PRE-FEASIBILITY REPORT

for

PROPOSED EXPANSION OF NON-FERROUS METAL (LEAD – BOTH PRIMARY & SECONDARY AND TIN) EXTRACTION PLANT

at
Routhusuramala village, Thottambedu mandal,
District Chittoor, Andhra Pradesh - Location

M/s Axora Resources Limited
1, A. J. C. Bose Road, 4th Floor, Kolkata-700020

December, 2018

Pre-feasibility Report

PROPOSED EXPANSION OF NON-FERROUS METAL (LEAD – BOTH PRIMARY & SECONDARY AND TIN) EXTRACTION PLANT AT ROUTHUSURAMALA INDUSTRIAL AREA

1.0 INTRODUCTION

In the Economic Globalization process, India as a country is a major player to receive and reciprocate the benefits of economic growth. In this context it is worthy to mention that there has been an industrial resurgence in India. Indian automobile industry is one of the largest receptor of the benefits of this industrial resurgence baring other industries like shipping, railways, various surface transportation, IT, hardware, hi-tech medical instrumentation, various defence and aeronautical sectors. Lead storage cells of different configurations are used in the above sectors in a large way to keep the system on move. The unexpected growth of these sectors over the years has forced Indian industry to start new primary lead manufactures in the country to substitute lead import and reciprocate the demand for primary lead. Further, Secondary lead recycling industry has also increased there production as much as possible to meet partly the demand scenario of the Country and abroad.

In this backdrop **M/s Axora Resources Limited** (hereinafter called ARL) has drawn up an ambitious expansion plan whereby the Company will increase the production capacity of Secondary Lead in their existing plant to double the capacity. Worthey to mention the Company is about to start the production in their plant at village Routhusuramala, Thottambedu mandal, Chittoor district in Andhra Pradesh as the necessary NOC has already been received.

In the above ambitious programme the Company will also install one primary lead & Tin smelting unit in the existing plant premises and for which the required land is already available. The unit will produce primary lead from imported lead ore concentrate which will substitute partially the lead import from other countries. To manufacture both primary lead & tin the imported ore concentrate will be used.

2.0 PROJECT PROPONENT

M/s Axora Resources Limited, the project proponent wants to expand its non ferrous metal extraction plant at Sy No.: 151/1, 151/2, 151/3, 151/4, 147, 148& 150, Routhusuramala village, Thottambedumandal, Chittoor district, Andhra Pradesh.

The project proponent has their office located at 11thFloor, DLF Building No.9, Tower-B, DLF Cyber City, Phase III, Gurgaon and Registered Office at 1, A. J. C. Bose Road, 4th Floor, Kolkata-700020.

Promoter

Mr. Vijendra Kedia, Status : NRI, Age: 44 Years

3.0 BACKGROUND

The Company is promoted by Mr. Vijendra Kedia, NRI who possess more than two decades of experience in non-ferrous metals manufacturing Industry. He has established and is successfully running secondary lead recycling plants in Thailand and Myanmar.

Mr. Kedia being prompted by his past experience in secondary lead recycling metallurgy is now proposing the expansion project of Non-ferrous Lead & Tin Metal Extraction Plant. In this project the plant will manufacture lead from (1) drained battery waste and (2) from lead ore concentrate mix, from two separate units located in the same plant area. In the same site there will be a small unit to manufacture Tin from Tin Ore Concentrate. It may be recorded that there will exist provision for recovery of different precious non-ferrous metals from waste generated from the Lead extraction process.

In this project, one unit of sulphuric acid manufacture will be installed to manufacture sulphuric acid from process off gas SO_2 (by product). Further, a captive power plant based on waste heat recovery boiler, will be installed to utilise process waste heat. Through this the Company will generated 4 MW power for captive consumption.

Tin concentrate shall be processed and pure tin shall be manufactured from the same plant with Electric Arc Furnace followed by refining process.

The salient features of the project furnished below,

1) Environment friendly pathway for lead recycling
2) Manufacture of primary lead metal for battery and other uses.
3) Manufacture of Tin metal for misc. high-tech application.
4) Recovery of different precious non-ferrous metals like Antimony, Bismuth, Telurium, Silver, Gold etc. from waste generated from the Lead extraction process for miscellaneous end uses viz alloying and Ornament manufacture.
5) Manufacture of Sulphuric Acid by using SO_2 as off gas by-product
6) Generation of 4 MW electricity from waste heat recovery.

The proposed unit of M/s. ARL can partially fill up the void in the requirement of primary lead in the country.

The Company has already got 18.0 Acres of land allotted by APIIC at IP-Routhusuramala, Survey Nos. 151/1 to 151/4, Thottambedu Mandal, Srikalahasti, District – Chittoor.

The proposed expansion project for both Primary & Secondary Lead manufacture along with Tin manufacture will takes place in the existing plant premises where the total land availability breakup is as follows,

S.N	DESCRIPTION	LAND REQUIRMENT	
1.0	Existing Secondary Lead Recycling unit (Phase-I) (The proposed expansion of secondary lead Recycling will also take place in this land)	18.0 Acres	7.3 Hectares
2	Installation of Primary Lead & Tin Manufacture unit (Phase-II)	33.0 Acres	13.3 Hectares
TOTAL		**51.0 Acres**	**20.6 Hectares**

M/s. ARL has already received NOC for battery breaking and lead recycling plant for production of 19,350 TPA refined lead along with some precious non-ferrous metals as mentioned above from drained battery waste vide Order No. CTR1233/PCB/ZOK/CFE/2017 dated 06.01.2018 & Order No. CTR-1233/PCB/ZO-KNL/CFE/2018 dated 04.07.2018 of Andhra Pradesh State Pollution Control Board. The NOC is valid up to 7

years from the date of its issue i.e. 05.01.2025. The production details are presented below.

Sl. No.	Products	Capacity
1	Refined Lead	19,350 TPA
2	Silver	12 TPA
3	Gold	0.025 TPA
4	Bismuth	2 TPA
5	Tellurium	1 TPA
6	Oxygen (for internal consumption)	25 TPD
7	Tin	600 TPA
8	Antimony	1800 TPA
By product		
7	PP Chips	0.25 MT/Month

Current Status of the Unit (ARL):

- Consent to Operate (CTO) has already been awarded to ARL by Andhra Pradesh Pollution Control Board (vide Order No. CTR-1233/APPCB/ZO-KNL/CFO/2018 dated 12.10.2018) to conduct activities as furnished below,

Sl. No.	Products	Quantity
Product :		
1	Refined Lead	19350 TPA
By product		
1	PP Chips	0.25 MT/Month

  The detail terms & Conditions for this CTO is available in the letter vide reference given above.
- The plant is now ready to take off commercially and regular production will start shortly.

4.0 PROJECT SITE

The plant shall be located at Sy No.: 151/1, 151/2, 151/3, 151/4, 147, 148& 150, Routhusuramala village, Thottambedumandal, Chittoor district, Andhra Pradesh. The project site is about 14 km from Srikalahasthi by

road. Nearest railway station is Srikalahasti Railway Station which is located at a distance of about 11 km from the project site. Tirupati Airport is the nearest airport which is located at a distance of about 40 km from the project site. The State Highway No.61 runs at a distance of about 4.5km (North) from the site. It is well connected by rail and road network, thus raw materials and finished products can be transported within a short time.

The following criteria have been considered for selection of sites.

- Availability of adequate land, infrastructure facility and other services for utilities.
- Free from any human habitation and encumbrances
- Scope for easy convertibility to industrial land
- The major raw materials, which are slag producing chemicals and other minor chemicals like coke, coal powder, lime stone etc. etc. can be sourced locally through easily accessible road connectivity or through import by port connectivity.
- Environmental / rehabilitation – connected issues.

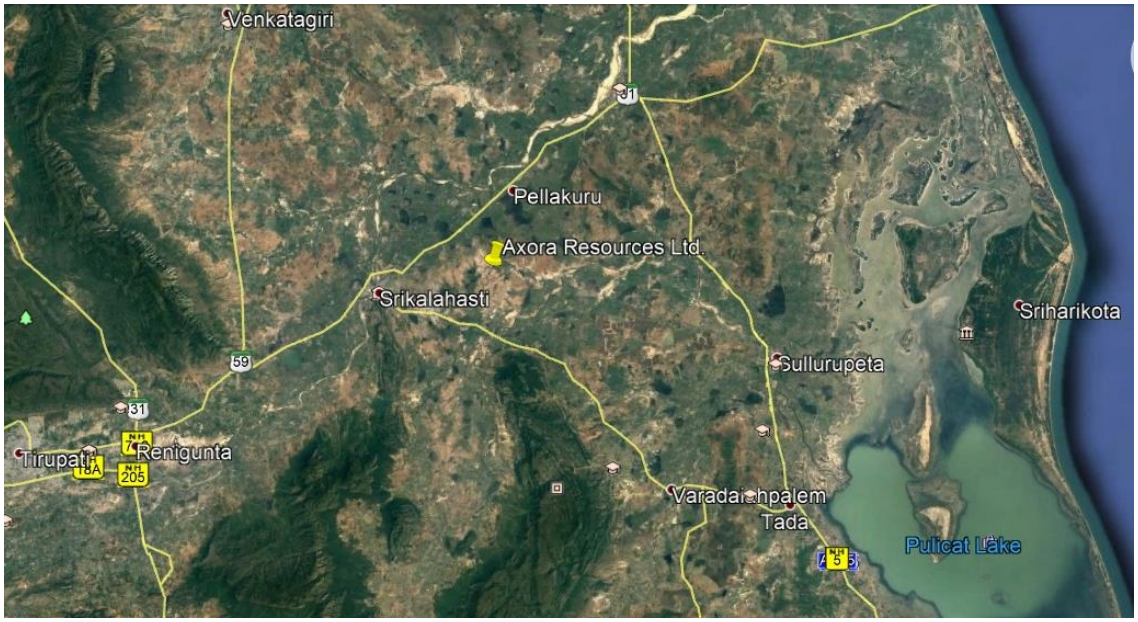
Land area required for proposed primary Lead & Tin project has been estimated to be around 13.3 Hectares (33.0 acres). Land area for the existing secondary lead recycling plant along with its expansion part of the project is around 7.3 Hectares (18.0 acres). Therefore, total land area required for the entire project shall be 20.6 Hectares (51.0 acres).

M/s ARL has already acquired 18.0 acres of land from APISC where already one unit for secondary lead recycling plant from drained waste battery is operating. Further expansion of the said existing plant will take place in the same plot of land (18.0 acres) and the final out of secondary lead will be increased from existing 19350 TPA to 40,000 TPA. The land requirement for the manufacture of primary Lead & Tin from their Ore concentrate will take place in another plot of land (33.0 acres) located adjacent to the existing plot of land. M/s ARL is in the process of acquiring the same plot of land 33.0 acres from APSIC and the acquirement process will be completed shortly. **(APIIC: Andhra Pradesh Industrial Infrastructure Corporation).**

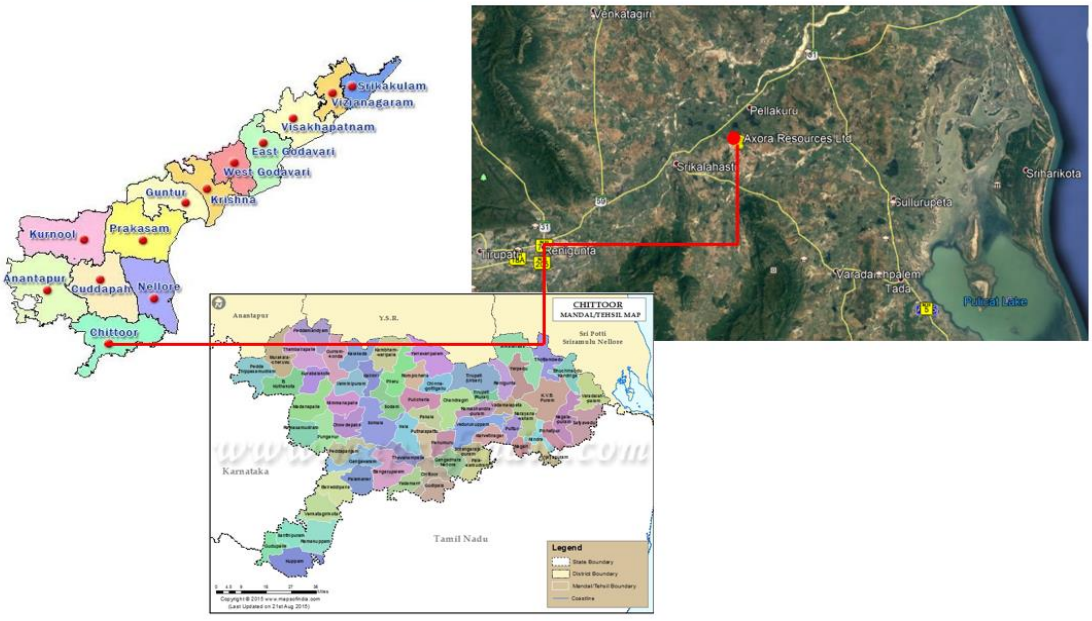
Project Site Location: Routhusuramala village, Thottambedumandal, Chittoor district, Andhra Pradesh

- **Geographical co-ordinates**: Latitude- 13⁰46'0.57"N & Longitude - 79°47'25.62"E
- **Above Mean Sea Level (AMSL)**: 167 feet.

Project Site on Google Earth



SITE LOCATION MAP



5.0 PROPOSED EXPANSION PROJECT FOR SECONDARY LEAD

M/s ARL is planning to increase the production capacity of the existing secondary lead manufacturing unit from drained battery waste from 19350 TPA to 40,000 TPA. The technology programme for secondary lead recycling vis-à-vis environment management in the expansion project will remain unaltered. The process description of Secondary Lead manufacturing is described below.

List of raw materials consumed per annum in Metric Tonnes,

S.N	RAW MATERIALS	TOTAL PRODUCTION SECONDARY LEAD (40,000 TPA)
1	Used drained batteries	31000
2	Lead residues	41350
3	CI Boring s & Mill scales	5050
4	Soda Ash	4340
5	Charcoal & Coke fines	5800
6	Lime stone	3620
7	Silica	2900
8	Caustic soda	77
9	Sodium Nitrate	39
10	Sulphur	39
11	Hydro Fluorosilicic acid	115

List of products produced per annum in Metric Tonnes,

S. N	PRODUCT	QUANTITY (IN TPA)
1	Refined lead	40,000
2	Silver	13
3	Gold	0.03
4	Bismuth	2.1
5	Telurium	1.1
6	PP Chips	6.2

Battery Breaking and Separation Unit

Used lead acid batteries are the main raw material for lead production in the plant. The batteries are made of pure lead, lead alloys and lead oxides. In this section used batteries shall be broken in a crusher. Whole, drained batteries are received and stored in the plant. These are fed into the crusher through a conveyor belt. Batteries are broken into small fragments. The broken materials are then taken through a number of conveyors, screens and tanks where various lead bearing materials,

plastics and separators are segregated from each other on principle of gravity separation.

Lead bearing materials are stored and fed into the furnaces for recovery of lead. Plastic is sold as a by-product.

Smelting Section

This section shall consist of two rotary furnaces of 20 tons each capacity. Lead bearing raw materials from the battery breaking plant shall be charged into the rotary furnaces along with fuels and fluxes in pre-determined ratio. A burner fires at one end of the rotary furnace for smelting the charge. As the name suggests, rotary furnace is continuously rotated. Thus, the charge is thoroughly mixed and various reactions take place with production of two phases – lead and slag.

After completion of smelting, both lead and slag shall be tapped from the furnace in liquid state. While lead – which contains many impurities – shall be sent to Lead Refinery Unit, slag shall be disposed off in a government approved disposal site or for government authorised recovery agents.

Lead Refinery section

Smelting furnace shall produce crude lead with many impurities. These impurities shall be removed and recovered in Lead Refinery Section. It will be prudent to combine this refining process along with other associated process like slime treatment section etc. with the refining activities installed in the primary lead manufacturing process under expansion programme.

Auxiliary Plants

Oxygen Plant

M/s ARL plan to use an oxy-fuel burner in the rotary furnace. To this effect one oxygen plant shall be built to cater to oxygen requirement of the smelting furnace burner.

Gas Cleaning and Treatment Section

Off gases from the smelting furnace shall be passed through followings:

Dust Settling Chamber

Hot gases from the rotary furnaces shall be first passed through a refractory lined settling chamber. Here much of the dust falls off due to

decrease in velocity. The collected dust is periodically removed from a manhole provided in the bottom of the settling chamber.

Cyclones

Gases then pass through cyclones, where again due special design of the gas path, dust particles fall down and are collected in the hoppers. Dust is periodically removed from the cyclones.

Bag Filters

Gases from the cyclones enter a series of bag filters. Bag filters are provided with a number of filter bags. Gases pass through the filter bags, leaving dust on the outer surface of the bags. Clean gases are led off from the bag house with the help of an ID fan.

