fatehgarh Sahib, Punjab.	210	Lead Acid Battery Plates and Lead Scrap
23.	Jyoti Metal Works, 36-B, Industrial Area-A (Extn.), Ludhiana-141 003, Punjab.	600	Lead Acid Battery Plates and Lead Scrap
24.	Kunal Metal Industries (Unit-II), Backside Focal Point Extn., Near Transport Nagar Bypass, Jalandhar City, Punjab.	1200	Lead Acid Battery Plates and Lead Scrap
25.	Prime Auto Industries, Adjacent to Industrial Estate, Ajay Nagar, Jalandhar City, Punjab.	600	Lead Acid Battery Plates and Lead Scrap
26.	New Power Industries, D-10, Focal Point, Mandi Gobindgarh - 147 301, Distt. Fatehgarh Sahib, Punjab.	300	Lead Acid Battery Plates and Lead Scrap
	Total	**20420**	
XI	**RAJASTHAN**		
1.	Puransons Alloys P. Ltd., F-934, RIICO Industrial Area, Phase-II Bhiwadi, Rajasthan.	16200	Lead Acid Battery Plates and Lead Scrap
2.	Sumetco Alloys Pvt. Ltd., G-740, Phase-II Industrial Area, Bhiwadi, Rajasthan.	7200	Lead Acid Battery Plates and Lead Scrap
3.	Rohan Metals Pvt. Ltd., G-733, Phase-II RIICO Industrial Area, Bhiwadi, Rajasthan.	3600	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
4.	Siyarco Industries, F-540-B, Marudhar Indl. Area, 2nd Phase, Basni, Jodhpur - 342 005 Rajasthan.	1200	Lead Acid Battery Plates, Lead Scrap/ Lead Ashes and Lead Residues
5.	Arya Alloys (P) Ltd., B-824 Industrial Area, Bhiwadi-301 019, Distt. Alwar, Rajasthan.	7200	Lead Acid Battery Plates and Lead Scrap
6.	Asawa Industries, F-34, RIICO Industrial Area, Gegal Dist. Ajmer, Rajasthan.	1800	Lead Acid Battery Plates/Lead Scrap
7.	Kaysons Pigments Private Limited, G-24, Industrial Area, Odella Road, RIICO, Dholpur-328 001, Rajasthan.	5000	Lead Acid Battery Plates/Lead Scrap
8.	Ashish Pigments & Alloys Pvt. Ltd., G-691, Phase-II, RIICO Indl. Area, Bhiwadi, Dist. Alwar, ajasthan.	4500	Lead Acid Battery Plates/Lead Scrap
9.	Shruti Dye Chem, 977, Sancheti Bhavan Near Geeta,Bhawan 3rd Road, Sardarpura, Jodhpur - 342 003, Rajasthan.	4400	Lead Acid Battery Plates and Lead Scrap
10.	B.M.A. Zinc Pvt. Ltd., F-449, Industrial Area Bhiwadi, Alwar, Rajasthan.	700	Lead Acid Battery Plates and Lead Scrap
11.	Ajmer Lead Refinery, Near Radio Station, Opp. Bhupendar, Farm Gagwana, Dist. Ajmer, Rajasthan.	2160	Lead Acid Battery Plates and Lead Scrap
12.	Rahul Metal Industries, J-512 to J-514 RIICO Indl. Area, MIA, Alwar Rajasthan.	6000	Lead Acid Battery Plates and Lead Scrap
13.	Shree Balaji Metal Works, Parbatpura, Kishangarh Bypass Road, Sedaria Road, Dist. Ajmer, Rajasthan.	900	Lead Acid Battery Plates and Lead Scrap
14.	Shree Radhey Industries, H-1-48 B 49-A Indl. Area Gegal, Ajmer – 305 001, Rajasthan.	1500	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
15.	Vipul Metal P. Ltd., G-1/625 Industrial Area Chopanki, Bhiwadi – 301 019, Alwar, Rajasthan.	5000	Lead Acid Battery Plates and Lead Scrap
16.	Gagan Udyog, G-1-120B Udyog Vihar, RIICO Shri Ganga Nagar Rajasthan.	40	Lead Acid Battery Plates/Lead Scrap
17.	Shree Ganesh Udyog, 16-Mini Maya Puri, Near Bus Stand, Sri Ganganagar – 335 001, Rajasthan.	960	Lead Acid Battery Plates/Lead Scrap
18.	Sultania Engineering Services, G-91 Kuber Indl. Area, Ranpur, Kota, Rajasthan.	3000	Lead Acid Battery Plates and Lead Scrap
19.	Mona Batteries & Chemicals, G-1/16,RIICO Industrial Area, Odela Road, Dholpur-328 001, Rajasthan.	1800	Lead Acid Battery Plates and Lead Scrap
20.	Shivalik Metalloys Pvt. Ltd., G-1/1209 (B), Rampur Mundana RIICO Industrial Area, Bhiwadi, Distt. Alwar-301 019, Rajasthan.	10500	Lead Acid Battery Plates and Lead Scrap
21.	Lotus Alloys, G-1-669, Phase-I, RIICO Industrial Area, Chopanki – 301 019, Distt. Alwar, Rajasthan.	3000	Lead Acid Battery Plates and Lead Scrap
22.	Shankar Udyog, Plot No. E-99(A), MIA, IInd Phase, Basni, Jodhpur, Rajasthan.	1500	Lead Acid Battery Plates and Lead Scrap
23.	Gravita India Limited, Saurabh Chittora Road, Diggi-Malpura Road, Tehsil-Phagi, Jaipur-303 904 , Rajasthan.	8865	Lead Acid Battery Plates and Lead Scrap
24.	Raja Industries, F-226, RIICO Industrial Area, Khara, Dist. Bikaner – 334 001, Rajasthan.	3600	Lead Acid Battery Plates, Lead Scrap, Lead Ashes and Residues

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
25.	Shri Shyam Industries, G 1/13 RIICO Industrial Area, Ondela Road, Dholpur - 328001, Rajasthan.	240	Lead Acid Battery Plates/Lead Scrap
26.	Shiv Shakti Metals, G1 670, Industrial Area, Chopanki Bhiwadi, Alwar, Rajasthan.	3600	Lead Acid Battery Plates/Lead Scrap
27.	Raj Industries, G-512 (IV) Road No.7, Indraprastha Industrial Area, Kota, Rajasthan.	600	Lead Acid Battery Plates/Lead Scrap
28.	Pragati Udyog, H-1/630(A), RIICO Industrial Area, MIA, Alwar – 301 030 Rajasthan.	5000	Lead Acid Battery Plates/Lead Scrap
29.	Shyam Metals, H-883 Phase-III, RIICO Industrial Area, Bhiwadi, Rajasthan.	1200	Lead Acid Battery Plates/Lead Scrap
30.	A.I. Metals (P) Ltd., F- 624 Phase –I , RIICO Industrial Area, Bhiwadi – 301 109, Distt. Alwar, Rajasthan.	17000	Lead Acid Battery Plates/Lead Scrap
31.	Shree Swastik Pigments, F-14, RIICO Industrial Area, Power House Road, Parbatpura, Ajmer, Rajasthan.	1500	Lead Acid Battery Plates and Lead Scrap
32.	Dixit Battery Centre, G1-20, RIICO Industrial Area, Odela Road, Dholpur, Rajasthan.	1200	Lead Acid Battery Plates and Lead Scrap
33.	Exclusive Food Products, Private Ltd., G-1678, Industrial Area, Bhiwadi-301 019, Rajasthan.	3000	Lead Acid Battery Plates/Lead Scrap
34.	Durocon Industries, G-1/232, RIICO Industrial Area, Kaladera, Jaipur Rajasthan.	1400	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
35.	Exclusive Lead Alloys Pvt. Ltd., G-1/690, RIICO Industrial Area, Bhiwadi, Alwar-301 019, Rajasthan.	5000	Lead Acid Battery Plates and Lead Scrap
36.	Shree Mahaveer Industries, F-13, RIICO Industrial Area, Parbatpura, Ajmer, Rajasthan.	3000	Lead Acid Battery Plates and Lead Scrap
37.	Shree Charbhuja Engineers Pvt.Ltd. , G-9,RIICO Industrial Area, Sanwar, Distt.Udaipur, Rajasthan.	10800	Lead Acid Battery Plates/ Lead Scrap/ Lead Ashes and Lead Residues
38.	B.M.P Metals Pvt. Ltd., G-1032 A, Phaae-III, RIICO Industrial Area, Bhiwadi-301 019, Rajasthan.	1575	Lead Acid Battery Plates/Lead Scrap
39.	Precocious Metals Recyclers, G-1/199, Gudli Industrial Area, Gudli, Tahsil – Mavli, Udaipur, Rajasthan.	5000	Lead Acid Battery Plates and Lead Scrap
40.	R.P.Plastic, G-1 – 1279, RIICO Industrial Area, Rampur Mundana, Bhiwadi, Distt.Alwar, Rajasthan – 301 019.	1800	Lead Acid Battery Plates/Lead Scrap
41.	National Thermoplast Industries 15,Bhimpura Industries Area, Bhimpura, P.O. Cable Nagar, Distt.Kota – 325 003, Rajasthan.	600	Lead Acid Battery Plates/Lead Scrap
42.	Anjeneya Metal Corporation, E-Makhupura Extn., RIICO Industrial Area, Ajmer, Rajasthan.	1800	Lead Acid Battery Plates/Lead Scrap
43.	Chanderiya Lead Zinc Smelter, Hindustan Zinc Ltd., P.O.Puthali Chittorgarh, Rajasthan - 312 021.	18000	Lead Scrap/Ash/Residues
	Total	**182940**	
XII	**TAMILNADU**		
1.	K.M.R. Metal Mart, 1/226-B Pollachi Main Road, Near SIDCO Railway Gate, Eachanari (P.O), Coimbatore-641 021, Tamil Nadu.	7200	Lead Acid Battery Plates/ Lead Scrap/ Lead Ashes/Residues

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
2.	EMGEE Foundry, Unit1-4 Industrial Estate, Karaikudi, Tamil Nadu - 641 001.	500	Lead Acid Battery Plates and Other Scrap/ Lead Ashes/Residues
3.	Universal Lead Alloys, 181, Senganatham Road, Rangapuram, Vellore, Tamil Nadu- 632 009.	7200	Lead Acid Battery Plates/ Lead Scrap/ Lead Ashes/Residues
4.	Pondy Oxides & Chemicals Ltd. G-17 to G-19 & G-30 to G-32, Sipcot Industrial Park, Sriperumbudur , Kancheepuram District, Tamil Nadu – 602 105.	28800	Lead Acid Battery Plates and Lead Scrap
5.	Promptek Metal Alloys & Refining Corporation, 35, SIDCO Industrial Estate, Thirumazhisai, Chennai – 602 107, Tamil Nadu.	120	Lead Acid Battery Plates and Lead Scrap only
6.	Premium Pigments, S.F. No. 16 Athipalayam Road, Chinnavedampatti, Post Ganpathy, Coimbatore-641 006, Tamil Nadu.	2600	Lead Acid Battery Plates/Lead Scrap
7.	G. M. T. Alloys, Plot No. B-25, SIPCOT Indl.Complex, Gummidipoondi, Thiruvallur Dist- 601 201,Tamil Nadu.	2400	Lead Acid Battery Plates/Lead Scrap
8.	Jayachandran Alloys (P) Ltd., S. F. No. 20/1, MasagoundanchettyPalayam Village, Ganesapuram, Coimbatore – 641 107, Tamil Nadu.	5000	Lead Acid Battery Plates/Lead Scrap
9.	Bharathi Metal Refiner, S.F. No. 488, Alwarthangal Road, Karnampattu, Vellore Sugar Mill Post -632 519 Tamil Nadu.	400	Lead Acid Battery Plates/Lead Scrap
10.	Lohia Metals Pvt. Ltd., B-19 & B-20, SIDCO Industrial Estate,Maraimalai Nagar, Kancheepuram District, Tamil Nadu.	-	Lead Scrap(excluding Lead Acid Battery Plates)

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
11.	Sri Sai Traders, SF No.536/2 A, Thattamangalam Village Kariamanickam Road, Trichy, Tamil Nadu.	1200	Lead Acid Battery Plates and Other Lead Scrap/ Ashes /Residues
12.	Global Lead Alloys , Shed No.89 & 90, SIIDCO Industrial Estate, Acamangalam Village, Bugur Taluk Krishangiri District., Tamil Nadu.	6000	Lead Acid Battery Plates/ Lead Scrap/ Lead Dross and Lead Ashes
13.	Southern Power Industries, D.P.No.3, Electrical Industrial Estate, Kakkalur - 602 003, Thiruvallur District, Tamil Nadu.	1200	Lead Acid Battery Plates/Lead Scrap
	Total	**72620**	
XIIII	**UTTAR PRADESH**		
1.	Gupta Metal Works C-1/D, South Side of G.T.Road, Industrial Area, Near Rathi Udyog, Ghaziabad- 201009, Uttar Pradesh.	15200	Lead Acid Battery Plates/Lead Scrap
2.	Rama Metal Industries, J-30, Site-III, Panki Industrial Area, Kanpur, Uttar Pradesh.	600	Lead Acid Battery Plates and Lead Scrap
3.	Krishna & Sons, G-33, Site No. 3, Panki Indl. Area, Kanpur-208 012, Uttar Pradesh.	800	Lead Acid Battery Plates/Lead Scrap
4.	Manoj Metal Industries, K-14 15, Site No. 3, Panki Indl. Area, Kanpur, Uttar Pradesh.	2000	Lead Acid Battery Plates
5.	J.S Industries, K-37, Industrial Area, Begrajpur, Muzaffarpur, Uttar Pradesh.	1200	Lead Acid Battery Plates/Lead Scrap
6.	Metal Alloy, E-46, Industrial Area, Ram Nagar, Chandauli, Varanasi-221 110, Uttar Pradesh.	1500	Lead Acid Battery Plates

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
7.	Bindal Smelting Pvt. Ltd., F-63-64, Surajpur Indl. Area, Site B, Dist. Gautam Budh Nagar, Greater Noida, Uttar Pradesh.	15000	Lead Acid Battery Plates/Lead Scrap/Lead Ash
8.	Dinesh Metal Co., G-117, Site No. 3, Panki Indl. Area, Dist. Kanpur, Uttar Pradesh.	1000	Lead Acid Battery Plates/Lead Scrap
9.	Met Trade India Ltd., Village -Bheel Akbarpur, G.T. Road, Dadri, District-Gautam Budh Nagar, Ghaziabad, Uttar Pradesh.	60000	Lead Acid Battery Plates/Lead Scrap/lead Ash
10.	Om Engineering Works, Plot No. D-19-20, Industrial Area, Site-2, Mumtaz Nagar, Faizabad- 224001 Uttar Pradesh.	1800	Lead Acid Battery Plates/Lead Scrap
11.	Dhawan Metal Industries , T-728 Industrial Area Parsakhera, Bareilly, Uttar Pradesh.	900	Lead Acid Battery Plates/Lead Scrap
12.	Shree Metal Works, G-5, Industrial Area Begrajpur, Muzaffarnagar, Uttar Pradesh.	840	Lead Acid Battery Plates and Lead Scrap
13.	Agra Chemicals (P) Limited, A-3 & A-5, Industrial Estate, Shikohabad, Distt.Firozabad, Uttar Pradesh.	2000	Lead Acid Battery Plates/ and Lead Scrap
14.	Kavita Overseas (P) Ltd., Plot No.56, Industrial Area, B.S. Road, Pandav Nagar, Ghaziabad – 201 202, Uttar Pradesh.	14140	Lead Acid Battery Plates/Lead Scrap, Lead Ash and Lead Residues
15.	A.R.Metal Industries, 13 B-2, Co-Operative Industrial Estate, Dada Nagar, Kanpur, Uttar Pradesh.	750	Lead Acid Battery Plates and Lead Scrap
16.	Lavanya Sponge Iron Pvt. Ltd., H-97-99, Masuri Gulawathi Road, Industrial Area, Ghaziabad, Uttar Pradesh.	6000	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
17.	Shri Bankey Bihari Metals, Khasra No.118, Sikhera Road, Modi Nagar, Distt. Ghaziabad, Uttar Pradesh.	900	Lead Acid Battery Plates and Lead Scrap
18.	Bajaj Industries, F-7, South Side of G.T. Road, Industrial Area, Ghaziabad, Uttar Pradesh.	2700	Lead Acid Battery Plates and Lead Scrap
19.	K.B. Metal Industries, F-5, South Side of G.T. Road, Industrial Area, Ghaziabad, Uttar Pradesh.	900	Lead Acid Battery Plates and Lead Scrap
20.	Patel Enterprises, 5/28, South Side of G. T. Road , Industrial Area, Ghaziabad, Uttar Pradesh.	600	Lead Acid Battery Plates and Lead Scrap
21.	Thakral Batteries, Kamdhenu Complex, Industrial Area, Janta Road, Saharanpur, Uttar Pradesh.	1320	Lead Acid Battery Plates and Lead Scrap
22.	Gupta Metal Company, C-4/3, Amousi Industrial Area, Nadar Ganj, Lucknow, Uttar Pradesh.	450	Lead Acid Battery Plates and Lead Scrap
	Total	**130600**	
XV	**WEST BENGAL**		
1.	Samta Metal Industries, 76, Canal Circular Road, Kolkata - 700 054, West Bengal.	480	Lead Acid Battery Plates/ Lead Scrap/ Lead Ash/Residues
2.	Shiwshakti Metal Works, 157-A , Picnic Garden Road, Kolkata-700 039, West Bengal.	300	Used Lead Acid Battery Plates
3.	Raj Finoxides Pvt. Ltd., Village Kharial, P.O. D.C.C. Dankuni, Hoogly, West Bengal.	7800	Used Lead Acid Battery Plates/Lead Scrap
4.	India Metal industries, Santrapara, Perdankuni Delhi Road, Hoogly- 712 310, West Bengal.	470	Lead Acid Battery Plates/Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
5.	Abdul Salem & Co., Dharala Budbud, Panagarh Bazar, Dist. Burdwan- 713 148, West Bengal.	1200	Lead Acid Battery Plates/Lead Scrap
6.	Shiv Shankar Metal Works, 157-A, Picnic Garden road, Kolkata – 700 039, West Bengal.	150	Lead Acid Battery Plates
7.	Eastern Metal, Vill. Khamar, P.O. Bishnupur P. S., Rajahat, Dist. 24 Parganas (N) – 743 510, West Bengal.	450	Lead Acid Battery Plates/Lead Scrap
8.	Rajnath Metal Works, 158-B Picnic Garden Road, Kolkata – 700 039, West Bengal.	300	Lead Acid Battery Plates
9.	Singh Metal Company, 157-A, Picnic Garden Road, Kolkata – 700 039, West Bengal.	450	Lead Acid Battery Plates
10.	Ram Dular & Bros., 157-A, Picnic Garden Road, Kolkata – 700 039, West Bengal.	150	Lead Acid Battery Plates/Lead Scrap
11.	Sajta Metal Works, Chandmari Danesh Shaikh Lane, P.S. Sankrail, Howrah – 711 109, West Bengal.	150	Lead Acid Battery Plates/Lead Scrap
12.	Ranjan Industries, Village Kulai, P.O. Bikihakola, Dist.Howrah - 711 322, West Bengal.	1800	Lead Acid Battery Plates/Lead Scrap
13.	Kashi Metal Works, 157-A, Picnic Garden Road, Kolkata – 700 039,West Bengal.	300	Lead Acid Battery Plates
14.	Panchwati Metal Works, Village & P.O. Argori, PS-Sankrail, Dist-Howrah-711 302, West Bengal.	900	Lead Acid Battery Plates
15.	Tarak Metal Industries, 76 Canal Circular Road, Kolkata - 700 054, West Bengal.	250	Lead Ash/Lead Acid Battery Plates

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
16.	Maa-Bhagwati Metal Industries, Village & Mouja-Argori, P.O. Argori, P.S. Sankrail, Dist. Howrah - 711 302 West Bengal.	800	Lead Acid Battery Plates/Lead Scrap
17.	Grade Enterprise, Dhalagarh Industrial Park, Vill. & PO Kendua, P.S. Sankrail, Dist. Howrah - 711 302, West Bengal.	350	Lead Acid Battery Plates/Lead Scrap
18.	Singh & Sons Manufacturer, Vill. Jala Dhulagori, PO Dhulagori, P.S. Sankrail, Dist. Howrah - 711 302 West Bengal.	560	Lead Acid Battery Plates/Lead Scrap
19.	Vinod Metal Industries, Mouza & Vill. Argori (NH-6), P.O. Argori, P.S. Sankrail, Dist. Howrah - 711 302, West Bengal.	480	Lead Acid Battery Plates/Lead Scrap
20.	Bijay Metal Works, 76 Canal Circular Road, Kolkata - 700 054, West Bengal.	200	Lead Acid Battery Plates /Lead Ash
21.	Azad Metal Works, 158 B Picnic Garden Road, Kolkata- 700039, West Bengal	300	Lead Acid Battery Plates/Lead Scrap
22.	Shivshakti Metals Works, Unit-II Jalan Industrial Park, Village – Jaladhulagori, P.O. Dhaulagori, P.S. Sankrail District-Howrah West Bengal.	450	Lead Acid Battery Plates and Lead Scrap
23.	Ram Dular & Brothers, Unit-II Bombay High Road, Village- Jala Dhulagori, P.O. Dhulagori, P.S. Sankrail, Dist. Howrah-711302, West Bengal.	450	Lead Acid Battery Plates/Lead Scrap
24.	Ramashankar Daya Shanakar, 8C/H/17 Jogodyan Lane, Kolkata-700 054, West Bengal.	170	Lead Acid Battery Plates/ Lead Scrap/ Lead Ash/Residues

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
25.	Panchawati Metal Works, B/8/C/H/8 Jogodyan Lane, Kolkata -700 054, West Bengal.	160	Lead Acid Battery Plates/ Lead Scrap/ Lead Ash/Residues
26.	Shree Ganesh Metal Works, 157 A Picnic Garden Road, Kolkata-700 039, West Bengal.	150	Lead Acid Battery Plates
27.	Associated Pigments Ltd., Mouza-Kanakpur, P.O. Naranda, P.S. Panskura-721 139, Dist. Purba Midnapore, West Bengal.	63000	Lead Acid Battery Plates/Lead Scrap
28.	Singh & Sons Manufacturer , Chandmari Danesh Shaikh Lane, P.S.Sankrail, Howrah, West Bengal.	150	Lead Acid Battery Plates and Lead Scrap
29.	Skylub Battery Co. , Vill. & P.O.Raghudevpur , P. S. Ulberia, Distt.Howrah - 711 322, West Bengal.	490	Lead Acid Battery Plates and Lead Scrap
30.	Azad Metal Works (Unit-II), Village-Jaladhulagori, P.O: Dhulagori P.S: Sankrail, Howrah, West Bengal	450	Lead Acid Battery Plates and Lead Scrap
31.	Star Metal Industries, Debgram Industrial Estate, Satellite Township P.S. Rajganj, Distt. Jalpaiguri – 734 015, West Bengal	420	Lead Acid Battery Plates and Lead Scrap
32.	Usha Metal Industries, 26/5 B.A.M. Ghosh Road, Budge-Budge, 24 Parganas(S), West Bengal.	500	Lead Acid Battery Plates and Lead Scrap
33.	Sunflower Metal Industries, Vill.& Mouja - Dhulagorhi, Kendua, P.O. – Bhagabatipur, P.S. – Sankrail, Distt. Howrah – 711 302 , West Bengal.	336	Lead Acid Battery Plates and Lead Scrap
34.	Shama Metal Industries , Vill.& Mouja – Kendua, PO – Kendua, PS – Sankrail, Distt. Howrah – 711 302, West Bengal	1080	Lead Acid Battery Plates/Lead Scrap and Lead Ash

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
35.	Jaiswal Metal Industries, 16G, Debgram Industrial Estate, P.O.Satellite Township, Distt. Jalpaiguri, West Bengal.	480	Lead Acid Battery Plates and Lead Scrap
36.	R.B.Enterprise, Vill.Bodai, P.O.Jugberia, P.S.Ghola, Distt.24 Parganas (N), West Bengal.	240	Lead Acid Battery Plates Lead Scrap Lead Ash and Residues
37.	Raj Metal Industries Mouza Majukshetra,P.S. Jagatballavpur, Distt. Howrah, West Bengal.	4400	Lead Acid Battery Plates, Lead Scrap, Lead Ash
38.	Dolphin Enterprises, Village – Bhagabatipur, P.O. – Chaturbhujkali, Dhulagori P.S. – Sankrail, Under Kendua Gram Panchayat, Distt.Howrah – 711 302, West Bengal.	1200	Lead Acid Battery Plates, Lead Scrap and Lead Ash,
39.	Bachhelal Metal Industries, 22G, Shiv Krishna Da Lane, P.S. – Phulbagan, Kolkata – 700 054, West Bengal.	360	Lead Acid Battery Plates,Lead Scrap and Lead Ash
40.	Jai Shambho Metal Company 157 A, Picnic Garden Road P.O. Tiljala. Kolkota – 700 039 West Bengal.	312	Lead Acid Battery Plates and Lead Scrap
41.	Sun Metal Industries, Post : Sugandhya, Delhi Road, P.S : Polba, Distt : Hoogly, West Bengal.	1500	Lead Acid Battery Plates/ and Lead Scrap
42.	Adarsh Galai Udyog Dag No.1314/2124,New Dag No.1250, Khatian No.1819,1862 Jala Dhulagori, Dhulagarh Industrial Park P.O.& P.S. – Sankrail, Howrah-711 302, West Bengal.	1380	Lead Acid Battery Plates and Lead Scrap
43.	Krishna Metal, Village : Lakshmanpur, P.O. : Domjur, District : Howrah, West Bengal.	384	Lead Acid Battery Plates and Lead Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (In tonnes/year)	WASTE PERMITTED FOR RECYCLING
44.	Global International Village : Lakshmanpur P.O. : Domjur District : Howrah West Bengal.	564	Lead Acid Battery Plates and Lead Scrap
45.	Mega Energy Pvt.Ltd. Village:Gotu, P.O:Sugandhya P.S: Polba, Distt. Hoogly-712 102, West Bengal.	1500	Lead Acid Battery Plates/Lead Scrap and Lead Ash
46.	Balaji Metal Corporation, 5, Raj Krishna Kumar Street, Belur Math, Howrah-711 202 West Bengal.	600	Lead Acid Battery Plates/Lead Scrap/Lead Ash
	Total	**98566**	
	Grand Total	**1097876**	

Annexure: 3 – III (B)

LIST OF THE NON-FERROUS METAL WASTE RE-PROCESSORS (OTHER THAN LEAD WASTE) UNITS REGISTERED WITH MOEF/CPCB AS RECYCLERS/REPROCESSORS HAVING ENVIRONMENTALLY SOUND MANAGEMENT FACILITIES
As on 13.5.2010

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
I	**ANDHRA PRADESH**		
1.	Magus Metals Pvt. Ltd., Lingojigudesm (Village), Chowtuppal (Mandal), Nalgonda Dist, Andhra Pradesh.	10000	Brass dross/Scrap, Copper Scrap, Copper dross, Copper Oxide, Mill Scale Copper & Reverts, Cake, residues spent catalyst containing Copper & Zinc, Zinc Scrap/Ash Dross, Zinc Skimming, Waste Copper & Cu Alloys Slags from Copper processing only.
2.	Lakshmi Venkateshwara Metals & Chemicals, K-1 IDA, Gooty Road, Guntakal, Ananthpur, Andhra Pradesh - 515 803.	240 300 240	Spent Catalyst containing Copper Copper Oxides Mill Scales, Reverts, Cake Residues Zinc Ash /Skimming.
	Total	**10,780**	
II	**CHATTISGARH**		
2.	Shreyansh Industries, 14-A, Light Industrial Area, Bhilai, Dist. Durg, Chhattisgarh	300	Brass dross/Scrap, Copper Scrap/ Copper dross/Copper Oxide, Copper Cakes/Copper residues spent Copper Druid.
	Total	**300**	
III	**DAMAN DIU & DADRA NAGAR HAVELI (UNION TERRITORY)**		
1.	Dhakad Metal Corporation, 341/4, Bharat Industrial Estates, Bhimpore- Nani, Daman-396 210	2700	Brass Dross Copper dross, Copper Oxide, Copper Scrap & Brass Scrap.
2.	Raja Zinc Pvt. Ltd., Plot No. 3, 4 &5, Bharat Industrial Estates, Bhimpore, Nani, Daman-396 210	4350	Copper Druid, Copper Ash, Residues and cakes, Copper Dross, Copper Oxide Mill Scale Copper Skimmings, Copper Reverts, Brass Dross, Zinc Dross, Zinc Ash and Zinc Residues.
3.	Nissan Copper (P) Limited Sr. No. 168/2/1, Village Rudana, Dadra Nagar Havelli	4600	Copper Dross, Copper Druid, Copper Scrap, Copper Residues, Brass Dross & Brass Scrap.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
4.	Sunland Metal Recycling Industries, S. No. 89/1/2, Village Karajgan, Dadar & Nagar Haveli, Silvasa- 396230	12000	Brass Dross/Copper Druid Copper Cakes & Residues, Copper Oxide Mill Scale Brass Dross Zinc Ash & Skimmings & Zinc Dross.
5.	B.N. Industries, Plot No. 75/80, Bharat Industrial Estate, Bhimpore,Nani , Daman.	6360	Brass Scrap, Brass Dross, Copper Scrap, Copper Dross, Copper Reverts, Cakes & Residues Waste Copper and Copper Alloys, Copper Druid, Zinc Drops and Zinc Scrap.
6.	Spring Merchandisers P. Ltd., Survey No. 170(1) & (02), Shed No. 1, Panchal Udyog Nagar, Bhimpore, Daman	9000	Brass Dross, Copper Oxide, Mill Scale Reverts, Cakes, Residues, Copper Dross, Copper Druid & Zinc Ash.
7.	RHJ Metals Private Limited, S. R. No. 47/1/1/3 & 47/1/4, Village Kherdi, D&NH Silvaasa	1200 5400	Copper Oxide, Mill Scale Copper Reverts, Cakes & Residue, Waste Copper & Copper Alloys in dispersible form, Slag from copper processing and spent cleared Metal Catalyst containing Copper. Brass Dross, Zinc Dross, Copper Dross, Zinc Residues, Zinc Ash & Zinc Skimmings.
8.	Shri Singhal Commodities Pvt.Ltd. 47/1/1/1, 47/1/2 & 47/1/3, Amboli, Kherdi, Silvaasa	5670 5500	Copper Dross,Brass Dross and Zinc Dross. Zinc Ash and Residues, Copper Reverts, Cakes & Residues.
9.	NICO Extrusion Pvt.Ltd. Survey No.678/1/3, Plot No.4, Bhilad-Silvaasa Main Road, Naroli, Silvaasa , Daman – 396 235	5760 3600	Brass Dross, Copper Dross, Copper Residues, Copper Oxide Mill Scale and Copper Druid Zinc Dross, Zinc Ash and Skimming of Hazardous Waste containing Zinc.
10.	Transalloy India Pvt.Ltd., Survey No.71/3, Post Box No.39, Village - Samarvarni, Opp. Krishna Knitwear Technology Ltd, Silvaasa – 396 230	5400	Brass Dross, Copper Dross, Waste Copper & Copper Alloy and Zinc Ash.
	Total	**71,540**	

