

Unit Profile –

Rajpura Dariba Mine is a mining unit of Hindustan Zinc Limited, a Vedanta group company. The company operates an underground mine and an ore beneficiation unit for the production of lead–zinc concentrates. The ore deposits at RD Mines area are one of the most complex multimetallic ore deposits of the country. The economic minerals are sulphide based galena (lead) & Sphalerite(zinc). The unit is a certified Integrated Management System EHSQ Unit for ISO 14001: 2004; ISO 9001:2000; ISO 18001:1999.

Rajpura-Dariba Mine is located at the southern extremity of Rajpura-Dariba-Bethumni metallogenic belt in Rajsamand District, Rajasthan, at a distance of 76 KM NNE of Udaipur. The mining activity is below the surface level or it is an underground mines. This mine perhaps represents the oldest mining and smelting operations in the world for the extraction of zinc metal. Old wood, bamboos have been carbon dated to 2100 -2500 years old. The other prominent deposit in the area is Sindesar Khurd, where mine production has started and ore is transported to the RD mine beneficiation plant for treatment. This mine is located 6 Km NNE of RD mine. The deposit is approachable from RD mine by a metalled road.

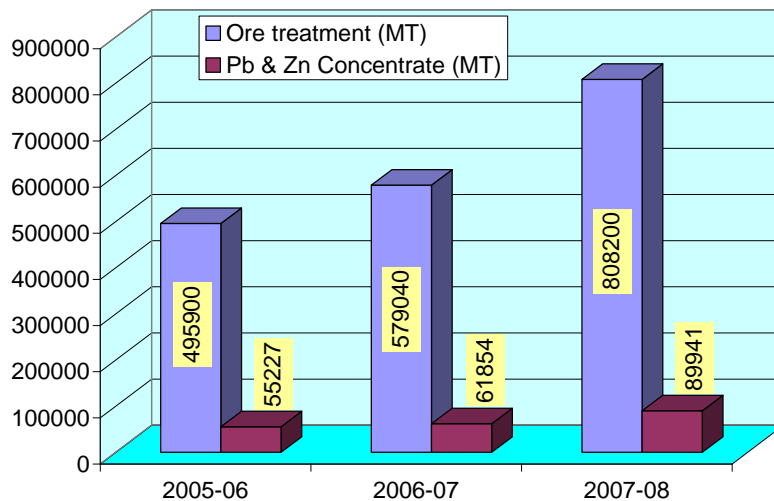
Mining – The mine was commissioned in April 1983. Access to the mine is through a main and an auxiliary shaft. Both the shafts are used for men / material winding. Horizontal Flat – back Cut and Fill method was employed for extraction of ore above 300 mRL of South Lode. Vertical Crater Retreat mining method is being used below 300 mRL. The voids created by stoping are back filled by cemented fill to provide support to the walls. In addition other reinforcements like cable bolting & supporting is also done. Large dia holes are drilled by ITH & DTH drill machines. Main compressor is installed at surface. After blasting 3.5 m³ electric LHDs are used to load and haul the broken ore upto the nearest ore pass which opens at a track facilitated haulage drive. Electric locomotives pull a train of 5 t Grandby cars carrying the ore up to the main ore pass. After crushing to (-) 150 mm size ore is hoisted to surface by 6 t capacity skip and conveyed to coarse ore stockpile of beneficiation plant.



Beneficiation – Ore hoisted from underground mine is transferred to crushing plant at surface for size reduction in secondary & tertiary crushers. Then it is fed to the Ball Mills for fine wet grinding in closed loop. After cycloning in hydrocyclones the desired size slurry is fed into froth flotation cells. Lead & Zinc is separated & collected by using chemical agents and the concentrates are fed to thickeners for dewatering. Further water is filtered from slurry in filters and dry concentrate is stocked in yards. The graph below shows the mine production figures for the last three years.