Dust deposited on the filter bags is dislodged periodically. Dust is collected in the hoppers of the bag house from where it is collected from time to time.

All the dust collected from the settling chamber, cyclones and bag house are recycled back into the rotary furnace.

Wet Scrubber

Lead Dust free gases from the bag filters shall be treated in the wet scrubber system with lime/soda to arrest any SO_2 escaped.

Clean gases, in conformance to the MoEF&CC norms shall be released through a stack of appropriate height.

Neutralized cakes from the scrubber shall be suitably disposed off.

LIST OF MAIN PLANT AND MACHINERY:

Battery Breaking and Separation Unit – mainly consisting of crusher, conveyor systems, screens, tanks, pumps etc.

1. Rotary Furnaces - 2 nos., 20 tons capacity each
2. Refining pots – 8 Nos , 50 to 100 tons capacity
3. Casting machine for lead ingot casting.
4. Oxygen plant - 25 tons capacity
5. Bag houses
6. Cyclones
7. Packed bed scrubbers
8. Various material handling equipment like cranes, forklifts etc.
9. Electrical sub-station including transformer, panels etc.

The process flow diagram for Secondary Lead Recycling Process is presented in **Figure- 1.0 & 2.0**.

6.0 PROPOSED EXPANSION PROJECT FOR PRIMARY LEAD

The Company in the proposed expansion project will manufacture Primary Lead (60,000 MTPA) and Tin (3,200 MTPA) through installation of Lead & Tin Smelters. The ore/concentrate for both primary Lead & Tin would be imported. The proposed capacity for different products in this expansion project will be as below:

Main Product: Lead & Tin Production Capacity:	
Lead	60,000 MTPA
Tin	3,200 MTPA
By-Product and their capacities:	
Sulphuric Acid	52,000 MTPA
Zinc Oxide	15,000 MTPA
Copper Matte	2,600 MTPA
Silver	60 MTPA
Gold	0.2 MTPA

7.0 RAW MATERIALS

The major raw materials, which will be handled consists of Ore Concentrates of Lead & Tin, Quartz stone, Lime Stone, Coal & Coke fines etc. The annual requirement of the major raw materials is presented below,

1. Lead ore/concentrate – 1,10,000 MTPA
2. Tin Concentrate – 6,000 MTPA

Fluxes, Fuels & Other minor raw materials,

1. Quartz Stone – 10,000 MTPA
2. Coal fines – 13,800 MTPA
3. Coke Powder – 9,160 MTPA
4. Lime Stone – 6000 MTPA
5. Oxygen (produced in house) – 23,558 MTPA
6. Vanadium Pentoxide – 8.4 MTPA
7. Hydrofluosilicic acid - 240 TPA

8. Sodium carbonate – 561 MTPA
9. Heavy Oil – 6,000 MTPA

Raw materials will be received at plant site by rail/road. All the trucks for raw material and finished product transportation shall comply with the applicable environmental norms as applicable for bulk transportation system.

8.0 IMPORTANCE TO COUNTRY & REGION: DEMAND-SUPPLY GAP PRIMARY LEAD

It is significant to note that the average growth rate in consumption of lead for all countries is merely 2.5% over the period 1997-2000 while in India, lead consumption has grown at the rate of 10.5% during the same period. The steep growth in lead consumption in India is primarily due to the sharp rise in automobile production as a result of economic and market liberalisation. Substantial increase in use of lead acid batteries in domestic inverters and UPSs for computers is also a major contributing factor. Assuming a moderate demand growth of 6% per annum, the annual demand for lead is expected to be around 1.0 MTPA by the year 2016-17. Even if we presume that all the capacity additions planned in the organized sector during the next 15 years materialize, the supply-demand gap is expected to be around 1,64,200 MTs by the year 2016-17.

It needs to be noted that the projections above do not take into account the demand for lead in the unorganized sector engaged in assembling/ reconditioning of batteries and also supply of lead from the unorganized sector consisting of backyard smelters. It is recognized that the supply of lead from the unorganised sector is substantial. However, there is no reliable estimate of its magnitude. From industry sources, it has been gathered that import of lead metal was around 60,000 MT during 2000-2001. The industry sources have, taking into account the role of the unorganized sector, provided a rough estimate of the total lead demand in India based on current levels of vehicle production, vehicle population and assumptions regarding battery life, etc.

The demand-supply gap may be bridged by one or more of the following:

(i) Expansion of existing primary lead smelters and their capacities
(ii) Establishing new primary smelter
(ii) Increase of the secondary smelter capacities
(iii) Imports

In India as of now, there is only one primary lead smelter i.e. M/s Hindusthan Zinc Limited (HZL) in PPP mode of operation. Naturally to fill up the gap the project of M/s ARL is very much timely and a correct stepping for the country.

9.0 PROCESS TECHNOLOGY FOR PRIMARY LEAD MANUFACTURE

Lead ore concentrate mix are fed into a bottom blown oxidation furnace along with Quartz & Limestone. Oxygen is blown into the furnace which facilitates the oxidation reaction and enough heat is generated to melt all the materials. Metallurgical reactions produce two distinct liquid phases – crude lead bullion and slag. Due to difference in their densities, bullion and slag separate out. Both bullion and slag are tapped from the furnace time to time.

Off gas SO_2 from oxidation furnace is passed through waste heat recovery boiler for power generation. The gas from boiler is then passed through ESP and dust collected in ESP is sent back to oxidation furnace for recycling. The Off gas (SO_2) from ESP is passed through scrubber/Electric Demister/Drying Tower/ Primary and Secondary Converter and absorber to produce Sulphuric Acid for merchant selling.

Slag from the Oxidation furnace is further reacted in a Reduction furnace for recovery of balance lead, zinc and other minor precious metals. Lead bullion from this furnace is sent to lead refining section. The off gas from the Reduction Furnace is passed through Waste Heat recovery boiler for power generation.

The slag from the reduction furnace is subsequently reacted in Fuming furnace to recover Zinc as Zinc Oxide and disposable slag. The off gas from the Fuming Furnace is passed through Waste Heat recovery boiler for power generation and Zinc oxide powder is collected in bag filters for selling in the market.

Crude lead bullions from Oxidation & Reduction Furnaces is reacted to get freed from Copper as Copper Matte before the remaining mass of Bullion enter the Cell House as impure Lead Anode for electro refining process. In the electro refining process, impure lead bullion will be used as anode and pure lead sheet as cathode. Hydrofluosilicic acid is used as electrolyte for the process. During passage of electricity through the cell, pure lead from

anode is deposited on the cathode. At the end of the cycle, cathodes are melted in a steel pot and cast as refined lead ingots or lead alloy ingots.

Save in Lead the other precious minor metals in the impure lead bullion viz Silver, Gold, Antimony, Bismuth, Arsenic etc. are locked in anode slime. The slime is treated in small furnaces for separation of Silver, Gold, Antimony, Bismuth, Arsenic etc.

9.1 Lead Smelter

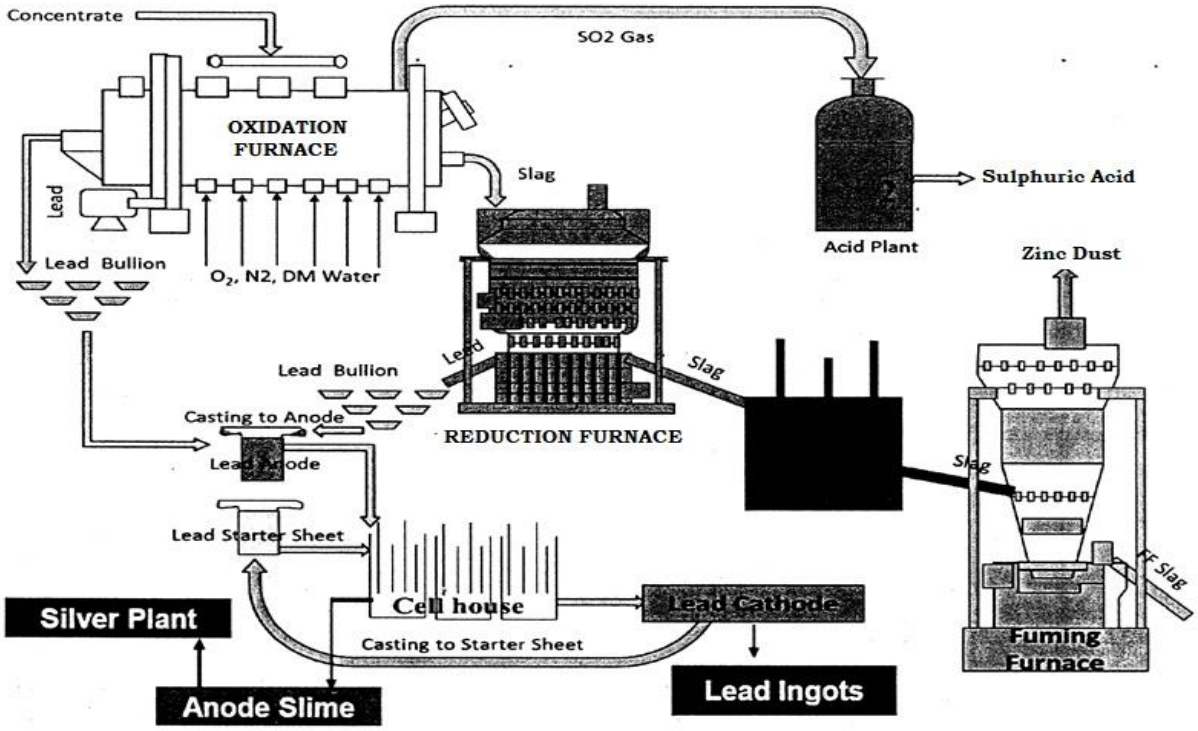
M/s ARL has planned to set-up one primary lead production unit of capacity 60,000 MTPA at the current site as described earlier. The plant will adopt the proven energy savvy & environment friendly pyro-metallurgical processing route which has been already discussed. This installation is as per the expansion programme of the existing unit for secondary lead recycling at the same site.

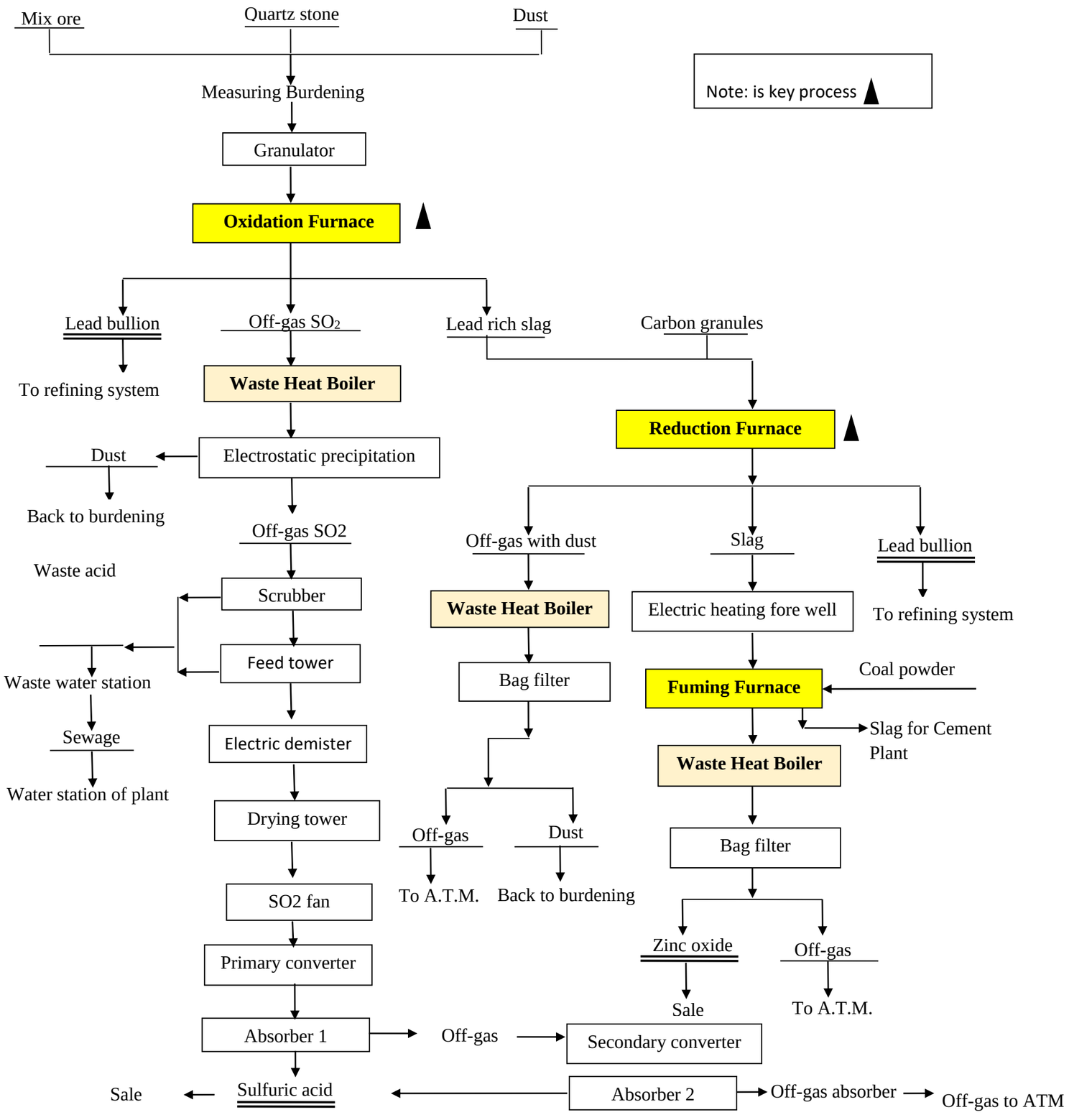
Lead (Pb) is a chemical element with atomic number 82 and symbol Pb. It is a soft, malleable, and heavy metal. Its melting point is 327°C. Freshly cut lead has a bluish-white colour that soon tarnishes to a dull greyish colour when exposed to air. As a liquid, it has a shiny chrome-silver luster. Lead's density of 11.34 gm/cm^3 exceeds that of most common materials. The most common lead ore is galena (PbS), which contains 86.6% lead. Other common varieties include cerussite ($PbCO_3$) and anglesite ($PbSO_4$). In fact, lead ore is also a source of silver and contributes substantially towards the world's total output.

Lead is still widely used for car batteries, pigments, ammunition, cable sheathing, weights for lifting, weight belts for diving, lead crystal glass for radiation protection and in some solders. It is often used to store corrosive liquids.

The flow diagram of the primary lead production in the smelter is shown below.

Primary Lead Smelter Process Technology




Mix ore
Quartz stone
Dust
Measuring Burdening
Granulator
Oxidation Furnace
Note: is key process
Lead bullion
To refining system
Off-gas SO2
Waste Heat Boiler
Lead rich slag
Carbon granules
Reduction Furnace
Dust
Back to burdening
Electrostatic precipitation
Off-gas SO2
Waste acid
Scrubber
Feed tower
Waste water station
Sewage
Water station of plant
Electric demister
Drying tower
SO2 fan
Primary converter
Absorber 1
Off-gas
Sale
Sulfuric acid
Off-gas with dust
Waste Heat Boiler
Bag filter
Off-gas
To A.T.M.
Dust
Back to burdening
Slag
Electric heating fore well
Fuming Furnace
Coal powder
Slag for Cement Plant
Waste Heat Boiler
Bag filter
Zinc oxide
Sale
Off-gas
To A.T.M.
Secondary converter
Absorber 2
Off-gas absorber
Off-gas to ATM
Lead bullion
To refining system

9.1.1 Oxidation Furnace

The oxidation furnace is a horizontal cylindrical vessel with bottom blowing facility. The furnace will be fed with feed materials from the top through feed port and oxygen shall be blown from the bottom of the furnace. The furnace is operated on a continuous smelting concept. Bullion from the furnace is tapped at regular intervals and cast into ingots. The bullion ingots are then transported to the refinery for further purifications. The molten slag with approximately 45% lead content will move through launder fitted with proper hood and other fume extraction system to the reduction furnace to recover balance lead in the slag. The off gas SO_2 management system shall consist of a WHRB, ESP, wet gas cleaning facility followed by a sulphuric acid plant.

Oxidation Furnace Inputs

- Mixed feed (lead Ore conc.– of different recipe & drained battery lead as applicable + Oxidation furnace dust + reduction furnace dust + limestone + Scrap iron + Quartz Stone).
- Oxygen at 16 bar Pressure.
- Nitrogen (only in case of oxygen failure) at 16 bar pressure.

