

## Rampura Agucha Mine, Bhilwara

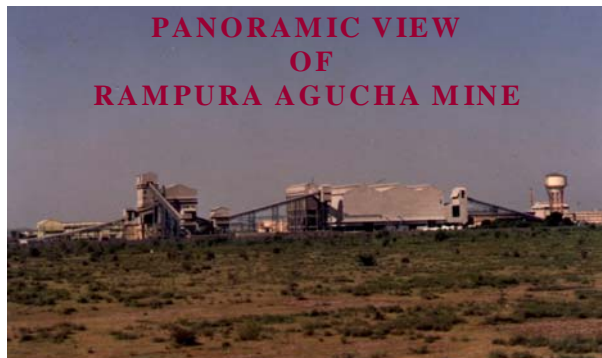
### Unit Profile

The Rampura Agucha Mine is situated 15 km. South-east of Gulabpura and 220 km. South-west of Jaipur, in the district of Bhilwara, Rajasthan. It is a world class deposit - with the estimated geological reserve of 63.648 million MT at the geological grade of 13.54% Zinc and 1.97 Lead - owned by M/s Hindustan Zinc Ltd., Yashad Bhawan, Udaipur – 313004, Rajasthan, India

R.A. Mine was commissioned in 1991 for the designed capacity of 3000 TPD ore production and its beneficiation. Same has been expanded to 4500 TPD in 1998. Further expanded for enhanced capacity to 11400 TPD in 2005.

Business activity at R.A. Mine involves mining of Lead Zinc composite ore by highly mechanized open pit method, with the help of heavy earth moving machinery (HEMM) and its beneficiation in a state of the art captive plant by froth floatation method to produce quality Lead and Zinc concentrate separately for using at the own Smelters or sale / export. Major departments are Mining, Mill(Ore Dressing ), Electrical, Central Work shop, Personnel & Administration, Finance, Materials, Civil, Medical etc.

The Mine & Mill operates round the clock in three shifts of 8 hours duration each. Mine is managed by a team of dedicated professionals, committed to the management of environment, health and safety (EHS). The total strength of highly skilled and dedicated departmental work force is 702 only (Executives-125 + Workmen –577). Besides above, on an average 200 to 250 employees also find employment daily under various contracts in the mine. Initial and periodical medical examinations for all the employees are carried out and vocational training is imparted to all employees as per the statutory requirements. Major achievements in environment, health and safety in the past has remained as follows:



### (1)Environment Awards

- (a) FIMI(Federation of Indian Mineral Industries )National Environment award ( Gem Granite) in 1993-94
- (b) Overall Excellence award in 1997,1998,1999,2000,2001 & 2004 for Mine Environment & Mineral Conservation by Indian Bureau of Mines.

## (2) Safety Awards

- (a) First prize in Overall performance in safety week competition by DGMS, every year from 1991 to 1999 & 2004
- (b) Far excellence award in safety week competition by DGMS in the year 2000, 2001 & 2003

## (3) Environment Management Plan

- As per the recommendation of EMP, HZL is committed to reduce the waste generation and improve the recovery of lead and zinc concentrate. This is being done by controlling emissions and resource conservation
- HZL has developed a green belt of 240 Ha area in and around the mine. This is also in line with the recommendation of EMP. The noteworthy point is the survival rate of this green belt which is about 80% in Rajasthan's harsh climate

## (4) Various studies regarding environment and safety

- (a) Review of geological stability of tailing dam
- (b) Identifying birds species at tailing dam site and suggest plan to develop the area as refuge
- (c) Review the green belt development plan
- (d) Evaluation of tailing disposal at RA Mine
- (e) Land use cover change study within 15 Km. Radius of RA mine
- (f) Stability of tailing dam by GPR method
- (g) Pit-slope stability study
- (h) Aquifer Vulnerability Index study for Tailing Dam
- (i) Hydrology and hydrogeology study