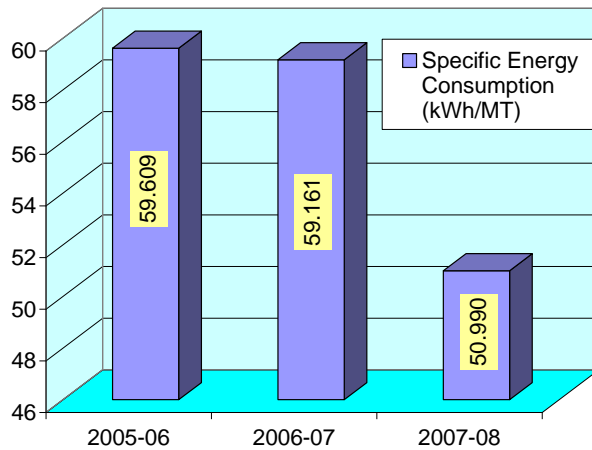
The graph below shows the mine and concentrate production for the last three years.



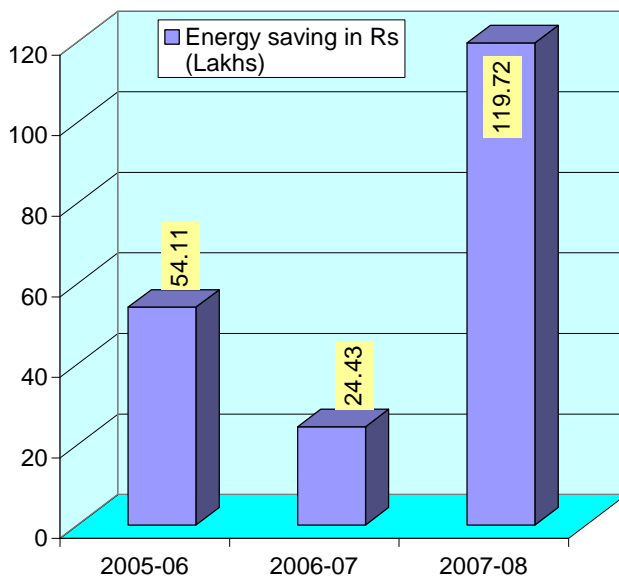
Energy Consumption –

All the activities and processes use electrical energy at this unit. Thermal energy is not required in any of the activities. Diesel Generator is used for emergency lighting and man winding (evacuation from underground mine) only during power cuts. Electrical energy consumption of each section and specific energy consumption of the unit is monitored on daily basis. The unit has been successful in reducing its carbon footprint. There is continuous decline in the specific energy consumption. Tables below show the energy consumption trends and savings achieved –

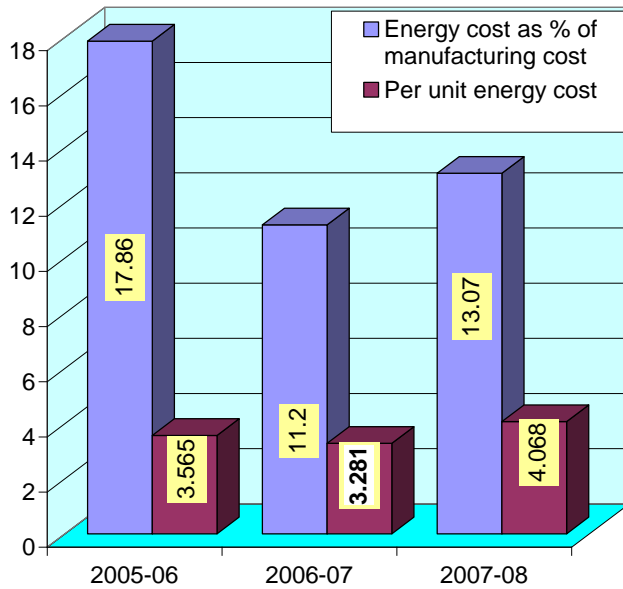
Specific Energy consumption trend for the last three years