Oxidation Furnace Outputs

1. Lead bullion
2. Lead oxidation slag (Oxidation furnace slag)
3. Sulphur Di-oxide (SO_2)
4. Oxidation furnace dust in off gas

Oxidation Furnace Reactions:

$$PbS + 0_2 \xrightarrow{1150°C} PbO + SO_2$$

$$PbO + PbS \xrightarrow{1150°C} Pb + SO_2$$

At 1150°C lead sulphide reacts with oxygen to form lead oxide and sulphur dioxide. The lead oxide in turn reacts with lead sulphide to form pure lead metal and sulphur dioxide is liberated. The heavier lead bullion collects at the bottom of the furnace and the slag floats at the top. The furnace has an inbuilt siphon to tap out the Lead bullion; Lead oxidation slag is tapped out through a slag tap-hole. Sulphur converted to sulphur dioxide and escape as off-gas mix.

Off-Gas Collection

The SO_2 rich off-gas with lead dust generated in the smelting process is continuously removed under the negative pressure created by an Induced Draft Fan in the off-gas system. Along, with the off-gas from smelting process, air sucked from throat and feed inlets also enters the off-gas stream. Around 15% PbS to PbO conversion takes place in the off gas. The off gas stream passes through the Waste Heat Recovery Boiler (WHRB) and Electro-Static Precipitator (ESP) before entering the Acid Plant Battery Limit (Gas Cleaning Plant).

Almost 97.67% of sulphur fed into the furnace enters the off gas and rest being carried in the Oxidation furnace slag. In primary lead smelter sulphur dioxide liberated during oxidation.

Waste Heat Recovery Boiler

The sensible heat in the off-gas (at ~1150°C) is recovered as steam in the Waste Heat Recovery Boiler (WHRB) system along with collection of off-gas dust. Some of the dust in the stream gets collected at the bottom of the boiler which is conveyed by a chain conveyor to the common dust chain conveyor of dust collection system. This dust which is rich in lead (~60% Pb) in the form of PbO is then sent to the Oxidation Furnace through a weigh feeder and a bucket elevator.

Electrostatic Precipitator

The off-gas leaving the WHRB enters the ESP. The discharge electrodes in the fields are charged with high voltage and the collecting plates are neutral which collects the statically charged dust. The dust from the collecting plates is discharged by rapping system during each cycle of operation. Dust gets collected at the bottom of the ESP, which is conveyed by a chain conveyor to the intermediate chain conveyor. The off-gas which contains by & large dust at a moderately high temperature viz ~350°C enters subsequently the gas cleaning section for recovery of SO_2.

9.1.2 Reduction Furnace

The slag from Oxidation Furnace will be fed to the reduction furnace along with a coke mix for recovering the lead along with other minor precious metals. Molten Lead from the reduction furnace is cast into Bullion and transported to the refinery for further treatment. The slag from reduction furnace containing approximately 3% lead and 15% Zn is fed to the electric arc holding furnace. Off-gas from the reduction furnace is treated through a cooling fine bag filter to recover dust in the off-gas.

The dust collected from the cooling fine and bag filter is re-cycled as they have high lead content.

Reduction Furnace Inputs

1. Lead oxidation slag (approx. 40% lead content);
2. Quartz Stone;
3. Coke;
4. Lean slag from noble lead furnace (PMR).

Reduction Furnace Outputs

1. Lead bullion (97% purity);
2. Reduction furnace slag; and
3. Reduction furnace dust.

Reduction Furnace Reactions

$$PbO + C \xrightarrow[\text{Reduction}]{} Pb + CO + CO_2$$

Off-gas Dust Collection Section

The off-gas from Reduction Furnace passes through the cooling flue (surface cooler) and bag filter and then will be sent to the Tail-gas scrubbing section. The induced draft fan located at the outlet of the bag filter keeps the negative pressure in operation for off gas flow from reduction furnace through cooling flue and bag filter.

There will be multiple sets of cooling flues for the dust collection. A cold air valve is installed on the inlet of cooling flue. When off-gas temperature is above 170°C, this valve will automatically open for diluting the off gas with cold air. When temperature becomes less than 100°C, it will automatically close. The Duct between reduction furnace and cooling flue is designed as up-wide down 'V' shaped to avoid dust accumulation.

A cooling water jacket is equipped on the outlet pipe of the Reduction furnace. When the off-gas temperature is higher than the design value, the water feed system will turn on automatically for cold water charging.

After the cooling flue, the gas enters a Bag filter. The bag filter is waterproof and covered with temperature resistant materials. The bag filter is designed to meet the gas emission requirements. Explosion valves are equipped on the bag filter for safe operation as the off gas from reduction furnace contains Carbon Monoxide.

The dust collected in the cooling flue and bag filter are conveyed to the lead dust receiving bin located at Oxidation furnace workshop through a pneumatic conveying system. This pneumatic conveying system uses compressed nitrogen from the oxygen plant for Oxidation furnace.

9.1.3 Slag Fuming Furnace

The reduction furnace slag is first taken to the electric arc furnace to maintain the temperature of the slag and also to buffer a stock of slag for one batch of slag fuming furnace operation. The slag fuming is done on batch processing philosophy by using pulverized coal along with high pressure air. The final slag produced after fuming is discarded for use in many downstream applications like slag in Cement Plant. The off-gas system is designed to recover waste heat through WHRB. Zinc oxide compound (with ~10 to 20% lead and ~55% zinc) in the off gas shall be recovered from WHRB and bag filter system. The zinc oxide shall be collected & sold to the market.

Fuming Furnace Inputs

1. Reduction furnace slag
2. Pulverized coal
3. Air Blast

Fuming Furnace Outputs

1. ZnO dust; and
2. Fuming furnace slag.

Slag for Disposal

The slag tapped from the fuming furnace will have very low Pb and Zn content. This slag is not viable for further recovery of metals and hence shall be discarded for other use. The slag is tapped and granulated by a jet of water in slag launder. After water granulation and settlement, the slag will be grabbed by bridge crane and is stored in slag bin. From slag bin, the slag is transported to slag yard by trucks.

Off-Gas Collection System

The off-Gas generated is sucked by an Induced Draft Fan located at the outlet of the bag filter and the fan keeps the negative pressure in operation. The off-gas passes through the WHRB and the temperature of off-gas drops to 360°C. Then it enters the cooling flue (surface cooler) and bag filter where the zinc rich dust is collected. The off gas leaving the bag filter will be sent to tail gas scrubbing unit.

The dust collection in fuming furnace is similar to the dust collection system of reduction furnace section. The zinc oxide compound (~55% Zn, 10~20% Pb) collected in the cooling flue and bag filter are conveyed to the intermediate storage bin by chain conveyors. From the bin, the dust is collected and bagged in nylon bags by bagging machine. The bags are then stored in zinc oxide storage building and before being sent for recovery of zinc & lead.

Coal Pulverization Plant

The raw coal pulverizing system adopts the closed-negative pressure pulverizing process and is not prone to leaking coal powder. The raw coal is milled by the coal mill and dried by hot off-gas. The fine pulverized coal dust produced by the crushing is collected in three stages. The first stage uses coarse powder to remove dust and the efficiency is 85%, and the second stage uses cyclone separator to remove the dust and the efficiency is 85%. The third stage uses explosion-proof counter-blow bag filter dust removal and the efficiency are 99%. The total dust collection efficiency is up to 99.78% concentration of dust. The off-gas from coal powder preparation and raw material system is discharged together through bag filter and finally discharged to atmosphere through a stack of adequate height.

Lead Refinery Unit Process for Refining Primary Lead Bullion & Secondary Lead Bullion (Recovery of precious Metals metal from Anode Slime included):

The Lead refining section consists of the following three main sub-sections:

1. Copper drossing and anode fabrication
2. Cell house
3. Cathode fabrication / melting & ingot casting section

The cast bullion produced from Oxidation furnace, reduction furnace and secondary Lead bullion is transported to the electrolytic refinery for melting and drossing to remove copper from the bullion. After copper drossing, the Lead bullion is cast into anode suitable for electro refining. The initial thin cathode sheets are produced from refined Lead and the final thick cathodes produced from the electro-refining process are removed on periodical basis for melting and casting into saleable ingots. The slime from the electro-refining operation is further treated for recovery of valuable metals like silver, gold, antimony, bismuth, arsenic etc.

Silver Refinery

The plant shall have rotary furnaces like noble lead furnace & cupel furnace to produce silver bullion. The antimony and bismuth concentrate shall be recovered from the off-gas handling system of the furnaces which has cooling fins and bag filter. The bismuth concentrate is skimmed from the cupel furnace. Lead rich slag (recyclable) and copper matte (saleable) is also recovered from the cupel furnace. The silver bullion is further refined by electrolysis. The pure silver powder from the electrolytic process is melted and cast into silver ingot of 99.99% purity.

Copper Recovery Plant

The plant will take the copper dross from the electro-refinery unit and will produce copper matte of around 40% purity. This plant uses the ball mill and reverberatory furnaces to produce the copper matte. Copper matte shall be sold.

Off-Gas Collection

The off-gas having little content of sulphur as SO_2 passes through a flue gas chamber and bag filter system under negative pressure created by induced draft fan and finally sent to the scrubber. The hot off-gas is cooled in the flue chamber and in turn, the inlet air for the burner of reverberatory furnace is preheated. The dust is collected in the bag filter and is sent back to Oxidation furnace.

9.1.4 Captive Power Plant

The proposed unit is also comprised of one Captive power plant of 4 MW capacity based on waste heat recovery boilers, utilising waste heat from Oxidation, Reduction & Fuming furnaces.

9.2 Tin Smelter

M/s. ARL also has planned to install under this expansion programme a Tin Smelter unit for production of 3,200 MTPA Tin from tin ore concentrate in the electric arc furnace.

Tin is a chemical element with the symbol Sn (from Latin: stannum) and atomic number 50.Tin is a soft, malleable, ductile and highly crystalline silvery-white metal. When a bar of tin is bent, a crackling sound known as the "tin cry" can be heard from the twinning of the crystals. Tin melts at low temperature of about 232°C (450 °F).

Cassiterite is a tin oxide mineral with a chemical composition of SnO_2. It is the most important source of tin, and most of the world's supply of tin is obtained by mining cassiterite. Small amounts of primary cassiterite are found in igneous and metamorphic rocks throughout the world. It is also a residual mineral found in soils and sediments. Cassiterite is more resistant to weathering than many other minerals, and that causes it to be concentrated in stream and shoreline sediments. Although cassiterite is the most important ore of tin, it has only been found in minable concentrations in a few locations.

Tin has many uses. It takes a high polish and is used to coat other metals to prevent corrosion, such as in tin cans, which are made of tin-coated steel. Alloys of tin are important, such as soft solder, pewter, bronze and phosphor bronze. A niobium-tin alloy is used for superconducting magnets.

Process

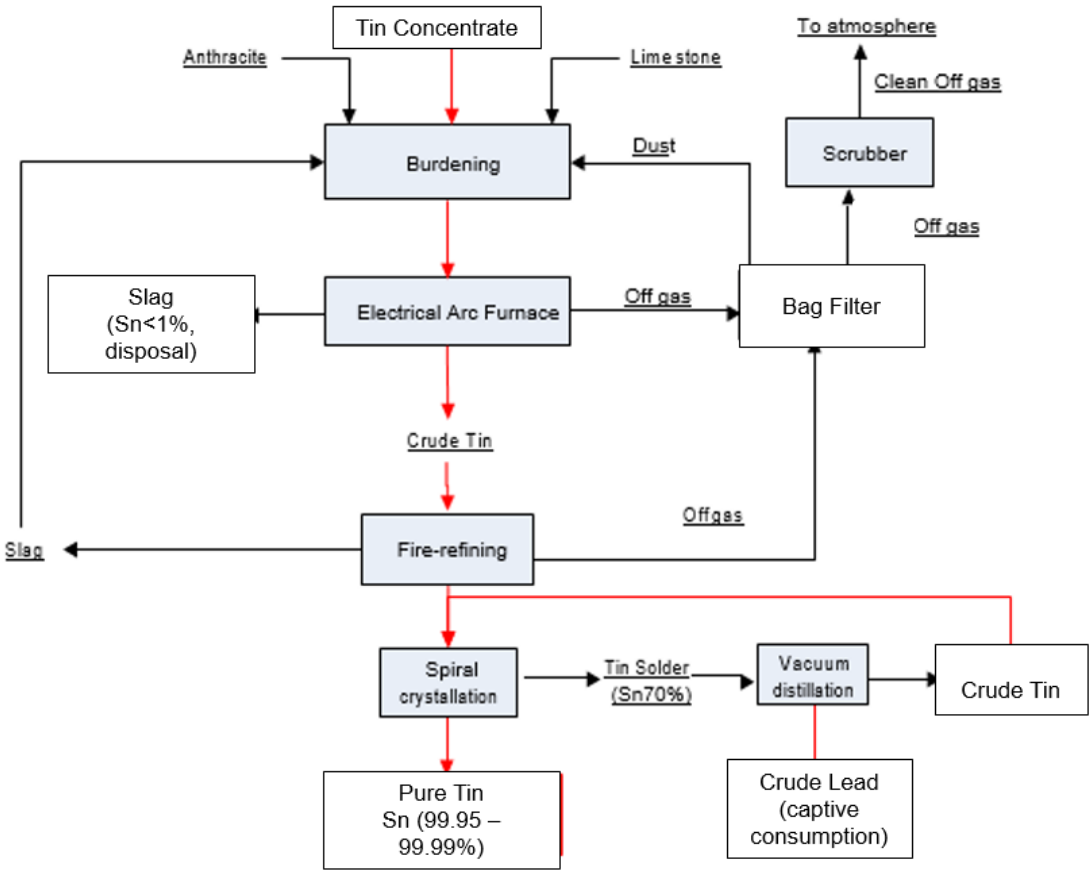
Tin Ore concentrate mixed with Anthracite and lime stone are charged into the electric Arc furnace through charging port. The reduction smelting process that follows inside the furnace produces crude molten tin and slag. Tin is tapped out from the furnace outlet. The crude tin is then sent to refining process. The Tin available from this refining process is further sent to spiral crystallization process and thus the pure tin metal is obtained (99.99% tin).

The dust from charging port inlet and the off gas released from the Arc furnace and fire refining system are passed through Bag filter followed by a passage through outside scrubber to ultimately receive the clean off gas for discharge through appropriate stack. Tin solder obtained at the end of spiral crystallization process is distilled under vacuum, crude lead separates out and collected for captive consumption. The tin collected is sent for further refining as required.

Small amount of slag is also available from Fire refining process and the same is again re-circulated in the smelting process in electric Arc furnace.

No solid waste virtually is discharged outside the metallurgical process system. Only clean off gas what is available is released outside through stack of proper height.

Process flow chart- TIN Concentrate



Plant and Machinery for the Proposed Expansion Project:

- Bottom Blown Oxidation Furnace
- Reduction Furnace
- Fuming Furnace
- Lead Refining Plant
- Slime treatment, precious metal and minor metals recovery plant
- Electrolysis Plant
- Sulphuric Acid Plant
- Gas cleaning and treatment plant
- Effluent Treatment Plant
- Oxygen Plant
- Electric Arc Furnace
- Tin Refining Pot

- Spiral crystallization unit
- Vacuum distillation Furnace

10.0 IDENTIFICATION OF SPECIFIC ENVIRONMENTAL ISSUES

This section covers all aspects of pollution – sources and nature of pollution & proposed measures required for meeting the prevailing statutory requirements of gaseous emissions, solid wastes generation, waste water discharge characteristics, noise level etc. for environmental management purpose in connection with the installation and operation of proposed expansion of Secondary lead Recycling, proposed Primary Lead and Tin smelters.

M/s Axora Resources Limited will operate the proposed plant at Routhusuramala village, Thottambedu mandal, Chittoor district in Andhra Pradesh. The Company is well aware about the importance of Pollution Control. The Company will install adequate Pollution Control Measures in this proposed Plant. Strict Monitoring will be done regularly through in house facilities, Approved Agencies/Laboratories of SPCB. SPCB will also check whether pollution levels are within Stipulated Norms.

In general Pollution Prevention and Control Measures are enumerated as below:

Genesis of Pollution: The genesis of industrial pollution can be accessed from the project concept described in earlier chapters. The specific aspects, which need to be looked into for assessing the pollution potential, are:

(i) Physical and chemical characteristics of raw materials,
(ii) Manufacturing technology involving a set of physical and chemical conversions of raw materials and
(iii) The generation of all types of wastes, namely, gaseous, liquid and solid having specific characteristics.

The pollutants in the form of solids, liquids and gases will be generated from various Units & sections of the proposed plant already described. Release of such pollutants without proper care may affect the environment adversely. Pollution of the environment not only adversely affects the human beings, flora and fauna but also shortens the life of plant and equipment. This vital aspect, therefore, has been taken into

account while planning the plant and equipment. Adequate measures have been proposed to limit the emission of pollutants within the stipulated statutory norms.

The various types of specific environmental issues in the proposed project are presented as follows.