## (5) EHS Measures institutionalized at the mine are ;

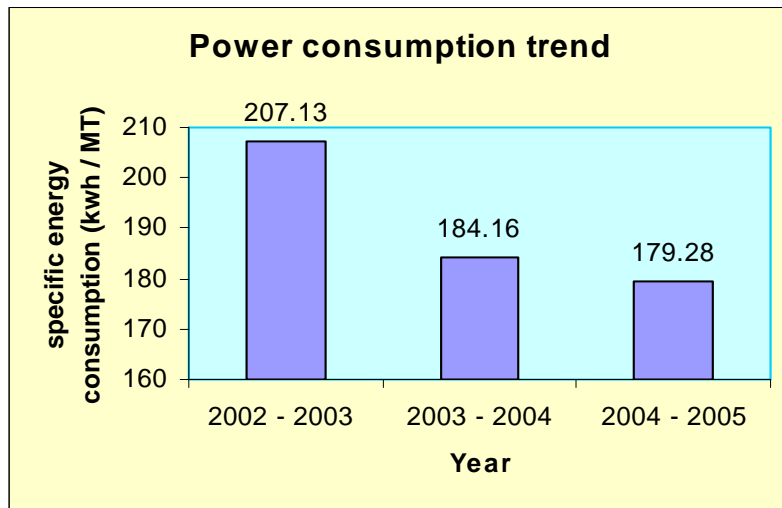
- Zero discharge of effluents
- Air pollution control system / facilities
- Occupational health care centre
- Emergency preparedness measures
- Green belt development

The mine is also an active member of IZA (International Zinc Association).