Energy saving in Rs Lakhs for the last three years



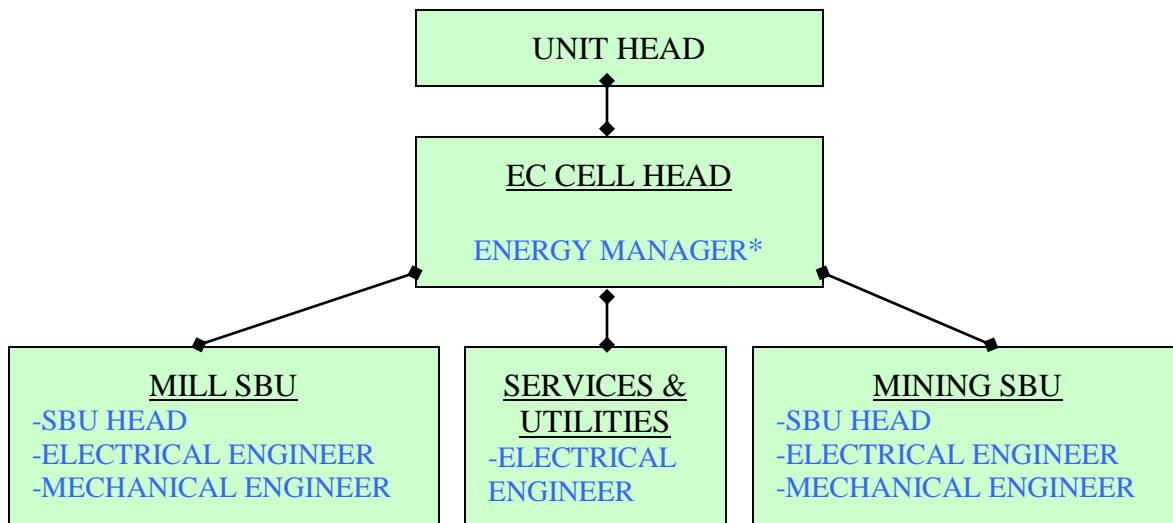
Energy cost as % of manufacturing cost



Note:- In 2006-07, the unit cost of power (Rs 3.281) is low due to power wheeling from our own CPP.

Energy Conservation Commitment, Policy and Organizational Set-up -

The unit has an energy conservation policy and an organizational setup for implementing the policy. The organization structure is as shown below



***BEE certified Energy Auditor**

All the executives of respective strategic business units identify projects. These are discussed in EC cell meetings and finally presented by the EC cell head. Proper budget allocation and implementation strategy is finalized three months before starting of next financial year. All the EC projects are monitored, audited and their benefits are quantified and considered in setting the specific energy consumption targets. The energy consumption targets reflect the savings in energy consumption. A photo copy of the unit's energy conservation policy is attached –



Hindustan Zinc Limited Rajpura Dariba Mine



ENERGY MANAGEMENT POLICY

We at Rajpura Dariba Mines of Hindustan Zinc Limited commit ourselves as a team to achieve effective energy management system towards sustainable development of environment for the benefit of future generation.

We Commit ourselves to continually improve energy performance to all our activities, products and services by:

- ◆ Managing efficiently the utilization of energy resources.
- ◆ Replacing the old energy inefficient technologies/ equipments by latest energy efficient technologies/ equipments.
- ◆ Propagating energy conservation consciousness among community, employees, suppliers & other stakeholders
- ◆ Carrying out regular internal or external audits to identify areas for improvement
- ◆ Controlling the sustenance development of energy performance by periodic review.

We have accepted to demonstrate our leadership by reinforcing this policy throughout the unit by our trained and empowered employees by the application of best management practices and technologies.

(Praveen Kumar Jain)
Unit Head

Energy conservation achievements –

1) VFD installation in Ball Mill belt feeders-



Belt feeders feed the conveyor going to Ball Mill feed chutes. There were 4.0kW DC motors connected to thyristor DC panel. These are auto controlled from DCS as per the desired feed rate. The feed to the ball mill was not constant and there used to be some fluctuation. All the eight DC drives were replaced by 3.7 kW AC squirrel cage motor and variable frequency drives. The Ball Mill throughput increased, resulting in power saving and better grinding quality. There is direct saving of 50000 units of electricity.

2) VFD installation in air blower -

Air blowers are operated for supplying air to the flotation circuit. One Air Blower with 200 kW, 2950 rpm motor was operated at full speed with different positions of outlet damper. The damper was manually operated as per requirement of air for the number of flotation circuits in operation. Now a variable frequency drive is installed. The damper position is fully open. The blower speed is set as per requirement and is normally run between 2000 to 2500 rpm. The running load dropped from 155 kW to 85 kW. The Total energy saved is 8.50 lakh units per year. Additionally there was drastic reduction in the maintenance cost of the blower, safety issue of blower getting damaged at high rpm was resolved and noise level reduced drastically.