- Air Pollution
- Water Pollution
- Noise Pollution
- Solid & Hazardous Waste management

10.1 Air Pollution Control

Effective mitigative measures for sustainable environment management have been envisaged and planned covering both Primary & Secondary lead manufacturing / recycling process & Tin Smelting in regard to proper ventilation, dust/gas collection and control at source. The main dust / gas emission sources in the proposed project, is furnished below. However, the same has also been described while detailing the process.

(1) Dust generated during the process of transportation of Ore Concentrates & other major raw materials. Also, during batching and charging in the furnace
(2) Off-gas from raw coal pulverizing system
(3) Off-gas from bottom blowing Oxidation furnace; by & large the off-gas containing SO_2 will be treated to get converted to Sulphuric Acid plant in Primary Lead process.
(4) Dust/Fume from charging port of bottom blowing Oxidation furnace, molten Lead & slag outlets etc. in Primary Lead process;
(5) Off-gas from side blowing Reduction furnace in Primary Lead process.
(6) Dust/Fume from charging port, Lead outlet, slag outlet of side blowing Reduction furnace in Primary Lead process
(7) Fuming furnace off-gas. Fumes from slag quenching
(8) Off-gas from Copper dross reverberatory furnace;
(9) Lead electro-refining workshop Lead smelting dust/off-gas;
(10) Coal burning off-gas/fire in lead melting for refining process in Lead electro-refining workshop;
(11) Lead electrolytic cell - unorganized HF emissions;
(12) Silver smelting / reflection smelting off-gas;
(13) Bismuth oxide slag crushing dust;
(14) Bismuth refining / reflection off-gas;
(15) Dust from Bismuth / refining process.

(16) Lead dust, Off-gas & slag from Rotary Furnace in secondary Lead recycling process

Effective ventilation system with properly designed collection hoods, high capacity suction fans, Electrostatic Precipitator (ESP) and bag filter system etc. are envisaged at all potential points of lead/ particulate matter/gaseous emission. Also, effective scrubbing/ purification measures have been considered to treat the fumes & process off-gases from the plant.

Conclusion: Adoption of all these pollution control measures will help to maintain the dust & gaseous emission at a level which will comply with the legislative requirements of the country. However, disposable slag released from fuming furnace outlet will be transferred after quenching for disposal to Cement manufacturing Plant. Slag generated from Rotary furnace in the secondary lead recycling process will be disposed through authorised venders for recycling/reuse etc.

a. Raw Material Handling and Batching Sections

Dedicated ventilation system using network of collection hoods, ducts, high capacity fans and bag filters have been proposed for installation at all identified location to control the dust at source, primarily to cover the following areas:

- Receiving point of raw material;
- Loading point of raw material;
- Transfer point of raw material from the bin to belt conveyor; and
- Transfer point of lead Ore concentrate along with all raw materials from one belt conveyor to another belt conveyor.

Necessary design measures have been considered to keep the lead Ore concentrate in a completely covered storage shed with no possibility of cross ventilation. All the conveyors shall be designed with covered top and sides to avoid spill and carryover of raw material.

b. Off-gas from pulverized coal preparation system in Primary lead process

The raw coal pulverizing system adopts the closed-negative pressure pulverizing process and is not prone to leaking coal powder. The raw coal is milled by the coal mill and dried by hot off-gas. The fine pulverized coal dust produced by the crushing is collected in three stages. The first stage uses coarse powder to remove dust and the

efficiency is 85%, and the second stage uses cyclone separator to remove the dust and the efficiency is 85%. The third stage uses explosion-proof counter-blow bag filter dust removal and the efficiency are 99%. The total dust collection efficiency is up to 99.78% concentration of dust. The off-gas from coal powder preparation and raw material system is discharged together through bag filter and finally discharged to atmosphere through a stack of adequate height.

c. Oxidation Furnace Plant in Primary lead process

Oxygen bottom-blowing oxidation furnace generates a large amount of SO_2-containing off-gas in the smelting process. The off-gas passes though waste heat boiler and purified by electrostatic precipitator (ESP) and sent to a sulphuric acid plant for sulphuric acid production. The acid production process consists of dilute acid scrubbing, two-contact and two-suction processes, a design purification rate is 99%, a conversion rate is 99.7%, and an absorption rate is 99.99%. In order to further reduce SO_2 emissions from acid production, the off-gas from the production process is discharged from the stack of adequate height after desulfurization treatment. The desulfurization agent uses NaOH + lime and the desulfurization efficiency is 65%. The sludge generated from the system will be disposed through authorised recycler.

Apart from the primary process off-gas handling system, the Oxidation furnace system will be provided with a dedicated ventilation system comprising of proper suction hood, ducting system, fan with bag filter to cover the secondary emission from the following points:

- Charging ports of the furnace;
- Lead tapping system;
- Bullion casting machine;
- Slag tapping system;

The fugitive emission collections from all these locations will pass though bag filters for the removal of particulate matter and the purified gas will be discharged through stack of adequate height. The dust collected by the bag filter will be returned to the raw material bin for charging back to the furnace.

d. Reduction Furnace and Fuming Furnace Plant in Primary lead process

The off-gas from side blowing furnace contains dust. The output off-gas is cooled by a surface cooler and collected by a bag house filter. The dust removal efficiency is greater than 99.55%. After passing through the double-alkali desulfurization tower, the desulphurized off-gas (with a desulfurization efficiency is over 65%) is discharged to the atmosphere through a stack of adequate height.

Off-gas from the fuming furnace mainly contains Zinc Oxide. The off-gas is cooled while passing through waste heat boiler and baghouse filter. The designed total dust collection efficiency is 99.65%. The off-gas further enters the desulfurization process for desulfurization (above 65% desulfurization efficiency) and the desulphurized off-gas is discharged to the atmosphere through a stack of adequate height.

e. Side blowing reduction furnace, fuming furnace workshop ventilation and dust collection system in Primary lead process

The coke, flux container, weighing hopper, feeder, lead outlet, lead flow through, slag discharge port, and flow through off the side blowing furnace and fuming furnace are all equipped with suction hoods. A set of centralized dust removal system is used for the off-gas inlet of the furnace and the slag outlet. The high-pressure pulse bag type dust collector is used for dust removal. After the dust removal, the off-gas is discharged through a stack of adequate height.

f. Copper dross reverberatory furnace workshop in Primary lead process

(1）Copper dross reverberatory off-gas:

The off-gas from copper dross reverberatory furnace is treated by the water-cooled flue, cooling flue and bag filter. The dust collected in the bag filter will be returned to the reverberatory furnace. The dust removal off-gas is discharged through a stack of adequate height, where the total dust removal efficiency is 99.5%.

(2）Dust from charge port, Lead outlet, slag outlet of dross treatment in reverberatory

There are dust suction hood and mechanical exhaust system arranged at charge port, lead bullion outlet, copper matte outlet of reverberatory furnace. Connected with the reverberatory off-gas

discharged system after passing through bag filter and finally through a stack of adequate height. The total dust removal efficiency is here 99%.

g. Lead electrolysis workshop

Lead melting kettle of lead electro refining system in the lead Electrolysis workshop will produce off-gas and Lead dust. The project plans to set up suction hood above the melting kettle to collect the off-gas followed by passing the off gas across the bag filter (dust removal efficiency 99%) for final discharge through a stack of adequate height.

In the electro-refining workshop of the project, the lead melting kettle is heated with heavy oil, which is equivalent to a natural ventilation boiler. The off-gas passes through the cyclone plate, granite water film desulphurization and dust removal, with lime water as desulfurizer. The environmental assessment indicates that the desulfurization rate can reach 90%, the dust removal efficiency can be over 98%.

h. Anode slime comprehensive recovery workshop (PMR workshop)

(1) Silver reduction smelting rotary furnace (noble Lead furnace) off-gas

Off-gas from anode slime rotary furnace smelting system caries dust which contain Pb, As, SO_2, F. The fluorine is from the anode slime which is with fluorosilicic acid (H_2SiF_6).The rotary furnace off-gas is diluted and cooled in a settling chamber followed by passage through bag filter (collects the dichromic oxide) to collect dust. This operation follows subsequent rinsing by alkali liquid (dust removal efficiency is 99.5% and defluorination efficiency is 97%). After treatment, the off-gas is discharged through a stack of adequate height.

The alkali liquid washing tower uses NaOH as an absorbent and the absorbing liquid is recycled after being defluorinated with lime milk.

(2) Silver Oxidation Refining Rotary furnace (Silver separating furnace) Off-gas

Precious lead oxidation refining furnace off-gas contains mainly dust contaminated with Pb, As and SO_2. The hot off-gas is passed through a settling chamber with air dilution cooling followed by passage through bag filter to collect dust (dust removal efficiency 99.5%). The reduction furnace off-gas exhausted by a stack of adequate height.

The rotary furnace dust is sent to the Bismuth wet treatment system for processing.

(3) Off-gas from Silver electro-refining workshop

Nitric acid decomposition in silver electro-refining generates NO and NO_2 containing off-gas. After the off-gas is collected, it is treated by acid mist purification tower (liquid alkali is used as absorbent and absorption rate is 80%) and passed through a stack of adequate height. Absorption solution recycling, regular inspection of the absorption concentration, to ensure that the absorption solution pH ≥ 11, when the pH ≤ 11 supplements with fluid.

(4) Off-gas from refining kettle and Bismuth reverberatory

The Bismoclite is reduced, smelted in reverberatory furnace. The combustion of coal from the reverberatory furnace and the off-gas from the smelting pool are discharged from the furnace tail. The off-gas temperature is 900°C. Bismuth refining produces refinery off-gas and coal-fired off-gas. A hood is provided on each refining kettle (total of 4 refining kettles). The refined off-gas is collected together with the off-gas of the reverberatory furnace after being collected by the collecting hood. The off-gas is cooled by a special technology which involves a passage through flue, surface cooler, the herringbone flue and finally through Bag filter & Double Base Absorption Tower. This together with Bismuth reverberatory off-gas (dust removal efficiency 99.5%, dichlorination rate 99%, desulfurization efficiency is over 65%) and off gas from silver system discharged through a stack of adequate height.

(5) Precious metal smelting workshop fugitive dust collection

The fugitive dust collection system is designed to be installed in the silver reduction smelting furnace feed port, slag discharge port, precious lead port, casting mould attached to silver reduction refining rotary furnace, outlet of oxide refining rotary furnace and Bismuth reverberatory. The main pollutant is dust, dust with Pb, dust with As, and the fugitive dust gas is collected by a gas gathering hood and enters a bag filter (dust removal efficiency 99%). The reduction smelting off-gas and oxidation refining off-gas is discharged together from a stack of adequate height.

i. Unorganized emission source

(1) Dust, lead dust

The unstructured emission of dust and lead dust from the proposed project comes from the raw material preparation system, the smelting system, the Lead melting kettle of the electro-refining workshop, and the uncollected pollutants from the hood of the sanitary dust collection system. The collection efficiency of the various sanitary dust collection systems is about 98%, and the rest of the dust is discharged as unorganized emission through stack of adequate height.

(2）Off-gas from electrolytic cell

Since the electrolytic cell in the lead electro-refining workshop works at normal temperature, the electrolyte is a stable compound of lead silicate fluoride, and the volatilized amount from hydrofluoric decomposition product of Hydrofluorosilicic acid is negligible, natural ventilation is used in the design workshop.

In lead electro-refining workshop using lead silicic acid electrolyte to refine lead, trace amounts of hydrogen fluoride gas are generated. Since it is room temperature electrolysis, the electrolyte is a stable compound of lead silico fluoride, and thus the volatilization amount of hydrogen fluoride from the decomposition of Hydrofluorosilicic acid is very small. The workshop uses natural ventilation and discharges through the workshop skylight.

10.2 Water Pollution

Waste water generated from the different areas of the plant will be treated to the desired extent in suitable treatment facilities and recycled back to the process, as far as practicable. This will ensure adequate recirculation of water in the respective systems and thus, economizing the make-up water requirement.

The plant's domestic water consumption is 102 m^3/day (30 kld for secondary lead recycling process proposed for expansion + 72 kld for proposed primary process). The domestic wastewater generation will be 91 m^3/day (27 m^3/day for secondary lead recycling process proposed for expansion + 64 m^3/day for primary process) which will be treated in common Sewage Treatment Plant and the treated effluent shall be collected in the sump, located in a low lying area. The water thus collected shall be used for dust suppression purpose at raw material

storage yards, pavements, landscaping and green-belt development activities.

The Plant will be designed in such a way that practically no waste water after proper treatment will be discharged outside the plant premises. Treated wastewater will be fully recycled in the plant. It will be a "**Zero Liquid Discharge"** plant.

Different waste water treatment scheme is discussed below.

(1) Acid produced by the off-gas

In the proposed project waste acid will be generated from different off-gas handling section. The main pollutants are pH, SS, Pb, Zn, Cu, Cd, As, Hg, and F. After proper treatment by the waste acid treatment facility, a part of treated wastewater will be used for bags cleaning, car washing. The remaining part will be used in slag flush in the fuming furnace. Washings from bags & car wash wastewater will be used in disc granulator.

(2）Other acidic wastewater

Other acidic wastewater will be generated from electric mist washing water, chemical water treatment station, high temperature fan impeller flushing water, laboratory drainage, and from ground flushing water. Contaminants such as pH, SS, and heavy metals will be treated in acid wastewater treatment facility which will be finally used in bags cleaning, car washing.

(3）Fuming furnace slag flushing water

In the fuming furnace section the slag flushing water is precipitated in the sedimentation tank and pumped back to the fuming furnace to continue flushing of the slag. The water quenched slag system has the supplements of water from the stock of treated effluent water available from different other section. Such treated wastewater water as already described is also used as cooling water supplement for bottom blowing furnace, ingot casting and slag casting machine.

(4) Indirect cooling water

Most of the indirect cooling water of the engineering equipment is recycled after being cooled by the cooling tower. There is cooling tower blow down discharge which is also use in the plant area. The project will make full use of the secondary drainage in various processes within the system and will use extra cooling water of the bottom-

blowing furnace, side blowing furnace as implement water of slag flushing water of fuming furnace to save new water.

(5) Lead electro-refining workshop

Electrolyte of electro-refining process is recycled completely. When the lead electrolysis is performed, the circulating electrolyte flows into the circulation tank, and an appropriate amount of Hydrofluorosilicic acid and additives are regularly added to the circulation tank, and then the solution in the circulation tank is pumped to the overhead tank for recycling. The electrolysis plant is provided with a liquid pool, various tanks, pumps, etc. drip, and leak. At the same time, the anode scrap and cathode wash water can be returned to use or used as new electrolyte water. Therefore, no process wastewater is discharged outside the normal working conditions of the electrolysis plant.

(6) Precious metal recovery (PMR) workshop for both Primary & Secondary Lead recycling process

All the silver electrolytes are recycled without any discharge. The amount of decomposed liquid and gold settling fluid produced by gold electro-refining are discharged into the acidic wastewater treatment facility for treatment.

The crucible furnace smelting and rough refining are pyrometallurgical processes and there will be no process wastewater generation.

(7) Domestic sewage

The plant's domestic water consumption is 102 m^3/day and the domestic wastewater generation will be 91 m^3/day which will be treated in Sewage Treatment Plant.

10.3 Noise Pollution

Noise generation will be considered while selecting equipment. The main noise creating devices in the project include all types of fans, air compressors, coal mills, oxygen generators, water pumps and rectifiers. The noise intensity is generally around 85~110 dB(A). Except for oxygen production noise, the source strength is less than 85 dB(A) after protection by sound insulation, vibration reduction and noise elimination measures.

Wherever required noisy equipment will be placed on vibration isolators or

housed in a separate enclosure or surrounded by baffles covered with noise absorbing material. As the operator would be stationed in the control room, there will be minimum chance of exposure to high noise levels. However, personnel working in high noise zones will be provided with personal noise protection equipment (e.g. ear muffs, ear plugs) and their duty hours will be regulated to control noise exposure levels.

Strength of Noise Source of Main Equipment

Sl. No.	Equipment name	Source strength	Sl. No.	Equipment name	Source strength
1	Fan	90	5	Rectifier	90
2	Coal mill	105	6	Water pump	80～90
3	Air compressor	95	7	Generator	90
4	Oxygenerator	110	8	Steam turbine	90

10.4 Solid & Hazardous Waste management

There are three types of solid waste disposal methods:

(1) Comprehensive use in plant (Effective Recycling)

Smelting fumes, side-blowing furnace dust, dross reverberatory furnace, lead dross, anode slime, noble metal comprehensive recovery system reduction slag, Bismuth oxide slag etc. can be effectively utilized in the production. The above wastes belong to dangerous solid wastes category. The different dust released in the process contains by & large lead and other precious non-ferrous metals. Lead dross contains a large amount of lead and copper (Pb60~70%, Cu10~28%); reverberatory furnace slag contains part of lead and copper. The anode slime contains a large amount of gold, silver and Bismuth; the precious metal integrated recovery system contains a small amount of lead and silver in the reduced slag.