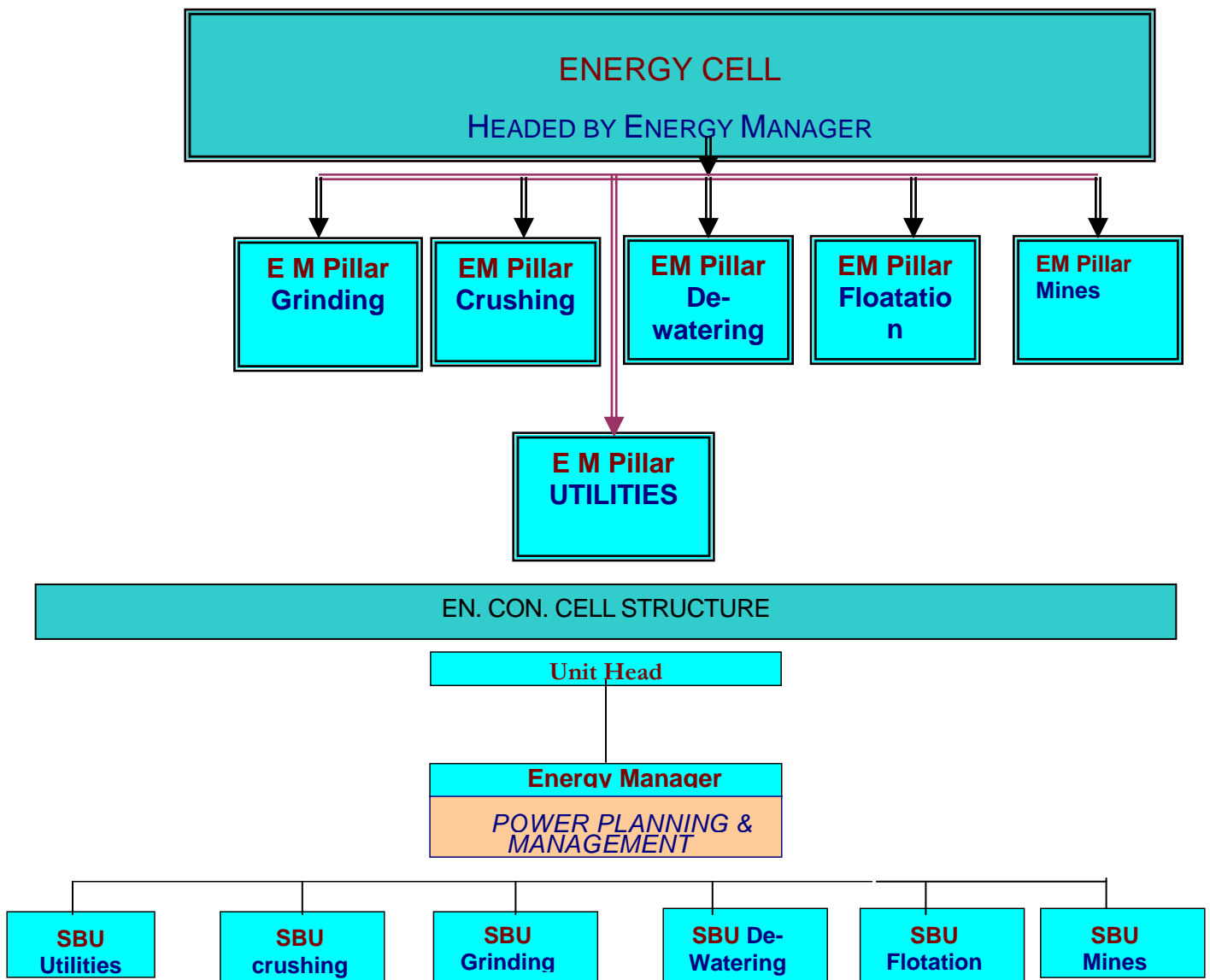
## Energy consumption: –

There has been a steady decrease in the electrical energy consumption per MT of concentrate due to the implementation of the various energy conservation measures.

Description	Unit	2002 - 03	2003 - 04	2004 - 05
Concentrate production (zinc + lead concentrate)	Metric tonne (MT)	408169	524403	597051
Total energy consumption	Lakhs kWh	845.46	967.33	1070.44
Specific energy consumption	kWh / MT	207.13	184.46	179.28
Energy cost as % of manufacturing cost	%	17.5	16.3	15.3



#### Energy Management setup



## ENERGY CONSERVATION PROJECTS UNDERTAKEN DURING 2004-05

### (1) Installation of a.c. drives in zinc Regrinding cyclone feed pump.

It was observed that flow and pressure at the cyclone were not constant and it was maintained by throttling the suction. A.C. drives were installed in this location to overcome above problem and for power saving.

**Cost involved** : Rs. 8.5 lakhs  
**Annual saving** : Rs. 6.00 lakhs



### (2) Use of lower size of grinding media .

The avg. diameter of the grinding media inside mill was found 35 mm. Required diameter was theoretically calculated and it was found 30 mm. So grinding media of size 40 mm was used in the mill from April 2004 and avg. diameter was found 30 mm. The lower size of grinding media reduces the void inside mill and hence grinding efficiency increases.

**Cost involved** : Nil as we started taking 40 mm grinding media from supplier .  
**Annual saving** : Power reduction 0.20 kwh / MT ( Rs. 17.18 lakhs )



### (3) Reduction in grinding power by increasing the speed of ball and rod mill

The plant through put was increased by de-bottlenecking two different areas.

One of them was to increase the speed of ball and rod mill. The critical speed of the ball and rod mill was 20.49 rpm and 26.44 rpm. Earlier rod and ball mills were running at 65 % and 71 % of the critical speed. After change of pinion the speed of the mill were increased and now they are running at 70 an 80 % of their critical speed. Grinding efficiency has been increased and power saving is 0.1 kw/MT.

**Cost involved : Rs. 10 lakhs**

**Power Saving : 214825.4 units ( Rs. 8.59 lakhs )**



#### **(4) Installation of seal water pump**

Initially two seal water pumps were running continuously with a combined discharge of 13 lps and pressure of 8 kg / sq. cm . these pumps were replaced by a single pump of a capacity 13 lps and pressure of 6.45 kg / sq. cm .