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
IV	**GUJARAT**		
1.	Dadbhawala Fertilizers & Chemicals Pvt. Ltd., Plot No. 103/104, GIDC Area, Trolley Road, Wadhwan City, Gujarat – 363 035	1440	Copper Oxide, Mill Scale Copper Dross, Brass Dross, Copper Reverts, Cakes & Residues, Zinc Dross, Zinc Ash & Residues.
2.	Shanti Agro Products, Plot No. C1-B-13, Old GIDC, Kabilpore Navsari - 396 445 Gujarat	7776	Copper Scrap, Zinc Ash, Zinc Skimmings, Copper Oxide, Mill Scale Copper Cakes and Residues, Zinc Bearing Wastes arising from smelting & Re-Refining.
3.	Madhav Extrusion, Plot No. C-1/298 & 301, Phase-2 GIDC, Dared –Jamnagar-361004, Gujarat	1080	Brass Scrap.
4.	Ambica Recycling, Plot No. 621-622, GIDC Phase-II, Dared Jamnagar - 361 004 Gujarat	1080	Copper Scrap, Zinc Scrap, Brass Scrap, Zinc Dross & Copper Druid.
5.	Siyaram Metal Pvt. Ltd., Plot No. 12 & 14, Village – Lakhabaved, Post – Khodiyar Colony, Jamnagar – 361 005	5400	Brass Scrap, Brass Dross, Copper Scrap & Zinc Scrap.
6.	Deep Recycling Industries, Plot No. 773 GIDC, Phase-II, Jamnagar-361 004	4860	Brass Scrap, Copper Scrap & Zinc Scrap & Copper Druid.
7.	Zinco Chemical Industries, Plot No. 22/2, 23, GIDC Estate, Kalol Dist. Gandhi Nagar,Gujarat.	3000	Zinc Ash, Zinc Scrap and Brass Scrap.
8.	S. J. Coating Industries, Block No. 227, Vill. Ukharla, Dist. Bhavnagar Gujarat.	750	Spent Catalyst containing Nickel, Spent Catalyst containing Copper Dross, Copper cakes and Residues, Spent Catalyst containing Zinc, Zinc Ash Skimmings and Residues.
9.	Shree Super Industries, A-20, GIDC, Shankar Tekri, Jamnagar – 361 004, Gujarat	270	Brass Scrap.
10.	Viom Impex, Plot No.3003-3007, Phase-III GIDC Estate, Dared, Jamnagar Gujarat	8400	Brass Scrap, Copper Scrap, Zinc Scrap, Brass Dross, Copper Dross, Zinc Dross and Copper Druid.
11.	Kissan Agro Fertilizers, Shed No.A-2/2219, Phase-III, GIDC, Vapi-396 195, Gujarat.	450	Zinc Ash, Zinc Skimmings & Other Zinc Bearing Wastes, Copper Oxide, Mill Scale and Waste Copper & Copper Alloys.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
12.	D&G Metal Inc., Plot No. 109/110, Phase-II GIDC Estate, Jamnagar – 361 005 Gujarat	1250	Brass Scrap, Copper Scrap and Zinc Scrap.
13.	Senor Metals Pvt. Ltd., Plot No.353, GIDC Phase-II Dared, Jamnagar-361 004 (Gujarat)	600	Brass Scrap, Copper Scrap and Zinc Scrap.
14.	Mahalaxmi Extrusions, SPL 431, Shanker Tekri, Udyognagar, Jamnagar-361 004,Gujarat	2160	Brass Scrap, Copper Scrap, Zinc Scrap, Brass Dross, Copper Dross, Zinc Dross and Copper Druid
15.	Marvel Metal Corporation, Plot No. 771, GIDC Estate, Phase –II Dared, Jamnagar – 361 005, Gujarat	600	Brass Scrap and Brass Dross
16.	Sterling Enterprises, 408/4, GIDC, Shankar Tekri, Jamnagar-361 004, Gujarat	600	Brass Scrap, Copper Scrap and Zinc Scrap
17.	Suraj Recycling Pvt. Ltd., 656/566,GIDC Phase-II, Dared, Jamnagar -361 004, Gujarat	840	Brass Scrap, Copper Scrap and Zinc Scrap
18.	Pranami Metal, Plot No. 240, Phase-II GIDC Estate, Dared, Jamnagar, Gujarat	900	Brass Scrap, Copper Scrap and Zinc Scrap
19.	Monarch Metals Pvt. Ltd., Plot No. 260, GIDC Phase-II Wadhwan City- 363025, Gujarat	300	Copper Scrap, Brass Scrap & Zinc Scrap
20.	Hindustan Impex, B-23/24, M.P. Shah Udhyognagar, Saru Section Road, Jamnagar-361002, Gujarat	750	Brass Scrap
21.	Bravo Agro Tech., Plot No. 200, Phase-II, GIDC Estate, Vadhwan, Dist. Surendranagar, Gujarat	1800	Brass Dross, Zinc Dross, Zinc Scrap & Zinc Ash
22.	Padmavati Impex Pvt. Ltd., Shed No. 781 GIDC, Phase-II, Dared, Jamnagar - 361 004 , Gujarat	1850	Brass Scrap, Copper Scrap, Zinc Scrap, Copper Dross, Zinc Dross, Brass Dross & Copper Druid

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
23.	Rozy Metals Extrusions, Plot No. 194 GIDC, Phase-II Dared, Jamnagar – 361 005, Gujarat	2520	Brass Scrap, Zinc Scrap, Copper Scrap and Waste Copper & Copper Alloys
24.	Akshar Exports, Shed No. 250 GIDC Phase II, Dared, Jamnagar – 361 005	3600	Brass Scrap, Zinc Scrap, Copper Dross, Copper Scrap, Waste Copper & Copper Alloys
25.	Indu Overseas Pvt. Ltd., Sp. Shed No. 23/1/A, GIDC Shankar Tekri, Udyognagar, Jamnagar – 361 004	1600	Brass Scrap, Zinc Scrap & Copper Scrap
26.	Siyaram Impex Pvt. Ltd., Plot No. 6-7, Naghedi, P.O. Khodiyar Colony, Village Lakhabavad, Distt-Jamnagar – 361 006, Gujarat	7000	Brass Scrap, Brass Dross, Copper Scrap, Waste Copper, Copper Alloys & Zinc Scrap
27.	Meridian Impex, Plot No. 2980 – 81 GIDC, Phase – III Near Dared, Jamnagar, Gujarat	1800	Brass Scrap, Copper Scrap, Copper Druid & Zinc Scrap
28.	Maheshwari Overseas, Spl. Shed No. 430 GIDC, Udyognagar Shanker Tekri, Jamnagar – 361 004, Gujarat	1350	Brass Scrap Copper Scrap Zinc Scrap
29.	Raj Metallurgical Industries, Plot No. 661-662, Raj Marg, Phase – II GIDC Estate, Dared, Jamnagar, Gujarat	1080	Brass Scrap, Copper Scrap including Scrap & Copper Reverts
30.	Divine Impex, Plot No. 440/441, GIDC Phase II Dared, Jamnagar – 361 004, Gujarat	240	Brass Scrap, Copper Scrap, Zinc Scrap
31.	Conex Metal (International), Plot No. C-1/451/452, Phase-II, GIDC Estate Dared, Jamnagar, Gujarat	1350	Brass Scrap, Copper Scrap , Zinc Scrap
32.	Meet Industries, Plot No. 2, Sub Plot No. 2A + 2C/2 GIDC Udhyognagar, Jamnagar – 361 004,Gujarat	500	Brass Scrap, Copper Scrap, Zinc Scrap
33.	Ghanshyam Metal Udyog Survey No.36/1, Kuha Road Village- Singarva, Ta: Dascroi Dist - Ahmedabad ,Gujarat	1500	Brass Scrap, Copper Scrap, Zinc Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
34.	Sanginita Chemicals Pvt.Ltd. (Unit-II) , Block No.1133, Near Laxmi Chemicals, Nr.Phase-IVGIDC, Chhatral Tq-Kalol Distt.Gandhinagar, Gujarat	2220	Copper Oxide, Mill Scale Copper Reverts Cakes & Residues, Waste Copper & Copper Alloys in dispersible form, spent catalyst containing nickel & Zinc
35.	Sara Chemicals, Plot No.3205/B GIDC, Ankleshwar – 393 002, Distt.Bharuch, Gujarat	3000	Zinc Ash & Residues, Copper Residues, Spent Catalyst containing Copper Spent Catalyst containing Zinc
36.	Sairam Industries, Plot No.316, Phase-1, GIDC Estate, Chhatral, Distt.Gandhinagar, Gujarat.	1200	Zinc Ash, Zinc Skimming, Zinc bearing wastes arising from smelting and refining, Copper Oxide, Mill Scale Copper Reverts Cakes & Residues
37.	Khandelwal Brass Industries, B-37, GIDC, Shankar Tekari Indl.Area, Post Box No.607, Jamnagar-361 004, Gujarat.	3000	Brass Dross, Copper Dross and Copper Druid
38.	Shyam Chemical, Survey No.222, At: Ramgadh, Post-Derol, Tq:Himmatnagar, Distt. Sabarkantha, Gujarat.	1500	Zinc Ash & Skimmings, Copper Cakes and Residues
39.	Raj Agro, Plot No.3-4, Gojariya GIDC, Taluka – Vijapur, Distt. Mahesana, Gujarat.	6500	Zinc Ash, Brass Dross & Zinc Dross, Zinc Residue Copper Residue
40.	Madhu Processor, Block No.227, Talaja Highway, Opp.Sartanparx Road, Village – Ukharala, Tehsil – Gogha, District Bhavnagar, Gujarat.	4200	Zinc Ash, Zinc Residue, Spent Catalyst containing Zinc Nickel, Copper Residues, Copper Cakes, Copper Ash, Copper Dross and Zinc Dross.
41.	Rubamin Limited, 23-Shree Laxmi Industrial Estate, Village – Duniya, Halol Tehsil, District – Panchmahal, Gujarat.	6000	Spent Catalyst containing Nickel, Zinc, Copper Cobalt, Vanadium and Cadmium.
42.	G.G.Manufacturer, Plot No.439/6, GIDC Odhav, Near Neptune Textile Mill, Ahmedabad, Gujarat-382 415	5880	Zinc Dross, Zinc Skimming, Zinc Ash, Copper Dross, Copper Reverts, Copper Oxide, Mill Scale, Copper Residue, Copper Cake, Spent Catalyst containing Copper and Zinc.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
43.	Abbey Chemical (P) Ltd., S.R.No.1088/B-1, Lamdapura Road, Manjusar, Taluka – Savli, Distt.Vadodara, Gujarat.	350 1000 550	Zinc Dross, Zinc Skimming, Zinc Ash and Residues. Copper Dross, Copper Oxide, Mill Scale, Copper Cake and Residue Waste Copper and Copper Alloys Slag from Copper processing. Spent Catalyst containing Nickel
	Total	**104,096**	
V	**HARYANA**		
1.	Gupta Metal Sheets(P)Ltd., Post Box No.1559, Delhi Road, Rewari, Haryana	7500	Copper Scrap, Brass Scrap, Zinc Scrap, Zinc Dross, Copper Dross and Brass Dross
2.	Shiv Metals, Gulab Nagar Chowk Bilaspur Road Jagadhari, Yamunanagar Haryana-135 003	200 70 30	Brass Dross Zinc Ash Zinc Ash Copper Dross.
3.	Shree Narayan Industries, V.P.O.Thana Chapper, Shahbad-Adhoya Road, Jagadhari, Dist. Yamunanagar, Haryana	2455 2505 2355	Brass Dross. Copper Dross, Copper Slag and Copper reverts Zinc Ash & Zinc Dross
4.	Soorajmull Baijnath Industries (Pvt.)Ltd. E-4, Industrial Area, Sonepat – 131 001, Haryana	3000	Zinc Ash, Zinc Skimming, Zinc Dross, Brass Dross, Copper Dross and Copper Reverts.
	Total	**18,115**	
VI	**JAMMU & KASHMIR**		
1.	Vimco Alloys, 163-164, SICOP Industrial Estate, Kathua, Jammu (J &K) -184 104	5400 5300	Copper Scrap/Copper. Dross/Waste Copper and Copper Alloys/Brass Scrap and Brass Dross. Zinc Scrap./Zinc Dross.
2.	Jammu Metallic Oxides Pvt. Ltd,. Logate More, Village Logate, Tehsil & Dist. Kathua – 184 104, (J &K)	4860	Copper Scrap/Copper Dross/ Copper Reverts/Waste Copper/Brass Scrap/Zinc Scrap/Zinc Dross.
3.	Shri Ganga Metals Plot No. 38, Phase-III SICOP Indl. Area Extension, Gangyal, Jammu (J&K)	10800	Copper Scrap/Nickel Scrap.
4.	Vardhman Extrusion Pvt. Ltd., Lane No.4, Bari Brahmma, Phase-II Industrial Complex, (J & K)	3600	Copper Scrap, Zinc Scrap and Brass Scrap.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
5.	Shree Shub Laxmi Enterprises, Lane No.3, SIDCO Industrial Complex, Bari Brahmna, Jammu, (J&K)	7000	Copper Reverts, Copper Druid Zinc Ash and Zinc Skimming.
6.	Shivangi Metal Industries Pvt. Ltd., Plot No. 13-14, IID Centre Battal Balian Udhampur - 182 101, (J&K)	10000	Zinc Skimming, Zinc Residues Zinc Dross Brass Dross, Copper Mill Scale, Copper Dross and Copper Druid.
	Total	**46,960**	
VII	**KARNATAKA**		
1.	Alchemist Processors, A-150 2nd 'C' Main PIE, 2nd Stage, Bangalore, Karnataka-560 058	720	Spent Catalyst (Ni,Cu,Cd, Zn,As).
2.	MSR Chemicals & Fertilizers Pvt. Ltd., No. 380, 6th Cross, 2nd Block RMV, 2nd Stage, Bangalore-560 094.	750 198	Zinc Ash /Dross /Residue/ Skimming. Copper Scrap/Residue/ Dross.
3.	Metcorp, No.175, Nagappa Garden, Kothanur Dinaye, Off.B.G.Road, Behind Meenakshi Temple, Bangalore Karnataka-560 083	3500	Copper Scrap Copper dross Brass Scrap/Dross Zinc ScrapDross/Ash Skimmings insulate Copper wise Scrap.
4.	Balaji Smelters and Alloys, Sy. No. 138/P9, Hulimangala Hoskote, Village Lakkur, Hobli Malur (TK), Kolar District, Karnataka	480 480 240	Brass Scrap. Copper Scrap. Zinc Scrap.
5.	Rajeshwari Copper Products, Shed No. D-79, Industrial Suburb Yeshwantpur, Bangalore, Karnataka-560 022	3600 860	Copper Scrap Insulated Copper Cable Scrap, Copper Dross, Copper with PVC Sheathing as Copper Druid. Zinc Ash/Skimmings.
6.	Moogambigai Metal Refineries, 89 & 90, Industrial Area , Baikampady, Mangalore, Karnataka – 575 011	760 760 760	Zinc Dross. Brass Dross. Copper Dross.
	Total	**13,108**	
VIII	**MADHYA PRADESH**		
1.	Jhaveri Overseas Pvt. Ltd., Plot No. 193/1, Navada Panth Dhar Road, Indore, Madhya Pradesh	1000	Zinc Dross/Zinc Ash/ Spent Catalyst containing Zinc Copper Scrap/Copper Dross, Spent Catalyst containing Copper & Spent Nickel Catalyst.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
2.	Cable Processors India Pvt. Ltd., Plot No. 14, Sector – A Maneri Industrial Area Dist. Mandla Madhya Pradesh	6300	Brass scrap/ Copper scrap/ Zinc Scrap, Brass Dross and Zinc Dross.
3.	Siddharth Wires Pvt. Ltd., A.B.Road, Biaora-465 674, Distt.Rajgarh, Madhya Pradesh	1800	Zinc Dross and Zinc Ash.
4.	Metachem Industries, 16/17, Industrial Growth Centre, Maneri, Distt.Mandla, Madhya Pradesh	105 105 350	Copper Scrap. Brass Scrap. Zinc Scrap.
5.	Savitri Enterprises, Plot No.22-B, Laxmibai Nagar, Fort Industrial Area, Indore-452 006 Madhya Pradesh	300	Brass Dross, Copper Dross, and Zinc Dross.
	Total	**9,960**	
IX	**MAHARASHTRA**		
1.	Aashumi Chemicals P. Ltd., 169-B, Village Mangathane, Tal. Wada, Dist. Thane,Maharashtra	2000	Copper Druid, Copper slag, Zinc Scrap, Brass Dross, Brass Scrap and spent Catalyst Containing Copper.
2.	Bharti Rubber Lining and Allied Service P. Ltd., Plot No. C-49, TTC Indl. Area, Pawane, Village & Dist. Thane, Maharashtra	10000	Copper Druid, Copper Dross Copper Residues, Copper Oxide Mill Scale, Brass Dross, Zinc Ash, Brass Scrap, Copper Scrap and Zinc Dross.
3.	Beetachem Industries, W-177,TTC Industrial Area, Pawana Village, Thane Belapur Road, Navi Mumbai, Maharashtra	60	Spent Catalyst Containing Copper & Spent Catalyst Containing Nickel.
4.	Astron Engineers (I) Pvt. Ltd., GAT No. 131, Near Lavale Phata Tal. Mulshi, Dist. Pune, Maharashtra.	4500	Copper Scrap, Brass Scrap, Zinc Scrap and Copper Druid.
5.	Namdev Silicates & Chemicals (P) Ltd., Shed No. W-73(II), MIDC Taloja, Raigarh-410 208, Maharashtra.	300 1350 900	Zinc Ash. Spent Nickel Catalyst. Copper Scrap and Spent Catalyst Containing Copper.
6.	Rajkob Industries, Plot No. N-41, MIDC Tarapur, Boisar, Dist. Thane, Maharashtra – 401 506	720	Copper Scrap, Copper Dross, Spent Catalyst containing Copper, Copper Oxide Mill Scale, Nickel Scrap, Spent Catalyst Containing Nickel Zinc Dross and Zinc Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
7.	Nizalco Metals P. Ltd., Plot No.C-353, TTC Industrial Area, MIDC Turbe, Navi Mumbai, Maharashtra	3600	Copper Druid, Copper Dross, Brass Dross & Zinc Scrap
8.	S. K. Naik & Sons, Sr. No. 50/15, Naregaon Road, Dharygaon, Dist. Pune – 411 041,Maharashtra	2160	Copper Scrap, Zinc Scrap & Brass Scrap
9.	Monika Metal Corporation, S. No. 79, Plot No.B, Opp. Bhairav Nath Temple, Kudulwadi, Chikali, Pune – 412 114,Maharashtra	2400	Copper Dross, Copper Druid, Copper Residues, Copper Reverts, Copper Cakes, Zinc Skimmings, Brass Scrap & Brass Dross.
10.	Metal Press India, 146 BCD, Industrial Estate, Charkop, Kandivli West, Mumbai – 400 067 Maharashtra	450	Copper Scrap, Brass Scrap & Zinc Scrap.
11.	Arjandas Metals Industries Pvt. Ltd., Saki Vihar Road, Arjandas House, Sakinaka, Mumbai - 400 072	8100	Brass Scrap Brass Dross Copper Scrap and Copper Dross.
12.	Vineeth Precious Catalyst (P) Ltd., 9 & 10, Estate No. 3, 15 to 18, Building, No. 8, Agarwal Udyog Nagar, Sativali Road, Vasai(E), Dist. Thane- 401 208, Maharashtra	250 150	Spent Nickel Catalyst & Nickel Scrap. Copper Scrap and Zinc Scrap.
13.	R. K.Manufacturing Company, Plot No. A-395, TTC MIDC, Mahape, Navi Mumbai-400 710, Dist. Thane, Maharashtra	2700	Copper Druid, Copper Dross, Copper Scrap, Copper Oxide, Mill Scale Copper Reverts, Cakes, and Residues Brass Scrap Brass Dross Zinc Scrap and Zinc Dross.
14.	Bharat Industries, Plot No. 46, Phase-II, Ramtekadi Industrial Estate, Hadapsar, Pune-411013, Maharashtra	500	Brass Scrap & Copper Scrap.
15.	HSR Enterprises, GAT No. 799, Pawar Vasti, Vishnu Nagar, Near Kohinoor Weigh Bridge, Chikali, Dist. Pune- 412 114, Maharashtra	2520	Copper Scrap, Brass Scrap & Copper Druid.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
16.	Aryavart Chemicals Pvt. Ltd., Plot No.G-14/3, MIDC Taloja, Tal-Panvel, Dist-Raigad, Maharashtra	300 100	Spent Nickel Catalyst. Copper Reverts & Cakes.
17.	Aditya Industries, 474, Naigaon Road, At Shinde Village Nashik-422 002, Maharashtra	1600	Copper Scrap, Zinc Ash & Zinc Dross
18.	Maurya Metal Pvt. Ltd., Plot No. A-762, TTC Industrial Area, MIDC, Khairane, Navi Mumbai – 400 709, Maharashtra	4800	Brass Scrap, Brass, Dross Copper Scrap, Copper Dross, Copper Residues, Copper Druid, Zinc Scrap, Zinc Dross, Zinc Ash & Skimmings and Zinc Residues
19.	Shri Hari Extrusion Ltd., Ashok Nagar, A.C.Road, Near Bank of Baroda, Kandivili(East) Mumbai Maharashtra	9000	Brass Dross, Copper Dross, Zinc Dross and Copper Cable i.e. Druid, Copper Residues, Zinc Scrap and Zinc Ash & Skimmings.
20.	Shree Metals(Mujbi)Private Limited, Plot No.312/2, At.Mujbi, P.Bela, Tah. & Dist.Bhandara - 441 904, Maharashtra	655 560	Zinc Dross, Zinc Ash & Zinc Residues. Brass Dross.
21.	B.R.Steel Products Pvt. Ltd., Plot No.C-39(B&C), Near Krishna Steels, Pawane Village TTC Industrial Area, Mhape Turbhe, Navi Mumbai-400 705 Maharashtra	1300	Copper residue Cakes. Copper Dross, Brass, Dross Zinc Dross Zinc Skimming, Zinc Ash and Spent Catalyst containing Nickel.
22.	R.T.Jain & Co., Plot No.F-1/19, MIDC, Tarapur, Boisar, District Thane, Maharashtra	1800	Brass Dross, Copper Dross, Copper Druid, Copper Slag, Zinc Dross, Zinc Ash.
23.	Om Balaji Inorgo Metal Pvt.Ltd., W-71/B, MIDC Chikhloli, Ambernath, District Thane, Maharashtra – 421 505	350 100	Spent Nickel Catalyst. Spent Catalyst containing copper.
24.	Kam-Vit Chemicals Pvt.Ltd., Gut No.45-46 & 47, Village:Kambre, Wada, Distt.Thane, Maharashtra-421 303	2880	Spent Catalyst containing Nickel, Copper, Copper Reverts, Cakes and Residue, Waste Copper and Copper Alloys in dispersible forms, spent cleared metal catalyst containing copper

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
25.	Govind Metal Industries, Khasra No.60/1, Station Road, Bhandara, Maharashtra	876	Brass Dross, Copper Dross, Zinc Dross and Zinc Ash.
26.	Rishabh Meta Process, Gut No.27/1, Village: Jamni(Dhaba), Station Road, Tah & Distt.Bhandara,Maharashtra	10000	Zinc Ash, Zinc Dross, Copper Dross, Brass Dross, Copper Oxide Mill Scale, Waste Copper.
	Total	**76,981**	
X	**PUNJAB**		
1.	D. D. Agro Industries Ltd., Industrial Area-C, Dhandari Kalan, Ludhiana, Punjab	7300 4300	Zinc Ash/Skimming & Zinc Scrap Copper Druid/Copper Scrap/ Copper Dross/ Copper Oxide Mill Scale/Reverts/ Cakes and residue.
2.	Randeep Paper Board Mill, Chemical Division, Village-Chabba, Tarantaran Road, Amritsar, Punjab	520	Zinc Ash, Zinc Skimming and Brass Dross.
3.	Gupta Smelters Pvt.Ltd., C-48, Industrial Focal Point, Sangrur – 148 001, Punjab	4500 2250	Zinc Dross and Zinc Skimming. Brass Dross.
	Total	**18,870**	
XI	**RAJASTHAN**		
1.	Rose Zinc Ltd., Airport Road, Post Gundli, Distt. Udaipur, Rajasthan	21200	Zinc Ash and Skimmings, Brass Dross, Copper Dross, Copper Oxide Mill Scale, Brass Scrap, Copper Scrap, Copper Reverts Cakes and Residues, Waste Copper & Copper Alloys, Zinc Scrap, Zinc Dross & Slag from Copper processing for further processing or refining.
2.	Siyarco Industries, F-540, B Marudhar Industrial Area, 2nd Phase, Basni, Jodhpur-342 005, Rajasthan	3600	Zinc Dross, Zinc Ash & Skimmings, Brass Dross, Brass Scrap, Copper Dross, Copper Scrap Reverts, Cakes & Residues, Copper Mill Scale and Copper Druid.
3.	B.M.A. Zinc Pvt. Ltd., F-449, Industrial Area, Bhiwadi, Alwar Rajasthan	2000 1275	Zinc Ash/Skimmings. Brass Dross.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
4.	West India Chemicals, F-24 -25, Mewar Indl. Area, Road No. 4, Madri, Udaipur – 313 003, Rajasthan.	1080	Zinc Ash Zinc Skimmings & Brass Dross.
5.	Goel Meta Chem. P. Ltd., A-114(A), Indraprastha Industrial Area, Kota, Rajasthan.	650	Spent Catalyst Containing Copper, Spent Catalyst Containing Nickel, Copper Residues, Copper Oxide Mill Scale, Copper Scrap and Nickel Scrap.
6.	Barium International Ltd., A-114, Indraprastha Industrial Area, Kota, Rajasthan – 324 005.	650	Spent catalyst containing Zinc & Copper, Zinc Ash, Zinc Skimming, Zinc Residues
7.	Resource Recycling Industries, G 35, RIICO Industrial Area, Manpura, Distt. Chittorgarh, Rajasthan.	6300	Spent Catalyst containing Copper Zinc & Nickel
8.	G.L. Metallica Pvt. Ltd. (Unit II), G-1/38, RIICO Industrial Area, Bassi, Jaipur, Rajasthan.	4320	Brass Scrap, Copper Scrap, Zinc Scrap Copper Druid, Waste Copper & Copper Alloys, Copper Reverts, Zinc Ash & Skimmings
9.	M/s Alcobex Metals Ltd., 24/25, HIA Area, Jodhpur, Rajasthan	700 1500	Brass Dross Waste Copper and Copper Alloys
10.	Swastik Zinc Pvt. Ltd., F-268, Mewar Industrial Area, Road No.12, Madri, Udaipur, Rajasthan – 313 001	1700 1800	Zinc Ash, Zinc Skimming, other Zinc bearing waste arising from smelting & refining, Zinc Dross, Bottom Dross, Spent cleared metal catalyst containing Copper & Zinc Copper Dross, Brass Dross, Copper Oxide Mill Scale, Copper Reverts, Cake & Residue, Waste Copper alloys and slags
	Total	**46,775**	
XII	**TAMIL NADU**		
1.	Pondy Oxides & Chemicals, G-47, SIDCO Industrial Estate, Kakkalur Village-602 003, Distt.Thiruvallur, Tamil Nadu.	4000	Copper Dross, Brass Dross, Zinc Ash, Copper Druid, Copper Scrap, Brass Scrap, Zinc Scrap and Zinc Dross

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
2.	Hydromet (India) Ltd., Vedal Village, Rajakulam Post, Kanchipuram, Tamil Nadu.	12000 3600 1400	Copper Dross, Brass Dross, Copper Zinc Spent Catalyst, Copper residue, Copper Cakes, Copper reverts, Copper Skimmings, Copper Druid, Copper Scrap/Copper alloys/Zinc Scrap & Brass Scrap Zinc Ash/Dross, Skimming Spent Zinc Catalyst, Spent Nickel Catalyst
	Total	**21,000**	
XIII	**UTTAR PRADESH**		
1.	Kay Em Enterprises, F 29 -31, Masuri Gulawali Road, Industrial Area P. O., Masuri, Dist – Ghaziabad, UP - 201 302.	2500 4500	Copper Druid Brass Dross/Copper Dross/Zinc Ash/Residue/Copper Oxide/ Mill Scale/Brass Scrap/Copper Scrap/Zinc Skimmings
2.	Aditya Recycling Industries, Vill. –Bharona, Varanasi Road, Mirzapur – 231 001, U.P.	6000	Brass Dross, Copper Dross, Copper Druid, Copper Cake & Residues, Zinc Ash, Zinc Dross and Zinc Skimming
3.	Sagun Udyog Pvt. Ltd., Rajdeopur Dehati, P.O. Rauza, Ghazipur-233 001, U.P	1000 750 500 750	Zinc Ash/Skimming Brass Dross Zinc Dross Brass Scrap
4.	Gold Star Inc., Vill. Ahraula Mafi, P.O. Chaudharpur, Via: Pakbara, Dist. Moradabad- 244 001, U.P	6000	Copper Scrap/Druid/Dross/ Residue Zinc Scrap /Dross /Skimming/ Residue and Brass Scrap/Dross
5.	Agrasen Metal Works, Shed No. D-3, Industrial Estate, Mirzapur-231 001, U.P	300 200 220	Brass Scrap/Brass Dross Copper Scrap/Copper Dross Zinc Scrap/Zinc Dross
6.	Metal Alloy, E-46, Industrial Area, Ram Nagar, Chandauli, Varanasi – 221 110 U.P	1080 540 540	Copper Oxide Mill Scale, Copper Reverts, Waste Copper and Copper Alloys, Insulated Copper Wire Scrap, Copper with PVC Sheathing, Jelly filled Copper Cables Brass Dross Zinc Dross – hot dip galvanizers Slab, Zinc Dross – Bottom Dross
7.	Chadha Brass Limited, 26, Madhubani Kanth Road, Moradabad-245 372, U.P	1800	Zinc Scrap/Brass Scrap/ Copper Scrap

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
8.	S.D.M Metalloys Limited, 16/1, A-5 Site-IV, Sahibabad Industrial Area, Ghaziabad-201 010,U.P.	6500	Brass Dross, Copper Dross, Copper Druid, Zinc Dross and Zinc Ash.
9.	Met Trade India Ltd., Village – Bheel Akbarpur, G.T Road, Dadri, Distt.Gautam Budh Nagar, U.P.	22000 22000	Zinc Ash, Zinc Dross, Zinc Skimming and spent cleared Metal Catalyst containing Zinc Copper Dross, Copper Oxide Mill Scale, Copper Reverts, Copper Cake & Residue, Waste Copper & Copper Alloys, Copper Slag, insulated Copper wire scrap, Copper with PVC Sheathing including Druid; Spent cleared Metal Catalyst containing Copper & Jelly filled Copper Cable.
10.	Sheo Kumar Sunil Kumar, Bharuhna, Varanasi Road, Mirzapur, Uttar Pradesh	500	Copper Dross, Brass Dross and Zinc Dross.
	Total	**77,680**	
XIV	**WEST BENGAL**		
1.	A.R. Engineering Works Unit-II, 36/2, Hara Chand Mukherjee Lane, Howrah-711 101 West Bengal	132 60 12	Copper Scrap, Waste Copper, Copper Alloys Brass Scrap. Zinc Scrap.
2.	Vinod Metal Industries, Mouza & Vill. Argori (NH-6), PO Argori P.S. Sankrail, Dist. Howrah - 711 302, West Bengal	420	Copper Cable/ Copper Scrap/ Copper Dross/Brass Scrap/ Brass Dross
3.	Golden Metal Industries, 265/A/1/A G.T. Road, Liluah, Howrah-711 204, West Bengal	78 36 12	Copper Scrap. Brass Scrap. Zinc Scrap
4.	Arjun Enterprise, Dakshin Duttapara Bazar, P.O.Haripukaria, P.S.Haringhata, Distt.Nadia-741 257, West Bengal	600	Insulated Copper Wire Scrap, Copper with PVC Sheathing including 'Druid', Jelly filled Copper Cables, Copper Dross & Waste Copper and Copper Alloys, Zinc Dross, Zinc Ash & Zinc Skimmings & Brass Dross.
	Total	**1,350**	
	Grand Total	**5,17,515**	

Annexure:3 - IV

Unit Wise Recovery Percentage of Secondary Lead By Lead Scrap Processors (Data Provided By CPCB, New Delhi)

Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
1.	Shri Ponni Industries, Bangalore	5000	2007 2008	364 714	276 557	76 78
2.	Relson Engineers, Kaithal, Haryana	1200	-	400	-	-
3.	Shivam Metal Works, Barara	900	-	-	1.5 Kg.	-
4.	K. B. Metal Industries, Gaziabad	900	2007-08 2008-09 2009-10	91 236 258	47 106 88	52 45 34
5.	Dinesh Metal Company, Kanpur	2000	2007 2008 2009	201 139 310	101 64 143	50 46 46
6.	Saraswat Industries, Bangalore	3200	2007 2008 2009	1010 1894 1195	982 1704 1015	97 90 85
7.	Manoj Metal Industries, Kanpur	2000	2007 2008 2009	562 191 349	281 95 174	50 50 50
8.	Associated pigments, Medinipur, Kolkata	72000	09.08 - 03.09 04.09-01.10	6365 19644	3916 11289	62 57
9.	Singh and Sons Manufacturers, Howrah	225	2007 2008 2009	56 64 80	32 49 41	57 77 51
10.	A. R. Metals, Kanpur	-	2007-08 2008-09	143 190	72 95	50 50
11.	Kunal Metal Industries, Jalandhar	1200	2007-08 2008-09 2009-10	256 402 109	101 185 52	39 46 48
12.	Maharanjani Metal Mart, Malur, Dist. Kolar	6000	2007 2008 2009	602 1803 1053	508 1052 702	84 67 100
13.	Aman Industries, Guntur	700		1124	702	62
14.	Ananda Metal Corporation, Bangalore	1800	2007 2008 2009	368 857 475	281 827 327	76 96 69
15.	Jai Shambho Metal Co., Kolkata	312	2004 2005 2006	120 122 22	85 85 16	71 70 73

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Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
16.	Perfect Alloys, Chenganur	3109	2007-08 2008-09 2009-10	378 669 913	240 370 502	63 55 55
17.	Peejaye Enterprises, Thiruvallur, Kerala	1962	2008-09 2009-10	600 540	312 350	52 65
18.	Raj Finoxides Pvt. Ltd.	10000	2007 2008 2009	4233 4381 3258	- - -	- - -
19.	Vinayaka Industrial Corp., Jalandhar City	720	2008-09	98	47	48
20.	Dashmesh Metal , Pathankot	720	Nil	Nil	Nil	Nil
21	HBL Pwer System Ltd.	12000	2006-07 2007-08 2008-09	6267 6966 7702	4694 4993 5519	75 72 72
22.	Bajaj Industries, Ghaziabad	2700	2007-08 2008-09 2009-10	237 192 160	91 64 76	38 33 47
23.	A.R. IndustriesUnit-I, Jalandhar	1200	2007to 2009	173	121	70
24.	A.R. IndustriesUnit-I, Jalandhar	500	2007to 2009	114	80	70
25.	Om Shivshakti Metal Industries, Bangalore	590	2007 2008	280 225	- -	- -
26.	Kashi Metal Works,	300	2007 2008 2009	73 86 89	42 55 55	57 64 69
27.	Rajnath Metal Works, Kolkata	300	2007 2008 2009	120 188 101	82 85 86	68 45 85
28.	Shiv Shankar Metal Works, Kolkata	234 234 234	2007 2008 2009	56 59 58	40 42 40	71 7 69
29.	Jyoti Metal Works, Ludhiana	270	06-07 07-08	85 49	50 28	59 57
30.	Ram Dular & Bros., Kolkata	150	2007 2008 2009	115 112 109	83 65 58	72 58 53
31.	Shree Ganesh Metal	234	2007 2008 2009	83 38 62	46 27 46	55 71 74
32.	Usha Metal Industries., 24 Parganas	800	2007 2008 2009	150 140 143	113 113 1146	75 81 80

Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
33.	Azad Metal Works	300 300 300	2007 2008 2009	145 142 143	114 115 114	79 81 80
34.	EMGEE Foundry	720 720 720	06-07 07-08 08-09	280 157 306	Not Mentioned	Not Mentioned
35.	Ridhi-Sidhi Dhoop & Metal Ind.	720 1200	-	18	Not Mentioned	Not Mentioned
36.	Power Trek Industries, Guntur	2700	2006-07 2007-08 2008-09 2009-10	906	572 906 388 410	27 34 36 34
37.	Himachal Forging, Solan, H.P.	21,600	09-10	735	-	6
38.	KMR Metal Mart, Coimbatore	7200	2006-07 2007-08 2008-09	1091 987 1478	- - -	
39.	Guru Nanak Auto Industrial Corporation, Rohtak	1400 1400	08-09 09-10	1747 4693	1745 4689	99 99
41.	Shiv Shakti Metal Works, Kolkata	300	2007 2008 2009	138 138 128	101 89 73	73 45 57
42.	Tarak Metal Industries, Kolkata	540	2007 2008 2009	244 248 114	144 192 104	71 77 91
43.	Jayachandran Alloys, Coimbatore(T.N.)	9600	2008	5201	3137	60
44.	BT Solders Pvt. Ltd., Mysore	450	2008 2009	281 136	66 15	23 11
45.	Singh Metal Co., Kolkata	450	2007 2008 2009	149 99 105	104 62 58	70 63 55
46.	Universal Lead Alloy, Vellore	7200	2007 2008 2009	4831 4394 4302	3330 2894 2878	69 66 67
47.	Bindal Smelting Pvt. Ltd., Greater Noida	15000	2007 2008 2009	594 1207 1143	- - -	- - -
48.	Lohia Metals Pvt. Ltd.	APLU 903024080		MSCUFW 280645		21.546 (I) 55.100(I)
49.	Krishna & Sons	800	2007 2008 2009	170 181 349	21 89 214	12 49 61

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Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
50.	Shivom Gram Udyog Samiti, Mandi Gobindgarh	1200	2006-07 2007-08 2008-09	59 86 37	32 46 21	54 53 57
51.	Pondy Oxides and Chemical Ltd. Kancheepuram(T.N.)	MSCUFW 304841 MSCUFW 314329 MSCUFW 321985		Lead Scrap Radio arrived on 26.02.10 and 4.3.10 and 10.3.10, at Chennai Port.		- - -
52.	Mekala Metal Works Pvt. Ltd., Bangalore	3000	2006-07 2007-08 2008-09	1357 1728 1584	1327 1689 1551	98 98 98
53.	Leadage Alloys India Ltd., Tq. Malur, Dist. Kolar	16000	2007 2008 2009	7620 14685 15303	- - -	- - -
54.	New Power Industries, Mandi Gobindgarh	300	2006-07 2007-08 2008-09	64 108 34	41 57 17	64 53 50
55.	Jayvel Industries, Kolar, Dist.Bangalore	6000	July'09 to Dec.09	218	167	77
56.	Sajta Metal Works, Howrah	206	2007 2008 2009	56 78 75	36 53 50	64 68 67
57.	Samta Metal Industries, Kolkata	564	2009-10	169	112	66
58.	Panchwati Metal Works, Kolkata	480	2009-10	52	26	50
59.	Panchwati Metal Works, Vill. Argori, Dist. Howrah	1200	2009-10	204	125	61
60.	Maa Bhagwati Metal Industries, Argori, Dist.Howrah	1100	2009-10	298	190	64
61.	Bijay Metal Works, Kolkata	540	2009-10	79	70	89
62.	India Metal Industries, Hooghly	470	2007 2008 2009	86 126 104	62 96 81	72 76 78
63.	Rajnath Metal Works, Kolkata	300	2007 2008 2009	98 102 101	82 85 86	84 83 85
64.	Shree Ram Batteries Industries, Hyderabad	1980	2009	335	-	
65.	Bharat Industries, Ahmednagar(M.S.)	1200	2009	6	4	67

Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
66.	MRJS Lead Pvt. Ltd., Khed, Pune	2500	2007 2008 2009	4688 960 1146	9 9 9	
67.	S.S.Enterprises, Kudus, Thane	200	2006-09	54	33	61
68.	Ranchal Industries, Kudus, Thane	1200	2005-09	82	49	60
69.	Jarsons Metal, Vasai, Thane	18000	2006-07 2007-08 2008-09	828 1118 86	- - -	
70.	Sabnam Enterprises, Kutch, Gujarat	75	Aug 08 to Dec.09	85	34	40
71.	Rajkot Industries, Rajkot	4800	2006-07 2007-08 2008-09	261 412 191	146 227 120	56 55 63
72.	Blaze Metal Works, Moraiya, Ahmedabad	780	2006-07 2007-08 2008-09	148 72 191	96 60 107	65 83 56
73.	S.K. Metal Industries, Veraval, Gujarat	3300	2006-07 2007-08 2008-09	517 596 627	354 354 352	68 59 56
74.	Shakti Metal Industries, Borivali(w), Mumbai	5000	2009	263	166	63
75.	Saurabh Metal Refinery Kudus,Thane	1440	2006-07 2007-08 2008-09	253240 225	143 140 128	57 58 57
76.	Bharat Metal oxide, Moraiya, Ahmedabad	840	2009-10	10	5	50
77.	R.K. Metal Refinery, Andheri(w), Mumbai	4800	June 09 to Jan.10	141	85	60
78.	D.K.Metal Works, Kudus, Thane	4250	2006-07 2007-08 2008-09	305308 241	168172 137	55 56 57
79.	Gold Star battery Pvt. Ltd., Jamnagar, Gujarat	12000	2006-07 2007-08 2008-09	473 1141 1916	444860 1686	98 99 99
80.	Kothari Metallurgical Exports Pvt. Ltd., M umbai	7200	Aug.08 to March 09	121	68	56
81.	Global Associates	1200	2009	84	42	50

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Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
82.	Swastik Industries, Bhusaval, Jalgaon	1500	2008-09 2009-10	27 39	17 23	77 59
83.	Vishal Alloys, Gandhi Nagar	600	2006-07 2007-08 2008-09	291 317 213	196 170 150	67 54 70
84.	Sitaram Metals	1044	-	Nil	Nil	-
85.	N.V. Metal & Alloys	1800	2006-07 2007-08 2008-09	245 245 268	156 137 152	64 56 57
86.	R.K. Industries	300	08.08-03.09 04.09-09.09 10.09-03.10	58 135 43	32 74 24	55 55 56
87.	Kranti Metal Industries, Katni	-	07.09-12.09	10	-	-
88.	Vinay Industries	120	2006-07 2007-08 2008-09	36 181 102	26 92 86	72 51 84
89.	Ashish Pigments & Alloys, Bhiwadi, Alwar	4500	2009	1680	819	49
90.	Vijay Metal Industries, Daulatganj, Gwalior	430	2009	219	127	58
91.	A. M. Industries, Sanwar Road, Indore	2000	2008 2009	36 32	10 12	28 37
92.	Gravita India Ltd., Jaipur	8865	2006-07 2007-08 2008-09	459 360 709	2368 2213 3271	Not Calculated
93.	Ravi Metals, Sarigam, Valsad, Gujarat	480	2006-07 2007-08 2008-09	51 114 30	34 73 21	67 64 70
94.	Hans Enterprises, Vile Parle, Mumbai	1800	2006-07 2007-08 2008-09	316 370 228	174 195 155	55 53 68
95.	Ajay Metal Refinery, Dinkarpada, Thane	2800	2006-07 2007-08 2008-09	315 196 213	198123 134	63 63 63
96.	Shivalik Metalloys Pvt. Ltd., Bhiwadi, Alwar	18000	2008-09	348	168	48
97.	Kaycee Industries, Borivali Mumbai	5550	2009	290	-	-
98.	Noble Industries, Sanwar Road, Indore	3000	2009	46	15	33

Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
99.	Nayan Metals, Mumbai	960	2006-07 2007-08 2008-09	129 198 36	79 136 24	61 69 67
100.	Shivalik Vyapar PVT. Ltd., Indore	5000	2009	457	216	47
101.	Shiv Shakti Metals, Tapkura, Bhiwadi, Alwar	6000	11.08-03.09 04.09-12.09	252471	150 280	59 59
102.	M.S. Metals, Indore	3600	2007 2008 2009	214 163 163	203 160 130	95 98 80
103.	Sree Radhay Industries, Ajmer	-	2008 2009 2010	160 180 190	80 92 70	50 51 37
104.	Mateshwari Metals,Orpad, Surat	3000	-	135	84	62
105.	Pradeep Metal Industries, Richchai, Jabalpur	335	08.09-12.09	27	15	56
106.	Sultania Engineering Services, Ranpur, Kota	3000	2008-09 2009-10	90 110	48 60	53 55
107.	Ajmer Lead Industries, Ajmer	2160	2006-07 2007-08 2008-09	118 60 127	11759 126	99 98 99
108.	BMP Metals Pvt. Ltd., New Delhi, Bhiwadi, Rajsthan	1800 1575Reg.	2010	700	-	-
109.	Arya Alloys, New Delhi, Bhiwadi, Rajsthan	9630 7200Reg.	2006-07 2007-08 2008-09	808 1540 1704	365 671 865	45 44 51
110.	Shri Ganesh Udyog , Ganganagar	500	2006-07 2007-08 2008-09	Nil Nil Nil	Nil Nil Nil	- - -
111.	Chloride Metals Ltd. Pune	3000 7200Reg.	2007 2008 2009	4547 6757 10890	Nil Nil Nil	Nil Nil Nil
112.	Shree Mahavir Industries, Ajmer	3000	2007 2008 2009	264 Nil 296	125 Nil 145	47 - 49
113.	Mahamaya Batteries, Indore	3600	2007 2008 2009	Nil Nil Nil	Nil Nil Nil	- - -

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Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
114.	Shruti Dychem, Jodhpur	4400	2006-07 2007-08 2008-09 2009-10	78 78 145 25	39 68 64 41	50 87 44 -
115	Gagan Udyg, Ganganagar	20	2006-07 2007-08 2008-09	5 Nil 39	2 Nil 20	40 - 51
116.	Shree Swastik Pigments	1500	2008 2009	Nil 176	Nil 98	- 56
117.	Raja Industries, Bikaner	3600	2007 2008 2009	241 165 216	142 99 128	59 60 59
118.	Sumetco Alloys Pvt. Ltd., Alwar	7200	2006-07 2007-08 2008-09	474 1243 713	360 737 377	76 55 53
119.	Sarshi Metals, Wada, Thane	1800	2006-07 2007-08 2008-09	184 260 132	153 117 111	83 45 84
120.	Harban, Bhavnagar	4800	2007-08 2008-09	39 83	21 44	54 54
121.	Simplex India, Sativali, Vasai, Thane	600	2006-07 2007-08 2008-09	390 201 252	234 121 151	53 60 60
122.	Krishna Metal Refinery, Sapronda, Thane	3000	2007-08 2008-09 04.09-12.09	274 454 363	124 151 197	45 33 54
123.	Sterling Lead Pvt. Ltd., Kolhapur	7200	10.08-12.08 2009	67 662	31 345	46 52
124.	Shankar Udyog, Jodhpur	1500 (Reg. Scrap)	2007 2008 2009	226 134 167	199 60 125	88 45 75
125.	Hemal Industries, Indore	3000 (Battery scrap)	2008 2009	50 161	23 160	46 99
126.	Shri Shyam Industries, Dholpur	300 (240Reg)	2006-07 2007-08 2008-09	Nil Nil 4.5	Nil Nil 2	- - 44
127.	Raj Industries, Kota	600	08.08-12.09	120	-	-

Concld....

Sl. No.	Name of the company	Licensed Capacity (TPA)	Year	Waste Treated Tonnes	Refined metal Produced Tonnes	Percentage Recovery %
128.	Shanti Metal Refinery, Kandivali, Mumbai	1500	2007 2008 2009	241 212 433	152 134 272	63 63 63
129.	Kaysons Pigments Pvt. Ltd., Dholpur	7500 6870Reg. 5500 5000Reg.	2006-07 2007-08 2008-09	131 211 222	115 143 140	88 68 63
130.	Shree Balaji Metal Works, Ajmer	900	4.07-01.10	650	350	54
131.	Rohan Metals Pvt. Ltd., Bhiwadi	4500 3600Reg.	07.06-12.09	1970	940	48
132.	Shri Maa Narmada Metal , Jabalpur	1600	-	9	9	100
133.	Shivam Industries, Pandhurna	900	07.09-12.09	24	17	71
134.	Aswa Industries, Ajmer	2160	2006-07 2007-08 2008-09	393 285 185	266 209 209	68 73 73

Annexure:3 - V

GUIDE LINES FOR NONFERROUS SCRAP, 2009, INSTITUTE OF SCRAP RECYCLING INDUSTRIES INC. (ISRI) (FOR ZINC)

SAVES

Old Zinc Die Cast Scrap: shall consist of miscellaneous old zinc base die castings, with or without iron and other foreign attachments. Must be free of borings, turnings, dross pieces, chunks, melted pieces and skimmings. All unmeltables, dirt, foreign attachments and volatile substances (Such as rubber, cork, plastic, grease, etc) are deductible. Material containing in excess of 30% iron will not constitute good delivery.

SCABS

New Zinc Die Cast: shall consists of new or unused clean zinc base die castings. Castings to be unplated, unpainted and free from corrosion.

SCOOT

Zinc Die Cast Automotive Grills: shall consist of clean, old or used zinc base die cast automotive grilles, free from soldered material. All foreign attachments and extraneous materials are deductible.

SCOPE

New Plated Zinc Die Cast : shall consist of new or unused clean, plated zinc base die castings, free from corrosion.

SCORE

Old Scrap Zinc: shall consist of clean dry scrap zinc, such as sheets, jar, lids, clean unalloyed castings and anti-corrosion plates. Borings and turnings are not acceptable. Material must not be excessively corroded or oxidized. All foreign attachments and extraneous materials are deductible.

SCREEN

New Zinc : shall consist of any new pure zinc sheets or stampings free from corrosion. To contain no foreign material or attachments. Printers zinc such as engravers zinc, lithograph sheets and addressograph plates subject to special arrangements. Printers zinc to be free of routings.

SCRIBE

Crushed clean sorted fragmentizers die cast scrap as produced from automobile fragmentizers: to be clean, free of dirt, oil, glass, rubber and trash. To contain a maximum of 5% unmeltables such as free iron, copper, aluminium and other metals.

SCROLL

Unsorted zinc die cast scrap: Produced from automobile fragmentizers. Material to contain about 55% zinc-bearing scrap. Other non-ferrous metals such as aluminium, stainless steel, red metal etc. to be about 40%. Insulated copper wire about 1%. Trash, dirt, rubber, oil, iron not to exceed 5%. Any variations to be sold by special arrangement between buyer and seller.

SCRUB

Hot dip galvanizers slab zinc dross (batch process): Shall consist only of galvanizers unsweated zinc dross in slab form from hot dip galvanizing(Batch Process) with a minimum zinc content of 92% and shall be free of skimmings and tramp iron. Broken pieces under 2" in diameter shall not exceed 10% of the weight of each shipment. Slabs shall not weight over 100 pounds. Heavier pieces acceptable upon mutual agreement between buyer and seller. Material from continuous galvanizing operation is not acceptable. Blocks are acceptable upon mutual agreement.

SCULL

Zinc die cast slabs or pigs: Shall consist of melted zinc base die cast materials, in smooth clean solid slabs or pigs. Material to be free from drosses and to contain a minimum zinc content of 90%. To contain a maximum of 0.1% nickel and maximum of 1% lead. Blocks are acceptable upon mutual agreement.

SEAL

Continuous Line Galvanizing slab zinc top dross: Shall consist of unsweated zinc dross removed from the top of a continuous line galvanizing bath, in slab form not weighing in excess of 100 pounds each with a minimum zinc content of 90%. Heavier pieces acceptable upon mutual agreement between buyer and seller. Shall be free of skimmings. Broken pieces under 2" in diameter shall not exceed 10% of the weight of each shipments.

SEAM

Continuous Line Galvanizing slab zinc bottom dross: Shall consist of unsweated zinc dross removed from the bottom of a continuous line galvanizing bath, in slab form not weighing in excess of 100 pounds each with a minimum zinc content of 92%. Heavier pieces acceptable upon mutual agreement between buyer and seller. Shall be free of skimmings. Broken pieces under 2" in diameter shall not exceed 10% of the weight of each shipments.

SHELF

Prime zinc die cast dross: Shall consist of metal skimmed from the top of pot of molten zinc die cast metal. Must be unsweated, unfluxed, shiny, smooth, metallic and free from corrosion or oxidation. Should be poured in moulds or in small mounds weighing not over 75 pounds each. Zinc content shall be minimum of 85%.

Annexure: 3 - VI

HS CODES OF ZINC AND OTHER ITEMS

S.No.	HSCode	Commodity
1.	26080000	ZINC ORES & CONCENTRATES
2.	26201100	HARD ZINC SPELTER
3.	26201900	OTHER ASH & RESIDUE CONTNG MAINLY ZINC
4.	28170010	ZINC OXIDE
5.	79011100	ZINC,NOT ALLOYD,CONTNG BY WT>=99.99% ZINC
6.	79011200	ZINC,NOT ALLOYED,CONTNG BY WT
7.	79020010	ZINC SCRAP COVERED BY ISRI CODE SAVES,SCAB,SCOPE,SCOOT,SCORE,SCREEN, SCULL,SCRIBE, SCRUB,SEAL,SEAM,SHELF
8.	79020090	OTHER ZINC SCRAP
9.	79031000	ZINC DUST
10.	79039000	ZINC POWDERS AND FLAKES
11.	79040011	HOLLOW BARS OF ZINC
12.	79040012	RODS, INCLUDING WIRE RODS OF ZINC
13.	79040019	OTHER BAR AND RODS OF ZINC
14.	79040021	HOLLOW PROFILES OF ZINC
15.	79040022	ANGLES, SHAPES AND SECTIONS OF ZINC
16.	79040029	OTHER PROFILES OF ZINC
17.	79040030	ZINC WIRE
18.	79050010	CALOTS OF ZINC
19.	79050020	PLATES OF ZINC
20.	79050030	SHEETS, STRIP AND CIRCLES OF ZINC

Annexure:3 -VII

LIST OF THE ZINC WASTE RE-PROCESSORS UNITS REGISTERED WITH MOEF/CPCB AS RECYCLERS/REPROCESSORS HAVING ENVIRONMENTALLY SOUND MANAGEMENT FACILITIES
As on 13.5.2010

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
I	**ANDHRA PRADESH**		
1.	Sylvan Agro Industry, Plot No. 160/A, IDA, Mallapur, Hyderabad- 500 076, Andhra Pradesh.	1250	Zinc Ash
2.	Ambica Industries, Plot No. 162, IDA, Mallapur R.R. Dist. Hyderabad - 500 076, Andhra Pradesh.	3700	Zinc Ash Zinc Dross Skimming, Zinc Scrap only.
3.	Siri Chemicals (P) Ltd., No. 296/7/5.,IDA Bollaram, Medak Dist. Andhra Pradesh	700	Zinc Dross, Zinc Scrap, Zinc Ash & Zinc Residue only.
4.	Syno Chemical India, Plot No.48 CIE(Expansion) Gandhinagar, Balanagar, Hyderabad-500 037	31.2	Zinc Dross Only.
5.	Gem Oxides Pvt. Ltd., Plot No.4/2 E, Road No.2, I.D.A Nacharam,Hyderabad, Andhra Pradesh - 500 063.	450	Zinc Ash/Dross/Scrap.
6.	Chensun Industries, GNT Road, Periyavattu, Nellore Dist., Andhra Pradesh - 524 401.	600	Zinc Dross.
	Total	**6731**	
II	**BIHAR**		
1.	Bharat Organics, Industrial Estate, Bela PO-M.I.C, Muzaffarpur -842 005 Bihar.	900	Zinc Ash /Skimming.
	Total	**900**	
III	**CHANDIGARH**		
1.	Haryana Agro Chemicals (India), 65, Industrial Area, Phase – II, Chandigarh - 160 002.	1800	Zinc Ash /Skimming and Dross.
2.	Hari Dev Chemicals, 28/3, Phase-II, Indl. Area, Chandigarh – 160 002	450	Zinc Dross/Zinc Skimming.

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
3	Shivalik Chemicals (P) Ltd., 349, Industrial Area, Phase-II, Chandigarh – 160 002	600	Zinc Ash /Skimming.
	Total	**2850**	
IV	**CHATTISGARH**		
1.	Om Chemicals Industries 654- A, Urla Industrial Estate, Raipur – 493 221 Chhattisgarh.	400	Zinc Ash.
	Total	**400**	
V	**DAMAN DIU & DADRA NAGAR HAVELI (UNION TERRITORY)**		
1.	Zincollied Industry, (A division of Rubamin Ltd.) Plot No. 29-31, Silver Industrial Estates, Bhimpore,Daman -396 210	3820	Zinc Dross.
2.	Zincollied (India), (A division of Rubamin Ltd.) 138/139, Panchal Udyog Nagar, Bhimpore, Daman - 396 210	5000	Zinc Dross/Zinc Scrap.
3.	Nav Bharat Metallic Oxide, Industries Ltd. (Unit -II), Plot No. 8 & 9, Survey No. 482, Near Checkpost, Village- Dabhel, Daman– 396 210	3600	Zinc Dross/Zinc Scrap.
4.	Nav Bharat Metallic Oxide- Industries Ltd. (Unit -I), Plot No. 6 & 7, Survey No. 482, Near Checkpost, Village- Dabhel, Daman - 396210	3600	Zinc Dross/Zinc Scrap.
	Total	**16020**	
VI	**GUJARAT**		
1.	Arat Electro Chemicals, Opp. Lal Bahadur Shastri Stadium, Nv. Panna Estate, Bhapu Nagar, Ahmedabad, Gujarat - 380 023	3600	Zinc Ash and Zinc Skimmings.
2.	Maliwal Impex Pvt. Ltd., Bhole Shiv Compound, P.O. Singarva ,Taluka–Daskroi, District Ahmedabad -382 430, Gujarat	4000	Zinc Scrap.
3.	Shivam Alums and Chemicals, Plot No. 7603, GIDC Estate, Behind Karmatur Chokdi, Ankleshwar-393 002, Gujarat.	9300	Zinc Dross, Zinc Ash & Zinc Skimmings.

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
4.	JAS Chemical Industries, PlotNo. 2412 GIDC, Sarigam, Valsad – 396 155 Gujarat.	480	Zinc Ash.
5.	Perfect Inorganic Pvt. Ltd., Old Rafadeshwar Road, Bhadiad, Morbi Dist. Rajkot, Gujarat – 363 642	240	Zinc Scrap & Zinc Dross.
6.	Ace Inorganics Pvt. Ltd., Vijay Industrial Estate, Padra Road Samiala – 391410, Dist. Baroda, Gujarat	720	Zinc Dross.
7.	Mars Metals Oxide & Alloys Corporation, Old Burder Road, Bhavnagar – 364 001 Gujarat	1800	Zinc Dross & Zinc Scrap.
8.	Dharti Zinc, 35 GIDC, Motipura, Himmat Nagar, 383 001, Dist. Sabarkantha, Gujarat	2000	Zinc Dross & Zinc Scrap
9.	Atlas Chemical, Plot No. 1005, Phase-IV GIDC, Naroda, Ahmedabad-382 330 , Gujarat	24	Zinc Ash, Zinc Scrap, Zinc Dross, Zinc Residues & Zinc Skimmings
10.	Shine Cera, Plot No. 44, GIDC Estate,Motipura, Himmatnagar, Dist. Sabarkantha – 383 001,Gujarat	2000	Zinc Dross & Zinc Scrap
11.	Rubamin Limited, 100 & 113, GIDC Nandesari, Nandesari, Vadodara, Gujarat	20160	Zinc Ash, Zinc Residues, Zinc Skimming and Brass Dross
12.	Gujarat Chlorides, GIDC Plot No.190/191, Nandesari Distt.Baroda, Gujarat	1000	Zinc Ash, Zinc Skimming,S Zinc bearing Nastes & Residues Zinc Alloy Residues in dispersible form
13.	Atlas Minerals & Chemical Mfg.Co., Plot No.1005/2, Phase-IV, GIDC Naroda, Ahmedabad.	90	Zinc Ash & Zinc Dross
14.	Radhe Agro, Block No.152/155, Near Umiya Weigh Bridge, Vill.-Dhanot, Chhatral Kadi Road, Tq-Kalol, Distt. Gandhinagar, Gujarat.	1440	Zinc Ash and Skimming

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
15.	Rubamin Limited, Plot No.17, GIDC Nandesari, Nandesari,Vadodara, Gujarat.	8000	Zinc Ash, Zinc Skimming, Zinc bearing Wastes from Smelting Refining, Galvanising, Die Casting, Zinc Residue and Spent Catalyst containing Zinc
16.	Transpek – Silox Industry Limited, Kalali Road, Atladra, Vadodara – 390 012, Gujarat.	1080	Zinc Ash
17.	Swet Chemical Industries, Plot No.C1 B, 25/1, 25/5, 26/2, GIDC, Kalol - 382 725 Gujarat.	520	Zinc Ash
18.	Transpek-Silox Industry Limited, AT & PO:Ekalbara, Distt.Vadodara, Tq:Padra, Gujarat – 391 440.	360	Zinc Ash.
19.	Uttam Industries, Plot No.708, GIDC, Sector-28, Industrial Area, Gandhinagar, Gujarat – 382 028	4500	Zinc Dross, Zinc Ash.
20.	Demosha Chemicals Pvt. Ltd., 82, GIDC, Gundlav, Distt. Valsad, Gujarat – 396 035.	2150	Zinc Dross
	Total	**63464**	
VII	**HARYANA**		
1.	Shri Ram Agro Chemicals Pvt. Ltd., Simbal Road, Tohana - 126 120, Dist. Hisar,Haryana.	3600	Zinc Ash/Zinc Skimming
2.	Dee Kay Exports, 24, Industrial Estate, Yamunanagar - 135 001, Haryana.	3410	Zinc Skimmings/Zinc Ash
3.	Prabhat Fertilizer & Chemical Works, Mangalpur- Kunjpura Road, Dist. Karnal,Haryana.	4000	Zinc Ash/Zinc Skimmings
4.	Metal and Alloys, Jetheri Road, 20th Mile, P.O. Rai Distt. – Sonepat 131 029 , Haryana.	1125	Zinc Ash and Zinc Skimming
5.	Chandigarh Chemical, Jamalpur Road, Tohana - 125 120, Distt. Fatehabad , Haryana.	1620	Zinc Ash/Zinc Skimming

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
6.	Sandley Industries, 29, Udyog Nagar, Hisar – 125 005, Haryana.	3000	Zinc Skimmings
7.	Haryana Chemicals Industries, Red Cross Road, MIE Bahadurgarh, Dist. Jhajjar, Haryana.	1800	Zinc Ash/ Zinc Skimming/ Zinc Residues
8.	Shakti Industries, 9th K.M. Rajgarh Road, Hissar Haryana	1700	Zinc Scrap
9.	Singhal Industries, 10, Industrial Development, Colony(IDC), Hissar – 125 005, Haryana	1200	Zinc Ash
10.	Surya International, 1617 MIE, Bahadurgarh, District-Jhajjar, Haryana	800	Zinc Dross/ Zinc Scrap
11.	Ridhi Sidhi Alloys (P) Ltd., 103, Sector 28-A, Delhi Road, Hissar, Haryana	6000	Zinc Ash/ Zinc Scrap
12.	Sonia Overseas Pvt. Ltd., 34, Industrial Area, Phase-I Panchkula – 134 113, Haryana	3600	Zinc Ash/ Zinc Skimming
13.	Vishal Chemicals & Metal Refining Works, 923, MIE Part-A, Bahadurgarh, 103 Sector 28-A, District- Jhajjar, Haryana	1500	Zinc Ash/ Zinc Skimming/Zinc Residue and Zinc Scrap
14.	Metalco India Pvt. Ltd., 1486, Modern Ind.Estate, Bahadurgarh – 124 507, Haryana	900	Zinc Ash/ Zinc Skimming/ Zinc Dross
15.	Punia Udyog, Delhi-Tijara Road, Rewari - 123 401, Haryana	1800	Zinc Ash and Zinc Dross
16.	Metal & Chemicals, Modern Industrial Estate(MIE), Red Cross Road, Tikri Border, Bahadurgarh – 124 507, Haryana	3000	Zinc Ash, Zinc Skimming and Zinc Dross
17.	P.R.Products, 164/3, HSIDC, Karnal-132 001, Haryana	3060	Zinc Ash and Zinc Skimming

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
18.	Mahesh Chemicals & Allied Industries, 24, Industrial Area-IIIrd, Sirsa, Haryana	4000	Zinc Ash and Zinc Skimming
19.	Shree Gopala Sanwaria Chemicals, Near Janak Steel Tubes, Delhi Road, Village – Satrod, Tehsil & District – Hissar, Haryana	3000	Zinc Ash.
20.	Upper India Smelting & Refinery Works, 11-E, Industrial Area, Yamunanagar – 135 001, Haryana	6500 5500	Zinc Dross. Zinc Ash and Zinc Skimming.
21.	Maa Bala Sundari Industry # 449, IGC, HSIDC, Saha Ambala, Haryana	6000	Zinc Ash, Zinc Skimming, Zinc Dross and Zinc Residue.
22.	Shakti Industries 9th K.M., Rajgarh Road Hisar, Haryana	1700	Zinc Ash, Zinc Dross and Zinc Skimming.
	Total	**68815**	
VIII	**HIMACHAL PRADESH**		
1.	Hari Har Industries, Village & Post Raisary, Dist. Una , Himachal Pradesh	1000	Zinc Ash.
2.	Indoplast Pvt. Ltd., Plot No. 46-48, Sector – 5, Parwanoo Distt. Solan, Himachal Pradesh	6000	Zinc Ash, Zinc Skimming and Zinc Dross.
3.	Una Chemicals Pvt.Ltd., Village & Post – Raisary, Distt.Una, Himachal Pradesh	1800	Zinc Ash.
	Total	**8800**	
IX	**JAMMU & KASHMIR**		
1.	D. D. Agro Industries Limited Unit-II, 23, Industrial Growth Centre, Phase-I Samba, (J & K)	14760	Zinc Dross/Zinc Skimming/Zinc Scrap.
2.	Quality Zinc Private Limited, Lane No.7, Phase-1 I.G.C., SIDCO, Samba-184 121, (J&K)	3600	Zinc Dross.

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
3.	Galaxy Industries, Phase-II, Industrial Growth Centre(IGC) Samba, (J&K)	5500	Zinc Dross.
4.	Hari Narain Industries, I.G.C., SIDCO Industrial Area, Phase-I, Samba, (J&K)	4320	Zinc Dross.
5.	Golden Fabricators, Lane No.4, Phase-II, SIDCO Industrial Complex, Bari Brahmana, Jammu, (J & K)	1320	Zinc Dross.
	Total	**29500**	
X	**JHARKHAND**		
1.	Tirupati Chemical & Industries, P.O. – Mahilong, Distt.-Ranchi , Jharkhand – 835 103	1120	Zinc Ash and Zinc Dross.
2.	Anmol Agrifarms Inputs Pvt.Ltd., Plot No.2655, Chota Manikpur, Jasidih Industrial Area, Jharkhand – 814 142	3200	Zinc Ash.
3.	United Chemicals, Plot No.B-12(P), 6th Phase , Industrial Area, Gamharia, Distt.Seraikela – Kharsawan, Jharkhand	300	Zinc Ash
	Total	**4620**	
XI	**KARNATAKA**		
1.	Himalaya Oxides Pvt. Ltd., 231-A, Hebbal Indl. Area, Mysore-571 106, Karnataka	240	Zinc Dross Only.
2.	Pranil Enterprises Pvt. Ltd., Sy No. 32, Kallugopanahally Bidadi, Hobliramanagaram Taluk, Bangalore-Mysore Road, Bangalore-562 109, Karnataka	3600	Zinc Ash.
3.	Vasthu Chemicals Pvt. Ltd., 314 Part-I, Hebbal Industrial area, Mysore, Karnataka-570016	720	Zinc Dross only.
4.	Chemitals Pvt.Ltd., A-156, III Cross, Industrial Estate Peenya, Bangalore- 560 058, Karnataka	1080	Zinc Dross only.
	Total	**5640**	

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
XII	**MADHYA PRADESH**		
1.	Agro Phos (India)Limited, 13A/2, Industrial Estate, Site-1, Dewas, Madhya Pradesh	1800	Zinc Ash/Zinc Skimmings
	Total	**1800**	
XIII	**MAHARASHTRA**		
1.	Dhatu Nigam, Village Tekadi, Jabalpur Road, P.O. Kanhan – 441 401,Dist. Nagpur, Maharashtra	192	Zinc Scrap & Zinc Ash.
2.	J.K. Corporation Gali No. 9 & 10, Walia Indl. Area, Village Sativali Vasai(E) Distt. Thane-401 208	2700	Zinc Ash, Zinc Residues & Zinc Scrap.
3.	Kothari Enterprises, Mujbi, P.O. Bela, Tah. & Dist. Bhandara, Maharashtra	1600	Zinc Ash, Zinc Dross, Zinc Scrap and Zinc Skimmings.
4.	Vijay Chem Industries, Survey No. 150 A/2, Saparonde Village, Kondala Road, Dist. Thane, Maharashtra	1250	Zinc Ash.
5.	Gaurav Industries, U-152 MIDC Estate, Hingna Road, Nagpur-440016, Maharashtra	540	Zinc Ash.
6.	R. K.Manufacturing Company, Plot No. A-395, TTC MIDC, Mahape, Navi Mumbai-400 710, Dist. Thane, Maharashtra	2700	Copper Druid, Copper Dross, Copper Scrap, Copper Oxide, Mill Scale Copper Reverts, Cakes, and Residues Brass Scrap Brass Dross Zinc Scrap and Zinc Dross.
7.	Sigma Chemical Industries, Plot No. H-6, MIDC Taloja, Tal-Panvel, Dist.- Raigad, Maharashtra	500	Zinc Ash & Zinc Waste.
8.	Raniganj Chemical Works, Plot No. A-12, MIDC Chemical Zone, Kalyan Badlapur Road, Ambernath, Dist. Thane -421 501, Maharashtra	140	Zinc Ash & Zinc Scrap.