(2) Direct Disposal

The quenched slag from the fuming furnace, the Zinc oxide from the fuming furnace, the fly ash from the lead melting kettle, the copper matte from the copper dross reverberatory, arsenic dust from the rotary furnace, waste vanadium pentoxide catalysts and slag from rotary furnace in secondary lead recycling process will be all disposed directly through the Authorised Recyclers. They are intended to be comprehensively used by authorised recyclers after being stockpiled at temporary yards in the plant area. The ash from burning coal can

be sold out to make bricks for construction activities. Copper matte and solid waste from rotary furnaces i.e. arsenic dust are given to recyclers.

(3) Store

Sewage treatment slag, acidic wastewater treatment sludge and anode slime reduction smelting waste gas defluorination treatment sludge are all hazardous wastes and are to be piled up in a temporary protected storage warehouse as hazardous waste. These stored hazardous wastes will be ultimately disposed through authorised waste recyclers.

The hazardous wastes will be properly stored in secured and ventilated chambers following protocols released by waste regulators in the country i.e. MoEF&CC.

Conclusion: All solid wastes generated in the Plant will either be reused / recycled in various Production Units or will be sold / utilised for land filling and other gainful purposes. Thus, there is no disposed off solid waste outside the plant.

11.0 IMPACT OF LEAD EMISSIONS ON SURROUNDING ENVIRONMENT

Lead occurs naturally in the environment. Lead itself does not decompose, however lead compounds are changed by sunlight, air and water. Lead may be released as particulates into the atmosphere or as dissolved compounds in water. Lead will also be released from natural sources such as windblown dusts and forest fires. Most lead released to air, water, sediment, and soil strongly attaches to other particles, and may remain there for many years.

Lead usually adheres to the soil. Movement to groundwater will depend on the type of lead compound and characteristics of the soil. Over time, lead accumulates in living tissues (a process called bioaccumulation) and is persistent in water.

Lead can affect almost every organ and system in the body. Lead toxicity mostly affects the nervous system. Exposure to lead may also cause paralysis in fingers, wrists or ankles. Lead exposure can also cause small increases in blood pressure and may cause anemia, malnutrition, abdominal pain and colic. High levels of lead can severely damage the brain and kidneys in adults and may cause death.

In pregnant women, exposure to high levels of lead may cause miscarriage. Lead can affect a child's mental and physical growth. Child during pregnancy period can be exposed to lead through their mothers intakes/ingestion. Harmful effects include premature birth, smaller babies, decreased mental ability in the infant, learning difficulties and reduced growth in young children. Some effects may persist beyond childhood.

As with humans, exposure to lead can lead to death of animals, birds or fish and death or low growth rate in plants. In soft water, lead is highly poisonous to plants, birds or land animals, long term exposure shortens the life span of animal, brings reproductive problems, lower fertility, changes in appearance &behavior. As lead bio-accumulates, it is expected that fish tissues will contain lead from polluted waters.

Effective measures have been considered and planned in the proposed lead smelter in regard to ventilation, dust collection and control of dust emission at source. Almost 100% of lead in the ore will be recovered. A small amount of lead to the extent of 0.32% of lead in ore will be lost in the non-leachable slag.

It is worth mentioning that in the Hazardous waste (Management, Handling & Trans boundary movement) Rules, 2016 the slag has been deleted from the category of hazardous waste. The water leachability test for heavy metals indicated that leachability of metal is negligible and utilization for roads would be environment friendly practice.

12.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)

Hazard is a source or situation that has the potential for doing harm in terms of human injury, ill health, damage to property or the environment, or a combination of these factors. It has got a short or a long term effect on the work environment with considerable human and economic costs. A hazard can have a potential to create an emergency like situation at the work place. Hazard is a potential cause to generate a disaster.

Hazards exist in every workplace in different forms and required to be identified, assessed and controlled regarding the work processes, plant or substances. They arise from (i) workplace environment, (ii) use of plant and equipment (iii) use of substances and materials, (iv) poor work and/or plant design, (v) inappropriate management systems and work procedures, and (vi) human behaviour.

Proposed expansion of Secondary Lead recycling, installation of primary lead & Tin Smelting Units involve many hazardous processes and operations which can cause considerable environmental, health and safety risk to the workforce& work place. So, need proper assessment and preventive measures.

Preliminary Hazard Analysis for the Whole Plant in General

Unit	Description of Plausible Hazard	Impact
Furnaces (Oxidation / Reduction / Fuming / Rotary (Secondary) Furnace etc.)	a. Fire & Explosion due to Molten metal contact with water. b. Molten Metal Spillage c. Hot Slag d. Re-circulating cooling water coming in contact with the molten metal or slag. e. Exposure to Toxic Gas / fumes	Fire / Explosion Heat Radiations due to Hot Metal Handling, Injury Spurting of metal/slag; Sudden flashing of fire or bursting Leakage of Gas can cause Gas Poisoning to employee
Material Handling Plant	a. Moving Equipment Parts b. Exposure to Dust c. Fire in Coal stock yard	Injury to worker & health problem Fire / Explosion
Sulphuric Acid Plant	a. Exposure to Toxic Gas. b. Spillage of acid tank	Leakage of Gas can cause Gas Poisoning to employee Severe burn injuries, health problem.
Oxygen Plant	a. Frost Bite because of cryogenic liquid b. Leakage in Oxygen Tank c. Asphyxiation due to leakage of nitrogen in work place	Fire & Explosion; Frost Bites, Suffocation health issue
Electrolytic Cell Division	a. Exposure to HF Acid fumes b. Electric Hazard	Serious Health Problem Burn/ injuries because of electrical shock

Power Plant	a. Bursting of boiler b. Electric Hazard	Fire / Explosion; Burn/ injuries because of electrical shock

The Brief about nature of various Hazards in ARL is given below,

NATURE OF HAZARD	SOURCES
Fire Hazard	Release/leakage of Oxygen, Off gas and Hot Liquid metal. Coal Mill. Fire in Heavy Oil & HSD storage.
Toxic Hazard	Release of Off gas containing SO_2& CO
Cold Burns	Exposure to liquid oxygen, liquid nitrogen and liquid argon.
Fire/Explosions due to Spillage of Liquid Metal	Spillage/Transfer of liquid metal, and hot slag.
Heat Radiations due to Hot Metal Handling	Spillage of liquid metal and hot slag
Accidents due to Material Handling Equipment	Connected with all Material Handling Equipment
Hazard from Electricity	Electro Refining Section, Electrical Sub-station

12.1 FAILURE MODE EFFECT ANALYSIS FOR PROCESS UNITS

Failure mode effects analysis (FMEA) is one of the most important and widely used tools for reliability analysis. FMEA identifies corrective actions required to reduce failures to assure the highest possible yield safety and reliability. Even though it is widely used reliability technique it has some limitation in prioritizing the failure modes and output may be large for even simple systems, may not easily deal with time sequence, environmental and maintenance aspects.

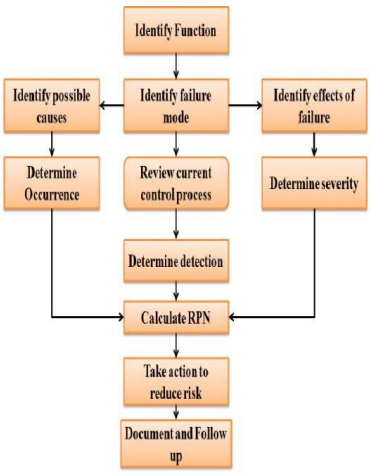


Figure – 3.0 : Steps in FMEA

12.2 RISK PRIORITY NUMBER

Risk priority number methodology is a technique for analysing the risk associated with potential failures during a FMEA analyses. To calculate risk priority number severity, occurrence, and detection are the three factors need to determine.

RPN= Severity× Occurrence× Detection

12.3 SEVERITY (S)

Severity is the seriousness of the effect of potential failure modes. Severity rating with the higher number represents the higher seriousness or risk which could cause death.

Table-1.0 : Example table of Severity

Rating	Detection	Detection by design control
10	Absolute uncertainty	Design control cannot detect failure mode
9	Very remote	Very remote chance the design control detect failure mode
8	Remote	Remote chance the design control detect failure mode
7	Very low	Very low chance the design control detect failure mode
6	low	Low chance the design control detect failure mode
5	Moderate	Moderate chance the design control detect failure mode
4	Moderately high	Moderately high chance the design control detect failure mode
3	High	High chance the design control detect failure mode
2	Very high	Very high chance the design control detect failure mode
1	Almost certain	Design will control detect failure mode

12.4 OCCURRENCE (O)

Occurrence ratings for FMEA are based upon the likelihood that a cause may occur based upon past failures and performance of similar system in similar activity. Occurrence values should have data to provide justification.

Table –2.0: Example table of Occurrence

Rating	Classification	Example
10 9	Very high	Inevitable failures
8 7	High	Repeated failures
6 5	Moderate	Occasional failures
4 3	Low remote	Few failures
2 1	Remote	Failures unlikely

12.5 DETECTION (D)

Detection is an assessment of the likelihood that the current controls will detect the cause of failure mode.

Table – 3.0: Example table of Detection

Ranking	Effect	Severity effect
10	Hazardous without warning	Very high severity without warning
9	Hazardous with warning	Very high severity with warning
8	Very high	Destructive failure without safety
7	High	System inoperable Equipment damage
6	Moderate	System inoperable with Minor damage
5	low	System inoperable without damage
4	Very low	Degradation of performance
3	Minor	System operable with Some degradation in performance
2	Very minor	System operable with minimal interference
1	None	No effect

12.6 FMEA IMPLEMENTATION

Failure mode effect analysis is executed by a multidisciplinary team of experts in furnace operation with the help of process flow chart. Criteria of ranking of severity, occurrence and detection are selected suitably by analyzing the past failure records of the furnace. Using values of severity, occurrence and detection number risk priority number is calculated.

Table – 4.0: RPN for Proposed Project with CPP & Proposed Control Measures

Furnaces								
Components / Process	**Failure Mode**	**Failure Effect**	**Failure Cause**	**S**	**O**	**D**	**RPN**	**Control Measures**
Furnace	Recirculating cooling water coming in contact with the molten metal or slag	Spillage & Spurting of Hot metal/slag. Explosion under extreme cases.	Leakage of water from the refractory walls Operate	8	2	2	32	Regular inspection and Periodic maintenance
Furnace	Presence of Oil & Grease and other impurities	Sudden catching of fires and flames	Improper Maintenance	4	3	3	24	Periodic Maintenance
valves	Failed to Operate	Explosion	Corrosion	10	2	3	60	Periodic Maintenance
Conveyor feed belt	Friction	Fire	Improper Maintenance	8	2	2	32	Lubricating the rotating parts regularly
Hot metal lifting by crane	Rope breakage	Hot Metal ladle upside down	Overloading	9	3	2	54	interlocks with alarm
Hot metal transfer by trolley	Mechanical Failure (Gearbox, Axial, Wheel)	Spillage of hot metal	Improper Maintenance	9	3	2	54	Regular inspection and Periodic maintenance
Furnace Off-gas	Pipeline rupture	SO2, CO poisoning	Over Pressure	10	2	2	40	Provide detectors with alarm system
Oxygen Injection	Pipeline rupture	Fire & Explosion	Over Pressure	10	2	2	40	Provide detectors with alarm system
Cooling water supply pump	Pump failure	Explosion	No power supply	10	3	2	60	Check the fuel level of diesel generator
Tapping hose	Oxygen hose cut	Fire	Ageing	8	4	4	128	Change hose periodically

Hot metal lifting by crane	Rope breakage	Hot Metal ladle down	Overloading	9	3	2	54	interlocks with alarm
Hot metal transfer by trolley	Mechanical Failure (Gearbox, Axial, Wheel)	Spillage of hot metal	Improper Maintenance	9	3	2	54	Regular inspection and Periodic maintenance
Gas cleaning filter bags	Filter bags failure	Improper gas cleaning	Excess Temperature	4	3	3	36	Regular inspection and Periodic maintenance
Material Handling								
Pulverisation of Coal	Friction	Fire & Explosion	Improper Maintenance	8	3	2	48	Periodic Maintenance
Conveyor Belt to storage Bins	Friction	Waste Storage System Failure	Improper Maintenance	4	2	2	16	Lubricating the rotating parts regularly
Conveyor feed belt to Furnace	Friction	Fire	Improper Maintenance	8	2	2	32	Lubricating the rotating parts regularly
Automatic lubricating system	Failed to Operate	Mechanical Failure	Improper Maintenance	4	2	3	24	Periodic Maintenance
Conveyor belt to top of the coal tower	Operation failure	Injury	Improper Maintenance	4	2	2	16	Periodic maintenance
Ladle Refining Furnace								
Hot metal ladle transfer car	Friction	Fire	Improper Maintenance	8	2	2	32	Lubricating the rotating parts regularly
Oxygen Plant								
Air feed	Pipeline rupture	Operation failure	Improper Maintenance	4	3	2	24	Provide detectors with alarm system
Sulphuric Acid Plant								
Pipeline to the Converter	Pipeline rupture	Operation failure	Improper Maintenance	9	4	3	108	Provide detectors with alarm system
Sulphuric Acid Storage Tank	Tank Failure	Mechanical Failure	Improper Maintenance & Monitoring	6	3	3	54	Regular inspection and Periodic maintenance
Captive Power Plant								

DM Water circulating unit	Failure to circulate de ionized water	Excessive Heat generation in solid state power supply unit	Electric Failure	4	3	3	24	Regular inspection and Periodic maintenance
Boiler	Corrosion Effect	Cooling of tube increases temperature	Creep Failure	4	4	5	80	Regular inspection
Boiler	Boiler Tube	Damage inside & outside the tube	Extremely combustion	6	2	5	60	Periodic Maintenance
Boiler	Tube Alignment & Setting	Deformation of vibration Arrestor	Vibration increases	6	2	4	48	Periodic Maintenance
Turbine/ Steam Generator	Temp of Heater & Reheater	Failure of turbine blades	Changing the plant load	5	2	6	60	Periodic Maintenance
Water Tank	Water Level of Drum	Excess Steam Pressure	Failure of Indicators	6	3	2	36	Regular inspection

13.0 FIRE PROTECTION SYSTEM

In addition to the yard fire hydrant system, the fire protection systems envisaged for the plant are as follows:

- Internal fire hydrant for multi storied buildings to be tapped-off from the outdoor fire water header
- Fire detection and alarm system for electrical rooms, cable basements/cellars, cable tunnels, selected oil/hydraulic cellars
- Portable fire extinguishers such as CO_2, foam and dry chemical powder in all areas of the plant with fire hazard.

14.0 GREEN BELT DEVELOPMENT OBJECTIVE

To capture the fugitive emission, if any from the plant and to attenuate the noise generated from the plant machinery, and to improve the aesthetics of the plant site, a green belt will be developed within the plant area.

The green belt is a set of rows of trees planted in such a way that they form an effective barrier between the plant and the surrounding. Prevalent wind directions shall be taken into considerations to ensure adequate capture of the air pollutants around the Plant.

Open spaces, where tree plantation is not possible shall be covered with shrubs and grass. The plantations shall match with the general landscape of the area and be aesthetically pleasant. Adequate attention will be paid to planting of trees and their maintenance and protections.

The proposed expansion project will be set up on 20.6 Hectares (51.0 acres) of land. Out of 20.7 Hecrares, Green Belt Cover will be about 6.8 Hectares (33% of total area).

The plant layout of the proposed project is presented in **Figure-4.0**.

15.0 UTILITIES

15.1 Power Requirement

Total power requirement of the entire project will be around -14 MW (4 MW for Secondary lead recycling process + 10 MW for Primary Lead & Tin process) where 4 MW shall be sourced from Waste Heat Recovery system and the rest will be sourced from AP State Power Distribution Corporation Ltd. (APSPDCL) .

15.2 Water Requirement

According to different requirements for water consumption and water quality, the water supply system of the project is divided into firefighting water supply, domestic water supply and circulating water supply.

According to the requirements of the cooling water quality, water temperature and water pressure, there are

a. Equipment cooling circulating system for smelting workshop,
b. Water quenching slag circulating water system,
c. Sulfuric acid circulating water system
d. Oxygen making station circulating water system.

a. **Melting workshop equipment cooling circulating water system (clean circulation):** It is mainly the cooling water for equipment such as oxygen bottom blowing smelting furnace, side-blowing reduction furnace, Cell division, high pressure centrifugal blower, air compressor, waste heat boiler room, power station etc.. The cooling water discharged from the equipment flows into the hot water pool and is pumped by the hot water

pump to cooling tower to cool down. The cold water flows into the cold water pool and is pumped to equipment correspondingly.

b. **Water quenching slag circulating water system (turbid circulation):** Mainly used to flush quenching slag of fuming furnace. After the slag flush water is precipitated in the sedimentation tank, it is pumped back to the fuming furnace to continue flushing the slag. In the water quenching slag system, replenishment water comes from the qualified wastewater of acidic wastewater treated.

c. **Sulfuric acid plant equipment cooling water system:** Mainly cooling water for equipment of dilute acid, dry acid, cooler of acid absorber, acid absorber and fans. The cooling water discharged from the equipment is returned to the cooling tower for cooling. The cold water flows to the cold water pool and is pumped to corresponding equipment in workshop.

d. **Oxygen making station cooling water circulating system:** Mainly cooling water for air compressor, oxygen compressor, nitrogen compressor, pre-cooling systems, etc. The cooling water discharged from the equipment is returned to the cooling tower for cooling. The cold water flows to the cold water pool and is pumped to corresponding equipment in workshop.