Cost involved : Rs. 1.0 lakh

Approximate saving : Rs. 4.5 lakhs / annum



#### **(5) Increase in through put**

The through put of the plant is increased from 290 MT / hour to 295 MT / hour by optimization of existing process and debottlenecking projects that has resulted in reduction of specific power consumption of 0.5 kwh / MT

**Cost involved** : Rs. 35.0 lakhs  
**Annual Saving** : Rs. 40 lakhs



**(6) Improvement in mill water supply system .**

In mill water supplied from overhead tank at a height of 42 meter was substituted by supplying partly from over head tank and mostly (60 %) from a low level reservoir of 50000 cubic meter capacity .

**Annual saving : Rs. 44 lakhs .**



**(7) Reduction in LT power in mill ( Taken in six sigma project )**

LT motors (above 15 kw) installed in the plant were studied and through various improvement measures like energy auditing , analysis of all flotation cells , pumps ,contour of pipelines , alteration in sump pump discharge points , bypassing of intermediate pumps , LT power was reduced from 16.04 kwh / MT to 15.69 kwh /MT .

**Cost involved** : Rs. 12 lakhs ( for small modification )

**Saving : Rs. 32 lakhS**



**(8) Conversion of lightly loaded motor into permanent star connection**

Efficiency of a motor reduces drastically for loading below 40 %.

In our Plant all the motors which were lightly loaded (less than 40 %) were permanently connected into star resulting in power saving .

**Cost involved : nil**

**Annual saving : Rs. 3.51 lakhs**



**(9) Replacement of 450W HPMV lamp by 250 W HPSV lamp.**

In process Plant 450 W lamps were replaced by 250 W HPSV lamps resulting in power saving.

**Cost involved : Rs. 1 lakhs**

**Annual saving :**



**(10) Providing translucent sheet in the main process plant to avoid artificial lighting :**

In the main process plant more transparent sheets were provided to avoid artificial light .

**Cost involved : Rs 1 lakh**  
**Annual saving : Rs 2.75 lakhs**



**(11) Energy Audit of all SPVC , other pumps , and their optimization .**

After brain storming by our team the diameter of 139 SPVC pump was increased from 6 inch to 8 inch and delivery line was rerouted to reduce the length and bend and frictional head . consequently discharge volume increased and power consumption reduced after stopping one pump .

**Cost involved** : Rs 4.0 lakhs  
**Annual saving** : Rs 6.68 lakhs



#### **Energy Conservation Plans for 05-06**

1. Replacement of existing heatless desiccant type of compressed air dryers with refrigerated type dryer
  2. Installation of new screw compressor with VFD for instrument air .
  3. Reduction of generation pressure of the reciprocating compressor for filter press .
  4. Installation of separate pump and cooling tower for compressors and blowers .
  5. Use of separate head for different head for different users of lead water circuit pump .
  6. Installation of lower size pump for process seal water pump.
  7. Optimizing the operation of cooling tower pumps.
  8. reducing the head of hot sump pump
  9. Installation of VFD for cooling tower fans
  10. Installation of VFD for lead and zinc filter feed pump .
  11. Reduction of rpm of primary dust extraction fan .
  12. Installation of VFD for shower pump .
  13. Optimizing the power consumption of secondary dust extraction fan no.1
  14. Replacing secondary dust extraction fan no. 2with energy efficient fan.
  15. replacement isolation transformer used in lighting circuit with amorphous core transformer .
  16. Replacement of conventional 40 W fluorescent lamps with 28 W T% series lamps .
- Estimated investment = 70 lakhs  
Annual target savings = 113 lakhs



# RAMPURA AGUCHA - 3.75 MTPY LEAD/ZINC CONCENTRATOR FLOW SHEET