Contd....

Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
9.	Muby Chemicals, W-105, Behind Hamilton Cycles, MIDC Ambernath - 421 501, Distt.Thane, Maharashtra	860	Zinc Ash, Zinc Residues, Zinc Dross & Zinc Skimming.
10.	A.I.C. Chemical Private Ltd., Mohan Mill Compound, Kolshet Road, Thane (West), Maharashtra	3000	Zinc Ash, Zinc Dross, Hot Dip Galvanizers Slab Bottom Dross, Zinc Ash/ Skimming arising from galvanizing and die casting operations, Zinc Ash/ Skimming/other Zinc bearing waste arising from smelting and refining. Zinc Ash and residues including Zinc Alloy residues in dispersible form.
11.	Ashok Chemical Industry, Village – Parivali, Post-Angaon, Wada Road, Tal-Bhiwandi, Distt.Thane, Maharashtra	1200	Zinc Ash.
	Total	**14682**	
XIV	**ORISSA**		
1.	Pushpanjali Limited, BN-25, Kalunga Industrial Estate, Kalunga-770 031, Orissa	4932	Zinc Scrap/Zinc Dross
2.	P.K.Sales Corporation, Brahmani Tarang, P.O.Vedvyas, Rourkela – 769041, Orissa	960	Zinc Dross/Zinc Scrap
	Total	**5892**	
XV	**PONDICHERRY**		
1.	AVR Zinc Products (P) Limited, 4-295, Anyam Gardens, Yanam, Pondicherry-533 464.	3000	Zinc Ash, Zinc Dross, Zinc Scrap only
	Total	**3000**	
XVI	**PUNJAB**		
1.	Gupta Agri Care Private Limited, B-13-14, Industrial Focal Point, Sangrur-148 001, Punjab	3500 1000	Zinc Ash/Zinc Skimming. Zinc Dross/Zinc Scrap
2.	Ganesh Agro, B-7, Focal Point, Dist. Sangrur- 148 001, Punjab	3780	Zinc Ash/Zinc Skimming.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
3.	Kay Chemical Industries, 430, Industrial Focal Point, Mehta road, Amritsar, Punjab	1000	Zinc Skimming Only Zinc Ash.
4.	Jyoti Chemicals & Fertlizers, Patiala Road, Village Fatehpur, Tehsil : Samana, Patiala-147 101 Punjab	3200	Zinc Ash/Skimming.
5.	Arihant Chemicals, Lodhana Jhikka Road, Banga, Distt. Nawanshar-144 505, Punjab	600	Zinc Ash/Skimming.
6.	Shambhu Nath Chemical Works, Old Jail Road, Amritsar, Punjab	1170	Zinc Ash.
7.	Nav Jyoti Chemicals & Fertlizers, Patiala Road, Samana, Patiala-147 101, Punjab	1260	Zinc Ash/Skimming.
8.	Malwa Fertilizers, Pawara Road, Moonak -148 033, Dist.Sangrur, Punjab	2000	Zinc Ash & Skimming.
9.	Lalit Chemicals and Fertilizers Industries, Lehal Khurd, Lehragaga, Dist- Sangrur, Punjab-148 031	3000	Zinc Ash/Zinc Skimming.
10.	Shri Ram Agro, Bagrain Road, Bardwal Dhuri, Punjab- 148 024	750	Zinc Ash/Zinc Skimming.
11.	Shri Ram Chemical Industries, Sangrur Road,Dhuri, Punjab- 146 024	5000	Zinc Ash, Zinc Skimming, and Zinc Dross.
12.	Suraj Fine Chemicals Mfg. Co., Pawara Road, Moonak, Dist. Sangrur, Punjab-148 033	3750	Zinc Ash/Zinc Skimmings/Zinc Dross.
13.	Sonia Overseas Pvt. Ltd., Village Samalheri, Tehsil-Derabasri, P.O. Dapper, Dist. Patiala, Punjab	4500	Zinc Ash/Zinc Skimmings/Zinc Dross.
14.	Bajaj Industries, Plot No. C-3A, Focal Point, Kotkapura - 151 204, Faridkot, Punjab	1800	Zinc Ash/Skimming.
15.	Bhoomi Sudhar Chemical Industries, 7-A, Focal Point, Industrial Area, Sangrur - 148 001, Punjab	7000	Zinc Ash/Skimming.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
16.	Tirupati Poly Packs, Ludhiana Road, Malerkotla – 148 023, Punjab	800	Zinc Dross.
17.	Sardar Agro Industries, R-61, Focal Point, Amritsar, Punjab	210	Zinc Ash.
18.	Shri Ram Crop Chem Pvt. Ltd., Gudder Dhandi Road, Guru Har Sahai, Dist. Ferozepur, Punjab	1500	Zinc Ash and Zinc Skimming.
19.	Vinayak Chemical Industries, Vill.Kup Kalan, Ludhiana Road, Malerkotla, 148 023, Distt. Sangrur, Punjab	600	Zinc Ash.
20.	B. B. Chemical Industries, Batala Road, Kanna Nagar, Distt. Amritsar, Punjab	1500	Zinc Ash.
21.	Noor Chemical Industries, Village Bal Kalan, Majitha Road, Amritsar, Punjab	200	Zinc Ash.
22.	Defence Agro Chemicals & Fertilizers, Village - Sialba Majri, Teh. Kharar, Distt. Ropar, Punjab	1000	Zinc Ash/Zinc Skimming.
23.	Sardar Chem-Fert.Industries, Seed Farm Road, Abohar, Punjab	500	Zinc Ash.
24.	Roopika Chemicals &Fertilizers (P)Ltd., D-195, Phase VIII B, Focal Point, Industrial Area, Mohali-160 017, Punjab	900	Zinc Ash and Zinc Skimming.
25.	Indian Phosphates & Carbonates, Manufacturing Company, Pawara Road, Moonak, Distt.Sangrur, Punjab	2000	Zinc Ash and Zinc Skimming.
26.	Balaji Industries, Plot No.C-3A, Focal Point, Kotkapura, Faridkot-151 204 Punjab	2000	Zinc Ash and Zinc Skimming.
27.	Punjab Fertilizers & Chemicals, G.T Road Bye Pass, Chheharta, Amritsar – 143 006 Punjab	400	Zinc Ash.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
28.	Ganesh Fertichem India Pvt.Ltd., D-51-52, Industrial Focal Point, Sangrur, Punjab	6000	Zinc Ash and Zinc Skimming.
29.	Ganga Chem. Fert,(P) Ltd., Jalalabad Road, Mukatsar, Distt.Mukatsar, Punjab	1000	Zinc Ash.
30.	Moonak Fertilizers, Dehia Road, Distt.Sangrur, Moonak-148 033, Punjab	2170	Zinc Ash and Zinc Skimming.
31.	Zinc Chem, 82, Amar Garden, Kamal Park, Near Aman Nagar, Jalandhar, Punjab	162	Zinc Dross.
32.	Sevson Agro Chemicals, G.T.Road, Near Old Octroi Post, Amritsar – 143 006, Punjab	300	Zinc Ash.
33.	Kissan Zinc (India) Pvt.Ltd., 281 A, East Mohan Nagar, Amritsar – 143 006, Punjab	200	Zinc Ash.
34.	J. J.Chemicals, B/S 262 E.Mohan Nagar Indl. Amritasar – 143 006.	300	Zinc Ash.
	Total	**65052**	
XVII	**RAJASTHAN**		
1.	S. S. Poly Chemicals Pvt. Ltd., E-218, IPIA Kota, Rajasthan	400	Zinc Ash and Zinc Skimmings.
2.	Mittal Pigments, A-203, Indraprastha Indl. Area, Road NO. 5, Kota, Rajasthan.	1500	Zinc Dross, Zinc Skimmings, Zinc Ash, Zinc Residues & Spent Catalyst containing Zinc
3.	Simran Chemicals, H-1-1337, Rampur Mundana Industrial Area, Bhiwadi, Rajasthan.	400	Zinc Dross
4.	Tanwar Rajput & Company, 10, Industrial Area, Kota – 324 007, Rajasthan.	640	Zinc Dross, Zinc Scrap, Zinc Ash & Skimmings

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
5.	Zinc-o-India, Village Kesarpur, Raigarh Road, Alwar – 301 001. Rajasthan.	950	Zinc Dross, Zinc Scrap & Zinc Ash
6.	M/s Zinc-o-Rajasthan Pvt. Ltd., Village-Kesarpur, Near Alwar Public School, Rajgarh Road, Alwar-301 001, Rajasthan.	1200	Zinc Ash, Zinc Dross & Zinc Skimming
7.	Krishna Enterprises, G-225(F), Road No.5, I.P.I.A. Kota, Rajasthan.	2000	Zinc Ash, Zinc Skimming and Zinc Dross
8.	Hitesh Enterprises, H-1, 794, Industrial Area, Chopanki, Bhiwadi Distt.Alwar, Rajasthan-301 019.	1440	Zinc Dross, Zinc Ash
	Total	**8530**	
XVIII	**TAMIL NADU**		
1.	ICMC Corporation Limited, Mailam Village, Tindivanam Taluk,Distt. Villupuram, Tamil Nadu.	850	Zinc Ash only
2.	ICMC Corporation Limited, 1/3, Industrial Estate, Ariyamangalam, Trichy, Tamil Nadu - 620 010.	850	Zinc Ash only
3.	Sayee Chem Industries, 45/2, A Velathal Kovil, Kadachanallur(P.O), Trichengode (T.K), Distt. Namakkal, Tamil Nadu - 638 008.	720	Zinc Ash/Skimming/Dross/ Residue/Catalyst
4.	Promptek Metal Alloys & Refining Corporation, 35, SIDCO Industrial Estate, Thirumazhisai, Chennai - 602 107, Tamil Nadu.	60	Zinc Scrap Only
5.	Sylvan Fram Chemicals, Velanganatham Road, M. Pudapatti, P.O. Box No. 7, Musiri - 621 211, District Trichy, Tamil Nadu.	800	Zinc Ash/ Zinc Skimmings/ Scrap / Other Zinc Bearing wastes
	Total	**3280**	

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
XIX	**UTTAR PRADESH**		
1.	N. J. Fertilizers Pvt. Ltd., F-87, Site-B Surajpur Indl. Area, Greater Noida, Gautambudh Nagar - 201 306, U.P	800	Zinc Skimming/Ash
2.	Shaiwal Chemicals, Bhansi Bazar, Gazipur- 233 001,U.P	800	Zinc Ash
3.	Chakradhar Chem. Pvt. Ltd., E-3, UPSIDC Industrial Area, Begrajpur, Muzaffar Nagar, U.P.- 251 203	6000	Zinc Ash/Zinc Skimming
4.	Himgiri Metals Pvt. Ltd., E-1, Industrial Area, Begrajpur, Distt. Muzaffar Nagar - 251 203, U.P	1800	Zinc Ash/Skimming/Dross
5.	Sumit Chemicals Pvt. Ltd., 50, Uptron Estate, Panki, Kanpur, U.P	20000 6500	Zinc Ash and Zinc Skimming Zinc Dross
6.	Batar Chemfert Private Ltd., Vill. & P.O. Beerakhedi, Distt. Saharanpur, U.P.	2400	Zinc Ash/Zinc Skimming.
7.	Dayal Furtilizers Pvt. Ltd., Delhi Road, Partapur, Meerut-250 130, U.P	6000	Zinc Ash.
8.	Gupta Metal Works, C-1/D, South Side of G.T. Road, Industrial Area, Near Rathi Udyog, Ghaziabad - 201 009 U.P	600	Zinc Scrap/ Zinc Ash/Zinc. Dross/ Zinc Skimming.
9.	R.R.B.Chemicals (P) Ltd., HD-10, Industrial Area, Sikandrabad, Distt.Bulandshahar, (UP)	480	Zinc Dross.
10.	Synthetic Silica Products, D-7B, D-8, Panki Industrial Area, Site-I, Kanpur-208 022, U.P.	10000	Zinc Ash, Zinc Skimming and Zinc Dross.
11.	Shri Pashupatinath Chemicals, Village – Ajroi, Tehsil & Block Sasni, Mahamaya Nagar (Hathras), U.P.	75	Zinc Dross and Zinc Ash.
12.	United Chemical Industries, Bhau Ka Nagla, Agra Road, Firozabad – 283 203, Uttar Pradesh	600	Zinc Dross, Zinc Ash and Zinc Skimming

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
13.	Bharat Agro Molecules, E-34 & 35, Udyog Puram, Partapur, Meerut – 250 103. U.P.	800	Zinc Ash.
14.	Bharat Agro Molecules(Unit-II), Khasra No.1128, Kanshi Road, Meerut -250 103, U.P.	7000	Zinc Ash.
15.	Saral Fertilizers (P) Ltd., 5th KM, Jansath Road, Muzaffar Nagar – 251 001, U.P.	1000	Zinc Ash.
	Total	**64855**	
XX	**WEST BENGAL**		
1.	J.G. Chemicals Pvt. Ltd., 189, Girish Ghosh Road, Belur, Howrah, West Bengal.	1200	Zinc Scrap/ Zinc Dross.
2.	Pigments & Chemical Industries Pvt. Ltd., 94, K G.T. Road, Kotrung, Hoogly-712 233, West Bengal	2000	Zinc Dross.
3.	J. G. Chemicals Pvt. Ltd. (Unit -II), Jalan Industrial Complex, PO-Biprannapara, P.S. Domjur, Howrah-711 411,West Bengal	3240	Zinc Dross.
4.	Kamala Metachem, Vill. Kulai, PO Bikihakula, NH-6 Dist. Howrah-711 322, West Bengal	2600 1000	Zinc Dross/Scrap. Zinc Ash/Skimming.
5.	Synotex Industries, 1/4C, Khagendra Chatterjee Road, Cossipore, Kolkata-700 002 West Bengal	350	Zinc Ash/Zinc Dross.
6.	Shri Vishnu Industries, P.O. Bipparannapara, (Near National Highway No. 6), P.S. Domjur, Dist. Howrah - 711 411, West Bengal	1800	Zinc Ash/Skimming/ Residues/ Scrap/Dross.
7.	Cross Point Chemical Industries, P.O. Sugandha, Dist. Hooghly – 712 102, West Bengal	400	Zinc Ash/Zinc Dross.
8.	Metacon Industries, P-153 Benaras Road, Belgachia P.S., Netajigarh P.O., Liluah Dist. Howrah-711 108, West Bengal	1000	Zinc Skimmings/Ash.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
9.	Sunflower Industries, Vill. Pipil, PO Jagdishpur Hat, PS – Domjur, Dist. Howrah-711 108, West Bengal	500	Zinc Skimmings/Ash.
10.	Gem Chemical Industries, 21/A, Mirpara Road, Liluha Bhattanagar, Howrah-711 203, West Bengal	350	Zinc Ash/Zinc Skimming.
11.	Super Chemical Industries, Chak Enayet Nagar, 24 Parganas, (South)-743 503, West Bengal	936	Zinc Ash/Zinc Dross/Zinc Skimming .
12.	Ambica Chemical & Industrial Corporation, 68, Debendra Chandra Dey Road, Kolkata-700 015, West Bengal	1600 400	Zinc Ash/Zinc Skimming Zinc Dross/Zinc Scrap.
13.	Sylvan Chemicals, 40/1 'A' Road, Bomangachi Salkia, Howrah 711 106, West Bengal	540	Zinc Ash/ Zinc Skimming.
14.	Pinkto Chemicals, 455, B.T.Road, P.O.- Sukchar, 24Parganas(N)-700 115West Bengal	720	Zinc Ash, Zinc Skimming and Zinc Dross.
15.	Sakti Enterprises, Dotala Jhilpar, Vill.&P.O. : Bankura, Distt.Howrah – 711 403, West Bengal	1200	Zinc Ash, Zinc Skimming and Zinc Dross.
16.	R.K Products, Vill. & P.O : Mahishrekha, P.S : Uluberia, Distt.Howrah, West Bengal – 711 303	1400	Zinc Ash, Zinc Skimming and Zinc Dross.
17.	Panna International, 40/1 ‘A’ Road, Bamangachi, Salkia, Howrah-711 106, West Bengal	1500	Zinc Ash and Zinc Skimming.
18.	Mahabir Chemicals, Klipcon Complex, N.H.No.6, Jala Dhulagori, Sankrail, Distt.Howrah – 711 302, West Bengal	720	Zinc Dross.
19.	ARM Industries, Village & Post-Dakshin Gouripur, Near Chakdhir, P.S.:Bishnupur, J.L.No.107, 24 Parganas(South)-743 503, West Bengal	936	Zinc Ash, Zinc Skimming and Zinc Dross.

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Sl. No.	NAME OF THE UNIT	CAPACITY (tonnes/year)	WASTE PERMITTED FOR RECYCLING
20.	Maskara Chemicals & Industries, 9, Ganpatrai Khemka Lane, Liluah, Howrah, West Bengal	2700	Zinc Ash and Zinc Skimming.
21.	Vee Aar Industries, 4, Ratan Haldar Lane(Patua Para), Liluah, Howrah – 711 204, West Bengal	540	Zinc Ash and Zinc Skimming.
	Total	**27632**	
	Grand Total	**402463**	

Annexure: 4 -I

World Reserves of Lead,
(By Principal Countries)

(In '000 tonnes)

Country	Reserves
Australia	27,000
China	13,000
Mexico	5,600
Peru	6,000
Russia	9,200
USA	7,000
Other Countries	12,300
Total (rounded)	**80,000**

Source: Mineral Commodity Summaries 2011
Note: Reserve base estimates were discontinued in 2009.

Annexure: 4-II

Countrywise Mine Production of Lead by Principal Countries, 2003 to 2009

(In '000 tonnes metal content)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	China	955	997	1142	1330	1402	1403	1908
2	Australia	688	674	767	668	641	650	566
3	USA	460	445	436	429	434	410	400
4	Peru	309	306	319	313	329	345	302
5	Mexico	139	118	134	135	137	141	140
6	India[1]	47	52	62	69	79	86	83
7	Canada	81	77	79	83	75	100	69
8	Poland	87	86	79	77	74	48	37
9	Sweden	51	54	60	56	63	64	69
10	Ireland (Rep. of)	50	64	72	62	57	50	49
11	Russia	24	23	36	34	48	60	78
12	South Africa	40	37	42	48	42	46	49
	Other Countries	269	267	272	296	419	397	350
	Total	**3200**	**3200**	**3500**	**3600**	**3800**	**3800**	**4100**

Source: World Metal Statistics.
1: Years ended 31st March following that stated.

Annexure: 4-III

Countrywise Production of Refined Lead by Principal Countries, 2003 to 2009

(In '000 tonnes)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	China	1564	1934	2391	2715	2788	3452	3708
2	USA[1]	1392	1262	1293	1297	1303	1285	1235
3	Germany	357	359	342	321	405	415	390
4	Japan	295	283	275	281	276	279	248
5	U.K.	365	246	304	319	263	283	302
6	Korea, (Rep. of)	220	229	257	240	260	274	278
7	Australia	309	274	267	241	239	260	234
8	Canada	223	241	230	250	237	259	259
9	Italy	214	202	211	190	212	200	149
10	Mexico	247	217	214	227	198	256	229
11	Brazil[2]	128	137	105	143	143	96	96
12	Spain	99	106	110	129	128	125	130
13	India	71	49	59	104	124	134	138
	Other Countries	1416	1461	1542	1543	1604	1612	1458
	Total	**6900**	**7000**	**7600**	**8000**	**8180**	**8930**	**8854**

Source: World Metal Statistics.

1 : Excludes Pb content of primary antimonial Lead.

2 : Includes scrap for direct use.

Annexure: 4-IV

Countrywise Exports of Refined Lead by Principal Countries, 2003 to 2009

(In '000 tonnes)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	China	438	448	455	538	244	35	24
2	Australia	267	212	245	218	222	218	247
3	Canada [3]	152	150	161	184	168	113	130
4	Germany	65	79	97	99	113	150	163
5	Belgium	105	93	110	98	112	97	108
6	Kazakhstan	102	123	104	97	104	88	79
7	Singapore	57	19	47	96	73	78	10
8	UK	62	38	50	86	68	80	128
9	Peru	91	89	91	77	124	122	37
10	Sweden[1]	66	62	63	69	60	49	44
11	USA[2]	96	52	39	49	43	55	60
12	Morocco	58	57	54	40	40	38	21
13	Other Countries	294	296	289	300	405	471	618
	Total	**1853**	**1718**	**1805**	**1951**	**1776**	**1594**	**1669**

Source: World Metal Statistics

1: May include some bullion.

2: Includes alloy.

3: Includes shots.

Annexure: 4-V

Countrywise Imports of Refined Lead by Principal Countries, 2003 to 2009

(In '000 tonnes)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	USA	184	176	271	326	257	308	251
2	Spain	119	150	171	144	139	113	118
3	South Korea	153	157	159	122	110	91	131
4	France	98	85	105	115	114	95	38
5	Singapore	16	22	50	115	64	71	20
6	Germany	121	89	85	109	108	106	87
7	Taiwan	98	125	97	101	78	54	95
8	Italy	61	95	67	99	94	86	77
9	India	82	104	96	93	83	91	116
10	Indonesia	53	65	54	86	67	85	71
11	Thailand	79	77	68	81	68	54	70
12	Brazil	50	64	69	74	60	85	78
13	Other Countries	595	779	528	561	544	481	582
	Total	**1709**	**1988**	**1820**	**2026**	**1786**	**1720**	**1734**

Source: World Metal Statistics

Annexure: 4-VI

World Reserves of Zinc (By Principal Countries)

(In '000 tonnes of Zinc content)

Country	Reserve base
Australia	53,000
Bolivia	6,000
Canada	6,000
China	42,000
India	11,000
Ireland	2,000
Kazakhstan	16,000
Mexico	15,000
Peru	23,000
USA	12,000
Other Countries	62,000
Total	**250,000**

Source: Mineral Commodity Summaries 2011
Note: Reserve base estimates were discontinued in 2009.

Annexure: 4 -VII

Countrywise Mine Production of Zinc by Principal Countries, 2003 to 2009

(In '000 tonnes of metal content)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	China	2029	2391	2548	2844	3048	3343	3092
2	Australia	1479	1334	1367	1362	1514	1519	1290
3	Peru	1373	1209	1202	1203	1444	1603	1509
4	USA	768	739	748	727	803	778	690
5	Canada	788	791	667	638	630	750	699
6	India1	318	355	472	503	552	615	681
7	Mexico	414	426	476	479	452	454	458
8	Ireland (Rep. of)	419	438	445	426	401	398	387
9	Kazakhstan	393	361	364	405	386	387	419
10	Sweden	186	197	216	210	215	188	192
11	Bolivia	145	147	160	173	214	379	431
12	Namibia	105	185	202	185	196	193	198
	Other Countries	1183	1127	1233	1245	1245	1193	1254
	Total	**9600**	**9700**	**10100**	**10400**	**11000**	**11800**	**11300**

Source: World Metal Statistics.
1: Years ended 31st March following that stated

Annexure: 4 -VIII

Countrywise Slab Zinc Production by Principal Countries, 2003 to 2009

(In '000 tonnes)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	China	2318	2719	2776	3153	3743	4042	4357
2	Canada	761	805	724	824	802	764	685
3	Korea (Rep. of)	644	669	647	667	691	739	660
4	Japan	651	635	638	614	598	616	541
5	Australia	553	473	457	464	502	500	525
6	Spain	519	525	501	507	509	466	517
7	India	280	272	302	415	459	546	615
8	Kazakhstan	295	317	338	365	358	366	329
9	Germany	388	382	335	343	295	292	151
10	Mexico	320	317	327	280	322	305	335
11	Finland	266	285	282	282	306	298	295
12	USA	303	306	309	269	278	286	215
13	Brazil	270	273	274	279	265	249	249
14	Russia	253	239	211	248	263	253	227
15	Belgium	244	272	222	251	240	256	31
16	Other Countries	1835	1911	1857	1739	1669	1722	1668
	Total	**9900**	**10400**	**10200**	**10700**	**11300**	**11700**	**11400**

Source: World Metal Statistics.

Annexure: 4-IX

Countrywise Exports of Slab Zinc by Principal Countries, 2003 to 2009

(In '000 tonnes)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	Canada	591	614	527	629	614	600	592
2	China	451	224	123	325	276	71	29
3	Netherlands	277	269	271	306	235	246	176
4	Kazakhstan	217	260	263	280	307	334	295
5	Spain[1]	246	294	334	270	220	192	217
6	Finland	212	236	235	233	260	257	269
7	South Korea	318	320	261	215	257	311	330
8	Australia	305	159	268	188	284	317	356
9	Mexico	181	189	194	148	197	203	225
10	Norway	126	127	135	138	131	130	128
11	India	21	12	14	109	81	172	177
12	Peru	132	79	78	85	97	124	109
13	Other Countries	854	916	594	682	784	764	895
	Total	**3931**	**3699**	**3297**	**3608**	**3743**	**3721**	**3798**

Source: World Metal Statistics 1: Includes zinc scrap.

Annexure: 4-X

Countrywise Imports of Slab Zinc by Principal Countries, 2003 to 2009

(In '000 tonnes)

Sl. No.	Name of Country	2003	2004	2005	2006	2007	2008	2009
1	USA	863	799	668	727	742	724	686
2	China	136	239	387	318	149	182	670
3	Germany	254	249	246	313	315	319	286
4	Taiwan	332	344	309	286	229	222	192
5	Italy	226	273	261	229	315	180	118
6	Netherlands	161	191	139	201	181	172	146
7	France	115	103	143	170	168	164	129
8	India	145	127	140	132	58	65	94
9	UK	174	142	137	119	123	120	84
10	Indonesia	79	87	84	74	84	98	86
11	Belgium[1]	244	261	46	74	202	207	237
12	Turkey	121	144	139	73	137	147	136
13	Other Countries	809	743	707	768	875	866	796
	Total	**3659**	**3702**	**3406**	**3502**	**3578**	**3466**	**3660**

Source: World Metal Statistics *1: Includes remelted zinc.*

Annexure: 4 –XI

Indian's Exports of Lead Ores & Concentrates, 2003-04 to 2008-09 (By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1	Egypt	152	-	-	-	-	-
2	Thailand	166	-	-	-	-	-
3	USA	70	-	-	-	-	++
4	Indonesia	70	-	-	-	-	-
5	Sri Lanka	22	-	++	2	13	16
6	UAE	17	-	-	-	-	-
7	Philippines	26	-	-	-	-	-
8	Singapore	14	-	-	-	-	-
9	China, Peop. Rep. of	-	70184	9838	75408	1076500	81079
10	Netherlands	-	-	-	-	26000	-
11	South Africa	-	-	-	-	1	-
12	Other Countries		10973	-	-	-	-
	Total	**543**	**81157**	**9838**	**75410**	**1102514**	**81095**

Source: DGcls

Annexure :4 -XII

India's Exports of Lead & Alloys, 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	UK	1149	678	341	1137	341	-
2.	Sri Lanka	636	1566	1519	2420	2471	878
3.	UAE	205	786	2797	1869	874	309
4.	Singapore	211	25	-	-	-	-
5.	China, Peop. Rep. of	129	-	-	-	-	-
6.	USA	25	278	378	2994	2313	79
7.	Indonesia	93	1065	1267	283	1403	5075
8.	Germany	43	-	-	-	-	-
9.	Belgium	45	161	-	-	-	-
10.	Nepal	112	-	-	-	-	-
11.	Chinese Taipei	30	-	-	-	-	-
12.	Malaysia	105	158	257	-	-	-
13.	Thailand	64	-	-	-	-	-
14.	Saudi Arabia	45	30	-	4	3268	2283
15.	Philippines	-	195	-	-	-	-
16.	Nigeria	-	76	-	-	-	-
17.	Korea, Rep. of	-	657	-	-	-	-
18.	Italy	-	++	1006	-	-	-
19.	Israel	-	-	229	875	73	-
20.	Netherlands	-	-	43	1595	835	3
21.	Oman	-	-	33	1261	3767	172
22.	Bangladesh	-	-	-	177	581	183
23.	Congo, Peop. Rep. of					173	392
24.	Egypt					51	517
25.	Other Countries	96	556	1994	2552	3583	2580
	Total	**2988**	**6231**	**9864**	**15167**	**19733**	**12471**

Source: DGCI&S

Annexure: 4 -XIII

India's Exports of Lead Scrap 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	UAE	111	84	124	-	12	-
2.	USA	21	-	2	30	-	4
3.	Sweden	24	-	-	-	-	-
4.	Germany	-	-	11	-	-	-
5.	France	-	2	6	-	-	-
6.	Australia	-	-	-	270	-	-
7.	Cuba	-	-	-	18	-	-
8.	Denmark	-	-	-	-	-	-
9.	Spain	-	-	-	50	25	-
10.	Zaire/Congo Dem. Rep.	-	-	-	-	36	-
11.	Japan	-	-	-	-	-	80
12.	Bhutan	-	-	-	-	-	2
13.	UK	-	-	-	-	-	5
14.	Ukraine	-	-	-	-	-	4
15.	Other Countries	-	360	-	-	-	-
	Total	**156**	**446**	**143**	**368**	**73**	**95**

Source: DGCI&S

Annexure: 4 -XIV

India's Exports of Zinc ores & Concentrates, 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	China,Peop. Rep. of	46579	81823	212100	2174369	357569	87500
2.	Korea,Rep. of	1504	77955	221489	745273	143755	-
3.	Australia	-	-	-	104550		2
4.	Germany	-	-	-	4		-
5.	Japan	-	-	-	50000		-
6.	Spain	-	-	-	100000		-
7.	Thailand	-	-	10	-		-
8.	UAE	-	-	49	-		885
9.	Nepal	-	-	-	-	40	-
10.	Nigeria	-	-	-	-	200	-
11.	Saudi Arabia	-	-	-	-	10	-
12.	Switzerland	-	-	-	-	5200	-
13.	Other countries	422	20926	-	-	-	-
	Total	**62041**	**180704**	**433648**	**3174196**	**506774**	**88387**

Source: DGCI&S

Annexure : 4- XV

India's Exports of Zinc & Alloys 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	China, Peop. Rep. of	3482	666	2824	27611	3318	10397
2.	Qatar	19660	13	-	-	-	-
3.	UK	881	764	545	-	-	-
4.	USA	1109	279	625	21772	3193	-
5.	UAE	719	894	4515	5045	6263	10060
6.	Bangladesh	813	1268	40	-	-	-
7.	Canada	654	505	-	-	-	-
8.	Egypt	489	-	-	-	-	-
9.	Vietnam	516	551	-	-	-	-
10.	Germany	353	-	-	-	-	-
11.	France	299	-	-	-	-	-
12.	Belgium	252	-	-	29603	6349	11095
13.	Chinese Taipei	288	1615	-	-	-	-
14.	Philippines	304	-	-	-	-	-
15.	Singapore	-	2325	4253	-	980	29004
16.	Saudi Arabia	-	121	-	-	-	-
17.	Nigeria	-	73	-	2072	6629	10068
18.	Korea, Rep. of	-	10153	1524	-	1588	16049
19.	Italy	-	4358	20	53425	7384	11061
20.	Netherlands	-	-	55	15460	540	-
21.	Turkey	-	-	591	4507	7685	6175
22.	Indonesia	-	-	-	2214	7502	8035
23.	Spain	-	-	-	1997	3597	-
24.	Malaysia	-	-	-	-	2926	41382
25.	Other Countries	1375	3400	5435	25024	26246	56048
	Total	**31194**	**26985**	**20427**	**188730**	**81274**	**209374**

Source: DGCI&S

Annexure : 4-XVI

India's Exports of Zinc Scrap 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Nepal	-	++	42	34	++	++
2.	Germany	-	-	-	-	122	-
3.	UAE	-	++	12	165	98	25
4.	Fiji	-	10	5	28	11	-
5.	Malaysia	-	-	2	-	-	-
6.	South Africa	-	++	2	14	1	-
7.	Australia	-	++	-	-	-	-
8.	Sri Lanka	27	-	-	-	-	-
9.	Syria	3	-	-	-	-	-
10.	Pakistan	-	-	-	50	18	-
11.	Belgium			-	50	-	-
12.	Canada	-	-	1	21	-	-
13.	Chinese Taipei	-	-	-	110	-	-
14.	Italy	-	-	-	24	-	-
15.	France	-	-	-	-	-	25
16.	USA	-	-	-	-	-	8
17.	Ethiopia	-	-	-	-	-	2
18.	Other Countries	++	45	17	23	12	-
	Total	**30**	**55**	**81**	**519**	**262**	**60**

Source: DGCI&S

Annexure : 4 -XVII

India's Imports of Lead Ores & Concentrates, 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Iran	2566	96	-	-	-	-
2.	Romania	1770	-	-	-	-	-
3.	Turkey	2370	-	-	-	-	-
4.	Malaysia	981	286	201	626	178	-
5.	Morocco	68	183	402	1208	1343	1061
6.	Nigeria	167	413	444	1094	1942	2038
7.	Sri Lanka	102	-	-	-	-	-
8.	Greece	-	-	632	595	942	212
9.	Haiti	-	252	540	-	-	-
10.	USA	-	59	300	205	37	-
11.	UK	-	-	500	-	-	-
12.	Dominican Rep.	-	120	-	-	-	-
13.	Cyprus	-	-	214	-	-	-
14.	UAE	-	24	165	478	191	1
15.	Liberia	-	100	-	-	-	
16.	Senegal	-	-	-	2785	239	
17.	Gambia	-	-	-	346	143	
18.	Indonesia	-	-	-	-	210	101
19.	Ivory Coast	-	-	-	-	230	1317
20.	Ghana	-	-	-	-	-	101
21.	Other Countries	239	1045	572	695	267	353
	Total	**8266**	**2578**	**3970**	**8032**	**5685**	**5184**