3) Installation of Spot compressors in north lode & SK mine –



Mining equipments are run either by electrical energy or compressed air. The compressors are situated at the surface level. Air is supplied via a large network of pipelines to the underground working sites. There is lot of losses due to leakage and pressure drop. Two small compressor of 200 cfm are in underground mines. Line losses as measured also reduced. The compressors are started only when the team reaches the spot. This resulted in saving to the tune of 1.70 lakh kWh/year.

4) Replacement of disc filter for lead by rotary drum filter –

The Disc filter was being used for dewatering / filtration of Lead concentrate slurry. The moisture content of the product was 18 -20 %. The concentrate was difficult to transport and was consuming more diesel due to more weight of water content. A 125 kW vacuum pump and a compressor was required for disc filter operation. This filter is replaced by a rotary drum filter of higher capacity but with 50 % lower connected load. The vacuum pump required is connected to a 45 kW motor and compressor is not required. The moisture content is 12 %. Overall huge energy saving and better product quality. The energy saving is 2.50 lakh kWh/MT.



5) Replacement of ventilation fan (aluminium casting) by FRP blade fan–



A 4000 m³/min ventilation fan is used for mine ventilation in the North Lode section of the mine. The fan blades are of aluminium casting. This fan is replaced by a FRP blade fan of same capacity. Other duct works are also carried out. The energy saving achieved is 2.00 lakh kWh/year

Energy Conservation plans & targets –

The company has drawn ambitious plans for energy conservation. A continuous improvement approach is being taken. Energy consumption targets for the next two years have been decided. The major projects to be taken up during the coming two financial years have been decided and preliminary work is being done for those projects.

Year	Electrical (kWh / MT)			Reduction over the year 2006-07
	Ore production	Ore treatment	Total	Electrical %
2006-07 (Base Year)	14.19	36.73	50.92	-
2007-08	14.10	36.47	50.97	0.67
2008-09	13.50	35.50	49.00	3.77

** To start separate stream for SK mine ore, additional extra energy consumption of 1 kWh/MT has been considered.

Anticipated money savings at the end of 2009-10 = Rs.90.8 lakhs/year.(@Rs 4.00/ kWh & Ore treatment of 10 lakhs/year)

Environment & Safety

Safety –

Safety is an important aspect of working culture at RD mines. The company has announced its safety policy which is implemented by safety department across the mines. The unit has vocational training centre managed by officer in charge to maintain safety standards and ensure safety regulations of DGMS (Director General of Mines Safety) are being followed strictly. Each production department has separate safety officers. The culture of safety is promoted by conducting various awareness programs, onsite training, demonstration, workshops, mock drills, competitions and rewards to make people conscious of safety aspects, use of PPEs and use of fire fighting equipments. The company has also prepared its disaster management plan to handle any accidental circumstances. The unit also runs an occupational health centre in the campus for health and welfare of employees and families. The company has released environment, occupational health, safety, security and community policy in compliance with **ISO 14001, OHSAS 18001**. The safety audit conducted at RD mines by National Safety Council (NSC) in April 2008. The action plan has been prepared for implementation of all observations and recommendations.

The accident rate has been reduced drastically as a result of continual improvement in safety as follows through Loss Time Injury Frequency Rate (LTIFR) data for the last four years –

Year	2004-05	2005-06	2006-07	2007-08
LTIFR	20.20	8.96	6.20	3.95

Environment –

The unit manages its operations to avoid environmental harm and minimize environmental impact. This is fundamental to the long-term viability of our business. The unit has ISO 14001 certification for environment management system. There are programs and systems in place to monitor and address issues like air quality, water quality and tailings management. The stack emission and dust emission are constantly monitored and controlled. The unit has planted 64950 plants in the entire campus to make the surrounding area green. The unit was winner in reclamation, rehabilitation, air pollution control measures and plantation and runner in noise, vibration control, aesthetic beauty and community development in VI th Mine Environment & Mineral Conservation week 2005 conducted by IBM (Indian Bureau of Mines).

The unit has engaged National environment engineering research institute (NEERI), Hyderabad in April 2008 for assessment of aquifer vulnerability study at RD mine. The environment effect assessment studies for RD mines is being carried out by Vimta Labs, Hyderabad.