Total industrial water demand estimated for the proposed project will be 3368 kld (190 kld for secondary lead recycling process proposed for expansion + 3178 kld for proposed primary process) which shall be sourced from TGP Canal / Proposed Reservoir by AP Govt (by laying the pipeline) / groundwater by installing bore wells within the plant premises & Surface Water.

Domestic Water Demand is 102 kld (30 kld for secondary lead recycling process proposed for expansion + 72 kld for proposed primary process).

16.0 RAIN WATER HARVESTING

It is proposed to achieve proper utilization of rain water through harvesting of rainwater in the plant area. Rain water harvesting will be implemented following the guidelines of the regulatory Authority.

17.0 PROPOSED INVESTMENTS:

Total project cost is estimated to be around Rs. 675 Crores (Rs. 115 Crores for Secondary Lead recycling process under expansion + Rs. 560 Crores for Primary process).

18.0 EMPLOYMENT:

Total man-power of around 1050 persons (300 persons for Secondary Lead recycling process under expansion + 750 persons for Primary process) will be required in the proposed expansion project in relation to activities of different units and sections.

Direct Supervisory: 100
Direct Skilled: 250
Direct Semi & Unskilled:300
Indirect : 400

19.0 PROJECT SCHEDULE

The installation of several production units along with utilities and services will involve award of all contracts, procurement of plant and equipment, construction & erection and supervision of all activities at plant site.

The factors which are responsible for timely implementation of the project are:

i) Arrangement of proper finance for the project.
ii) Finalization of layout of the proposed plant.
iii) Design of utilities and services.
iv) Placement of orders for plant and machinery.
v) Arrangements for Govt. sanctions and supply of power.
vi) Recruitment of personnel.

As per an initial estimate around 24 months will be needed for implementation of the project.

20.0 CONCLUSION

The feasibility of the project has been examined from 4 angles, which are backbone of any project to succeed:

- Import substitution of Primary Lead in Environmental savvy pathway
- Environment friendly feasibility
- Commercial and financial viability and
- Approach of Proponent towards environment sustainability during Construction and Post implementation stage of the project.

The outcome shows that results are positive which indicate that the project is viable.

FIGURE-4.0 : PLANT LAYOUT

SCALE – NTS	DRAWING NO – ARL/LRCR/PFD/001	SHEET : 1 OF 5	SIZE : A3	REV 0

	NAME	DATE
APPROVED		
CHECKED		
DESIGN	RDR	09.10.17
DRAWN	H.REDDY	09.10.17

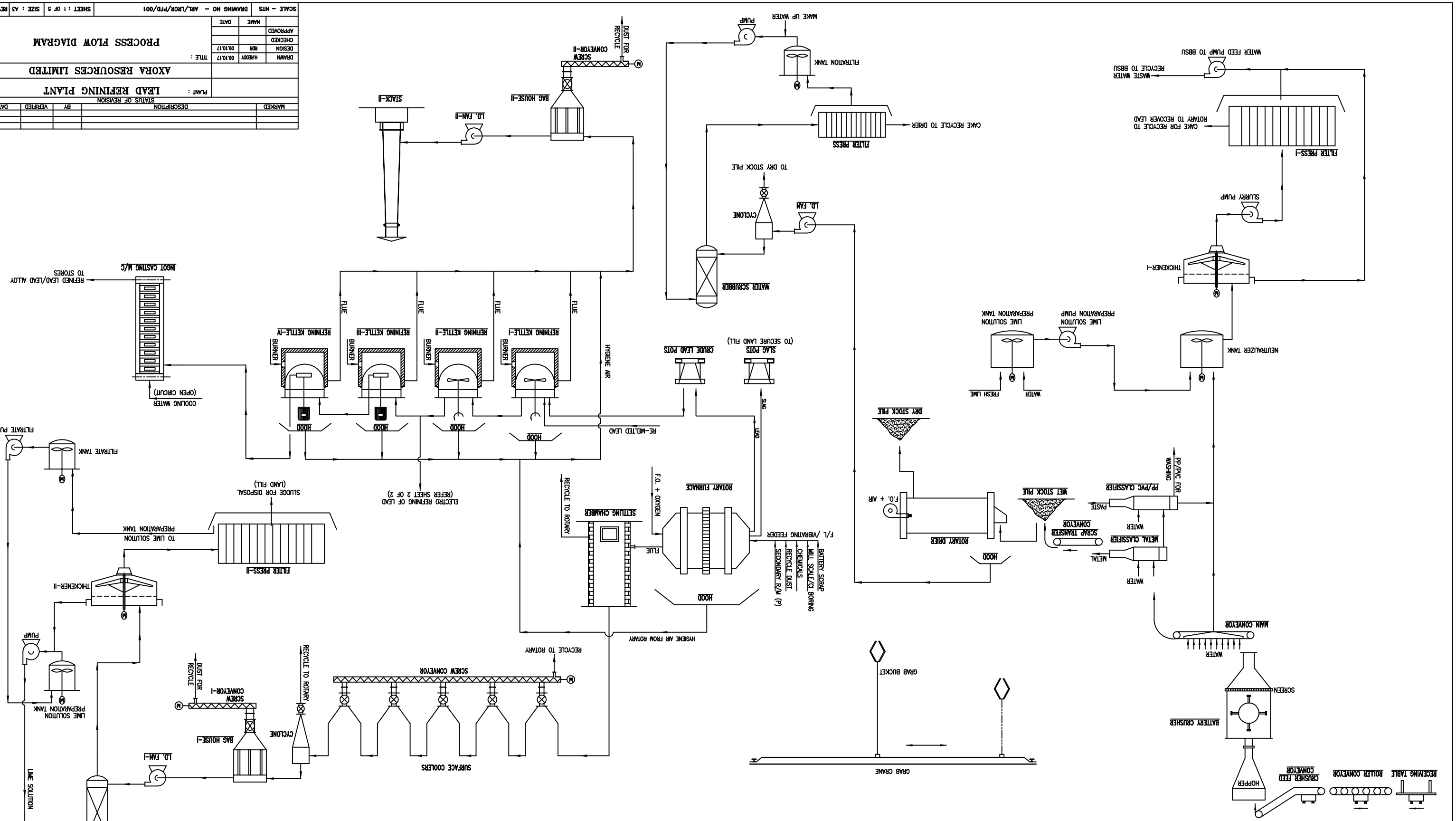
TITLE : **PROCESS FLOW DIAGRAM**

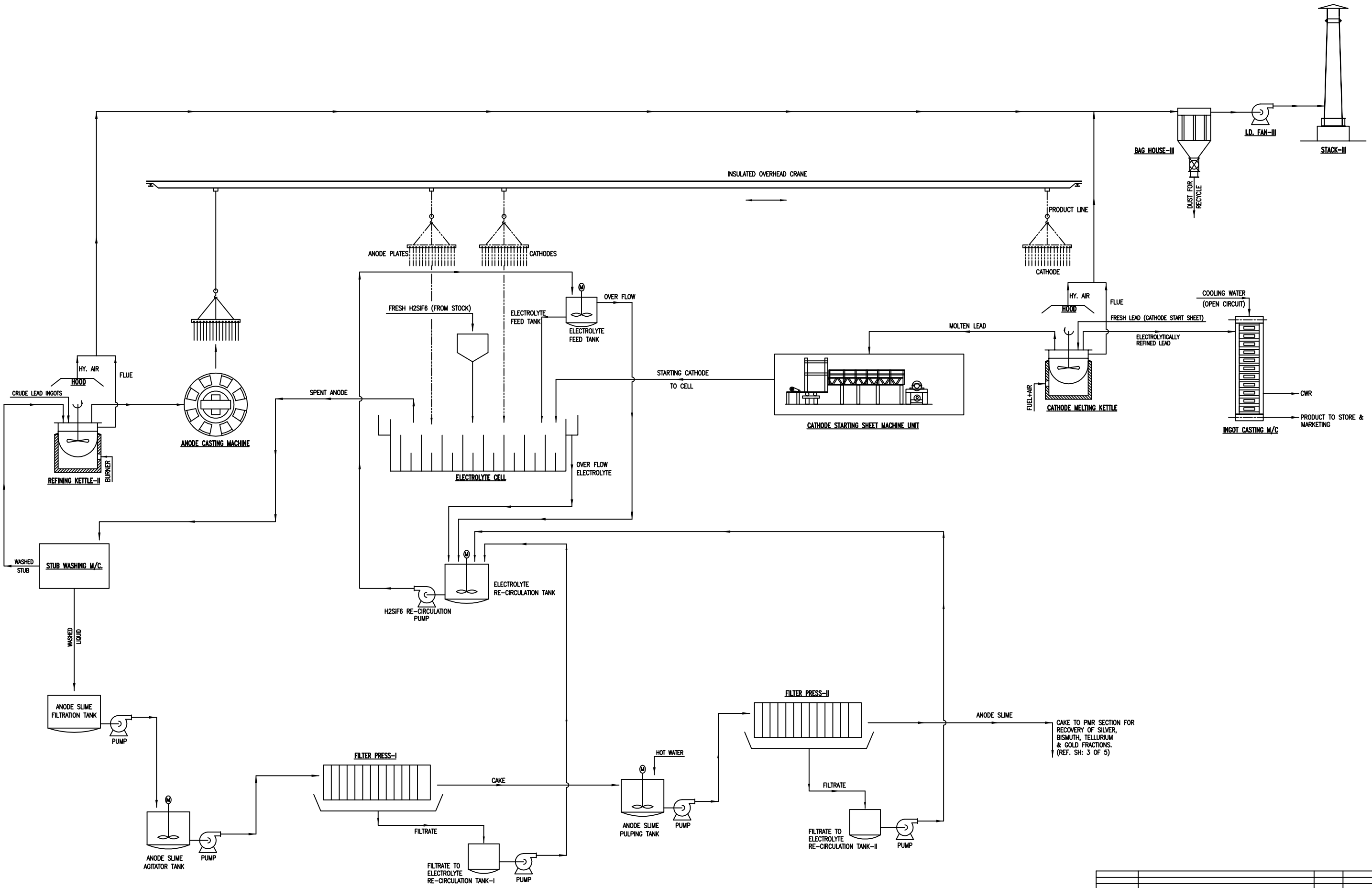
AXORA RESOURCES LIMITED

PLANT : **LEAD REFINING PLANT**

STATUS OF REVISION

MARKED	DESCRIPTION	BY	VERIFIED	DATE





MARKED	DESCRIPTION	BY	VERIFIED	DATE

STATUS OF REVISION

PLANT : **LEAD REFINING PLANT**

AXORA RESOURCES LIMITED

DRAWN	H.REDDY	09.10.17
DESIGN	RDR	09.10.17
CHECKED		
APPROVED		
	NAME	DATE

TITLE : **PROCESS FLOW DIAGRAM**

SCALE – NTS	DRAWING NO – ARL/LRCR/PFD/001	SHEET : 2 OF 5	SIZE : A3	REV 0

ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL OFFICE: KURNOOL
1st Floor, Shankar Shopping Complex, Krishna Nagar Main Road

Phone : 08518-236912,
e-mail: jceezoknl@gmail.com

BY REGD. POST WITH ACK.DUE

CONSENT ORDER FOR ESTABLISHMENT

Order No. CTR -1233/PCB/ZOK/CFE/2017- **Date:06.01.2018**

Sub: PCB-ZO-KNL-CFE - M/s. Axora Resources Limited, Sy No. 151/1, 151/2, 151/3 & 151/4, Routhusuramala (V), Tottembedu Mandal, Chittoor District, A.P. – Consent for Establishment (CFE) Order of the Board under Sec.25 of Water (Prevention & Control of Pollution) Act, 1974 and under Sec.21 of Air (Prevention & Control of Pollution) Act, 1981- Order- Issued- Reg.

Ref:
1. CFE application received at RO, Tirupati through APOCMMS on 21.11.2017.
2. RO, Tirupati Lr. No.C-1702/PCB/RO/TPT/CFE/2017-1709, dt.13.12.2017 received at ZO, Kurnool on 15.15.2017
3. CFE Committee meeting held on 20.12.2017.
4. Lr No.CTR – 1233/PCB/ZO-KNL/CFE/2017-1062, DT.23.12.2017
5. Industry's letter dt.01.01.2018 received at ZO, Kurnool on 02.01.2018
6. Industry's letter dt.05.01.2018.

*****

1) In the reference 1st cited, an application was submitted to the Board seeking Consent for Establishment (CFE) order to set up a plant to manufacture the following products with an installed capacities as mentioned below, with a total project cost of Rs. 7088 Lakhs.

Sl. No.	Products	Capacity
1	Refined Lead	19350 TPA
2	Silver	12 TPA
3	Gold	0.025 TPA
4	Bismuth	2 TPA
5	Telurium	1 TPA
6	Oxygen (for internal consumption)	25 TPD
	By Product	
7	PP Chips	0.25 MT/Month

2) As per the application, the above activity is to be located at Sy No. 151/1, 151/2, 151/3 & 151/4, Routhusuramala (V), Tottembedu Mandal, Chittoor District, A.P.in an area of 73238.83 Sq.Mtrs.
3) The above site was inspected by Environmental Engineer & Asst., Environmental Engineer, A.P. Pollution Control Board, Regional Office, Tirupati on 12.12.2017 and found that it is surrounded by the following:
   North: Vacant Land **South**: Vacant Land
   East: Vacant Land **West**: Irrigation canal Telugu Ganga Minor Channel followed by Sastry colony
4) The Board, after careful scrutiny of the application and verification report of Regional Officer, hereby issues CONSENT FOR ESTABLISHMENT(CFE) to your industry under section 25 of Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 and the rules made there under. This order is issued to manufacture the products mentioned at para (1) only.
5) This order is issued from pollution control point of view only. Zoning and other regulations are not considered.
6) This Consent Order now issued is subject to the conditions mentioned in Schedule 'A' and Schedule 'B'.
7) This consent order is valid for a period of 7 years from the date of issue.

Encl: Schedule 'A' & 'B'.

JOINT CHIEF ENVIRONMENTAL ENGINEER
ZONAL OFFICE, KURNOOL

To
M/s.Axora Resources Limited,
C/o.Sri Vijendra Kedia, Director,
Touchdown Building, Annasandrapalya Main Road,
Industrial Area, HAL, Bengaluru, Karnataka.

Copy to the Environmental Engineer, Regional Office, APPCB, Tirupati for information.

Annexure

SCHEDULE – A

1. The industry shall obtain Consent for Operation (CFO) from APPCB, as required Under Section 25/26 of Water (P & C of P) Act, 1974 and under Sec 21/22 of the Air (P&C of P) Act, 1981, before commencement of the trail runs.
2. The industry shall install or provide separate energy meter for Effluent Treatment Plant (ETP) & Air Pollution Control Equipments to record energy consumed. An alternative electrical power source sufficient to operate all pollution control systems shall be provided.
3. The industry shall construct separate storm water drains and provide rain water harvesting structures. No effluent shall be discharged in to the storm water drains.

SCHEDULE – B

1. The industry shall establish the battery breaking unit, lead smelting unit, lead refinery unit and electro refining unit at a distance of minimum 200 mtrs away from habitation and school as committed vide lr.dt.05.01.2018.
2. The industry shall provide 20 ft height GI sheets along the western boundary i.e., towards the school and habitation.
3. The industry shall develop thick greenbelt of 10 mtrs width with tall growing trees along the western boundary.
4. The industry shall conduct regular health checkups for the people living within 500 mtrs from the periphery of the unit as committed vide lr.dt.20.12.2017.
5. The industry shall not cause any pollution problems to the surrounding people/areas. Action will be initiated against the industry if it causes any adverse impacts on the health of the surrounding people.
6. The industry shall explore the possibility of selecting alternative site within the same industrial park at least 500 mtrs away from human habitation and school.