Source: DGCI&S

Annexure : 4 -XVIII

India's Imports of Lead & Alloys, 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	China, Peop. Rep. of	53732	56220	35505	41108	17509	6172
2.	Korea ,Rep. of	21205	17427	18420	13147	13505	8028
3.	Australia	18688	43446	34019	41194	31497	32559
4.	Singapore	6650	975	-	-	-	3574
5.	Belgium	5082	1390	-	-	-	-
6.	Jordan	4119	10801	12158	-	-	-
7.	Egypt	3969	1545	-	-	-	-
8.	Malaysia	3893	2201	-	-	-	-
9.	Saudi Arabia	2729	1736	-	-	-	-
10.	UAE	1700	2066	4245	4933	10751	5567
11.	Iran	1755	1595	3964	15396	4200	1512
12.	UK	-	1868	-	2537	3965	5170
13.	Sri Lanka	-	2041	2722	3683	-	-
14.	Nigeria	-	1533	3708	4507	-	-
15.	Turkey	-	-	14	6549	-	-
16.	Pakistan	-	-	2139	4838	-	-
17.	Kazakhstan	-	-	-	-	1021	9102
18.	Germany	-	-	-	-	8	8492
19	Bulgaria	-	-	-	-	-	5323
20.	Other Countries	9102	3585	25844	21956	73976	98111
	Total	**132623**	**148249**	**142738**	**159848**	**137823**	**183610**

Source: DGCI&S

Annexure: 4-XIX

India's Imports of Lead Scrap 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Australia	13528	2868	2174	1726	513	1145
2.	USA	6894	3070	3458	3108	2679	1732
3.	Belgium	2112	827	2092	-	-	-
4.	Malaysia	2127	-	-	-	-	-
5.	UK	1662	869	5564	1719	3346	16317
6.	UAE	1061	1306	3567	4379	3509	1439
7.	Saudi Arabia	1026	943	1719	1313	720	740
8.	Germany	709	722	-	-	288	649
9.	Egypt	553	-	-	-	-	-
10.	China, Peop. Rep. of	672	-	-	-	-	-
11.	Singapore	683	238	-	821	477	184
12.	Kuwait	447	2373	2411	-	413	505
13.	Spain	402	39	2937	-	-	-
14.	Switzerland	498	-	-	-	-	-
15.	Romania	-	260	-	-	-	-
16.	France	-	791	1142	1676	395	-
17.	Nigeria	-	89	622	1186	275	-
18.	Bahrain	-	489	-	-	-	-
19.	Russia	-	25	-	-	-	-
20.	Jordan	-	124	-	-	-	-
21.	Georgia	-	-	-	521	744	234
22.	Mexico	-	-	-	514	547	-
23.	Netherlands	-	-	-	-	247	355
24.	Other Countries	4287	3134	6991	7210	2323	2045
	Total	**36661**	**18167**	**32677**	**24173**	**16469**	**25845**

Source: DGCI&S

Annexure: 4-XX

India's Imports of Zinc ores & Concentrates, 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Australia	49053	76857	40187	38305	28476	28865
2.	Peru	52098	-	-	11027	20957	36280
3.	Ethiopia	-	-	-	-	39	-
4.	South Africa	-	-	-	-	21	-
5.	Germany	-	-	-	60	-	-
6.	Indonesia	-	-	-	55	-	-
7.	Japan	-	-	-	18	-	-
8.	Turkey	-	-	-	2538	-	-
9.	Belgium	-	-	-	-	-	7985
10.	Ireland	-	-	-	-	-	5044
11.	Nigeria	-	-	-	-	-	27
12.	Other countries	1046	4690	-	-	-	-
	Total	**103007**	**81547**	**40187**	**52003**	**49493**	**78201**

Source: DGCI&S

Annexure: 4-XXI

India's Imports of Zinc & Alloys 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Korea,Rep. of	33376	36817	42531	15222	20133	9484
2.	Russia	18602	5878	5644	2770	1061	4979
3.	Australia	17491	18291	32083	14241	5451	8958
4.	Uzbekistan	15185	17886	11303	6486	5722	11467
5.	China, Peop. Rep. of	18452	28223	13494	21636	2791	962
6.	Iran	6954	22948	30296	36653	12615	13950
7.	South Africa	3522	-	-	-	-	-
8.	Nepal	1794	-	-	-	-	-
9.	Germany	1253	1377	-	1212	597	-
10.	Singapore	1600	3400	2959	-	-	-
11.	Thailand	1260	-	-	-	-	-
12.	UAE	-	5314	-	1977	2982	3508
13.	Switzerland	-	2416	-	-	-	-
14.	Sri Lanka	-	2887	-	-	-	-
15.	Namibia	-	-	9113	-	-	-
16.	Malaysia	-	775	-	-	-	-
17.	Belgium	-	2786	3307	2060	2641	539
18.	Kazakhstan	-	-	403	13141	12665	17839
19.	Japan	-	-	-	-	1219	1889
20.	Other Countries	7467	4766	17022	15166	5765	6554
	Total	**126956**	**153764**	**168155**	**130564**	**73642**	**80129**

Source: DGCI&S

Annexure: 4 -XXII

India's Imports of Zinc Scrap 2003-04 to 2008-09
(By Countries)

(In tonnes)

Sl. No.	Name of Country	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
1.	Belgium	8349	7595	14456	8310	2894	488
2.	USA	6912	3461	5809	2594	1506	1231
3.	UK	4691	2931	5326	4334	2177	1190
4.	France	4206	2176	4989	3626	909	-
5.	Germany	3808	3913	9123	4417	3071	539
6.	UAE	3305	2411	4718	3848	3728	2465
7.	Singapore	1762	814	-	1050	1382	474
8.	South Africa	1723	1155	-	-	-	-
9.	Sweden	1523	-	-	-	-	-
10.	Spain	1423	772	-	-	-	-
11.	Saudi Arabia	1316	1655	2722	1725	3124	1332
12.	Malaysia	1034	993	2196	1471	1216	337
13.	Iran	870	-	-	-	-	-
14.	China, Peop. Rep. of	560	314	-	-	-	-
15.	Netherlands	737	768	4371	2313	1365	124
16.	Philippines	795	809	-	-	1060	405
17.	Italy	773	1054	-	-	-	-
18.	Mexico	678	-	-	-	-	-
19.	Australia	587	230	-	-	-	-
20.	Lithuania	653	-	-	-	-	-
21.	Thailand	539	-	-	-	-	-
22.	Denmark	-	128	-	-	-	-
23.	New Zealand	-	57	21999	-	-	-
24.	Other Countries	5651	7998	21579	14782	10140	-
	Total	**51895**	**39234**	**97288**	**48470**	**32572**	**14565**

Source: DGCI&S

Annexure – 4-

Exports of Lead as per HS Codes, 2003-04 to 2009-10

(In tonnes)

Sl. No.	HS Code	Commodity	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1.	26070000	Lead Ores & Concentrates	541.73	81157.00	9838.40	75410.00	1102514.00	81095.15	36475.68
2.	26202900	Other Ash Residue Containing Mainly Lead	-	259.99	-	-	476.80	100.00	-
3.	78011000	Refined Lead	1191.18	2583.61	2300.53	3457.18	6649.51	7020.94	26970.21
4.	78019910	Pig Lead	20.00	0.33	-	1217.50	1252.04	-	120.00
5.	78019920	Unrefined Lead, N.E.S.	48.00	642.00	-	2.00	-	98.10	300.90
6.	78020010	Lead Scrap Covered by ISRI Code Racks, Radio, Relay, Ropes, Roses	101.53	127.00	124.02	350.00	62.86	-	-
7.	78020090	Other Lead Scrap	54.90	318.70	18.22	18.23	10.00	95.41	120.91
8.	78030011	Hollow Bars of Lead	18.22	0.60	-	-	1.00	-	-
9.	78030019	Other Bars of Lead	4.66	7.09	161.30	176.58	459.11	-	-
10.	78030021	Hollow Profiles of Lead	0.20	-	-	-	-	-	-
11.	78030029	Other Profiles of Lead	-	346.81	71.07	205.93	63.91	-	-
12.	78030030	Lead Wire	59.96	276.39	294.42	55.03	30.33	-	-
13.	78041110	Sheets & Strips of lead	206.69	225.09	708.07	6718.40	3831.38	688.56	690.28
14.	78041120	Lead Foil	3.75	21.65	2.62	7.70	19.43	17.41	12.68
15.	78041910	Lead Plates	56.90	47.55	958.51	12.07	2.80	108.55	0.96
16.	78041990	Other Sheets, Strips &Foil of Thickness (Excluding Any backing) Exceeding 0.2mm	-	-	1609.46	-	67.48	192.21	686.66
17.	78042000	Lead Powders & Flakes	48.79	24.21	10.36	-	44.42	99.06	18.50
18.	78050010	Lead Tubes and Pipes	42.51	84.09	3.22	9.10	3.93	-	-

Source: DGCI&S

Annexure – XXIV

Imports of Lead as per HS Codes, 2003-04 to 2009-10

(In tonnes)

Sl. No.	HS Code	Commodity	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1.	26070000	Lead Ores and Concentrates	8266.29	2577.43	3969.96	8031.73	5685.55	5183.47	6944.07
2.	78011000	Refined Lead	87335.55	106813.17	86660.44	99678.53	71827.55	103254.28	110201.49
3.	78019100	Other Unwrought Lead		-	-	969.00	414.17	-	-
4.	78019910	Pig Lead	18539.83	12009.46	20857.61	16874.52	7383.83	3393.34	1693.90
5.	78019920	Unrefined Lead, N.E.S.	4125.63	3795.70	4452.20	5908.56	8893.89	8807.12	12305.90
6.	78020010	Lead Scrap Covered by ISRI Code Racks, Radio, Relay, Ropes, Roses	30396.25	17288.16	31391.35	22744.06	16318.56	25133.56	40320.95
7.	78020090	Other Lead Scrap	6265.00	878.17	1286.70	1429.00	151.44	710.21	61.60
8.	78030011	Hollow Bars of Lead	1.05	8.35	4.20	-	16.00	-	-
9.	78030019	Other Bars of Lead	491.14	419.45	1303.08	316.16	0.40	-	-
10.	78030029	Other Profiles of Lead	216.30	23.72	160.20	26.13	-	-	-
11.	78030030	Lead Wire	174.57	124.26	28.96	24.22	6.50	-	-
12.	78041110	Sheets & Strip of Lead	3.20	1.55	6.70	37.68	23.66	62.08	29.77
13.	78041120	Lead Foil	5.53	3.39	4.43	5.20	9.68	20.87	6.79
14.	78041910	Lead Plates	51.02	110.31	7.10	614.11	533.08	559.24	1434.12
15.	78041990	Other Sheets, Strips and Foil of Thickness (Excluding any Backing) Exceeding 0.2mm	9.28	8.77	-	184.21	879.67	330.11	882.79
16.	78042000	Lead Powders and Flakes	9.31	44.81	35.63	6.85	8.45	2.53	4.48
17.	78050010	Lead Tubes and Pipes	-	0.10	0.02	0.01	0.40	-	-

Source: DGCI&S

Annexure – XXV

Exports of Zinc as per HS Codes, 2003-04 to 2009-10

(In tonnes)

Sl. No.	HS Code	Commodity	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1.	26080000	Zinc Ores & Concentrates	62040.56	180704.17	433647.50	3174196.00	506774.25	88387.32	191960.09
2.	26201100	Hard Zinc Spelter	184052.98	312296.78	242323.02	-	68110.00	1.00	-
3.	26201900	Other Ash & Residue Containing Mainly Zinc	405.05	16531.45	11041.10	13860.14	10210.62	59730.89	92352.94
4.	28170010	Zinc Oxide	6127.02	29283.59	5875.09	8280.02	-	8281.70	10301.54
5.	79011100	Zinc, Not Alloyed, Containing By Weight >=99.99% Zinc	24770.00	17579.78	8393.54	87825.03	46535.39	196432.61	156433.03
6.	79011200	Zinc, Not Alloyed	55.06	0.04	3819.97	51035.70	24855.26	8052.21	14409.28
7.	79020010	Zinc Scrap covered by ISRI Code Saves, Scab, Scope, Scoot, Score, Screen, Scull, Scribe, Scrub, Seal, Seam, Shelf	0.40	0.27	24.63	247.48	219.66	50.48	0.01
8.	79020090	Other Zinc Scrap	30.00	55.38	56.33	271.24	42.56	9.50	20.15
9.	79031000	Zinc Dust	1569.60	2167.69	3018.81	2757.77	3153.59	1130.28	1220.12
10.	79039000	Zinc powders and Flakes	13.88	11.98	35.54	219.22	1276.14	274.62	59.78
11.	79040011	Hollow Bars of Zinc	-	57.98	-	22.00	-	-	-
12.	79040012	Rods, Including Wire Rods of Zinc	0.50	1.00	0.60	5.56	0.02	83.35	34.86
13.	79040019	Other Bar and Rods of Zinc	32.20	4838.23	962.00	11514.85	88.36	451.81	26.69
14.	79040022	Angles, Shapes and Sections of Zinc	-	10.00	0.57	6.01	-	-	1.56
15.	79040029	Other Profiles of Zinc	13.30	448.10	75.56	8.75	19.65	47.52	307.11
16.	79040030	Zinc Wire	17.80	28.67	120.51	13.48	120.52	217.55	295.88
17.	79050010	Calots of Zinc	41.27	130.09	0.47	3.16	-	-	-
18.	79050020	Plates of Zinc	243.99	73.15	23.63	88.62	38.18	73.92	257.38
19.	79050030	Sheets, Strip and Circles of Zinc	34.00	0.42	14.07	3.35	3.15	3.96	0.77
20.	79060010	Tubes & Pipes of Zinc	-	49.68	-	-	-	-	-

Source: DGCI&S

Annexure – XXVI

Imports of Zinc as per HS Codes, 2003-04 to 2009-10

(In tonnes)

Sl. No.	H S Code	Commodity	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1.	26080000	Zinc Ores & Concentrates	103007.00	81547.00	40187.00	52003.01	49492.26	78201.00	59857.17
2.	26201100	Hard Zinc Spelter	420.06	148.00	3.00	310.08	0.03	-	-
3.	26201900	Other Ash & Residue Containing Mainly Zinc	35535.96	26592.15	31572.57	14113.00	14482.33	15297.84	18252.99
4.	28170010	Zinc Oxide	1154.46	1161.26	2034.00	1923.19	2399.71	2041.98	2951.14
5.	79011100	Zinc, not Alloyed, Containing by Weight>=99.99% Zinc	80027.49	103271.28	118743.68	70047.74	33498.18	40149.43	76307.59
6.	79011200	Zinc, not Alloyed	31206.33	26526.14	27213.65	37492.28	21847.09	24478.75	27165.51
7.	79020010	Zinc Scrap Covered by ISRI Code Saves, Scab, Scope, Scoot, Score, Screen, Scull, Scribe, Scrub, Seal Seam, Shelf	50746.41	38655.15	95119.71	48454.38	32524.14	14407.22	27219.13
8.	79020090	Other Zinc Scrap	1148.82	578.91	2167.93	16.00	45.36	158.26	18.10
9.	79031000	Zinc Dust	867.60	1236.34	1437.17	1426.51	1179.96	1068.53	1912.09
10.	79039000	Zinc Powders and Flakes	793. 31	616.06	776.34	1630.06	2618.04	1398.33	1445.36
11.	79040011	Hollow Bars of Zinc	748.66	1.00	100.20	65.03	159.35	10.18	127.83
12.	79040012	Rods, Including Wire Rods of Zinc	1.75	5.27	18.48	12.43	11.97	7.20	5.76
13.	79040019	Other Bar and Rods of Zinc	290.99	7339.63	364.11	1972.20	1544.56	921.78	2855.86
14.	79040021	Hollow Profiles of Zinc	49.00	0.25	-	-	-	-	-
15.	79040022	Angles, Shapes and Sections of Zinc	66.90	-	3.05	0.18	0.01	-	1.60
16.	79040029	Other Profiles of Zinc	162.98	76.13	573.50	1976.45	1288.19	370.16	1540.81
17.	79040030	Zinc Wire	1076.35	1636.79	1644.36	1739.20	988.43	1013.10	1810.13
18.	79050010	Calots of Zinc	12.00	327.29	567.10	453.20	200.01	0.04	23.16
19.	79050020	Plates of zinc	31.00	2413.51	1930.82	519.06	356.94	191.40	867.02
20.	79050030	Sheets, Strip and Circles of Zinc	2172.50	1734.20	0.60	6.76	25.26	13.10	66.46

Source: DGCI&S

Annexure: 4-XXVII

Worldwide List of Companies producing Zinc and Lead

Company Name	Operations	Countries
(Governments)	Kazzinc Mines and Mae Sot	Kazakhstan, and Thailand,
(Private)	Aljustrel, Monte Cristo (Brazil) and Neves Corvo	Brazil, and Portugal,
(Public Shareholders)	Rubtsovsky	Russia,
(Various)	Quiruvilca and Rosh Pinah	Namibia, and Peru,
Abcourt Mines Inc.	Abcourt-Barvue	Canada,
Acadian Gold	Gays River	Canada,
Anglo American plc	Black Mountain, Flin Flon Complex, Gamsberg, Hudson Bay Complex/Snow Lake, Jabali, Lisheen, Rosh Pinah and Skorpion	Canada, Ireland, Namibia, South Africa, and Yemen,
Ansan Wikfs (Hadramaut) Ltd	Jabali	Yemen,
Apollo Gold Corporation	Montana Tunnels	USA,
Arehada Mining Limited	Xilin	China,
ASARCO LLC	Tennessee Mines	USA,
Baiyin Nonferrous Metal (Group) Co. Ltd.	Baiyin and Xiaotieshan	China,
Baoshan Iron & Steel Co Ltd	Baoshan	China,
Bass Metals Limited	Hellyer	Australia,
BHP Billiton Limited	Antamina, Cannington, Pering and Selbaie	Australia, Canada, Peru, and South Africa,
Bijiashan Lead and Zinc Mine	Cheng County	China,
Blackthorn Resources Limited	Perkoa	Burkina Faso,
Blue Note Mining Inc	Caribou	Canada,
Boliden AB	Boliden District, Garpenberg, Laisvall, Los Frailes (Aznalcóllar), Myra Falls and Tara	Canada, Ireland, Spain, and Sweden,
Brazilian Resources Inc	Monte Cristo (Brazil)	Brazil,
Breakwater Resources Ltd	Bouchard-Hébert, Bougrine, Caribou, El Mochito, El Toqui, Langlois, Myra Falls and Nanisivik	Canada, Chile, Honduras, and Tunisia,
Buenaventura Mining Company Inc	Caudalosa, Colquijirca, Pucarrajo and Uchucchacua	Peru,
CBH Resources Limited	Endeavor (Elura), Panorama and Rasp	Australia,
CEDIMIN S.A.C.	Pucarrajo	Peru,
Centromin S.A.	Cerro de Pasco (Paragsha) and Morococha	Peru,
Changba	Changba	China,
Chelyabinskiy Tsinkovyi zavod OAO	Akzhal	Kazakhstan,

Contd....

Company Name	Operations	Countries
Chifeng Baiyinnuoer	Chifeng	China,
China Metallurgical Construction Corporation	Duddar	Pakistan,
China Minmetals Corporation	Century, Dugald River, Golden Grove Zinc, Izok High Lake and Rosebery	Australia, and Canada,
Compañía Minera Atacocha S.A.A.	Atacocha	Peru,
Compania Minera Casapalca S.A.	Americana	Peru,
Compania Minera Milpo S.A.A.	Cerro Lindo and El Porvenir	Peru,
Compañía Minera Raura S.A.	Raura	Peru,
Compañía Minera San Ignacio de Morococha S.A.	San Vicente	Peru,
Comsur	Bolivar and Porco	Bolivia,
Corporacion Minera de Bolivia	Bolivar	Bolivia,
Dengjiashan Lead-Zinc Mine Co., Ltd.	Xihe	China,
Dia Bras Exploration Inc	Bolivar (Mexico)	Mexico,
Doe Run Company	Sweetwater and Viburnum Trend	USA,
Dongshengmiao Mining Co.	Dongshengmiao	China,
Dongwu Nonferrous	Dongwu	China,
Dowa Holdings Co Ltd	Rey de Plata and Tizapa	Mexico,
Elkhorn Tunnels LLC	Montana Tunnels	USA,
Elliniki Technodomiki Technical Investment Industrial Company SA	Stratoni	Greece,
Empresas Frisco S.A. de C.V.	Tayahua	Mexico,
European Goldfields Limited	Stratoni	Greece,
Exxaro Resources Limited	Black Mountain, Lisheen and Rosh Pinah	Ireland, Namibia, and South Africa,
Fankou Lead-Zinc Mine Company	Fankou	China,
Gansu Chengzhou Mining and Metallurgic Group Co. Ltd.	Xiaochangba	China,
Glencore International AG	Aguilar, Bolivar, Casapalca (Yauliyacu), Iscaycruz, Rosaura, Shaimerden and Tennessee Mines	Argentina, Bolivia, Kazakhstan, Peru, and USA,
Gongcheng Daoping Lead-Zinc Mine	Gongcheng Daoping	China,
Governments	Aljustrel, Mehdiabad, Neves Corvo and Perkoa	Burkina Faso, Iran, and Portugal,
Groupe ONA	Douar Hajar (Guemassa)	Morocco,
Grupo Carso S.A. de C.V.	Real de Angeles (MRA), San Francisco Del Oro and Tayahua	Mexico,
Guangxi Fozichong Lead-Zinc Mine	Fozichong	China,

Contd....

Company Name	Operations	Countries
Guangxi Lama Xinkuang	Guangxi Liama Xinkuang	China,
Guixi Silver Mine	Guixi	China,
Hecla Mining Company	Greens Creek	USA,
Herald Resources Limited	Dairi	Indonesia,
Hindustan Zinc Limited (64.9% owned by Sterlite Industries India Limited)	Rajpura-Dariba, Rampura Agucha and Zawar Mines	India,
Huanjiang Mining and Smelting Corp.	Huanjiang	China,
HudBay Minerals Inc.	Balmat, Flin Flon Complex and Hudson Bay Complex/Snow Lake	Canada, and USA,
Huidong Lead & Zinc Mine	Huidong	China,
Hunan Nonferrous Metals Corporation Ltd	Duddar and Huangshaping	China, and Pakistan,
IMS Empreendimentos Ltda	Monte Cristo (Brazil)	Brazil,
Indago Resources Ltd.	Cadjebut, Hellyer and Lennard Shelf (Pillara)	Australia,
Industrias Peñoles SA de CV	Bismark, El Monte/Zimapán, Francisco I Madero, Fresnillo, La Cienega, Naica, Rey de Plata, Sabinas and Tizapa	Mexico,
Inmet Mining Corporation	Izok High Lake, Jaguar and Winston & Pick Lakes	Australia, and Canada,
Inner Mongolia Mining Development	Bairendaba	China,
Inversiones Colquijirca	Colquijirca	Peru,
Iran Zinc Mines Development Group of Companies	Angurane	Iran,
Ivernia Inc	Lisheen	Ireland,
Jabiru Metals Limited	Jaguar	Australia,
Jiangsu Yinmao Holding Group Co., Ltd	Nanjing	China,
Jinduicheng Molybdenum Group Co. Ltd	Wolverine	Canada,
Kagara Limited	Mount Garnet and Mungana	Australia,
Kazzinc (69% owned by Glencore)	Kazzinc Mines and Shaimerden	Kazakhstan,
Kinross Gold Corporation	Stratoni	Greece,
Kumba Iron Ore Ltd	Rosh Pinah	Namibia,
Lappland Goldminers AB	Blaiken	Sweden,
Liuzhou Huaxi Gp Cp Ltd	Dachang Huaxi and Liuzhou	China,
Longquan Mining and Smelting Co.	Longquan	China,
Lundin Mining Corporation	Aljustrel, Galmoy, Mehdiabad, Neves Corvo, Storliden and Zinkgruvan	Iran, Ireland, Portugal, and Sweden,
Metorex Limited	Maranda and Perkoa	Burkina Faso, and South Africa,

Contd....

Company Name	Operations	Countries
Mitsubishi Materials Corporation	Antamina	Peru,
Mitsui & Co Ltd	Huanzala and Kamioka	Japan, and Peru,
Morococha SA	Yauricocha	Peru,
Newmont Mining Corporation	Golden Grove Zinc	Australia,
Nippon Mining Holdings Inc.	Toyoha	Japan,
North-west Mining and Geology Group Co., Ltd.	Wolverine	Canada,
Nyrstar NV	Gordonsville and Tennessee Mines	USA,
ONHYM	Douar Hajar (Guemassa)	Morocco,
Other - Public Companies, Governments, Minor Parties	Neves Corvo	Portugal,
Outokumpu Oyj	Tara	Ireland,
OZ Minerals Limited	Century, Dugald River, Golden Grove Zinc, Izok High Lake and Rosebery	Australia, and Canada,
Padaeng Industry Public Company Limited	Mae Sot	Thailand,
Pan American Silver Corp	Huaron, Morococha, Quiruvilca and San Vicente (Bolivia)	Bolivia, and Peru,
Perilya Limited	Broken Hill and Potosi	Australia,
Perubar S.A.	Graciela	Peru,
PolyMet Mining Corp.	Hellyer	Australia,
PT Aneka Tambang Tbk	Dairi	Indonesia,
Rio Tinto Group	Greens Creek, Neves Corvo and Zinkgruvan	Portugal, Sweden, and USA,
ShalkiyaZinc N.V.	Shalkiya	Kazakhstan,
ShuiKouShan Non-Ferrous Co., Ltd.	Kangjiawan and Shuikoushan	China,
Sichuan Hongda Co., Ltd.	Aidai	China,
Sichuan Huili Zinc Mine Co., Ltd.	Huili	China,
Sipa Resources Limited	Panorama	Australia,
Sociedad Minera Corona S.A.	Yauricocha	Peru,
Southern Copper Corporation	Charcas, San Martin (Mexico), Santa Barbara (Mexico), Santa Eulalia, Taxco and Tennessee Mines	Mexico, and USA,
Sumitomo Corporation	Rey de Plata, San Cristobal (Bolivia) and Tizapa	Bolivia, and Mexico,
Teck Resources Limited	Antamina, Cadjebut, Duck Pond, Lennard Shelf (Pillara), Louvicourt, Pend Oreille, Polaris, Red Dog, San Nicolas and Sullivan	Australia, Canada, Mexico, Peru, and USA,
Tennessee Valley Resources Inc.	Gordonsville	USA,
Terramin Australia Limited	Angas	Australia,

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Company Name	Operations	Countries
Union Resources Limited	Mehdiabad	Iran,
Ural Mining and Metallurgical Company (UMMC)	Rubtsovsky and Uchalinsky	Russia,
Volcan Cia Minera S.A.A.	Animon (Chungar), Cerro de Pasco (Paragsha) and Yauli	Peru,
Votorantim Group	El Porvenir, Paracatu (Morro Agudo) and Vazante (CMM)	Brazil, and Peru,
Western Copper Corporation	San Nicolas	Mexico,
Xstrata plc	Antamina, Brunswick, Kidd Creek, Lady Loretta, Lennard Shelf (Pillara), Matagami Mines, McArthur River, Mount Isa Copper, Mount Isa Zinc, Perseverance and Reocín	Australia, Canada, Peru, and Spain,
Yunnan Metallurgical Group General Company	Huize	China,
Zeehan Zinc Limited	Comstock	Australia,
ZincOx Resources Plc	Jabali and Shaimerden	Kazakhstan, and Yemen,

Source: AME Mineral Economics, Australia, 2010

Annexure: 4-XXVIII

Worldwide List of Countries Producing Zinc and Lead

Country	Operations	Companies
Argentina	Aguilar	Glencore International AG
Australia	Angas, Broken Hill, Cadjebut, Cannington, Century, Comstock, Dugald River, Endeavor (Elura), Golden Grove Zinc, Hellyer, Jaguar, Lady Loretta, Lennard Shelf (Pillara), McArthur River, Mount Garnet, Mount Isa Copper, Mount Isa Zinc, Mungana, Panorama, Potosi, Rasp and Rosebery	Bass Metals Limited, BHP Billiton Limited, CBH Resources Limited, China Minmetals Corporation, Indago Resources Ltd., Inmet Mining Corporation, Jabiru Metals Limited, Kagara Limited, Newmont Mining Corporation, OZ Minerals Limited, Perilya Limited, PolyMet Mining Corp., Sipa Resources Limited, Teck Resources Limited, Terramin Australia Limited, Xstrata plc, and Zeehan Zinc Limited
Bolivia	Bolivar, Porco, San Cristobal (Bolivia) and San Vicente (Bolivia)	Comsur, Corporacion Minera de Bolivia, Glencore International AG, Pan American Silver Corp, and Sumitomo Corporation
Brazil	Monte Cristo (Brazil), Paracatu (Morro Agudo) and Vazante (CMM)	(Private), Brazilian Resources Inc, IMS Empreendimentos Ltda, and Votorantim Group
Burkina Faso	Perkoa	Blackthorn Resources Limited, Governments, and Metorex Limited
Canada	Abcourt-Barvue, Bouchard-Hébert, Brunswick, Caribou, Duck Pond, Flin Flon Complex, Gays River, Hudson Bay Complex/Snow Lake, Izok High Lake, Kidd Creek, Langlois, Louvicourt, Matagami Mines, Myra Falls, Nanisivik, Perseverance, Polaris, Selbaie, Sullivan, Winston & Pick Lakes and Wolverine	Abcourt Mines Inc., Acadian Gold, Anglo American plc, BHP Billiton Limited, Blue Note Mining Inc, Boliden AB, Breakwater Resources Ltd, China Minmetals Corporation, HudBay Minerals Inc., Inmet Mining Corporation, Jinduicheng Molybdenum Group Co. Ltd, North-west Mining and Geology Group Co., Ltd., OZ Minerals Limited, Teck Resources Limited, and Xstrata plc
Chile	El Toqui	Breakwater Resources Ltd
China	Aidai, Bairendaba, Baiyin, Baoshan, Changba, Cheng County, Chifeng, Dachang Huaxi, Dongshengmiao, Dongwu, Fankou, Fozichong, Gongcheng Daoping, Guangxi Liama Xinkuang, Guixi, Huangshaping, Huanjiang, Huidong, Huili, Huize, Kangjiawan, Liuzhou, Longquan, Nanjing, Shuikoushan, Xiaochangba, Xiaotieshan, Xihe and Xilin	Arehada Mining Limited, Baiyin Nonferrous Metal (Group) Co. Ltd., Baoshan Iron & Steel Co Ltd, Bijiashan Lead and Zinc Mine, Changba, Chifeng Baiyinnuoer, Dengjiashan Lead-Zinc Mine Co., Ltd., Dongshengmiao Mining Co., Dongwu Nonferrous, Fankou Lead-Zinc Mine Company, Gansu Chengzhou Mining and Metallurgic Group Co. Ltd., Gongcheng Daoping

Contd....

Country	Operations	Companies
		Lead-Zinc Mine, Guangxi Fozichong Lead-Zinc Mine, Guangxi Lama Xinkuang, Guixi Silver Mine, Huanjiang Mining and Smelting Corp., Huidong Lead & Zinc Mine, Hunan Nonferrous Metals Corporation Ltd, Inner Mongolia Mining Development, Jiangsu Yinmao Holding Group Co., Ltd, Liuzhou Huaxi Gp Cp Ltd, Longquan Mining and Smelting Co., ShuiKouShan Non-Ferrous Co., Ltd. , Sichuan Hongda Co., Ltd. , Sichuan Huili Zinc Mine Co., Ltd., and Yunnan Metallurgical Group General Company
Greece	Stratoni	Elliniki Technodomiki Technical Investment Industrial Company SA, European Goldfields Limited, and Kinross Gold Corporation
Honduras	El Mochito	Breakwater Resources Ltd
India	Rajpura-Dariba, Rampura Agucha and Zawar Mines	Hindustan Zinc Limited (64.9% owned by Sterlite Industries India Limited)
Indonesia	Dairi	Herald Resources Limited, and PT Aneka Tambang Tbk
Iran	Angurane and Mehdiabad	Governments, Iran Zinc Mines Development Group of Companies, Lundin Mining Corporation, and Union Resources Limited
Ireland	Galmoy, Lisheen and Tara	Anglo American plc, Boliden AB, Exxaro Resources Limited, Ivernia Inc, Lundin Mining Corporation, and Outokumpu Oyj
Japan	Kamioka and Toyoha	Mitsui & Co Ltd, and Nippon Mining Holdings Inc.
Kazakhstan	Akzhal, Kazzinc Mines, Shaimerden and Shalkiya	(Governments), Chelyabinskiy Tsinkovyi zavod OAO, Glencore International AG, Kazzinc (69% owned by Glencore), ShalkiyaZinc N.V., and ZincOx Resources Plc
Mexico	Bismark, Bolivar (Mexico), Charcas, El Monte/Zimapán, Francisco I Madero, Fresnillo, La Cienega, Naica, Real de Angeles (MRA), Rey de Plata, Sabinas, San Francisco Del Oro, San Martin (Mexico), San Nicolas, Santa Barbara (Mexico), Santa Eulalia, Taxco, Tayahua and Tizapa	Dia Bras Exploration Inc, Dowa Holdings Co Ltd, Empresas Frisco S.A. de C.V., Grupo Carso S.A. de C.V., Industrias Peñoles SA de CV, Southern Copper Corporation, Sumitomo Corporation, Teck Resources Limited, and Western Copper Corporation

Contd....

Country	Operations	Companies
Mongolia		
Morocco	Douar Hajar (Guemassa)	Groupe ONA, and ONHYM
Namibia	Rosh Pinah and Skorpion	(Various), Anglo American plc, Exxaro Resources Limited, and Kumba Iron Ore Ltd
Pakistan	Duddar	China Metallurgical Construction Corporation, and Hunan Nonferrous Metals Corporation Ltd
Peru	Americana, Animon (Chungar), Antamina, Atacocha, Casapalca (Yauliyacu), Caudalosa, Cerro de Pasco (Paragsha), Cerro Lindo, Colquijirca, El Porvenir, Graciela, Huanzala, Huaron, Iscaycruz, Morococha, Pucarrajo, Quiruvilca, Raura, Rosaura, San Vicente, Uchucchacua, Yauli and Yauricocha	(Various), BHP Billiton Limited, Buenaventura Mining Company Inc, CEDIMIN S.A.C., Centromin S.A., Compañía Minera Atacocha S.A.A., Compania Minera Casapalca S.A., Compania Minera Milpo S.A.A., Compañía Minera Raura S.A., Compañía Minera San Ignacio de Morococha S.A. , Glencore International AG, Inversiones Colquijirca, Mitsubishi Materials Corporation, Mitsui & Co Ltd, Morococha SA, Pan American Silver Corp, Perubar S.A., Sociedad Minera Corona S.A., Teck Resources Limited, Volcan Cia Minera S.A.A., Votorantim Group, and Xstrata plc
Portugal	Aljustrel and Neves Corvo	(Private), Governments, Lundin Mining Corporation, Other - Public Companies, Governments, Minor Parties, and Rio Tinto Group
Russia	Rubtsovsky and Uchalinsky	(Public Shareholders), and Ural Mining and Metallurgical Company (UMMC)
South Africa	Black Mountain, Gamsberg, Maranda and Pering	Anglo American plc, BHP Billiton Limited, Exxaro Resources Limited, and Metorex Limited
Spain	Los Frailes (Aznalcóllar) and Reocín	Boliden AB, and Xstrata plc
Sweden	Blaiken, Boliden District, Garpenberg, Laisvall, Storliden and Zinkgruvan	Boliden AB, Lappland Goldminers AB, Lundin Mining Corporation, and Rio Tinto Group
Thailand	Mae Sot	(Governments), and Padaeng Industry Public Company Limited
Tunisia	Bougrine	Breakwater Resources Ltd

Contd....

Concld....

Country	Operations	Companies
USA	Balmat, Gordonsville, Greens Creek, Montana Tunnels, Pend Oreille, Red Dog, Sweetwater, Tennessee Mines and Viburnum Trend	Apollo Gold Corporation, ASARCO LLC, Doe Run Company, Elkhorn Tunnels LLC, Glencore International AG, Hecla Mining Company, HudBay Minerals Inc., Nyrstar NV, Rio Tinto Group, Southern Copper Corporation, Teck Resources Limited, and Tennessee Valley Resources Inc.
Yemen	Jabali	Anglo American plc, Ansan Wikfs (Hadramaut) Ltd, and ZincOx Resources Plc

Source: AME Mineral Economics, Australia, 2010

Annexure: 4-XXIX

Worldwide List of Mines Producing Zinc and Lead

Mine Name	Country	Owners
Abcourt-Barvue	Canada	Abcourt Mines Inc.
Aguilar	Argentina	Glencore International AG
Aidai	China	Sichuan Hongda Co., Ltd.
Akzhal	Kazakhstan	Chelyabinskiy Tsinkovyi zavod OAO
Aljustrel	Portugal	(Private), Governments, and Lundin Mining Corporation
Americana	Peru	Compania Minera Casapalca S.A.
Angas	Australia	Terramin Australia Limited
Angurane	Iran	Iran Zinc Mines Development Group of Companies
Animon (Chungar)	Peru	Volcan Cia Minera S.A.A.
Antamina	Peru	BHP Billiton Limited, Mitsubishi Materials Corporation, Teck Resources Limited, and Xstrata plc
Atacocha	Peru	Compañía Minera Atacocha S.A.A.
Austria Duvaz	Peru	
Bairendaba	China	Inner Mongolia Mining Development
Baiyin	China	Baiyin Nonferrous Metal (Group) Co. Ltd.
Balmat	USA	HudBay Minerals Inc.
Baoshan	China	Baoshan Iron & Steel Co Ltd
Bismark	Mexico	Industrias Peñoles SA de CV
Black Mountain	South Africa	Anglo American plc, and Exxaro Resources Limited
Blaiken	Sweden	Lappland Goldminers AB
Boliden District	Sweden	Boliden AB
Bolivar	Bolivia	Comsur, Corporacion Minera de Bolivia, and Glencore International AG
Bolivar (Mexico)	Mexico	Dia Bras Exploration Inc
Bouchard-Hébert	Canada	Breakwater Resources Ltd
Bougrine	Tunisia	Breakwater Resources Ltd
Broken Hill	Australia	Perilya Limited
Brunswick	Canada	Xstrata plc
Cadjebut	Australia	Indago Resources Ltd., and Teck Resources Limited
Cannington	Australia	BHP Billiton Limited
Caribou	Canada	Blue Note Mining Inc, and Breakwater Resources Ltd
Casapalca (Yauliyacu)	Peru	Glencore International AG
Catalina Huanca	Peru	
Caudalosa	Peru	Buenaventura Mining Company Inc
Century	Australia	China Minmetals Corporation, and OZ Minerals Limited
Cerro de Pasco (Paragsha)	Peru	Centromin S.A., and Volcan Cia Minera S.A.A.
Cerro Lindo	Peru	Compania Minera Milpo S.A.A.

Contd....

Mine Name	Country	Owners
Changba	China	Changba
Charcas	Mexico	Southern Copper Corporation
Cheng County	China	Bijiashan Lead and Zinc Mine
Chifeng	China	Chifeng Baiyinnuoer
Clinch Valley	USA	
Colquijirca	Peru	Buenaventura Mining Company Inc, and Inversiones Colquijirca
Comstock	Australia	Zeehan Zinc Limited
Dachang Huaxi	China	Liuzhou Huaxi Gp Cp Ltd
Dairi	Indonesia	Herald Resources Limited, and PT Aneka Tambang Tbk
Dongshengmiao	China	Dongshengmiao Mining Co.
Dongwu	China	Dongwu Nonferrous
Douar Hajar (Guemassa)	Morocco	Groupe ONA, and ONHYM
Duck Pond	Canada	Teck Resources Limited
Duddar	Pakistan	China Metallurgical Construction Corporation, and Hunan Nonferrous Metals Corporation Ltd
Dugald River	Australia	China Minmetals Corporation, and OZ Minerals Limited
El Mochito	Honduras	Breakwater Resources Ltd
El Monte/Zimapán	Mexico	Industrias Peñoles SA de CV
El Porvenir	Peru	Compania Minera Milpo S.A.A., and Votorantim Group
El Toqui	Chile	Breakwater Resources Ltd
Endeavor (Elura)	Australia	CBH Resources Limited
Fankou	China	Fankou Lead-Zinc Mine Company
Flin Flon Complex	Canada	Anglo American plc, and HudBay Minerals Inc.
Fozichong	China	Guangxi Fozichong Lead-Zinc Mine
Francisco I Madero	Mexico	Industrias Peñoles SA de CV
Fresnillo	Mexico	Industrias Peñoles SA de CV
Galmoy	Ireland	Lundin Mining Corporation
Gamsberg	South Africa	Anglo American plc
Garpenberg	Sweden	Boliden AB
Gays River	Canada	Acadian Gold
Golden Grove Zinc	Australia	China Minmetals Corporation, Newmont Mining Corporation, and OZ Minerals Limited
Gongcheng Daoping	China	Gongcheng Daoping Lead-Zinc Mine
Gordonsville	USA	Nyrstar NV, and Tennessee Valley Resources Inc.
Graciela	Peru	Perubar S.A.
Greens Creek	USA	Hecla Mining Company, and Rio Tinto Group
Guangxi Liama Xinkuang	China	Guangxi Lama Xinkuang
Guixi	China	Guixi Silver Mine
Hellyer	Australia	Bass Metals Limited, Indago Resources

Contd....

Mine Name	Country	Owners
		Ltd., and PolyMet Mining Corp.
Hualgayoc	Peru	
Huangshaping	China	Hunan Nonferrous Metals Corporation Ltd
Huanjiang	China	Huanjiang Mining and Smelting Corp.
Huanzala	Peru	Mitsui & Co Ltd
Huaron	Peru	Pan American Silver Corp
Hudson Bay Complex/Snow Lake	Canada	Anglo American plc, and HudBay Minerals Inc.
Huidong	China	Huidong Lead & Zinc Mine
Huili	China	Sichuan Huili Zinc Mine Co., Ltd.
Huize	China	Yunnan Metallurgical Group General Company
Iscaycruz	Peru	Glencore International AG
Izok High Lake	Canada	China Minmetals Corporation, Inmet Mining Corporation, and OZ Minerals Limited
Jabali	Yemen	Anglo American plc, Ansan Wikfs (Hadramaut) Ltd, and ZincOx Resources Plc
Jaguar	Australia	Inmet Mining Corporation, and Jabiru Metals Limited
Kamioka	Japan	Mitsui & Co Ltd
Kangjiawan	China	ShuiKouShan Non-Ferrous Co., Ltd.
Kazzinc Mines	Kazakhstan	(Governments), and Kazzinc (69% owned by Glencore)
Kidd Creek	Canada	Xstrata plc
La Cienega	Mexico	Industrias Peñoles SA de CV
Lady Loretta	Australia	Xstrata plc
Laisvall	Sweden	Boliden AB
Langlois	Canada	Breakwater Resources Ltd
Lennard Shelf (Pillara)	Australia	Indago Resources Ltd., Teck Resources Limited, and Xstrata plc
Lisheen	Ireland	Anglo American plc, Exxaro Resources Limited, and Ivernia Inc
Liuzhou	China	Liuzhou Huaxi Gp Cp Ltd
Longquan	China	Longquan Mining and Smelting Co.
Los Frailes (Aznalcóllar)	Spain	Boliden AB
Louvicourt	Canada	Teck Resources Limited
Mae Sot	Thailand	(Governments), and Padaeng Industry Public Company Limited
Manuelita/Morococha	Peru	
Maranda	South Africa	Metorex Limited
Matagami Mines	Canada	Xstrata plc
McArthur River	Australia	Xstrata plc
Mehdiabad	Iran	Governments, Lundin Mining Corporation, and Union Resources Limited

Contd....

Mine Name	Country	Owners
Montana Tunnels	USA	Apollo Gold Corporation, and Elkhorn Tunnels LLC
Monte Cristo (Brazil)	Brazil	(Private), Brazilian Resources Inc, and IMS Empreendimentos Ltda
Morococha	Peru	Centromin S.A., and Pan American Silver Corp
Mount Garnet	Australia	Kagara Limited
Mount Isa Copper	Australia	Xstrata plc
Mount Isa Zinc	Australia	Xstrata plc
Mungana	Australia	Kagara Limited
Myra Falls	Canada	Boliden AB, and Breakwater Resources Ltd
Naica	Mexico	Industrias Peñoles SA de CV
Nanisivik	Canada	Breakwater Resources Ltd
Nanjing	China	Jiangsu Yinmao Holding Group Co., Ltd
Neves Corvo	Portugal	(Private), Governments, Lundin Mining Corporation, Other - Public Companies, Governments, Minor Parties, and Rio Tinto Group
Panorama	Australia	CBH Resources Limited, and Sipa Resources Limited
Paracatu (Morro Agudo)	Brazil	Votorantim Group
Pend Oreille	USA	Teck Resources Limited
Pering	South Africa	BHP Billiton Limited
Perkoa	Burkina Faso	Blackthorn Resources Limited, Governments, and Metorex Limited
Perseverance	Canada	Xstrata plc
Polaris	Canada	Teck Resources Limited
Porco	Bolivia	Comsur
Potosi	Australia	Perilya Limited
Pucarrajo	Peru	Buenaventura Mining Company Inc, and CEDIMIN S.A.C.
Quiruvilca	Peru	(Various), and Pan American Silver Corp
Rajpura-Dariba	India	Hindustan Zinc Limited (64.9% owned by Sterlite Industries India Limited)
Rampura Agucha	India	Hindustan Zinc Limited (64.9% owned by Sterlite Industries India Limited)
Rasp	Australia	CBH Resources Limited
Raura	Peru	Compañía Minera Raura S.A.
Real de Angeles (MRA)	Mexico	Grupo Carso S.A. de C.V.
Red Dog	USA	Teck Resources Limited
Reocín	Spain	Xstrata plc
Rey de Plata	Mexico	Dowa Holdings Co Ltd, Industrias Peñoles SA de CV, and Sumitomo Corporation

Contd....

Mine Name	Country	Owners
Rosaura	Peru	Glencore International AG
Rosebery	Australia	China Minmetals Corporation, and OZ Minerals Limited
Rosh Pinah	Namibia	(Various), Anglo American plc, Exxaro Resources Limited, and Kumba Iron Ore Ltd
Rubtsovsky	Russia	(Public Shareholders), and Ural Mining and Metallurgical Company (UMMC)
Sabinas	Mexico	Industrias Peñoles SA de CV
San Cristobal (Bolivia)	Bolivia	Sumitomo Corporation
San Francisco Del Oro	Mexico	Grupo Carso S.A. de C.V.
San Martin (Mexico)	Mexico	Southern Copper Corporation
San Nicolas	Mexico	Teck Resources Limited, and Western Copper Corporation
San Vicente	Peru	Compañía Minera San Ignacio de Morococha S.A.
San Vicente (Bolivia)	Bolivia	Pan American Silver Corp
Santa Barbara (Mexico)	Mexico	Southern Copper Corporation
Santa Eulalia	Mexico	Southern Copper Corporation
Selbaie	Canada	BHP Billiton Limited
Shaimerden	Kazakhstan	Glencore International AG, Kazzinc (69% owned by Glencore), and ZincOx Resources Plc
Shalkiya	Kazakhstan	ShalkiyaZinc N.V.
Shaoguan	China	
Shuikoushan	China	ShuiKouShan Non-Ferrous Co., Ltd.
Skorpion	Namibia	Anglo American plc
Storliden	Sweden	Lundin Mining Corporation
Stratoni	Greece	Elliniki Technodomiki Technical Investment Industrial Company SA, European Goldfields Limited, and Kinross Gold Corporation
Sullivan	Canada	Teck Resources Limited
Sweetwater	USA	Doe Run Company
Tara	Ireland	Boliden AB, and Outokumpu Oyj
Taxco	Mexico	Southern Copper Corporation
Tayahua	Mexico	Empresas Frisco S.A. de C.V., and Grupo Carso S.A. de C.V.
Tennessee Mines	USA	ASARCO LLC, Glencore International AG, Nyrstar NV, and Southern Copper Corporation
Tizapa	Mexico	Dowa Holdings Co Ltd, Industrias Peñoles SA de CV, and Sumitomo Corporation
Toyoha	Japan	Nippon Mining Holdings Inc.
Tumurtiin Ovoo (AKA Tumurtin Obo)	Mongolia	

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Mine Name	Country	Owners
Uchalinsky	Russia	Ural Mining and Metallurgical Company (UMMC)
Uchucchacua	Peru	Buenaventura Mining Company Inc
Vazante (CMM)	Brazil	Votorantim Group
Velardena	Mexico	
Viburnum Trend	USA	Doe Run Company
Winston & Pick Lakes	Canada	Inmet Mining Corporation
Wolverine	Canada	Jinduicheng Molybdenum Group Co. Ltd, and North-west Mining and Geology Group Co., Ltd.
Woodcutters	Australia	
Xiaochangba	China	Gansu Chengzhou Mining and Metallurgic Group Co. Ltd.
Xiaotieshan	China	Baiyin Nonferrous Metal (Group) Co. Ltd.
Xihe	China	Dengjiashan Lead-Zinc Mine Co., Ltd.
Xilin	China	Arehada Mining Limited
Yauli	Peru	Volcan Cia Minera S.A.A.
Yauricocha	Peru	Morococha SA, and Sociedad Minera Corona S.A.
Zawar Mines	India	Hindustan Zinc Limited (64.9% owned by Sterlite Industries India Limited)
Zinkgruvan	Sweden	Lundin Mining Corporation, and Rio Tinto Group

Source: AME Mineral Economics, Australia, 2010

Annexure: 4-XXX

Worldwide List of Zinc Smelters & Refineries

Sl. No.	Country	Company	Location	Annual Capacity
Australia				
1.	Smelter	Port Pirie Smelter	Queentown	0.045MT
2.	Smelter	Horbart Smelter	Hobeirt	0.32 MT
3.	Refinery	Sun Metals Zinc Refinery	Townsville	0.17 MT
China				
1.	Smelter	North West China Pb-Zn Smelter	Gansu, Baiyin	0.15 MT
2.	Smelter	Shaoguan Smelter	Guangdong,Shaoguan	0.15 MT
3.	Smelter	Liuzhous Zinc Product Factory	Guangxi,Liuzhou	0.17MT
4.	Smelter	Yugang Gold-lead Co.Ltd.	Henan,Jiyuan	0.10 MT
5.	Smelter	Snuikaushan Non Ferrous Metal Co.Ltd.	Hunan,Hengyan	0.06 MT
6.	Smelter	Zhuzhou Smelter	Hunan,Zhuzhou	0.3 MT
7.	Smelter	Huludao Zinc Smelting Co.	Liaoning, Huludao	0.39 MT
8.	Smelter	Dongling Zinc Industries Co.Ltd.	Shaaxi,Baoji	0.1 MT
9.	Smelter	Laibin Smelter	Yunnan,Lailbin	0.06 MT
10.	Smelter	Yunnan Jinding Zinc Co.Ltd.	Yunnan,Lanping	0.1 MT
11.	Smelter	Yunnan Chihong Zinc & Germanium Co.Ltd.	Yunnan,Quging	0.16MT
Japan				
1.	Refined	Akita Smelting Co.Ltd.	Iijima,Akita Prefecture	2,00,400 T
2.	Refined	Hachinole Smelting Co.Ltd.	Hachinohe,Aomari Prefecture	117,600 T
3.	Refined	Hikoshima Smelting Co.Ltd.	Hikashima, Yamoguchi Prefecture	8400 T
4.	Refined	Kamioka Mining & Smelting Co.Ltd.	Kamioka,Gifu Prefecture	139,200 T
5.	Refined	Toho Zinc Co.Ltd.	Annakka,Gum,ma Prefecture	139,200 T
6.	Refined	Sumitomo Metal Mining Co.	Harima, Huogo Prefecture	90,000 T
North Korea				
1.	Refined	Korea Zinc Induistrail Group	Munpyong,Kangwon Province	0.1 MT
Republic of Korea				
1.	Primary Metal	Korea Zinc Co.Ltd.	0nsan	0.43 MT
2.	Primary Metal	Young Poong Corp.	Sukpo	0.28 MT

Contd....

Sl. No.	Country	Company	Location	Annual Capacity
Mangolia				
1.	Concentrator	Tsait Mineral Co.Ltd.	Sukhbaatar Province	0.07 MT
Thailand				
1.	Concentrator	Padaeng Industries Public Co.Ltd.	Maesot	0.065 MT
2.	Refined	Podaeng	Tak	0.115 MT
Vietnam				
1.	Concentrator	Thai Nauyen Nonferrous Metal Co.	Cho Dien	0.055 MT
2.	Refined	Ta Pan Zinc-lead Plant	Lung Vay	0.06 MT
3.	Refined	Thal Nauyen Zinc Refinery	Thai Nguyen City	0.01 MT
Africa & Middle East				
Congo (Kinshasa)				
1.	Smelter	La Societe Pour Bill Hill Tailing & Cobalt Smelter	Lubumbashi	15,000 MT
2.	Smelter	La Generate des Carrier Kolwezi Zinc Leach Plant & Refinery		300,000 MT
3.	Smelter	La Generate des Carrier Kolwezi Zinc Leach Plant & Refinery	Kolwezi Zinc Smelter	72,000 T
Morocco & Western Sahara				
1.	Concentrator	Compagnie Miniere de Geumassa	Guemassa	1,70,000 T
2.	Concentrator	Compagnie Miniere de Geumassa	Draa Sfar	NA
3.	Concentrator	Societe des Mines de Tennoes	Aquerd NTazoult	NA
4.	Concentrator	Societe des Mines de Tennoes	Lalla Mimouna,Taza	NA
Namibia				
1.	Refinery	Namzinc (Pty) Ltd. Skorpian SXEW Refinery	Pinah	1,50,000
South Africa				
1.	Refinery	Zinc Corp.of South Africa Ltd.	Springs	0.110 MT
2.	Concentrates	Black Mountain Mineral Dev.Co.Ltd.	Aggeneys	0.041 MT
Zambia				
1.		Stable Zinc Kobwe Ltd.Zinc Treatment Plant at Kombwe	Kombwe	5000T
Iran				
1.	Refined	Bafgn Zinc Co.	Bofgn,Yazd	0.030 MT
2.	Refined	Qeshm Iranian Lead & Zinc Co.	Zanjan	0.015 MT
3.	Refined	National Iranian Lead & Zinc Co.	Zanjan	0.015 MT
4.	Refined	Calcimin Co.	Dande	
5.	Refined	Bandar Abbas Zinc Production	Bandar Abbas	0.013 MT

Contd....

Sl. No.	Country	Company	Location	Annual Capacity
6.	Refined	Zanjan Zinc Smelting Co.	Zhanjan	0.005 MT
Kazakhstan				
1.	Concentrator	Kazzinc JSC	East Kazaksthan	NA
2.	Refinery	Chimkent refinery	Shymkent	NA
3.	Smelter	Kazzinc JSC	Oskemen	0.168 MT
Russia				
1.	Concentrator	Altay Mining	Altay Mountain Region	2000 Tonnes
2.	Concentrator	Dalpoly metal mining	Meritime territory	20,000 Tonnes
3.	Concentrator	Nerchinsk polymetallic Complex	Chitinskaya Oblast	7,000 Tonnes
4.	Concentrator	Sadon lead Zinc Complex	Severnaya Osetiya-Alaniya Republic	5,000 Tonnes
5.	Concentrator	Salair Mning	Kemerovo Oblast	2,000 Tonnes
Ukrain				
1.	Lead Secondary	Ukrtsink Plant	Kostyantynivka	70,000 Tonnes
Switzerland				
1.	Lead Secondary	Metallum AG	Prattein	0.013 MT
Germany				
1.	Smelter & Refinery	Metaleurop Weser GmbH	Nordenham	0.120 MT
2.	Smelter	Berzelius Metall GmBH	Primary Smelter at Stolberg	0.2 MT
3.	Refinery	Sudamin MHD GmBH	Secondary Smelter at Braubatch	0.120 MT
4.	Refinery	Nordeutsche Affinerie	Hamburg	0.050 MT
Italy				
1.	Refinery	Glencore International AG	San GaVino Sardinia	0.1 MT
2.	Smelter	Glencore International AG	Kivcet, Porto Vesme	0.035 MT
Netherland				
1.	Electrolytic Plant	Hollandse Metallurgische Industries	Amhen	0.035 MT
2.	Electrolytic Plant	Billiton Witmetal	Naarden	0.006 MT
Spain				
1.	Refinery	Espanola	Del Zinc SA	Cartagena, Murcia0.05 MT
2.	Smelter	Componia La Cruz	Lineares, Jaen	0.04 MT
3.	Refinery	Componia La Cruz	Lineares, Jaen	0.04 MT
4.	Secondary Smelter	Tudor SA	Saragoza	0.016 MT
5.	Secondary Smelter	Ferroaleadones espanolas	Medina del campo	0.0-12 MT

Contd....

Sl. No.	Country	Company	Location	Annual Capacity
6.	Secondary Smelter	Derivodas de Minerals	Barcelona	0.005 MT
Sweden				
1.	Smelter & Refinery	Bliden metals	Ronnskar	0.115 MT
Latin America & Canada				
Argentina				
1.	Lead & Silver Refinery	Cia Minera del Sar	Aquilar	15,000 Tonnes
Brazil				
1.	Concentrator	Mineracao Boquira	Boquira, Bahla State	0.310 MT
Canada				
1.	Smelter	Brunswick Mining & Smelting Corp Ltd.	Belledune	0.074 MT
2.	Lead & Zinc	Hudson Bay Mines & Smelting Co.	Fliri Flon Snow Lake	0.06 MT
3.	Refined lead	Teck Cominco Ltd.	Trail, British Colombia	0.12 MT
Mexico				
1.	Lead & zinc Smelter	Ndustrias Penoles	Torreon	Pb 0.180 MT Zn 0.220 MT
Peru				
1.	Smelter	Doe Run Peru	La Oroyo	0.150 MT
2.	Refinery	Doe Run Peru	--do--	0.120 MT
3.	Lead	Empresa Minera Las	Izcaycruz	0.010 MT
4.	Lead	Empresa Minera Las	Yauliyacu	0.015 Mt
5.	Lead	Volcan Compania Minera	San Cristobal	0.070 MT
6.	Lead	Volcan Compania Minera	Paragsha	0.085 MT
7.	Lead	Compania Minera San	Yauricocha	0.005 MT
Europe & Central Eurasia				
Austria				
1.	Secondary	Montanwerke Brixlegg AG	Brixlegs	0.075 MT Cathode
Serbia & Montenegro				
1.	Smelter	Rudarsko Toplonicki Bazen Bar	Bor Serbia	0.18 MT
2.	Refinery	Rudarsko Toplonicki Bazen Bar	Electrolytic refinery at Bor Serbia	0.18 MT
3.	Mill & mine	Rudarsko Toplonicki Bazen Bar	Bor Serbia	5 MT ore
4.	Mill & mine	Rudarsko Toplonicki Bazen Bar	Majdanpek Serbia	15 MT ore

Contd....

Sl. No.	Country	Company	Location	Annual Capacity
5.	Mill & Mine	Rudarsko Toplonicki Bazen Bar	Veliki Krivels, Serbia	8 MT ore
Belgium & Luxemberg				
1.	Refinery	N.V. Vonicore S.A.	Olen	0.33 MT
2.	Smelter	N.V. Vonicore S.A.	Antwerp-Hoboken	0.050 MT
3.	Smelter	Metallo-Vhimique NV	Beerse	0.080 MT
Poland				
1.	Concentrate	Kombinat Gomiczo Huntniczy	Lubin Benificiation Plant	0.45 MT
2.	Concentrate	Kombinat Gomiczo Huntniczy	Polkowice Beneficiation Plant	0.70 MT
3.	Refineries	Kombinat Gomiczo Huntniczy	Glogow & Legnica	0.480 MT
Armenia				
1.	Blister	Armenian Copper Programme CJSC	Alaverdi	0.015 MT
Kazakhstan				
1.	Smelter	Balkhash Smelter	South Central Kazakhstan	0.25 MT
2.	Refinery	Balkhash Refinery	South Central Kazakhstan	0.25 MT
3.	Smelter	Zhezkazgan Smelter	North Central Kazakghstan	0.21`5 MT
4.	Refinery	Zhezkazgan Refinery	North Central Kazakghstan	0.25 MT
Russia				
1.	Smelting	Kirovgrad	Kirovgrad	0.15 MT
2.	Smelting	Krasnoural'skly	Krasnouravsk	0.06 MT
3.	Refining	Kyshtym	Kysntym	0.07 MT
4.	Smelting	Mednogork	Mednogork	0.04 MT
5.	Smelting & Refining	Norilsk	Mednogork	0.04 MT
6.	Refining	Psysh	Psysh	0.35 MT
7.	Smelting	Severonikel	Monchegorsk	0.02 MT
8.	Smelting	Sredneuralsk	Revda	0.14 MT
Uzbekistan				
1.	Refinery	Almalyk	Olimalig	0.13 MT
Finland				
1.	Smelter	Outokumpu OYJ	Harjavalta	0.16 MT
2.	Refinery	Outokumpu OYJ	Pori	0.125 MT
France				
1.	Metal	Compagnie	Electrolytic Plant at Palais-Sur-Viene	0.045 MT
2.	Smelter	Societe Francaise	Polssy	0.011 MT
Germany				
1.	Smelter, Refinery & Secondary Plant	Norddeutsche Affineries	Hamburg	0.56 MT

Contd....

Sl. No.	Country	Company	Location	Annual Capacity
2.	Refinery & Secondary	Huttenwerke Kayser AG	Lunen	0.185 MT
Italy				
1.	Refinery	Societa Metalli halia	PortoMarghera	0.060 MT
2.	Refinery & Secondary	Europametalli	Fornacidi Barga	0.024 MT
3.	Refinery & Secondary	Sitindustrie	Pieve Vergonte	0.22 MT
Norway				
1.	Smelter	Nikkelverk Als	Kristiansand	0.040 MT
Spain				
1.	Refinery	Atlantic Copper S.A.	Huelva	0.27 MT
2.	Electrolytic Refinery	Atlantic Copper S.A.	Huelva	0.105 MT
3.	Smelter	Industrias Reunidas de Cobre	Asua-Bilbao	0.030 MT
4.	Smelter & Electrolytic Refinery	Elmet SL	Berango Vizcaya	0.060 MT
Sweden				
1.	Smelter & Refinery	Boliden Metal AB	Ronnskar	0.24 MT
United Kingdom				
1.	Refinery	IMI Refinery Ltd.	Walsall, West Midlands	0.080 MT
Latin America & Canada				
Brazil				
1.	Concentrate	Mineracao Caraiba	Jaguari	0.090 MT Ore
2.	Refinery	Caraiba Metals	Camacari	0.22 MT
Canada				
1.	Smelter	Inco Ltd.	Sudbury, Ontario	0.5 MT
2.	Refinery	-- do--	-- do--	0.17 MT
3.	Smelter	Falconbridge Ltd.	Noranda, Kubec	0.77 MT
4.	Smelter	Falconbridge Ltd.	Thompson, Manitoba	0.686 MT projected
5.	Smelter	Falconbridge Ltd.	Timmins, Ontario	0.44 MT
Chile				
1.	Smelter	Corporacion National Del Cobre de Chile	Chugui Camata	0.46 MT
2.	Smelter	Corporacion National Del Cobre de Chile	Caletone (EI teniente)	0.36 MT
3.	Smelter	Corporacion National Del Cobre de Chile	Potrerillos (Salvador)	0.14 MT
4.	Refineries	Corporacion National Del Cobre de Chile	Chuquicamata (Ocide)	0.60 MT
5.	Refineries	Corporacion National Del Cobre de Chile	Chuquicamata (Sulphide)	0.085 MT

Contd....

Sl. No.	Country	Company	Location	Annual Capacity
6.	Refineries	Corporacion National Del Cobre de Chile	Potrerillos	0.130 MT
7.	SX-EW Plants	Corporacion National Del Cobre de Chile	Chuquicamata (Oxide)	0.130 MT
8.	SX-EW Plants	Corporacion National Del Cobre de Chile	EI Teniente	2000 Tonnes
9.	SX-EW Plants	Corporacion National Del Cobre de Chile	Potrerillos (Oxide & Sulphide)	0.085 MT
10.	SX-EW Plants & Mine	Socirdad Contruchal Minera	EI Abra Calama	0.25 MT
11.	SX-EW Plants & Mine	Compania Minera Dona Ines	Ujina	0.515 MT
12.	SX-EW Plants & Mine	Minera Sur Andes Uda	Los Bronices Mine	0.240 MT
13.	Smelter	Minera Sur Andes Uda	Chagres Smelter	0.162 MT Blister Anode
14.	SXEW Plant & Mine	Empresa Minera de Montas	Montas	0.095 MT
15.	SX-EW Plants & Mine	Empresa Minera de Montas	Montovende	0.060 MT
16.	SX-EW Plants & Mine	Minera EI Tesora SA	EI Tesoro	0.10 MT
17.	SX-EW Plants & Mine	Minera Michilla SA	Michila Mine	0.055 MT
18.	SX-EW Plants & Mine	Compania Minera Falconbridge	Lomas bayas mine	0.065 MT
19.	Smelter	Norunda Chile SA	Altonorle	0.29 MT
20.	SXEW Plant & Mine	Compania Minera Cerro Colorado	Cerro Colorado	0.125 MT
21.	Billeaching Plant	Allianie Copper Ltd.	Chuquicamata	0.020 MT

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Sr.No.	Country	Company	Location	Annual Capacity
Mexico				
1.	Mine, Smelter, Refinery, Rod Plant	Mixicana de Cobre	Nacozaride Garcia	Smelter - 0.35 MT Refining- 0.30 MT SXEW - 0.05 MT Rod Plant – 0.15 MT
2.	Mine & Smelter	Mexicana de Cananea	Cananea	SXEW - 0.33 MT
Peru				
1.	Smelter	Southern Peru Copper Corp.	Lio	0.320 MT
2.	Refinery	Southern Peru Copper Corp.	Lio	0.300 MT
3.	Smelter	Doe Run Peru S.R. Ltda	La Oroya	0.065 MT
4.	Refinery	Doe Run Peru S.R. Ltda	La Oroya	0.060 MT

Annexure: 4 -XXXI

Worldwide List of Lead Smelters and Refineries

Sl.No.	Country	Company	Location	Annual Capacity
Asia & Pacific				
Australia				
1.	Smelter	Mount Isa Smelter(Xstrata plc)	Mounta Isa	0.240 MT
2	Smelter	Port Price Smelter (Nyrstar Corp.)	Queenstown	0.235 MT
Nepal				
1.	Lead & Zinc	Nepal metal Co.Ltd.	Lari	NA
China				
1.	Lead Smelter	Baiyiri Non ferrous metals Co.Ltd.	Gansu, Baiyin	0.080 MT
2.	Lead Smelter	Shaguan Smelter	Guangdorg, Shaogyan	0.1 Mt
3.	Lead Smelter	Laibin Smelter	Guangxi, Laibin	0.1 MT
4.	Lead Smelter	Hechi South Non Ferrous metal Co.	Guangxi, Hechi	0.06 MT
5.	Lead Smelter	Anyang Smelter	Henan, Anyang	0.16 MT
6.	Lead Smelter	Jiyyan Wangyang Non ferrous Smelter	Henna, Jiaozuo	0.1 MT
7.	Lead Smelter	Jiyuan Smelter	Henan, Jiyuan	0.3 MT
8.	Lead Smelter	Henan Lingye Co. Ltd.	Henan,Lingbao	0.1 Mt
9.	Lead Smelter	Hanjiang Smelter	Hubei,Luhekou	0.05 MT
10.	Lead Smelter	Shuikoushan Non ferrous Metal Co.	Hunan, Hengyang	0.1 MT
11.	Lead Smelter	Zhuzhou Smelter	Hunan, Zhuzhou	0.1 MT
12.	Lead Smelter	Xuzhou Chunxing Alloy Co. Ltd.	Jiangsu, Xuzhou	0.15 MT
13.	Lead Smelter	Huludao Non Ferrous metal Group Co.	Liaoning, Huludao	0.03 MT
14.	Lead Smelter	Kumming Smelter	Yunnan, Kumming	0.1 MT
India				
1.	Lead Primary	Hindustan Zinc Ltd. Sterlite Copper Ltd.	Chenderiya (Ausmelt) Smelter Rajasthan	0.05 MT
2.	Lead Primary	Hindustan Zinc Ltd. Sterlite Copper Ltd.	Tundoo Smelter, Bihar	0.008 MT
3.	Lead Secondary	Indian Lead Co.	Thone refinery, Mumbai	0.025 MT
4.	Lead Secondary	Indian Lead Co.	Wader, Mumbai	0.040 MT
Japan				
1.	Refined Lead	Komioka Mining &	Komioka, Gifu,	0.033 MT

Contd....