Water

7. The source of water is supply from Ground Water and the maximum permitted water consumption is as follows:

Sl. No.	Purpose	Proposed capacity in KLD
1	Process (BBSU)	48.0
2	Scrubbing	84.0
3	Cooling	232.0
4	Domestic	30.0
	Total * (fresh + recycled)	**394.0**

8. The industry shall install digital flow meters with totalizers and necessary pipeline at various points to assess the quantity of water used for various purposes such as Process, Scrubbing, Cooling, domestic etc and shall record the same.
9. The maximum waste water generation shall not exceed the following:

S. No.	Source	Proposed capacity in KLD
a	Trade effluents (BBSU)	48.0
b	Scrubbing	84.0
c	Cooling tower bleed off	7.75
d	Domestic	27.6
	Total	**167.35**

10. **Treatment & Disposal:**

Effluent Source	Treatment units	Mode of final disposal
Trade effluents (BBSU)	Thickner, neutralizer and filter press	The treated water shall be completely recycled
Scrubbing	Thickner, neutralizer and filter press	The treated water shall be completely recycled
Cooling tower bleed off		
Domestic effluents	STP	Onland for irrigation after meeting the standards.

11. The treated domestic waste water shall meet the following standards.

Sl.No	Parameter	Limiting Standards
1	pH	6.5 – 8.5
2	Total Suspended Solids (TSS)	100 mg/l
3	Total Dissolved Solids (TDS)	2100 mg/l
4	Biochemical Oxygen Demand (3 days at 27^0C)	30 mg/l
5	Chemical Oxygen Demand	250 mg/l
6	Oil and Grease	10 g/l

12. The Lead concentration in the effluents shall not exceed 0.1 mg/l.
13. Effluents shall not be discharged into any water bodies or aquifers under any circumstances.
14. The industry shall completely recycle the trade effluents generated from battery breaking unit and scrubbers after treatment. The industry shall provide suitable ETP based on physico – chemical treatment units.

Air:

15. The industry shall comply with the following for controlling air pollution.

Details of Stack	Stack – 1	Stack -2	Stack 3
Attached to:	Charging points of Rotary furnace and melting pots	Rotary furnace	Melting pots
Capacity	2 x 20 MT (Rotary furnace) & 100 T, 50 T & 25 T (Melting pots)	20 MT – 2 Nos	100 T – 2 Nos
Name of the Fuel :	---	Oxygen	Oxygen
Stack height above ground (m)	30 m	30 m	30 m
Air Pollution Control Equipment:	Ventilation hood and bag filter	Expansion/settling chamber, cooling ducts/surface coolers, cyclones, bag filter with pulse jet , alkaline scrubber with arrangement of alkaline dosing	Ventilation hood and bag filter

Details of Stack	Stack – 4	Stack -5	Stack 6
Attached to:	Charging point of Noble furnace & Noble furnace flue gas	Reverberatory Furnace & melting pots.	DG Set
Capacity	5 T	25 T (Reverberatory Furnace for copper dross), 10 T (melting pot for bismuth) & 5 T (Melting pot for Tellurrium)	500 KVA
Name of the Fuel :	Oxygen	Oxygen	HSD
Stack height above ground (m)	Common stack of 30 m	Common stack of 30 m	5 m
Air Pollution Control Equipment:	For charging point ventilation hood with mechanized bag filter. For flue gas cooling ducts/surface coolers and bag filters with pulse jet	Cooling ducts/surface coolers and bag filter with pulse jet separately for each 25 T, 10 T & 5 T furnaces	Acoustic enclosure

16. The emissions shall not contain constituents in excess of the prescribed limits mentioned below:

Chimney No.	Parameter	Emission Standards
1 to 5	Lead	10 mg/Nm^3
	Particulate Matter	25 mg/Nm^3

17. A sampling port with removable dummy of not less than 15 cm diameter shall be provided for all the 5 stacks at a distance of 8 times the diameter of the stack from the nearest constraint such as bends etc. A platform with suitable ladder shall be provided below 1 meter of sampling port to accommodate three persons with instruments. A 15 AMP 250 V plug point shall be provided on the platform.
18. The generator shall be installed in a closed shed with a silencer and suitable noise absorption systems. The ambient noise level shall not exceed 75 dB(A) during day time and 70 dB(A) during night time.
19. The bag filters proposed to be installed for the rotary furnace and refining/alloying pot furnace shall be designed such that 50% additional bags are to be provided as spare in the bag house to meet the emergency requirements.
20. The industry shall provide interlocking system between the process equipment and air pollution control equipment such that in case of any failure of air pollution control equipment, the process will be stopped automatically.
21. The proponent shall ensure compliance of the National Ambient Air quality standards notified by MoEF, GoI vide notification No.GSR 826(E), dt.16.11.2009 during construction and regular operational phase of the project.
22. The Lead in working area shall be 0.05 mg/m3 (NIOSH – 8 Hr Average). Lead in the factory premises near boundary wall shall be less than 1.0 µg/m3 (24 hr average)

23. The proponent shall provide stainless steel fabricated bed column type wet scrubber with mist eliminator to the batteries crushing & hydro separator unit for controlling the acid fumes.

Hazardous/Solid Waste (Proposed):

24. The proponent shall comply with the following:

Sl. No	Source of solid waste	Proposed Quantity	Method of disposal
1	Used Oil / Waste Lubrication Oil	50 LPA	Shall be disposed to authorized Re-processors / Recyclers of waste oil authorize by APPCB/ SPCBs.
2	PPFRP Waste	400 MT/Annum	Shall be disposed to authorized reprocessors/ recyclers
3	Lead slag	160 TPA	Shall be sent to TSDF, Parawada, Visakhapatnam Dt
4	Battery scrap	15,000 TPA	Shall be brought from authorization agencies and consumed as raw material
5	Lead Ash Powder	280 TPA	Shall be reused in the process / sent to authorized reprocessors/recyclers.

Other conditions:

25. The industry shall provide the following minimum required facilities, operating practices and standards as per Standard Operating Procedures (SOPs) notified by Ministry of Environment & Forests & Climate Change, Govt of India vide office memorandum dt.24.11.2015.

    a. Rotary furnace with suction hood connected with APCS over the charging point.
    b. Furnace connected with expansion chamber, cooling tubes/ducts, Cyclone/Multi Cyclone, Bag filter with pulse jet/ mechanical shaker arrangement, Alkaline Scrubber with arrangement of alkali dosing, & connected with ETP, ID fan and stack of minimum 30 meter height.
    c. Separate and secured covered space for storage of residue generated after recycling of lead bearing waste. The floor of the storage area should be impervious.
    d. Separate covered storage space for 1 raw material having impervious acid proof flooring and finished products.
    e. ETP based on physic-chemical treatment of wastewater
    f. Battery breaking area should have acid proof flooring with acid collection pit connected with ETP
    g. Each stack should have a port-hole (as per specifications given in CPCB document COINDS-III) with platform for stack monitoring. There should be an easy ladder for safe access to stack monitoring platform.
    h. **Battery-Breaking Processes:** The proponent shall install mechanical/automatic battery breaking units. After draining the acid, the battery shall be mechanically broken along with the casing before battery plates are processed for smelting.
    i. Facilities required for mechanical/ automatic breaking include arrangements for noise control and dust and fume extraction system and acidic collection / neutralization facilities and ETP for treatment of lead and acidic wastewater
    j. Adequate facilities for collection and storage of ETP sludge and slags.
    k. **Workers Blood lead levels:** As a practice, all lead related units should periodically examine their workers at least once in year for lead level in blood as well as urine. Persons with higher lead levels (greater than 42 micrograms /dl) should be shifted immediately to non-lead activity areas and given special medical treatment till the lead levels come back to acceptable level (10- micrograms /dl).

    l. Steps to minimize fugitive emissions of Lead

        I. The design of hood/fume collection system from the smelting/refining operations (from metal tapping point, charging doors, furnace joints etc.) should be capable of collecting lead emissions and transfer to the air pollution control system.
        II. The storage and handling of all the raw materials, intermediates and products should be in covered areal shed having concrete floDl'sand mechanized equipment should be used to handle these materials as far as possible.
        III. The floors in the loading area should be kept wet through sprinklers to reduce the chances of lead particles/dust getting airborne.
        IV. Any water used for washing, rain water etc, should be collected through separate pits (to delink this from the regular drain) for removing metallic lead etc and the pit should have fine screens for passage of clear water.
        V. The movement of vehicles to the administrative/working/production areas should ensure that only the trucks/vehicles involved III the material handling/transportation reach the work areas, and their tyres are washed before they leave these areas.

26. The industry should regularly monitor the lead concentrations in the working area (in different units) at monthly intervals and see that they conform to the NIOSH standards.

27. Blood lead monitoring should be done for the employees and their family members and the report should be submitted to R.O. Tirupati, APPCB.
28. The industry shall obtain registration certificate cum pass book for setting up of secondary lead recycling units as required under Hazardous & Other Wastes (Management & Transboundary Movement) Rules 2016.
29. The industry shall obtain permission from MoEF & CC, GoI for import of lead scrap/used lead acid batteries.
30. The industry shall obtain membership with M/s.TSDF, Parawada, Visakhapatnam and enter an agreement to dispose the hazardous waste.
31. Concealing the factual data or submission of false information / fabricated data and failure to comply with any of the conditions mentioned in this order may result in withdrawal of this order and attracts action under the provisions of relevant pollution control Acts.
32. Notwithstanding anything contained in this conditional letter or consent, the Board hereby reserved to it the right and power under section 27 (2) of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 (4) of the Air (Prevention & Control of Pollution) Act, 1981 to review any or all the conditions imposed herein above and to make such alternation as deemed fit and stipulate any additional conditions or revoke the order in the interest of environment protection.
33. Any person aggrieved with this order may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to the Appellate Authority constituted under Section 28 of the Water (Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air (Prevention and Control of Pollution) Act, 1981.

JOINT CHIEF ENVIRONMENTAL ENGINEER
ZONAL OFFICE, KURNOOL.

To
M/s.Axora Resources Limited,
C/o.Sri Vijendra Kedia, Director,
Touchdown Building, Annasandrapalya Main Road,
Industrial Area, HAL, Bengaluru, Karnataka.

ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL OFFICE: KURNOOL
1st Floor, Shankar Shopping Complex, Krishna Nagar Main Road

Phone : 08518-236912,
e-mail: jceezoknl@gmail.com

CONSENT ORDER FOR ESTABLISHMENT

Order No.CTR-1233/PCB/ZO-KNL/CFE/2018 **Date:04.07.2018**

Sub: PCB-ZO-KNL- CFE for expansion - M/s. Axora Resources Limited, Sy No. 151/1, 151/2, 151/3 & 151/4, Routhusuramala (V), Tottembedu Mandal, Chittoor District, A.P.– Consent for Establishment (CFE) Order of the Board under Sec.25 of Water (P & C of P) Act, 1974 and under Sec.21 of Air (P & C of P) Act, 1981- Order- Issued- Reg.

Ref:
1. CFE expansion application received through Single Desk system on 27/06/2018.
2. R.O.TPT Lr.No.C-1702/PCB/RO/TPT/CFE/2018-904, dt. 27.06.2018
3. Mail. Dt. 02.07.2018 received from the proponent
4. CFE Committee meeting held at ZO, Kurnool on 02.07.2018

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1) In the reference 1st cited, an application was submitted to the Board seeking Consent for Establishment (CFE) for expansion to produce the following additional products with installed capacities as mentioned below, with a additional project cost of Rs.7088 lakhs

Sl. No.	Name of the Products and By-products	Existing capacity as per CFE order dt: 06.01.2018	Proposed capacity (MT/Month)	Total capacity after expansion
1	Refined Lead	19350 TPA	-	19350 TPA
2	Silver	12 TPA	-	12 TPA
3	Gold	0.025 TPA	-	0.025 TPA
4	Bismuth	2 TPA	-	2 TPA
5	Telurium	1 TPA	-	1 TPA
6	Oxygen (Captive consumption)	25 TPD	-	25 TPD
7	Antimony Ingots	-	150 TPM	150 TPM
8	Tin Ingots	-	50 TPM	50 TPM

2) As per the application, the above activity is to be carried out in the existing premises at Sy No. 151/1, 151/2, 151/3 & 151/4, Routhusuramala (V), Tottembedu Mandal, Chittoor District, A.P.

3) The above site was inspected by Environmental Engineer & Asst. Environmental Engineer, A.P. Pollution Control Board, Regional Office, Kurnool on 27.06.2018 and found that it is surrounded by the following:

North : Vacant Land **South :** Vacant Land
East : Vacant Land **West :** Irrigation canal Telugu Ganga Minor Channel followed by Sastry colony

4) The Board, after careful scrutiny of the application and verification report of Regional Office, Kurnool hereby issues CONSENT FOR ESTABLISHMENT(CFE) to your INDUSTRY under section 25 of Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 and the rules made there under. This order is issued to manufacture the products mentioned at para (1) only.

5) This order is issued from pollution control point of view only. Zoning and other regulations are not considered.

6) This Consent Order now issued is subject to the conditions mentioned in Schedule 'A' and Schedule 'B'.

7) This consent order is valid for a period of 7 years from the date of issue.

Encl: Schedule 'A' & 'B'.

JOINT CHIEF ENVIRONMENTAL ENGINEER
ZONAL OFFICE, KURNOOL

To
M/s.Axora Resources Limited,
C/o.Sri Vijendra Kedia, Director,
Touchdown Building, Annasandrapalya Main Road,
Industrial Area, HAL, Bengaluru, Karnataka.

Copy to the Environmental Engineer, Regional Office, APPCB, Tirupati for information

SCHEDULE – A

1. The proponent shall obtain Consent for Operation (CFO) from APPCB, as required Under Section 25/26 of Water (P & C of P) Act, 1974 and under Sec 21/22 of the Air (P&C of P) Act, 1981, before commencement of the trail runs.
2. The proponent shall install or provide separate energy meters for Effluent Treatment Plant (ETP) and Air Pollution Control equipments to record energy consumed. An alternative electric power source sufficient to operate all pollution control systems shall be provided.
3. The proponent shall construct separate storm water drains and provide rain water harvesting structures. No effluent shall be discharged in to the storm water drains.

SCHEDULE – B

1. The industry shall establish the furnaces at a distance of minimum 200 mtrs away from habitation i.e. Sastry Colony and Girijana Welfare Primary School.

Water

2. The source of water is Bore well and the maximum permitted water consumption is following:

Sl. No.	Purpose	Existing CFE order dt: 06.01.2018 (in KLD)	Proposed (in KLD)	Total after expansion (in KLD)
1	Process (BBSU)	48.0	-	48.0
2	Scrubbing	84.0	15.0	99.0
3	Cooling	232.0	-	232.0
4	Domestic	30.0		30.0
	Total * (fresh + recycled)	**394.0**	**15.0**	**409.0**

3. The maximum waste water generation shall not exceed the following:

Sl. No.	Source	Existing CFE order dt: 06.01.2018	Proposed KLD	Total after expansion
1	Trade effluents (BBSU)	48.0	--	48.0
2	Scrubbing	84.0	15.0	99.0
3	Cooling tower bleed off	7.75	--	7.75
	Domestic	27.6	--	27.6
	Total	**167.35**	**15.0**	**182.35**

4. Treatment & Disposal:

Effluent Source	Treatment units	Mode of final disposal
Trade effluents (BBSU)	Thickner, neutralizer and filter press	The treated water shall be completely recycled
Scrubbing	Thickner, neutralizer and filter press	The treated water shall be completely recycled
Cooling tower bleed off		
Domestic effluents	STP	Onland for irrigation after meeting the standards.

5. The treated domestic waste water shall meet the following standards.

Sl.No	Parameter	Limiting Standards
1	pH	6.5 – 8.5
2	Total Suspended Solids (TSS)	100 mg/l
3	Total Dissolved Solids (TDS)	2100 mg/l
4	Biochemical Oxygen Demand (3 days at 27^0C)	30 mg/l
5	Chemical Oxygen Demand	250 mg/l
6	Oil and Grease	10 g/l

6. Effluents shall not be discharged on land or into any water bodies or aquifers under any circumstances.

Air:

7. The industry shall comply with the following for controlling air pollution.

Details of Stack	Stack 7	Stack 8	Stack 9	Stack 10
Attached to:	Reverberatory Furnace for tin	Reverberatory Furnace for Antimony	Vacuum distillation furnace	Refining kettles
Capacity	20 MT	20 MT	10 MT/day	20 MT-2Nos
Name of the Fuel :	Oxygen	Oxygen	Oxygen	Oxygen
Stack height above ground (m)	30 m	30 m	30 m	30 m

Air Pollution Control Equipment:	Settling chamber, Bag filter, U-tube cooler & cyclones	Settling chamber, Bag filter, U-tube cooler & cyclones	Settling chamber, Bag filter, U-tube cooler & cyclones	Settling chamber, Bag filter, U-tube cooler & cyclones

8. The emissions shall not contain constituents in excess of the prescribed limits mentioned below:

Chimney No.	Parameter	Emission Standards
7 to 10	Lead	10 mg/Nm^3
	Particulate Matter	25 g/Nm^3

9. The bag filters proposed to be installed for the Reverberatory Furnace , Vacuum distillation furnace and Refining kettles shall be designed such that 50% additional bags are to be provided as spare in the bag house to meet the emergency requirements.
10. The industry shall provide interlocking system between the process equipment and air pollution control equipment such that in case of any failure of air pollution control equipment, the process will be stopped automatically.
11. A sampling port with removable dummy of not less than 15 cm diameter shall be provided in the stack at a distance of 8 times the diameter of the stack from the nearest constraint such as bends etc. A platform with suitable ladder shall be provided below 1 meter of sampling port to accommodate three persons with instruments. A 15 AMP 250 V plug point shall be provided on the platform.
12. The industry shall implement adequate measures to control all fugitive emissions from the plant.
13. The proponent shall ensure compliance of the National Ambient Air quality standards notified by MoE&F, GoI vide notification No.GSR 826 (E), Dt. 16.11.2009 during construction and regular operational phase of the project at the periphery.
    The generator shall be installed in a closed area with a silencer and suitable noise absorption systems. The ambient noise level shall not exceed 75 dB (A) during day time and 70 dB (A) during night time.