Sl.No.	Country	Company	Location	Annual Capacity
		Smelting Co. Ltd.	Prefecture	
2.	Refined Lead	Mitsui –do--	Takehara, Horishima Prefecture	0.043 MT
3.	Refined Lead	Toho Zinc Co. Ltd.	Chiorishima, Hiroshima Prefecture	0.12 MT
4.	Refined Lead	Sumitamo metal Mining Co.	Harima, Hyugo Prefecture	0.03 MT
5.	Refined Lead	Kosaka Smelting & Refining Co.	Kosaka, Akita Prefecture	0.025 MT
6.	Refined Lead	Hosokura –do--	Hosokura, Miyagi Prefecture	0.022 MT
North Korea				
1.	Lead Concentrates	Korea Zinc Industrial group	Korndok	0.02 MT
2.	Lead refined	Korea Zinc Industrial group	Munpyong	0.032 MT
Republic of Korea				
1.	Lead metal Primary	Korea Zinc Co. Ltd.	Kangwon	0.2 MT
Thialand				
1.	Concentrator	Kanchanaburi Exploration & Mining Co.	SongToh	0.03 MT
Africa & Middle East				
Kenya				
1.	Lead Refined	Associated Battery manufacturing Co.	Athi River	3000 tonnes
Morocco				
1.	Lead Concentrates	Compagnie Miniere de Guemassa	Douar Hajar Mine, Guemassa	29900 Tonnes
2.	Lead Concentrates	Compagnie Minere de Tourissits	Touissit, Jerda	73,000 Tonnes
3.	Lead Metal	Societe des Fonderies de Plomb	Oued EI heimer	70,000 tonnes
Namibia				
1.	Lead Concentrates	Rosh Pinah Zinc Corp.	Rosh Pinah mine	20,000 tonnes
South Africa				
1.	Lead Concentrates	Black Mountain Mineral Dev. Co.	Black Mountain Mine	54,000 tonnes
Uganda				
1.	Lead refined Secondary	Uganda Batteries Ltd.	Kampala	1000 tonnes
Israel				
1.	Lead Refined Secondary	Harkumas Lead Works	Ashdod	25,000 toones

Contd...

Sl.No.	Country	Company	Location	Annual Capacity
Europe & Central Eurasia				
Austria				
1.	Smelter	Blelberg Bergwerks Union AG	Brixlegg	0.055 MT
Serbia & Montenegro				
1.	Smelter	Rudarsko-Metalursko-Hemijski	Zvecan, Serbia	0.18 MT
2.	Refinery	Rudarsko-Metalursko-Hemijski	Zvecan, Serbia	0.09 MT
Belgium and Luxembourg				
1.	Smelter	NV Umicore SA	Antwerp-Hoboken	0.09 MT
2.	Refinery	NV Umicore SA	Antwerp-Hoboken	0.125MT
	Poland			
1.	Refined	Huta Cynku Mlasteczko Slaskie	Miusteczko Slaskie	0.060 MT
2.	Refined	Huta Metali Niezelaznych Szopienice	Katowice	0.35MT
Serbia & Montenegro				
1.	Electrolytic Plant	Rudarsko Metalursko, H. Kombinat	Titova Metrovica	0.04 MT
2.	Electrolytic Plant	Hemijska Industrija Zorkia	Sobac	0.04 MT
Belgium & Luxemberg				
1.	Smelter & refinery	N.V. Umicore S.A.	Balen	0.45 MT
Poland				
1.	Smelter	Huta Cynku Imerier Smelter	Miastezko Slaskie	0.06 MT
2.	Refinery	Zaklady Metalurgiczny	Katowice	0.03 MT
3.	Refinery	Zaklady Gorniczo-Hutnicze	Boleslaw	0.064 MT
4.	Refinery	Huta Metali Niezelaznych	Zaklady North Kazakhstan	0.028 MT
Kazakhstan				
1.	Refinery	Ridder Zinc refinery	East Kazakhstan	1,26,000 T
2.	Refinery	Ust-Kamenogorsk Zinc refinery	North Kazakhstan	2,16,000 T
Russia				
1.	Refinery	Chelyabinsk Electrolytic Zinc Plant	Chelyabinskaya Oblast	2,00,000 T
2.	Refinery	Elektrozinc Plant	Vladikavkaz, North Caucasus	1,00,000 T
Ukrain				
1.	Secondary Zinc	Ukrtsink Plant	Kostyantyrivka	25,000 T
Finland				
1.	Smelter	Outokumpu Oyj	Kokkola	0.26 MT

Contd...

Concld....

Sl.No.	Country	Company	Location	Annual Capacity
France				
1.	Metal	Umicore Group	Auby-les-Doubai & Calasis	0.220 MT
Germany				
1.	Smelter	XStrata Co	Nordenham	0.1555MT
2.	Refinery	Ruhr-Zink GmbH	Dattein	0.140 MT
3.	Refinery	Sudamin MHD GmbH	Dulsburg	0.100 MT
	Italy			
1.	Metal Pant	Glencore International AG	Porto Vesme, Sardina	0.06 MT
2.	Metal Pant	Pertulosa Sud S.P.A.	Crotone, Calabira	0.10 MT
Netherland				
1.	Plant	Budel Zinc BV	Plant at Budel-Dorplein	0.232 MT
Norway				
1.	Smelter	Norzik Als	Odda	0.150 MT
Spain				
1.	Electrolytic Plant	Asturina de Zinc SA	Nieva castillori Sanjunde	0.48 MT
2.	Electrolytic Plant	Espanola del Zinc SA	Cartagena	0.05 MT
Latin America & Canada				
Argentina				
1.	Refinery	Cia Suffacid SA	Rosario Santa Fe Province	0.04 MT
Brazil				
1.	Concentrator	Companhia Mineira de metals	Vezante	0.048 MT
2.	Refinery	Companhia Mineira de metals	Tres Matrias	0.165 MT
Mexico				
1.	Refinery	Industrial Minera Mexio SA	S.L.P.	0.110 MT
2.	Refinery	Industrias Penoles S.A.	Tres matrias	0.165 MT
Peru				
1.	Refinery	Doe Run S.R. Ltda	La Oroya	0.070 MT
2.	Refinery	Sociedad Minera refineries de Zinc	Cajamarquilla	0.130 MT

Annexure:4-XXXII

SHORT WRITE UP IN RESPECT OF IMPORTANT LEAD AND ZINC MINES IN THE WORLD

1. Red Dog Mine, Alaska, USA

Red Dog Mine, in the DeLong Mountains of northwestern Alaska is the largest zinc mine in the world. The Red Dog mine is a zinc and lead mine located in a remote region of the Arctic, within the boundaries of the Red Dog Mine census-designated place in the Northwest Arctic Borough of the U.S. state of Alaska. In addition, the area contains natural ore bodies with naturally high concentrations of cadmium, lead, zinc, aluminum, and other metals.

The mine is the world's largest producer of zinc and has the world's largest zinc reserves. Red Dog accounts for 10% of the world's zinc production. Red Dog accounted for 55% of the mineral value produced in Alaska in 2008. In 2008 the mine produced 515,200 tonnes of zinc, 122,600 metric tons of lead, and 283 tonnes of silver. At the end of 2008 the mine had reserves of 61,400,000 tonnes of zinc at a grade of 17.1% and 61,400,000 tonnes of lead at a grade of 4.5%, as well as significant additional zinc and lead in the less well-measured resource category.

Red Dog is located on land owned by the NANA Regional Corporation and is operated by the commercial mining company Teck Resources in partnership with NANA Development Corporation. Ore concentrate taken from the mine is trucked westward to a shipping facility on the Chukchi Sea and stored there until the shipping season.

The mine, which produces from an open pit, is expected to exhaust its currently-permitted ore in 2012. Teck Cominco has applied for permits to expand mining into the Aqqaluk orebody, immediately adjacent to the current pit, containing an additional 56 million tonnes of lead and zinc ore. The expansion would keep the mine operating until 2031.

Geology

The Red Dog area has the world’s largest known zinc deposits. They are stratiform massive sulfide bodies hosted in Carboniferous black shale and carbonates. Mesozoic mountain-building tectonic events deformed and thrust faulted the sedimentary strata that host the deposits. Subsequent uplift and erosion exposed parts of the deposits at today's earth surface.

Red Dog is an example of a sedimentary exhalative deposit, with the zinc-lead ore considered to have been deposited on the sea floor as strata of sulfide sediment. Zinc, lead, silver, and barium were deposited in black muds and carbonates on or beneath the seafloor, in a deep quiet ocean basin, some 338 million years ago in the Mississippian period.

Reserves and resources

Ore bodies and contained zinc at Red Dog consist of;

- Main pit ore body with 19.5 million tonnes of ore containing 20.5% zinc. The figures represent the ore body before mining began in 1989. This is the currently permitted area of active mining, which is expected to be mined out by 2012. The ultimate size of this pit will be 1,600 m x 900 m x 120 m deep.
- Aqqaluk ore body with 55.7 million tonnes at 16% zinc. This is adjacent to the Main pit. It is well understood geologically and metallurgically. A Supplemental Environmental Impact Statement is expected to be produced in 2008 as part of the process of permitting the development of this ore body. Most of the waste rock from this operation is expected to be placed in the depleted Main pit.
- Qanaiyaq ore body with 4.7 million tonnes at 23.7% zinc. Also an open-pit target, studies of the ore characteristics of Qanaiyaq continue.
- The Paalaaq ore body with 13 million tonnes at 15% zinc and the Anarraaq ore body with 17.2 million tonnes at 15% zinc are both deep underground and will be accessed by tunnels and shafts, if they are eventually mined.

Environmental concerns

According to the U.S. Environmental Protection Agency (EPA), Red Dog Mine creates more toxic waste than any other operation in the United States. But, almost all (over 99%) of the "toxic waste" reported by Red Dog is just rocks (waste rock and tailings) which naturally contain >2% sulfide minerals, thus making them reportable as "toxic waste". All of the waste rock and tailings material remains in permanent disposal on-site, contained, and treated as necessary by the mine operations. The EPA notes about Red Dog's rank, "No conclusions on the potential risks can be made based solely on this information."

Leaching of metals and acids from waste rocks into the environment is a valid concern. The waste rock piles are contained and all runoff water is monitored and treated to water quality standards. Monitoring, and mitigation if necessary, will need to continue throughout the mine life and for many decades after mine closure.

2. Cannington Mine, Australia, BHP Billiton

Overview

Cannington is the world's largest and lowest cost silver and lead mine. It is located in Queensland, Australia and employs approximately 600 BHP Billiton employees and 300 contractors. The deposit was discovered by BHP Minerals in 1990 and the mine was commissioned in 1997 at a cost of around A$ 450 million. Full production was achieved in early 1999, since then capacity has been expanded from 1.5Mt/y of ore to 3.1Mt/y. The operation includes a rail-loading facility at Yurbi, about 15 km east of the town of Cloncurry, and a modern minerals concentrate handling facility at the Port of Townsville.Cannington is an underground mine using both open-stope and bench mining methods.

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The mine is expected to have a life of 25 years, with an annual production of 750 tonnes silver, 265,000 tonnes lead and 111,000 tonnes zinc. These metals are produced by a range of metallurgical processes undertaken at the site including grinding, sequential flotation and leaching.

Location

The Cannington silver mine is a fly-in fly-out mining and processing operation located in northwest Queensland, 200 km southeast of Mount Isa, near the township of McKinlay. Cannington is located approximately 800 kilometres west-southwest of Townsville, and approximately 250 kilometres south-southeast of Mt Isa, on the southeastern corner of the Mt Isa Block. The mine is 83 kilometres by road from the small community of McKinlay (population 17). The mine has an airstrip. The mine's village is 3 kilometers from the mine. A shuttle bus connects the village, the mine, and the airstrip.

The area surrounding the Cannington deposit is semi-arid. Average yearly rainfall is 250 millimetres, most of it falling between November and March. The area is prone to flooding. There are numerous meandering rivers crossing the area, most of them dry for part of the year. Temperatures during the wet season are high, particularly in December and January when the annual monthly temperature maxima is 38.5 °C for both months. Temperatures range from 10 - 25 °Celsius in July. The countryside is flat, with rare, low, undulating rises, and occasional small, flat-topped sandstone hills called "mesas". Cannington lies at the confluence of the Hamilton River and Trepell Creek.

Geology

Cannington lies in the south-east corner of the proterozoic Mount Isa Block, within the metamorphics of the lower middle proterozoic eastern succession and overlain by 60m of younger sediments. It is divided by faulting into a shallow, low grade northern zone and a deeper, higher grade and more extensive southern zone. All mining and development to date is in the southern zone.

The southern zone contains a broadly zoned and faulted sequence of silver-lead- zinc, zinc and silver-lead lodes. The Cannington Growth project began in 2003, with the aim of improving recoveries, bringing the northern zone ore body into production and sustaining ore production at a rate of 2.4Mt/y. Surface exploration is continuing on a number of geophysical and geochemical anomalies in the mine lease area.

Cannington's major economic sulphides are galena and sphalerite. The silver occurs mainly as freibergite but is also present in solid solution within galena. The ore body contains proven and probable reserves of 23.2Mt grading 482g/t silver, 10.9% lead and 4.0% zinc. The metallurgical recovery rates for zinc, lead and silver are 72%, 89% and 89% respectively.

In 2000, a major airborne gravity survey was completed over the mine lease and BHP-held areas to the south of the mine lease. The Cannington Growth project

began in 2003, with the aim of improving recoveries, bringing the northern zone ore body into production and sustaining ore production at a rate of 2.4Mt/y.

Operation

Cannington is the world's largest single mine producer of silver and lead, representing about 6% of the world's primary silver production, while its lead production represents about 7% of the world's primary lead output. The lead concentrate contains 70% lead and over 3,000g/t silver with low levels of impurities.

It is an underground mine with access via a decline ramp from the surface. The hoisting shaft allows for a planned production rate of 1.8 million tonnes of ore a year. In 2008 Cannington mined 3.1Mt of ore. Total metal production in concentrate was over 31Moz of silver. Approximately 404,000 wet metric tonnes of lead and 163,000 wet metric tonnes of zinc were processed. The lead concentrate contains 70% lead and over 3 kg/t of silver. It is recognised as a clean concentrate with low levels of impurities. The zinc concentrate contains 50% zinc and 250 g of silver.

The stoping method used for the extraction of the main, thicker, hanging wall ore bodies of the deposit is transverse, long-hole open stoping. Broken ore from the stopes is loaded from draw points at the bottom of each stope and currently hauled to the surface via the decline by trucks. The ore is hauled along the level and tipped into one of several ore passes.

The decline ramp has a cross section of 5.2 metres high by 5.5 metres wide and descends at a gradient of one in eight to the 450-metre level and thereafter one in seven. The main functions of the decline are to provide an access for mobile equipment and personnel to enter the mine and to act as one of the main intakes for fresh air into the mine. The decline has a total length of 5,250 metres.

Excavation involves stripping out a 1.8m-diameter raise-drilled pilot hole and lining with concrete from the surface. The hoisting shaft has a finished internal diametre of 5.6 metres and extends to a depth of 650 metres. The shaft is equipped with a tower-mounted friction winder and two 9t skips in counter balance running on rope guides. The skips are hoisted from a loading station on the 610-metre level and reach a final hoisting speed of 12 metres per second. On the surface, tipping scrolls in the shaft headframe tip the skips into a surface bin for transfer to the processing plant's stockpile area.

Because the site is prone to flooding after heavy rains, the decline, shafts and surface infrastructure at the site have been elevated above known and predicted flood levels. After completion of the ore extraction from each stope, paste backfill is used to fill the open void to stabilise the area and allow for mining of adjacent stopes.

Paste backfill is a high solid density material, around 80% solids and mixed from tailings produced from the processing plant with the addition of approximately 5% cement. The paste backfill is gravity fed underground via boreholes from the surface and pipe work into the open stopes.

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Process

The Cannington mine includes a minerals processing concentrator to treat the silver-rich lead and zinc deposit. The purpose of the concentrator is to separate the valuable minerals (those containing silver, lead and zinc) from the remainder of the ore (known as gangue). The saleable products are known as concentrates. Cannington produces both lead and zinc concentrates which are sold to smelters in Australia and overseas.

The processing plant has been designed to treat 1.5 million tonnes of ore per annum during the 20-year life of the mine. The mill feed is a blend of a number of different lead and zinc lodes and mineralised types with varying silver, lead and zinc compositions. The average grade of this ore blend over the life of the mine is expected to be 520 g/t silver, 11.5% lead and 4.4% zinc. The concentrator recovers about 85% of the lead and 80% of the silver into the lead concentrate, and 75% of the zinc into the zinc concentrate. The target concentrate grades are 75% lead and 50% zinc, for the silver/lead and zinc concentrates, respectively.

Approximately two-thirds of the solids is used as fill in the mine. The remainder is stored in the tailings dam. Water reclaimed from the tailings dam is recycled to the concentrator. The operation of the concentrator is automated with progammable logic controllers (PLCs), an online sample analyser being used to provide continuous assays on a number of the concentrator streams for silver, lead and zinc. Concentrates are transported to rail loading facilities at Yurbi on the Matilda Highway. Queensland Rail moves the concentrates to the port of Townsville in 50 new 63t-capacity wagons for transporting for export to world markets.

3. Lucky Friday Mullan, Idaho , USA, (Hecla Mining Company)

Established in 1891, Hecla Mining Company is the largest and lowest cash cost silver producer in the U.S. The company has two operating mines and exploration properties in four world-class silver mining districts in the U.S. and Mexico. Since 1958, Hecla Mining Company owned and operated the Lucky Friday unit, a deep underground silver, lead and zinc mine located in the Coeur d'Alene Mining District in northern Idaho. Lucky Friday is one-quarter mile east of Mullan, Idaho, and is adjacent to U.S. Interstate 90.

Geology

There have been two ore-bearing structures mined at the Lucky Friday unit. The first, mined through 2001, was the Lucky Friday vein, a fissure vein typical of many in the Coeur d'Alene Mining District. The ore body is located in the Revett Formation, which is known to provide excellent host rocks for a number of ore bodies in the Coeur d'Alene Mining District. The Lucky Friday vein strikes northeasterly and dips steeply to the south with an average width of six to seven feet. Its principal ore minerals are galena and tetrahedrite with minor amounts of sphalerite and chalcopyrite. The ore occurs as a single continuous orebody in and along the Lucky Friday vein. The major part of the ore body has extended from the 1,200-foot level to and below the 6,020-foot level.

The second ore-bearing structure, known as the Lucky Friday Expansion Area, has been mined since 1997 pursuant to an operating agreement with Independence Lead Mines Company (“Independence"). During 1991, several mineralized structures were discovered containing some high-grade silver ores in an area known as the Gold Hunter property, approximately 5,000 feet northwest of the then existing Lucky Friday workings. This discovery led to the development of the Gold Hunter property on the 4900 level. On November 6, 2008, the acquisition of substantially all of the assets of Independence was completed, including all future interest or royalty obligation to Independence and the mining claims pertaining to their agreement with us.

Mining

The principal mining method at the Lucky Friday unit is ramp access, cut and fill. This method utilizes rubber-tired equipment to access the veins through ramps developed outside of the ore body. Once a cut is taken along the strike of the vein, it is backfilled with cemented tailings and the next cut is accessed, either above or below, from the ramp system.

The ore produced from Lucky Friday is processed in a conventional flotation mill, which produces both a lead concentrate and a zinc concentrate. In 2009, ore was processed at an average rate of approximately 950 tons per day. During 2009, mill recovery totaled approximately 94% silver, 93% lead and 89% zinc. All silver-lead and zinc concentrate production during 2009 was shipped to Teck Cominco Limited’s smelter in Trail, British Columbia, Canada.

During 2008, engineering, procurement and development activities relating to construction of an internal shaft at the Lucky Friday mine was initiated, which, upon completion, will provide access from the 4900 level down to the 8000 level of the mine. However, the project was temporarily placed on hold in the fourth quarter of 2008 due to then prevailing metals prices. Detailed engineering, long lead time procurement, and other early-stage activities for the internal shaft project resumed in 2009. Current activities include engineering, purchase of long lead time equipment including hoists and service trucks, and pre-development construction from existing workings to the proposed shaft collar, hoist room and other facilities on the 4900 level.

4. Brunswick 12 mine, Gloucester County, New Brunswick, Canada, Xstrata

The Brunswick 12 mine is an underground lead-zinc-copper mine in the Bathurst Mining Camp of northern New Brunswick, Canada. It was discovered in January, 1953 and entered production in April, 1964. The Brunswick 12 ore body is the largest deposit in the Bathurst area and was one of the largest underground zinc mines in the world well into the late 1990s.

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Geology

The supergiant Brunswick 12 deposit is a Volcanogenic Massive Sulphide (VMS) deposit rich in lead, zinc, and copper. Currently the copper-rich portion of the deposit has not been mined.

5. Mount Isa Mines Limited, Australia (Xstrata Plc)

Overview

Mount Isa Mines Limited (Xstrata Plc) operates two separate mining and processing streams, copper and zinc-lead-silver, at Mount Isa. Together the company's four underground mines form one of the largest underground mining operations in the world.

Xstrata's Mount Isa copper operations consist of 2 underground mines, X41 and Enterprise and a concentrator with a 7.2 Mt/y copper capacity and smelter with a 300,000 t/y copper anode capacity. The zinc-lead-silver operations consist of the George Fisher (formerly Hilton North), Black Star and Handlebar Hill open pit mines, a zinc concentrator with a 6.5 Mt/y capacity, a lead smelter and a zinc filter plant. Together these mines produce over 226,000 t/y zinc concentrate and 125,000 t/y lead and 8.26 Moz/y silver in lead bullion.

Discovered in 1923 with production commencing in 1931, Mount Isa is Australia's and one of the world's largest underground mining complexes. Even though the existence of copper ore in quantity was confirmed in the 1930's, it was not mined until a wartime scarcity of copper brought a request from the Australian Government. In 1943, the mine ceased silver-lead-zinc production and switched to copper to help the war effort. In 1946, copper mining stopped, and the mine reverted to silver-lead-zinc. Parallel production of silver-lead-zinc and copper ores commenced in 1953 and continues to this day. With the recent development of the Black Star open cut, Mount Isa has reserves to support a mine life of approximately 11 years. The George Fisher/Hilton mine has reserves to support a mine life of approximately 15 years. Xstrata employs more than 3200 employees and 1100 contractors at Mount Isa.

Location

Mount Isa, Queensland, Australia, is a thriving outback city approximately 1000 km west of Townsville, 2000 km northwest of Brisbane, and 1600 km east of Darwin and Alice Springs. Mount Isa Mines is based here and has massive mining and mining support operations along with other major mining companies operating in the region. Mount Isa is vast, it covers 41,000 square kilometers and is located among the ochre-red Selwyn Ranges on the banks of the Leichhardt River. The Lawn Hill Gorge in Boodjamulla National Park and the world-heritage listed Riversleigh Fossil Fields are nearby. Deep in dinosaur fossil country, the rocky terrain is harsh but beautiful, a rugged 'Mars-like' landscape with stark striking colours.

Property

It is believed that the copper ore bodies were formed within the Urquhart Shale Formation, in a sequence of alternating pyrite-rich dolomitic siltstone and shale

beds up to 1000 metres thick. The zinc-lead-silver ore bodies extend from the surface to about one kilometre below the surface. Individual ore bodies range in widths up to 35 metres and may persist for hundreds of metres in length. The large 1100 copper ore body extends from 400 metres to 1000 metres below the surface. It is three kilometres long and one of the largest and richest copper ore bodies in the world

The main copper mineral is chalcopyrite. Closer to the surface, weathering and ground water leaching has changed the chalcopyrite to secondary copper minerals such as chalcocite. This weathering has also affected some of the near-surface lead ore bodies, forming cerussite, a secondary lead carbonate mineral.

The George Fisher ore bodies are very similar to the Mount Isa zinc-lead-silver orebodies. They are narrower and disrupted by more folding and faulting. There is less copper as well. A significant increase in known copper resources has led to a planned 40% expansion in copper production by 2006. Resources sufficient to support a 400,000 tpa rate for up to 20 years from Mount Isa and Ernest Henry was announced in 2002.

Operation

Mount Isa operations are carried out in two production streams. Copper operations consist of the X41 (1100 and 1900 ore bodies) and Enterprise (3000 and 3500 ore bodies) underground mines along with a copper concentrator and smelter. Zinc, lead and silver operations consist of the Hilton and George Fisher (formerly Hilton North) underground mines and the Black Star open pit mine.

Underground operations are accessed via surface shafts, two equipped with ore hoists, and a decline, which is shared with the Isa Lead mine. Both the interconnected X-41 and Enterprise mines contain massive ore bodies, which are extracted using long-hole open stoping with delayed backfill. Operations are mechanised with a complement of rubber-tired trucks and loaders, electro-hydraulic drilling rigs, raise boring rigs and ancillary vehicles.

The main ore hoisting shaft for the Mount Isa copper operations is the 710-m deep U-62 shaft from surface. The R-62 shaft, located near U-62 is an ore hoisting and service shaft for personnel and supplies to the copper mine. R-62 is also the main ore hoisting facility for the Isa Lead mine, and is also used to feed copper ore to the lead concentrator when required. The internal M-62 shaft is used for hoisting ore from the deep Enterprise zone to the crushing and conveying system at the base of the U-62 shaft. A decline from surface, also shared with the Isa Lead mine, can be used for movement of personnel, materials and equipment into the Enterprise area.

A variety of mining methods have been used at Isa during the course of its operation. Sub-Level Open Stoping ("SLOS") is the method currently used in both the X-41 and Enterprise areas of the mine. SLOS is designed to extract massive blocks of ore in vertical slices throughout the orebodies. Stope sizes in the large 1100 ore body (X-41 area) are mined in blocks of 40 metres by 40 metres, and up to 300 metres high. Drilling sublevels for the blocks are developed at every 40 metres of elevation. Stope

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sizes in the 3000 ore body (Enterprise area) are as small as 25 metres by 25 metres, and up to 100 metres high. Drilling sublevels for mining the 3000 ore body are spaced approximately 25 metres apart. Blast-hole drilling is carried out using mechanised drill rigs. The broken ore is collected at the bottom of the stope and is extracted at draw points by load-Haul-Dump (LHD) mining equipment.

Enterprise zone stopes are extremely hot with virgin rock temperatures reaching 60 degrees centigrade at the bottom of the mine. Mount Isa cools the mine with some of the largest refrigeration plants in the world, which are located on the surface near the R-62 shaft. Enterprise ore is trucked or hoisted to the U-62 crusher and hoisted to surface. Ore from X-41 is transferred to a crusher and onto an underground conveyor system for subsequent hoisting through the U-62 shaft from the mine.

Completed stopes in the X-41 area are backfilled using a combination of waste rock mixed with a cement slurry, while Enterprise stopes are filled with mill tailings mixed with cement, much of which is introduced as paste fill. The current deepest part of the Enterprise mine is 1,600 metres. High rock stresses coupled with talcy, blocky ore in the Enterprise orebodies cause delays in mining. Prompt backfilling of completed northern Enterprise stopes is necessary to prevent major ground movements resulting from the high rock stress conditions.

At Mount Isa's Blackstar open pit mine, the copper-gold ore is crushed in a gyratory crusher, ground in a SAG-ball mill, and processed in a flotation plant for the production of a copper-gold concentrate. The copper-gold concentrate is predominately trucked to Mount Isa for smelting with the excess shipped to Townsville for transport to third-party smelters.

In September 2007, operations commenced at the Handlebar Hill open cut zinc-lead mine and will provide an additional 4.3 million tonnes of ore to Mount Isa's zinc-lead reserves.

Process

In 1999, a major expansion of the Mount Isa copper smelter was undertaken to increase smelter capacity and improve operating costs. The project was completed in 1999. Smelter capacity increased to more than 250,000 tonnes of copper anode per year to accommodate all mine production from Ernest Henry mine as well as Mount Isa.

The Hilton concentrator recovers three products shipped to Mount Isa as slurry. It uses SAG milling, tower-mill regrinding and flotation with company-designed column cells and Jameson cells. The plant reached rated output shortly after commissioning but switched to treating copper converter slag from Mount Isa in the mid 1990s when the mining rate was cut and ore was trucked to the Mount Isa lead-zinc concentrator. Long-run processing of 2.5Mt/y ore from George Fisher required modifications and general upgrading at the Mount Isa lead-zinc concentrator and lead smelter.

The Mount Isa copper smelter produces copper anode from ore mined in the two Mount Isa underground copper mines and from the Ernest Henry open-cut mine. The company has begun an A$7.2 million leaching project to recover around 2500 tonnes per annum (tpa) of additional copper from electrostatic precipitator dust in the Mount Isa copper smelter.

A project to expand the capacity of the Mount Isa copper smelter has also begun at an expected capital cost of A$41 million. The project comprises the installation of a second rotary-folding furnace, a copper slag-cleaning furnace, a converter slag-cleaning plant and associated plant, all designed to increase the smelter's capacity from 240,000 to 280,000 tpa by mid-2006.

The project will also improve the copper smelter matte process recoveries between the copper ISASMELT furnace and the copper converters by 2%, reduce unit operating costs, and improve the overall operating control of the copper smelter. Copper anode from the Mount Isa smelter is sent by rail to be refined at Xstrata's Townsville copper refinery to produce 99.995% pure London Metal Exchange (LME) grade ‘A’ copper cathode.

6. Century Zinc Mine, Queensland, Australia

Century Mine is the world’s second largest open pit zinc mine producing 500,000 tonnes of zinc annually.

Location: Two sites on Queensland’s remote lower Gulf region: the mine at Lawn Hill and associated dewatering and ship-loading facilities at Karumba.

Mining: Open pit mining.

Processing Plant: Conventional grinding and flotation.

Product: Zinc concentrate, lead concentrate and silver.

Market: Sold to smelters in Australia, Asia, Europe and North America. 35,000 - 40,000 tonnes of lead is also sold.

Commenced Operation: 2000

Expected Mine Life: 2015

2009 production: 480,000 - 505,000 tonnes of zinc.

The operation is located in the remote lower Gulf region of north-west Queensland and comprises two sites: the mine at Lawn Hill, and associated concentrate dewatering and ship-loading facilities at Karumba on the Gulf of Carpentaria. Century’s zinc concentrate is highly valued by smelters because of its low iron content, which enables smelters to produce minimal amounts of iron content by-products that can pose re-treatment and disposal problems.

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Background

Base metals were first discovered in the Lawn Hill area in 1869, and the first mining lease pegged in 1887 over what is now known as the Silver King vein deposit. The area encompassing these veins, which includes the Century deposit, was proclaimed the Burketown Mining Field in 1899. Exploration titles were granted to CRA in 1987, exactly 100 years after the initial discovery of Silver King, hence the name Century.

Key infrastructure, such as telecommunications services and existing public roads, were upgraded so that mining operations could commence at the remote Century mine site. The mine was commissioned in 2000.

Key Events

Port and Dewatering Facility

Concentrates at the mine site are transported via a 304 kilometre underground slurry pipeline to Century's port and dewatering facility in Karumba. From here, Century's 5,000 tonne transfer vessel, the MV Wunma, transports the concentrate to export ships anchored in a designated area offshore in the Gulf of Carpentaria.

Future developments

MMG holds interests in and manages exploration over 4,500 square kilometre of the Lawn Hill Platform.

Joint venture partners include Smarttrans Holding Limited at Wangunda and Icon Resources at Constance Range. These tenements, within the Century operating area, have the potential to contain repetitions of the shale hosted, straitform-style Century deposit. Numerous vein-style zinc, lead and silver deposits in the region are also being investigated.

Lawn Hill Operations

Conventional pit mining methods are used at Century. The ore body is flat-lying and covers an area of 1.4 kilometres by 1.2 kilometres with a final depth of 344 metres.

The mined ore is then moved to the concentrator, where a conventional grinding and froth floatation circuit is used. Due to the particularly fine nature of the zinc sulphide in the ore and its association with silicates, Century ore requires ultra fine grinding to maximise recovery of zinc sulphides and achieve acceptable in concentrate levels for sale.

7. Iscaycruz Zinc Mine, Peru (Glencore International AG)

Iscaycruz Zinc Mine is an operating underground mine in Peru. It mainly produces zinc and lead.

Glencore resumes operations at Iscaycruz mine

Swiss-based Glencore will resume operations at Iscaycruz, its largest zinc and lead mine in Peru, due to the recovery of metal's international prices, announced a company official. The company had halted operations last March due to the drop in international prices; as an example, prices of zinc had dropped by almost 40%. Iscaycruz, located in Peru's Central Andes, produced 175,184 tons of zinc and 13,710 tons of lead in 2008, and used to produce more than 50% of Glencore's total output in Peru. Glencore also operates Yauliyacu and Rosaura mines. Peru is the second zinc-producer worldwide.

8. Broken Hill Mine, Australia (Periliya Ltd.)

- **Mine Name:** Broken Hill Mine
- **Commodities produced:** Zinc, lead and silver
- **Operating company:** Perilya Limited
- **Status:** Underground mine in production
- **Background and Geological Setting:**

The Broken Hill silver-lead-zinc deposit was discovered in 1883 at Broken Hill in far western New South Wales. This world-class deposit contained an estimated 280 Mt of ore prior to mining. The ore grades ranging from 2.5 to 15% Pb, 20 to 300 g/t Ag and 5 to 20% Zn. The oxidised part of the Broken Hill ore zones contained spectacular lead and silver grades and a diverse range of secondary minerals. Perilya acquired the mine from Pasminco Limited in May 2002. At June 2004, resources at Perilya's South, North and Potosi mines were 21.132 Mt at 10.2% Zn, 5.7% Pb and 60 g/t Ag. The proven and probable reserve was 11.662 Mt at 7.8% Zn, 4.1% Pb and 44 g/t Ag.

The Broken Hill mineral tenure consists of nine contiguous mining leases covering 7,478 hectares located near the town of Broken Hill, New South Wales, Australia. The lead-zinc-silver deposit was discovered in 1883 by a local livestock station worker and has produced over 500 million ounces of silver over its 120 years of continuous mining operations. The Broken Hill Proprietary Company (BHP, later BHP Billiton) was founded in 1885 to mine the namesake deposit.

Perilya Ltd. acquired the Broken Hill mine from Pasminco (Zinifex) in 2002 and recommenced mining operations in 2003. Coeur d'Alene Mines purchased the silver production and reserves contained in the Broken Hill mine.

Two separate underground mining operations exist at Broken Hill - the Southern Operations and the North mine. Most of the ore comes from the Southern Operations. Ore from the North mine is shipped via conventional surface rail cars to the Southern Operations concentrator.

The deposit consists of the galena-rich Lead Lenses and sphalerite-rich Zinc Lodes at company's South and North operations. Silver mineralization occurs in both ore types but is typically higher-grade in the Lead Lenses. The mine uses bulk mining methods and a conventional flotation mill is employed to produce a concentrate that is

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sold to third party smelters in Australia and Korea. The plant is budgeted to process 2.1 million tonnes per yearIn the fiscal year 2007 the combined underground operations produced over 1.6 Moz silver, 60,500 t lead, and 92,100 t zinc.

The ore-body is hosted by Willyama Supergroup - a package of regionally metamorphosed clastic and volcaniclastic sediments, basic to acid volcanics and intrusions that range in age from about 1715 to 1590 Ma. The Broken Hill orebody contains six stacked, tabular lenses that strike northeasterly and dip steeply to the northwest. The mineralised system has an overall strike length of about eight kilometres. Though later folding and faulting has complicated the geometry, the ore lenses are conformable with the enclosing metasedimentary rocks.

Theories as to the origin of the mineralisation are varied, but there is a general consensus that mineralisation was concurrent with or soon after deposition of the sediments that contain the deposit. Some workers interpret the mineralisation as diagenetic. The main sulphides are galena and sphalerite while the gangue mineralogy includes spessartine garnet, quartz, rhodonite, bustamite, hedenbergite, wollastonite, calcite, fluorite and apatite. Each ore lens has characteristic lead:zinc ratio and gangue mineralogy.

The Broken Hill Mine in New South Wales produced 147 964t of lead concentrate and 367 175t zinc concentrate in 2000. Ore reserve (indicated, measured and inferred) estimates for the main orebody, South Operation, are 20.2 Mt grading at 9% zinc, 5% lead and 53g/t silver. An agreement has been made with Perilya Ltd to acquire the Broken Hill facility, following Pasminco intentions of selling its mining assets to become a focused smelting and refining company. Perilya plans to extend the life of Broken Hill to exnted to beyond 2001 and hopes to produce 330 000 t zinc concentrate, 120 000 t lead concentrate and 2.3 Moz silver per year.

9. Magellan Lead/Zinc Mine, Australia

Magellan Lead/Zinc Mine is an operating open pit mine in Western Australia, Australia. It mainly produces lead.

Following receipt of the Western Australian Government approvals in August 2009 to re-commence shipments through the Port of Fremantle, the Company focused on the setup and implementation of the logistics chain surrounding the shipment of the 23,000 wmt mine site concentrate stockpile. These shipments commenced in September 2009 and allowed to trial and fully test newly developed sealed shipment process – which is widely recognized as achieving a new level of industry best practice. Shipments of lead concentrate from the mine have progressed smoothly and shortly complete shipping the large 23,000 wmt stockpile that has been on site since 2007. During late 2009 and early 2010 the Magellan team developed the restart plan and worked through the maintenance and other projects and procurement necessary for restart including the recruitment of the workforce. It was a key milestone for Ivernia and Magellan to see the culmination of all those efforts lead to the restart of the Magellan processing plant in late February. At full production, it will be 2% of the world’s lead production. Magellan is the only significant pure lead mine in the world

and at full production run rates will produce on average approximately 85,000 tonnes (or 190 million pounds) of lead in concentrate per year over the mine life. Current mine reserves support about an eight year mine life at current metal prices and exchange rates.

The Company is having an off-take agreement in place with Yunnan Metallurgical Group in China for 50% of Magellan production for the life of the mine. It also has contracts with other customers in Asia, Africa and Europe and has commenced shipments to those customers.

The last publicly reported quarter was the third quarter of 2009 – at that time the reported cash balances of $13.6 million and expected net proceeds from stockpile shipments of $16 million to add to its cash balances.

10. Black Mountain (Aggeneys) Zinc/Lead Mine, South Africa

Black Mountain (Aggeneys) Zinc/Lead Mine is an operating underground mine in South Africa. It mainly produces lead and zinc. It is controlled/owned by Anglo American plc and Exxaro Resources Ltd

Vedanta buys Anglo American Zinc for $1.3bn in all cash deal

Beating rivals like China Metallurgical and Xstrata, Vedanta Resources on Monday said it has finalised a deal with the London-based Anglo American's entire zinc business in Ireland and Africa for $1.34 billion deal.

"Vedanta Resources and Anglo American have signed a definitive share purchase agreement under which Vedanta, through one of its controlled group companies (Hindustan Zinc), will acquire Anglo American Zinc for a total consideration of USD1.34 billion," the company said in a statement here.

11. Tara Mine

Tara Mine is a zinc and lead mine near Navan, County Meath, Ireland. In the Navan ore body Tara is an underground mine where the orebody lies between 50 and 900 metres below surface.The deposit was discovered in 1970, development started in 1973 and production began in 1977. Tara Mine is operated by Boliden. It is the largest zinc mine in Europe and the fifth largest in the world producing 200,000 tonnes of zinc concentrate and 40,000 tonnes of lead concentrate annually. The mine life extends past 2015. Broken ore is delivered to one of five underground crushers and reduced in size to less than 150mm before being carried by conveyor to a 3,600t capacity storage bin of at the base of the production shaft. Skip loading and hoisting are automatic, and ore is supplied, at an hourly rate of 570 tonnes, to the surface coarse ore storage building, with a 30,000t capacity, known as the Tepee. The concentrates are shipped via Dublin Port to Boliden's smelters in Kokkola, Finland and Odda, Norway and to other smelters throughout Europe. Tara Mines is connected by railway to Drogheda via Navan, where daily loads of ore are sent to Dublin port Due to low zinc prices production was halted between 2001 and 2003. In 2009 production was again threatened as demand for zinc, used to galvanise

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steel for the car and construction industries, declined sharply due to the slowdown in the global economy. Zinc and lead prices maintained their strength throughout 2009 due to continued demand from China and India. Ore production from Tara Mines continued strongly throughout 2009. A new Autogenous Grinding mill, which replaces large sections of the original crushing and grinding plant, became operational in October.

12. Lisheen Mine, Ireland

The Lisheen zinc and lead deposit is located in the Rathdowney Trend, which stretches 40 kilometres, between the Towns of Abbeyliex to the North East and Thurles to the South West. The region is a broad plain drained by the Rossetown and Drish Rivers, tributaries of the Suir River, which flows into the Irish Sea at Waterford. In common with much of Ireland, the area is characterised by cool, wet climatic conditions. Mean temperatures vary from 4.4 °C in January to around 15 °C in July, with an average humidity of 83%. Annual rainfall ranges between 700 and 1000 millimetres. Land in the vicinity of the Lisheen Mine has traditionally been used for dairy farming, cattle and sheep rearing, forestry and peat farming. The Lisheen Mine was wholly owned by Anglo American plc between 2003 and 2011 following a series of mergers and acquisitions of stake holdings.

The Mine is now owned by Vedanta Resources plc the largest mining and non-ferrous metals company in India that also has mining operations in Australia, Zambia and Namibia.

The Lisheen Mine is situated in county Tipperary in the heart of the Irish Midlands. Located between the villages of Moyne and Templetuothy the Mine provides much of the local employment in the area helping to keep the culture and traditions of rural Ireland alive.

The Mine is now in its second decade of operations and is currently one of the largest producers of Zinc concentrates in Europe. The Lisheen Mine is an underground operation, with an average mining depth of 170 metres. Room & Pillar and Drift & Fill are the main extraction methods employed underground, with blast hole stoping used in thicker areas.

Exploration History

Exploration of the Rathdowney Trend during the late 1960's and early 1970's identified sporadic occurrences of lead and zinc, although the first significant mineralisation was not discovered until 1984 at Derrykearn.

Following the discovery of the Galmoy deposit in early 1986, Ivernia and it's former venture partner, Chevron, were granted prospecting licences covering Lisheen and other areas. Over the subsequent two years, geochemical, geological and geophysical surveys identified the target area for a drilling program and work commenced under Ivernia's management in 1990. The seventh hole in the program, drilled in April 1990, intersected 6.4 metres of ore body grading 14.7% zinc and 2.7% lead.

Ore body Geology

The Lisheen deposit lies at an average depth of 170 metres and comprises two distinct ore bodies, Main Zone and Derryville. The ore bodies are predominantly stratiform or flat lying, ranging in thickness from 1 to 14 metres. Close to faults, mineralisation may be substantially thicker, in some cases up to 30 metres. The stratiform nature of the ore bodies is typical of zinc deposits in Ireland and also occurs elsewhere in the world. The ore bodies comprise mainly sphalerite (zinc), galena (lead) and pyrite (iron). The deposit is high grade, with zinc to lead ratio of 5:1.

Definition drilling and exploration continues in the mine area and district to identify extensions to the ore bodies, as well as new deposits. More than 650 holes have been drilled to date.

Mineral Resources

Regional Geology

The Lisheen zinc deposit is located in the Rathdowney Trend, which comprises sedimentary rocks, mainly limestone, which was formed approximately 320 million years ago.

The Lisheen deposit owes it's existence to the presence of several faults in the district, which played a major role in the formation, morphology and location of the ore bodies. It is believed that these fractures in the strata acted as conduits for the hydrothermal mineralising fluids which carried metals upwards from extreme depths.

Mining

The Lisheen Mine is an underground operation, with an average mining depth of 170 metres. Room & Pillar and Drift & Fill are the main extraction methods employed underground, with blast hole stoping used in thicker areas.

Mining operations are scheduled on a 3 shift rotating basis , 6 days per week basis. Approximately 6,300 tonnes of ore grade material are transported from the mine to surface daily via a conveyor system. The mine is accessed via a 1.5 kilometre long decline, at -15%, 6.3 metres wide by 5 metres high. Underground drilling rigs bore holes in the ore face, which are charged with explosives and fired. The resultant broken ore is removed by large Load Haul Dump (LHD) machines and loaded into trucks which transport the ore to the crusher. The ore is first emptied onto 'grizzly' bars which prevent oversized material from entering the crushing chamber before being fed into the underground crusher. All material is removed by conveyor to the surface, where it is stored in a covered stockpile of approximately 12,000 tonnes live capacity prior to processing in the Concentrator plant.

13. Rampura Agucha Mine, India

Rampura Agucha Mine is the world's largest zinc mine with an annual ore production capacity of 6.0 million tonnes. In FY 2010, Rampura Agucha produced 612.94 kt of contained zinc and 55.10 kt of contained lead. The successful commissioning of 1 mtpa concentrator in March 2010, has enhanced its ore

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production capacity from 5.0 million tonnes per annum to 6.0 million tonnes per annum. Rampura Agucha is also one of the lowest cost zinc producer globallyRampura Agucha is an open-pit mine, commissioned in 1991. It is located 230 kms north of Udaipur, in the State of Rajasthan in India. Rampura Agucha is stratiform, sediment-hosted, high grade zinc & lead deposits. The ore body is massive and lens shaped. Ore grade is consistent and is not deteriorating as we move down. Reserves and resources of Rampura Agucha Mine as on 31st March 2010 are 120.4 million tonnes.

The mine is equipped with the world-class infrastructural facilities including the latest generation slope monitoring radar system; truck dispatch system; in-house central workshop and heavy vehicle service centre and repair shop equipped with requisite facilities.

Location	:	Rampura Agucha, Rajasthan, India
Mining Type	:	Open Cast
Mining Method	:	Drill, blast, load and haul
Products	:	Zinc Concentrate and Lead Concentrate
Ore Production Capacity	:	6.00 million tonnes per annum

Mining:

The mine is highly mechanized with 34 m^3 excavator and 240 ton dumpers, for excavation of ore and waste.

Processing:

Processing facilities use rod mill - ball mill combination in stream I; Semi-Autogenous Grinding (SAG) mill - ball mill combination in stream II & III; and flotation methods to produce zinc and lead concentrates. Mine's concentrator is equipped with the state-of-art-automation which includes the Experion process control system; Multi stream analyzer to ensure faster & accurate readings of different metal percentages in the various streams and Froth image analyzer that provides actual image of froth bubbles to facilitate effective quality control.

Zinc and lead concentrates produced at Rampura Agucha are transferred to smelters. The tailing generated due to beneficiation of ore are stored in specially constructed tailing dam which is considered as the most compatible on-site storage facility for long term disposal of tailings. The base of the tailing dam is fully sealed by the application of a layer of impervious soil at bottom. After settling the tailings water gets recycled to plant thus maintain zero discharge.

14. Greens Creek , Admiralty Island, Alaska

Greens Creek Mine located in Southeast Alaska. The Greens Creek ore body contains silver, zinc, gold and lead, and lies adjacent to the Admiralty Island National Monument, an environmentally sensitive area. The Greens Creek property includes 17 patented lode claims and one patented mill site claim, in addition to property leased from the U.S. Forest Service. Greens Creek also has title to mineral rights on 7,500 acres of federal land adjacent to the properties. The entire project is accessed by boat and served by 13 miles of road and consists of the mine, an ore concentrating mill, a tailings impoundment area, a ship-loading facility, camp facilities and a ferry dock.

Prior to April 16, 2008, we owned a 29.7% interest in Greens Creek. On April 16, 2008, we completed the acquisition of all of the equity of two Rio Tinto subsidiaries holding a 70.3% interest in the Greens Creek mine for approximately $750 million.

The Greens Creek deposit is a polymetallic, stratiform, massive sulfide deposit. The host rock consists of predominantly marine sedimentary, and mafic to ultramafic volcanic and plutonic rocks, which have been subjected to multiple periods of deformation. These deformational episodes have imposed intense tectonic fabrics on the rocks. Mineralization occurs discontinuously along the contact between a structural hanging wall of quartz mica carbonate phyllites and a structural footwall of graphitic and calcareous argillite. Major sulfide minerals are pyrite, sphalerite, galena, and tetrahedrite/tennanite.

Pursuant to a 1996 land exchange agreement, the joint venture transferred private property equal to a value of $1 million to the U.S. Forest Service and received exploration and mining rights to approximately 7,500 acres of land with mining potential surrounding the existing mine. Production from new ore discoveries on the exchanged lands will be subject to federal royalties included in the land exchange agreement. The royalty is only due on production from reserves that are not part of Greens Creek’s extralateral rights. Thus far, there has been no production triggering payment of the royalty. The royalty is 3% if the average value of the ore during a year is greater than $120 per ton of ore, and 0.75% if the value is $120 per ton or less. The benchmark of $120 per ton is adjusted annually according to the Gross Domestic Product (GDP) Implicit Price Deflator until the year 2016, and at December 31, 2009, was at approximately $158 per ton when applying the latest GDP Implicit Price Deflator observation.

Greens Creek is an underground mine which produces approximately 2,100 tons of ore per day. The primary mining methods are cut and fill and longhole stoping. The ore is processed on site at a mill, which produces lead, zinc and bulk concentrates, as well as gold doré. In 2009, ore was processed at an average rate of approximately 2,167 tons per day. During 2009, mill recovery totaled approximately 72% silver, 79% zinc, 69% lead, and 64% gold. The doré is sold to a precious metal refiner and on the open market and the three concentrate products are sold to a number of major smelters worldwide. Concentrates are shipped from a marine terminal located on Admiralty Island about nine miles from the mine site.

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The Greens Creek unit has historically been powered completely by diesel generators located on site. However, an agreement was reached during 2005 to purchase excess hydroelectric power from the local power company, Alaska Electric Light and Power Company ("AEL&P"). Installation of the necessary infrastructure was completed in 2006, and use of hydroelectric power commenced during the third quarter of 2006. This project has reduced production costs at Greens Creek to the extent power has been available. Low lake levels and increased demand in the Juneau area combined to restrict the amount of power available to Greens Creek during 2007 and 2008. However, the mine received an increased proportion of its power needs from AEL&P during 2009. We expect to receive most, if not all, of the mine's power from AEL&P in 2010, and expect this to continue for the foreseeable future as a result of new capacity installed by AEL&P in 2009.

As of December 31, 2009, we have recorded a $35.3 million asset retirement obligation for reclamation and closure costs. We maintain a $30 million reclamation bond secured by the restricted cash balance of $7.6 million for Greens Creek. The net book value of the Greens Creek unit property and its associated plant, equipment and mineral interests was approximately $703 million as of December 31, 2009.

Production

Various subsidiaries control 100% of the Greens Creek mine. Greens Creek produced a total of 7.5 million ounces of silver and 67,278 ounces of by-product gold in 2009, at the low average total cash cost of $0.35 per ounce of silver. The average ore grade was 13.01 ounces of silver per tonnne.

Annexure: 5 - I

Average Monthly Prices of Lead (Ingots) and Zinc (Slab) (Bombay Metal Market)

(Rates in Rs. Per quintal)

Sl. No.	Month	Prices							
		2006		2007		2008		2009	
		Lead Ingots	Zinc Slab	Lead Ingots	Zinc Slab	Lead Ingots	Zinc Slab	Lead Ingots	Zinc Slab
1	January	N.A.	N.A.	N.A.	N.A.	11,681	12,565	N.A.	N.A.
2	February	N.A.	N.A.	7,733	18,157	N.A.	N.A.	8,655	7,705
3	March	6,296	12994	8,702	18,396	12,988	13,454	8,758	8,858
4.	April	6,576	16,943	10,346	19,200	12,900	12,264	9,187	9,852
5	May	6,873	18,692	9,908	19,765	12,119	11,450	9,012	9,672
6	June	6,246	17,342	10,162	19,016	10,704	10,352	N.A.	N.A.
7	July	6,177	18,608	11,088	18,373	10,519	10,381	N.A.	N.A.
8	August	6,372	18,987	11,046	17,621	N.A.	N.A.	N.A.	N.A.
9	September	6,726	18,924	11,536	16,236	N.A.	N.A.	9,735	11,026
10	October	7,218	20,228	13,431	16,442	N.A.	N.A.	N.A.	N.A.
11	November	7,802	23,392	N.A.	N.A.	8,878	7,235	N.A.	N.A.
12	December	7,992	23,625	12,027	12,908	7,767	6,911	N.A.	N.A.

Source: Metal World (Monthly)

Annexure: 5 - II

Average Monthly Settlement Prices of Lead, London Metal Exchange, 2007 to 2010

(In $ per tonne)

Sl. No.	Month	Prices			
		2007	2008	2009	2010
1	January	1666.09	2608.14	1132.74	2368.38
2	February	1779.60	3079.88	1100.53	2123.68
3	March	1914.05	3008.58	1238.91	2172.09
4.	April	2000.95	2822.75	1383.10	2264.85
5	May	2100.64	2234.63	1440.16	1882.68
6	June	2425.98	1863.05	1674.45	1703.95
7	July	3083.55	1944.91	1678.61	1836.98
8	August	3119.45	1923.58	1990.10	2075.24
9	September	3226.55	1868.36	2204.55	2184.53
10	October	3719.72	1480.11	2240.77	2379.67
11	November	3328.18	1291.10	2308.76	2376.73
12	December	2596.03	962.88	2328.52	2412.93

Source: Minerals & Metals Review

Annexure:5 - III

Average Monthly Settlement Prices of Lead, London Metal Exchange, 2001 to 2010

(In $ per tonne)

Sl. No.	Month	Average Prices									
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	January	478.05	513.07	444.66	758.38	953.15	1256.33	1666.09	2608.14	1132.74	2368.38
2	February	501.80	479.95	475.83	888.48	977.55	1277.05	1779.60	3079.88	1100.53	2123.68
3	March	498.39	480.15	456.67	886.48	1005.83	1192.09	1914.05	3008.58	1238.91	2172.09
4.	April	477.50	472.36	437.38	753.68	985.76	1170.42	2000.95	2822.75	1383.10	2264.85
5	May	466.69	451.89	463.50	808.89	988.08	1166.86	2100.64	2234.63	1440.16	1882.68
6	June	444.14	440.00	468.02	870.32	986.07	963.86	2425.98	1863.05	1674.45	1703.95
7	July	461.55	446.13	514.78	939.59	854.48	1052.38	3083.55	1944.91	1678.61	1836.98
8	August	482.95	423.24	496.53	921.81	887.02	1174.14	3119.45	1923.58	1990.10	2075.24
9	September	464.80	421.26	521.27	935.45	933.07	1342.38	3226.55	1868.36	2204.55	2184.53
10	October	468.11	418.15	587.33	932.76	1004.76	1531.14	3719.72	1480.11	2240.77	2379.67
11	November	486.48	442.17	622.33	967.80	1018.41	1624.52	3328.18	1291.10	2308.76	2376.73
12	December	483.26	443.61	692.07	974.90	1124.08	1725.50	2596.03	962.88	2328.52	2412.93

Source: World Metal Statistics

Annexure:5 - IV

Average Monthly Settlement Prices of Zinc, London Metal Exchange, 2001 to 2010

(In $ per tonne)

Sl. No.	Month	Average Prices									
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	January	1033.36	793.23	781.14	1017.00	1246.38	2090.31	3786.68	2340.11	1187.40	2434.45
2	February	1020.88	771.25	785.15	1087.68	1326.18	2291.38	3309.50	2438.14	1112.08	2156.90
3	March	1004.73	819.30	790.95	1105.78	1377.69	2416.91	3271.30	2511.47	1216.75	2275.07
4.	April	969.45	808.17	754.65	1032.73	1300.14	3084.78	3557.47	2263.80	1378.85	2366.68
5	May	937.95	769.55	775.65	1028.29	1243.63	3565.69	3830.29	2182.10	1483.79	1968.37
6	June	894.93	767.08	790.69	1021.45	1275.73	3225.68	3603.26	1894.48	1557.27	1742.84
7	July	852.41	794.85	827.54	988.32	1194.43	3339.86	3546.91	1852.37	1578.61	1843.89
8	August	828.07	747.60	817.88	975.81	1298.39	3347.30	3252.52	1732.28	1821.68	2044.57
9	September	798.55	756.24	818.18	975.18	1397.52	3403.02	2881.40	1735.48	1884.02	2151.41
10	October	761.50	754.67	897.96	1064.95	1488.38	3822.95	2975.33	1302.11	2071.59	2372.14
11	November	772.91	765.26	914.53	1094.65	1610.93	4382.23	2541.30	1147.60	2193.38	2291.68
12	December	754.68	797.74	977.76	1180.21	1821.83	4405.39	2353.08	1100.57	2375.90	2280.93

Source: World Metal Statistics

Annexure: 5 - V

Average Monthly Settlement Prices of Zinc, London Metal Exchange, 2007 to 2010

(In $ per tonne)

Sl. No.	Month	Prices			
		2007	2008	2009	2010
1	January	3786.68	2340.11	1187.40	2434.45
2	February	3309.50	2438.14	1112.08	2156.90
3	March	3271.30	2511.47	1216.75	2275.07
4.	April	3557.47	2263.80	1378.85	2366.68
5	May	3830.29	2182.10	1483.79	1968.37
6	June	3603.26	1894.48	1557.27	1742.84
7	July	3546.91	1852.37	1578.61	1843.89
8	August	3252.52	1732.28	1821.68	2044.57
9	September	2881.40	1735.48	1884.02	2151.41
10	October	2975.33	1302.11	2071.59	2372.14
11	November	2541.30	1147.60	2193.38	2291.68
12	December	2353.08	1100.57	2375.90	2280.93

Source: Minerals & Metals Review

Annexure: 5-VI

Lead Prices Forecast by Various Analysts, 2011 to 2014

Forecast date	Analyst/desk	year															
		2011				2012				2013				2014			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
02.02.11	MB Research	2680	2710	2750	2800	2900	300	3100	3300	3300	3300	3300	3300	-	-	-	-
17.01.11	Societe Generale, David Wilson	2840	2600	2650	3005	2870	2870	2870	2870	2900	2900	2900	2900	2930	2930	2930	2930
02.02.11	Goldman Sachs*	2205	2205	2205	2205	2161	2161	2161	2161	2260	2260	2260	2260	2447	2447	2447	2447
11.11.10	BAML, Michale Widmer	2800	2700	2900	2700	2750	2750	2750	2750	-	-	-	-	-	-	-	-
11.02.11	Barclays Capital	2500	2500	2600	2750	2588	2588	2588	2588	-	-	-	-	-	-	-	-
11.01.11	RBCCM Fraser Philips	2183	2183	2183	2183	2161	2161	2161	2161	2116	2116	2116	2116	2116	2116	2116	2116
15.02.11	Natixis, Nic Brown	2650	2650	2650	2650	2900	2900	2900	2900	2700	2700	2700	2700	2500	2500	2500	2500
17.01.11	Macquarie	2535	2601	2353	2491	2262	2623	2623	2623	2535	2535	2535	2535	2094	2094	2094	2094
01.02.11	Standard Bank Leon Westgate	2450	2390	2520	2560	2600	2600	2600	2600	-	-	-	-	-	-	-	-
16.02.11	BNP Paribas, Stephen Briggs	2550	2575	2675	2800	2900	2900	2900	2900	-	-	-	-	-	-	-	-
14.01.11	Credit Agricole, Robin Bhar	2500	2400	2500	2700	2800	2900	2700	3000	-	-	-	-	-	-	-	-
14.01.11	MF Global, Ed Meir	2600	2450	2850	2700	-	-	-	-	-	-	-	-	-	-	-	-
05.01.11	CISA, Ian Roper	2535	2535	2646	2646	2425	2425	2205	2205	1874	1874	1874	1874	1653	1653	1653	1653
18.01.11	VM Group / Abn Amro*	2316	2316	2316	2316	2388	2388	2388	2388	2646	2646	2646	2646	2205	2205	2205	2205
14.02.11	Citigroup	2569	2569	2569	2569	2504	2504	2504	2504	2317	2317	2317	2317	2129	2129	2129	2129
21.12.10	Commerzbank	2550	2550	2550	2550	-	-	-	-	-	-	-	-	-	-	-	-
13.01.11	Credit Suisse, Matt Hope	2425	2425	2425	2425	3307	3307	3307	3307	3968	3968	3968	3968	3968	3968	3968	3968
01.01.11	Deutsche Bank Daniel Brebner	2600	2400	2600	2800	2900	3000	3000	2900	2900	2900	2900	2900	2500	2500	2500	2500
31.01.11	Sucden Financial	2100	2100	2100	2100	-	-	-	-	-	-	-	-	-	-	-	-

*3M rather than cash prices, Source: Metal Bulletin London- 28 February 2011

Annexure: 5-VII

Zinc Prices Forecast by Various Analysts, 2011 to 2014

Forecast date	Analyst/desk	year															
		2011				2012				2013				2014			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
02.02.11	MB Research	2500	2700	2600	2500	2650	2800	2900	3000	3000	3000	3000	3000	-	-	-	-
17.01.11	Societe Generale, David Wilson	2765	2650	2585	2870	2800	2800	2800	2800	2890	2890	2890	2890	2920	2920	2920	2920
02.02.11	Goldman Sachs*	2227	2227	2227	2227	2183	2183	2183	2183	2359	2359	2359	2359	2601	2601	2601	2601
11.11.10	BAML, Michale Widmer	2700	2800	2600	2800	2900	2900	2900	2900	-	-	-	-	-	-	-	-
11.02.11	Barclays Capital	2450	2500	2550	2650	2538	2538	2538	2538	-	-	-	-	-	-	-	-
11.01.11	RBCCM Fraser Philips	1984	1984	1984	1984	1984	1984	1984	1984	2205	2205	2205	2205	2867	2867	2867	2867
15.02.11	Natixis, Nic Brown	2525	2525	2525	2525	2750	2750	2750	2750	2900	2900	2900	2900	2600	2600	2600	2600
17.01.11	Macquarie	2425	2535	2315	2342	2623	2623	2623	2623	2755	2755	2755	2755	2425	2425	2425	2425
01.02.11	Standard Bank Leon Westgate	2350	2300	2250	2380	2500	2500	2500	2500	-	-	-	-	-	-	-	-
16.02.11	BNP Paribas, Stephen Briggs	2325	2375	2350	2550	2650	2650	2650	2650	-	-	-	-	-	-	-	-
14.01.11	Credit Agricole, Robin Bhar	2300	2400	2500	2700	2700	2800	2600	2700	-	-	-	-	-	-	-	-
14.01.11	MF Global, Ed Meir	2350	2220	2600	2480	-	-	-	-	-	-	-	-	-	-	-	-
05.01.11	CISA, Ian Roper	2425	2425	2425	2425	2315	2315	2094	2094	1874	1874	1874	1874	1874	1874	1874	1874
18.01.11	VM Group / Abn Amro*	2348	2348	2348	2348	2735	2735	2735	2735	3671	3671	3671	3671	3200	3200	3200	3200
14.02.11	Citigroup	2460	2460	2460	2460	2436	2436	2436	2436	2311	2311	2311	2311	2186	2186	2186	2186
21.12.10	Commerzbank	2550	2550	2550	2550	-	-	-	-	-	-	-	-	-	-	-	-
13.01.11	Credit Suisse, Matt Hope	2205	2205	2205	2205	3086	3086	3086	3086	3527	3527	3527	3527	3748	3748	3748	3748
21.12.10	Scotiabank, Patricia Mohr	2271	2271	2271	2271	2315	2315	2315	2315	-	-	-	-	-	-	-	-
01.01.11	Deutsche Bank Daniel Brebner	2400	2400	2400	2400	2800	3000	3200	3500	2800	2800	2800	2800	2400	2400	2400	2400
31.01.11	Sueden Financial	2000	2000	2000	2000	-	-	-	-	-	-	-	-	-	-	-	-

*3M rather than cash prices, Source: Metal Bulletin London- 28 February 2011

Annexure: 6 - I

Production of Different Types of Vehicles and Lead Consumed for Batteries in India during 2004-05 to 2009-10

Type of vehicle	Average Lead content	2004-05		2005-06		2006-07		2007-08		2008-09		2009-10	
		No. of Vehicles	Quantity of Lead Consumed (kg)	No. of Vehicles	Quantity of Lead Consumed (kg)	No. of Vehicles	Quantity of Lead Consumed (kg)	No. of Vehicles	Quantity of Lead Consumed (kg)	No. of Vehicles	Quantity of Lead Consumed (kg)	No. of Vehicles	Quantity of Lead Consumed (kg)
Dumper	44Kg	486	21384	705	31020	650	28060	683	30052	817	35948	754	33716
Wheel mounted dump loaders	44 Kg	1276	56144	1346	59224	1603	70532	2512	110528	2104	92576	1825	80300
Commercial Vehicles	25Kg	350032	8750800	391078	9776950	520000	13000000	545104	13627600	416491	10412275	566585	14164625
Jeep type vehicles	10 Kg	249149	2491490	263032	2630320	306818	3068180	345883	3458830	309035	309035	424616	4246160
Passenger cars	10Kg	965391	9653910	1047493	10474930	1238737	12387370	1421984	14219840	1516791	15167910	1910465	19104650
Auto Rickshaws	0.5 Kg	371208	185604	434424	217212	555887	277944	500592	250296	496828	248414	619093	309547
Scooter & Mopeds	0.5 Kg	1332795	666398	1400587	700294	1323961	661980	1505760	752880	1559447	779724	2065479	1032740
Motor cycle	0.5 Kg	5121970	2560985	6201214	3100607	7112225	3556113	6503532	3251766	6801964	3400982	8444852	4222426
Total		**8392307**	**24386715**	**9739879**	**26990557**	**11059881**	**33050179**	**10826050**	**35701792**	**11103477**	**33228179**	**14033669**	**43193624**

Annexure: 6 – II

Imports of Lead Acid Batteries, 2004-05 to 2009-10

(In thousand nos.)

HS Code	Item	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
85071000	Lead Acid Accumulators of a Kind used for Starting piston Engines	1220.94	8337.54	10475.04	9571.77	1823.55	931.04
85072000	Other Lead Acid Accumulators	3934.73	7874.24	7573.86	7927.21	9087.66	14876.71

Annexure: 6 – III

Exports of Lead Acid Batteries, 2004-05 to 2009-10

(In thousand nos.)

HS Code	Item	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
85071000	Lead Acid Accumulators of a Kind used for Starting piston Engines	713.10	830.75	693.32	953.36	798.61	6115.79
85072000	Other Lead Acid Accumulators	84.46	64.18	143.74	197.54	465.76	250.05


Pb
Zn