Solid/Hazardous Waste:

14. The proponent shall comply with the following:

S. No	Source of solid waste	Proposed quantity	Method of disposal / Reception
a)	Reduction Smelting slag	67.25 T/M	Shall be reused in their factory premises for recovery of Lead.

Other conditions:

15. Green belt shall be developed all along the boundary & vacant spaces with tall growing trees with good canopy and it shall not be less than 33% of total area.
16. Concealing the factual data or submission of false information / fabricated data and failure to comply with any of the conditions mentioned in this order may result in withdrawal of this order and attracts action under the provisions of relevant pollution control Acts.
17. Notwithstanding anything contained in this conditional letter or consent, the Board hereby reserved to it the right and power under section 27 (2) of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 (4) of the Air (Prevention & Control of Pollution) Act, 1981 to review any or all the conditions imposed herein above and to make such alternation as deemed fit and stipulate any additional conditions or revoke the order in the interest of environment protection.
18. Any person aggrieved with this order may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to the Appellate Authority constituted under Section 28 of the Water (Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air (Prevention and Control of Pollution) Act, 1981.

JOINT CHIEF ENVIRONMENTAL ENGINEER
ZONAL OFFICE, KURNOOL

To
M/s.Axora Resources Limited,
C/o.Sri Vijendra Kedia, Director,
Touchdown Building, Annasandrapalya Main Road,
Industrial Area, HAL, Bengaluru, Karnataka.

ANDHRA PRADESH POLLUTION CONTROL BOARD
ZONAL OFFICE: KURNOOL

1st Floor, Shankar Shopping Complex, Krishna Nagar Main Road

Phone :08518- 233619,
e-mail: jceezoknl@gmail.com

CONSENT & AUTHORIZATION ORDER

Consent Order No.CTR - 1233/APPCB/ZO-KNL/CFO/2018 **Date:12.10.2018**

CONSENT is hereby granted for Operation under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act 1981 and amendments thereof and Authorisation under Rule 6 of the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016 and the rules and orders made there under (hereinafter referred to as 'the Acts', `the Rules') to:

M/s. Axora Resources Limited,
Sy No. 151/1, 151/2, 151/3 & 151/4,
Routhusuramala (V), Tottembedu Mandal,
Chittoor District

(hereinafter referred to as 'the Applicant') authorizing to operate the industrial plant, to discharge the effluents from the outlets and the quantity of Emissions per hour from the chimneys as detailed below.

i. Outlets for discharge of effluents:

Outlet No.	Outlet Description	Max Daily Discharge (KLD)	Point of Disposal
1	Trade effluents (BBSU)	48.0	The treated waste water shall be recycled back into the process
2	Scrubbing	84.0	
3	Cooling tower bleed off	7.75	
4	Domestic	27.6	shall be used for on land for irrigation after treatment

ii. Emissions from chimneys:

Chimney No.	Description of Chimney
1	Stack attacked to 1X 50 MT Melting posts
2	Stack attacked to 1X 100 MT Melting posts
3	Stack attacked to 1 X 20 MT rotary furnace
4	Stack attacked to D.G set of capacity 500 KVA

iii. HAZARDOUS WASTE AUTHORIZATION (FORM – II) {See Rule 6 (2)}

M/s. Axora Resources Limited, Sy No. 151/1, 151/2, 151/3 & 151/4, Routhusuramala (V), Tottembedu Mandal, Chittoor District is hereby granted an authorization to operate a facility for collection, reception, storage, treatment, transport and disposal of Hazardous Wastes namely:

Sl No.	Name of the Hazardous waste	Stream	Hazardous waste Qty	Disposal option
1	Used oil / Waste lubricant oil	5.1 of Schedule – I	50 LPA	Shall be disposed to authorized Re-processors / Recyclers of waste oil authorize by APPCB / SPCBs

2	PPFRP Waste	-	400 MT/Annum	Shall be disposed to authorized reprocessors / recyclers
3	Lead slag	-	160 TPA	Shall be sent to TSDF, Parawada, Vishakapatnam Dt.
4	Battery Scrap	-	15,000 TPA	Shall be brought from authorization agencies and consumed as raw material.
5	Lead Ash powder	-	280 TPA	Shall be reused in the process / sent to authorized reprocessors / recyclers.

This consent order is valid for manufacturing the following products with quantities mentioned below.

Sl. No.	Products	Quantity
Product :		
1	Refined Lead	19350 TPA
By product		
1	PP Chips	0.25 MT/Month

This order is subject to the provision of 'the Acts and the Rules' and orders made thereunder and further subject to the terms and conditions incorporated in the Schedule A, B & C enclosed to this order.

This combined order of consent & Hazardous Waste Authorization shall be valid for a period ending with the **31.07.2021.**

JOINT CHIEF ENVIRONMENTAL ENGINEER
ZONAL OFFICE, KURNOOL

To,
M/s. Axora Resources Limited,
Sy No. 151/1, 151/2, 151/3 & 151/4,
Routhusuramala (V), Tottembedu Mandal,
Chittoor District

Copy to the Environmental Engineer, APPCB, Regional Office, Tirupati for information and with a direction to ensure the compliance of Schedule –B Conditions, refer to Task Force in case of non compliance.

SCHEDULE – A

1. Any up-set condition in any industrial plant / activity of the industry, which result in, increased effluent / emission discharge and/ or violation of standards stipulated in this order shall be informed to this Board, under intimation to the Collector and District Magistrate and take immediate action to bring down the discharge / emission below the limits.
2. The industry shall put up two sign boards (6x4 ft. each) at publicly visible places at the main gate indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO and exhibit the CFO order at a prominent place in the factory premises.
3. Not withstanding anything contained in this consent order, the Board hereby reserves the right and powers to review / revoke any and/or all the conditions imposed herein above and to make such variations as deemed fit for the purpose of the Acts by the Board.
4. The applicant shall submit Environment statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1986 & amendments thereof.
5. The applicant shall make applications through Online for renewal of Consent (under Water and Air Acts) and Authorization under HWM Rules at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts and detailed compliance of CFO conditions for obtaining Consent & HW Authorization of the Board. The industry should immediately submit the revised application for consent to this Board in the event of any change in the raw material used, processes employed, quantity of trade effluents & quantity of emissions. Any change in the management shall be informed to the Board. The person authorized should not let out the premises/lend/sell/ transfer their industrial premises without obtaining prior permission of the State Pollution Control Board.
6. Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to Appellate authority constituted under Section 28 of the Water(Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air(Prevention and Control of Pollution) Act, 1981.

SCHEDULE – B

1. The industry shall not operate the Battery breaking unit without prior permission of the Board.
2. The industry shall provide 20 ft height GI sheets along the western boundary i.e., towards the school and habitation.
3. The industry shall develop thick greenbelt of 10 mtrs width with tall growing trees along the western boundary.
4. The industry shall conduct regular health checkups for the people living within 500 mtrs from the periphery of the unit as committed vide lr.dt.20.12.2017.
5. The industry shall not cause any pollution problems to the surrounding people/areas. Action will be initiated against the industry if it causes any adverse impacts on the health of the surrounding people.

Water pollution :

6. The source of water being Bore well. The following is the maximum permitted water consumption.

Sl. No.	Purpose	Quantity in KLD
1	Process(BBSU)	48.0
2	Scrubbing	84.0
3	Cooling	232.0
4	Domestic	30.0
	Total:	**394.0 KLD**

7. The industry shall not discharge treated effluents or untreated effluents outside the industry premises

8. The industry shall install digital flow meters with totalizer at various points to assess the quantity of water used for various purpose such as Scrubbing and domestic etc., and shall record the same.
9. The industry shall construct ETP to treat the scrubbed waste water, until such time the industry shall store the scrubbed effluents in a lined tank. The industry shall not discharge any effluents on the ground within the premises / outside the premises
10. The industry shall provide & maintain separate energy meter for ETP and maintain records of power consumption for the operation of ETP.
11. The treated effluents shall not contain the constituents in excess of the tolerance limits mentioned below:

Out let	Parameter	Limiting Standards
2	pH	6.5-8.5
	Total Dissolved solids	2100.0 mg/l
	Suspended Solids	50 mg/l
	Biochemical Oxygen Demand (3 days at 27^0C)	30.0 mg/l
	Lead	0.1 mg/l
	Oil and Grease	10.0 mg/l

12. The industry shall construct Sewage Treatment Plant to treat the domestic effluents within 3 months.
13. Effluents shall not be discharged into any water bodies or aquifers under any circumstances.

Air:

14. The emissions shall not contain constituents in excess of the prescribed limits mentioned below:

Chimney No.	Parameter	Emission Standards
1 to 3	Lead	10 mg/Nm^3
	Particulate Matter	25 g/Nm^3

15. A sampling port with removable dummy of not less than 15 cm diameter shall be provided in the stack at a distance of 8 times the diameter of the stack from the nearest constraint such as bends etc. A platform with suitable ladder shall be provided below 1 meter of sampling port to accommodable three persons with instruments. A 15 AMP 250 V plug point shall be provided on the platform.
16. The industry shall comply with the National ambient air quality standards as per MoEF, GOI notification dated. 18.11.2009 outside the factory premises at the boundary of the industry, as prescribed below.

S.No	Parameters	Standards in µg/m3
1	Particulate Matter(PM10)	100
2	Particulate Matter (PM2.5)	60
3	SO2	80
4	NOx	80

Noise Levels: Day time (6 AM to 10 PM) - 75 dB (A)
Night time (10 PM to 6 AM) - 70 dB (A).

17. The industry shall comply with emission limits for DG Sets upto 800 KW as per the Notification G.S.R.520 (E), dated 01.07.2003 under the Environment (Protection) Amendment Rules, 2003 and G.S.R.448 (E), dated 12.07.2004 under the Environment (Protection) Second Amendment Rules, 2004. In case of DG Sets more than 800 KW shall comply with emission limits as per the Notification G.S.R. 489 (E), dated 09.07.2002 at serial No.96, under the Environment (Protection) Act, 1986.
18. The bag filters shall be installed for the rotary furnace and refining/alloying pot furnace shall be designed such that 50% additional bags are to be provided as spare in the bag house to meet the emergency requirements.

19. The industry shall provide interlocking system between the process equipment and air pollution control equipment such that in case of any failure of air pollution control equipment, the process will be stopped automatically.
20. The industry shall ensure compliance of the National Ambient Air quality standards notified by MoEF, GoI vide notification No.GSR 826(E), dt.16.11.2009 during construction and regular operational phase of the project.
21. The Lead in working area shall be 0.05 mg/m3 (NIOSH – 8 Hr Average). Lead in the factory premises near boundary wall shall be less than 1.0 µg/m3 (24 hr average)
22. The industry shall provide stainless steel fabricated bed column type wet scrubber with mist eliminator to the batteries crushing & hydro separator unit for controlling the acid fumes.

Solid Waste:

23. Proper handling, storage, utilization and disposal of all the solid / hazardous waste should be ensured and regular report regarding toxic metal content in the waste material and its composition, end use of solid/ hazardous waste shall be submitted to the Regional Office, Tirupati.
24. The following rules and regulations notified by the MoE&F, GoI shall be implemented.
    a. Hazardous waste (Management, Handling and Transboundary Movement) Rules, 2008 and amendments thereof.
    b. Batteries (Management & Handling) Amendment Rules, 2010
    c. E-Waste (Management & Handling) Rules, 2011.

GENERAL:

25. The industry shall provide the following minimum required facilities, operating practices and standards as per Standard Operating Procedures (SOPs) notified by Ministry of Environment & Forests & Climate Change, Govt of India vide office memorandum dt.24.11.2015.
    a. Rotary furnace with suction hood connected with APCS over the charging point.
    b. Furnace connected with expansion chamber, cooling tubes/ducts, Cyclone/Multi Cyclone, Bag filter with pulse jet/ mechanical shaker arrangement, Alkaline Scrubber with arrangement of alkali dosing, & connected with ETP, ID fan and stack of minimum 30 meter height.
    c. Separate and secured covered space for storage of residue generated after recycling of lead bearing waste. The floor of the storage area should be impervious.
    d. Separate covered storage space for 1 raw material having impervious acid proof flooring and finished products.
    e. ETP based on physic-chemical treatment of wastewater
    f. Battery breaking area should have acid proof flooring with acid collection pit connected with ETP
    g. Each stack should have a port-hole (as per specifications given in CPCB document COINDS-III) with platform for stack monitoring. There should be an easy ladder for safe access to stack monitoring platform.
    h. **Battery-Breaking Processes:** The proponent shall install mechanical/automatic battery breaking units. After draining the acid, the battery shall be mechanically broken along with the casing before battery plates are processed for smelting.
    i. Facilities required for mechanical/ automatic breaking include arrangements for noise control and dust and fume extraction system and acidic collection / neutralization facilities and ETP for treatment of lead and acidic wastewater
    j. Adequate facilities for collection and storage of ETP sludge and slags.
    k. **Workers Blood lead levels:** As a practice, all lead related units should periodically examine their workers at least once in year for lead level in blood as well as urine. Persons with higher lead levels (greater than 42 micrograms /dl) should be shifted immediately to non-lead activity areas and given special medical treatment till the lead levels come back to acceptable level (10- micrograms /dl).

I. Steps to minimize fugitive emissions of Lead

I. The design of hood/fume collection system from the smelting/refining operations (from metal tapping point, charging doors, furnace joints etc.) should be capable of collecting lead emissions and transfer to the air pollution control system.

II. The storage and handling of all the raw materials, intermediates and products should be in covered areal shed having concrete floDl'sand mechanized equipment should be used to handle these materials as far as possible.

III. The floors in the loading area should be kept wet through sprinklers to reduce the chances of lead particles/dust getting airborne.

IV. Any water used for washing, rain water etc, should be collected through separate pits (to delink this from the regular drain) for removing metallic lead etc and the pit should have fine screens for passage of clear water.

26. The movement of vehicles to the administrative/working/production areas should ensure that only the trucks/vehicles involved III the material handling/transportation reach the work areas, and their tyres are washed before they leave these areas.
27. Blood lead monitoring should be done for the employees and their family members and the report should be submitted to R.O. Tirupati, APPCB
28. The industry shall obtain permission from MoEF & CC, GoI for import of lead scrap/used lead acid batteries.
29. The industry shall obtain membership with M/s.TSDF, Parawada, Visakhapatnam and enter an agreement to dispose the hazardous waste.
30. The industry shall develop green belt all along the boundary and in all the vacant places to cover at least 33 % of total area.
31. The industry shall submit the compliance report on the Consent for Operation (CFO) conditions for every six months i.e., on 1st January, and 1st July of the year to Regional Office, Tirupati on regular basis.

SCHEDULE - C

[See Rule 6 (2)]

(Conditions of Authorization for occupier or operator handling hazardous wastes)

1. All the rules and regulations notified by Ministry of Environment and Forests, Government of India under the E(P) Act, 1986 in respect of management, handling, transportation and storage of the Hazardous wastes should be followed.
2. The industry shall not store hazardous waste for more than 90 days as per the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016.
3. The industry shall store Used / Waste Oil and Used Lead Acid Batteries in a secured way in their premises till its disposal to the manufacturers / dealers on buyback basis.
4. The industry shall maintain 7 copy manifest system for transportation of waste generated and a copy shall be submitted to concerned Regional Office of APPCB. The driver who transports Hazardous Waste should be well acquainted about the procedure to be followed in case of an emergency during transit. The transporter should carry a Transport Emergency (TREM) Card.
5. The industry shall maintain proper records for Hazardous Wastes stated in Authorisation in FORM-3 i.e., quantity of Incinerable waste, land disposal waste, recyclable waste etc., and file annual returns in Form- 4 as per Rule 6(5), 13 (8), 16(6) and 20 (2) of the Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016.

JOINT CHIEF ENVIRONMENTAL ENGINEER
ZONAL OFFICE, KURNOOL

To,
M/s. Axora Resources Limited,
Sy No. 151/1, 151/2, 151/3 & 151/4,
Routhusuramala (V), Tottembedu Mandal,
Chittoor District