

MANGANESE ORE (INDIA) LIMITED - CHIKLA MINE

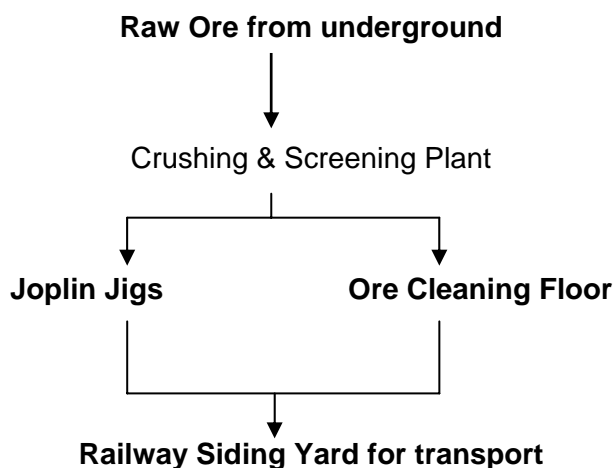
P.O. Chikla, Distt. Bhandara, Nagpur (Maharashtra)

Unit Profile

Manganese ore (India) Limited is a leading manganese ore producing company of India. The company shares about 55% of Manganese ore production of India. MOIL has established a 10000 TPA capacity Ferro-Manganese plant at Balaghat (M.P.) and a 1200 TPA capacity Electrolytic Manganese Di Oxide plant at Dongri Buzurg in Maharashtra State. Energy conservation and for clean and green environment MOIL has installed a 4.8 MW and 15.2 MW capacity Wind Energy Generator Plants at Dewas (M.P.), which are operating satisfactorily.

Chikla mine was established in the year 1899 by Central Provenance of Manganese Ore (CPMO) incorporated in Great Britain. Latter on it was taken over by MOIL in the year July 1962. Chikla Mine is an underground mine of the Manganese Ore (India) Limited, situated in Bhandara District of Maharashtra State. The annual production of Manganese Ore in Mine has gone up from 2 Lacs Ton per annum to 3.00 Lacs Ton per annum in couple of year. Total mining lease hold area of the Mine is 150.65 hectare., The total mineral reserve of the mine is 5.09 million tones. So far 58.86-hectare area of the mine is covered with afforestation.

Manganese ore produced from the underground is processed in the mine; process flow chart is as below:



Energy Consumption

The energy consumption is controlled by taking various measures like improving the efficiency of the equipments and regulating the operation of equipments.

Description	Unit	2005-06	2006-07	2007-08
Annual Production	Lakh Tonne	1.43	2.13	3.00
Total Electricity consumption	Lakh KWh	19.49	23.35	24.21
Specific electricity consumption	Kwh/Tonne	13.53	10.96	8.07

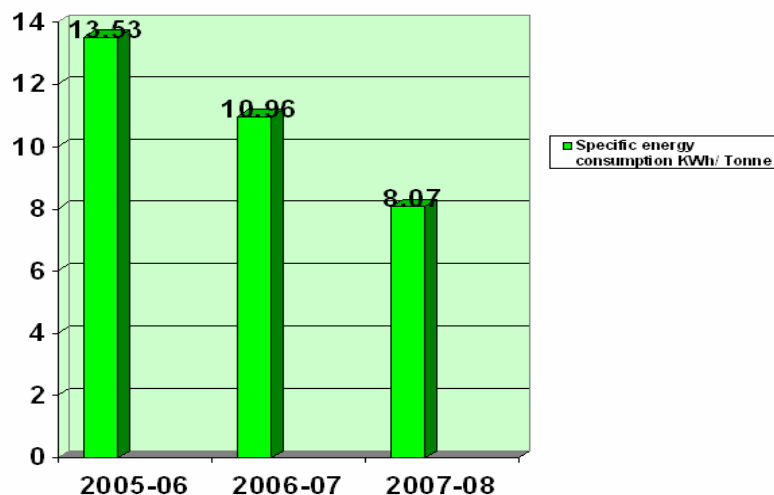
Energy Policy

MOIL, the largest producer of Manganese Ore in India and also the market leader, is committed to adopt a comprehensive approach towards conservation of energy in all its operations. To accomplish this MOIL will

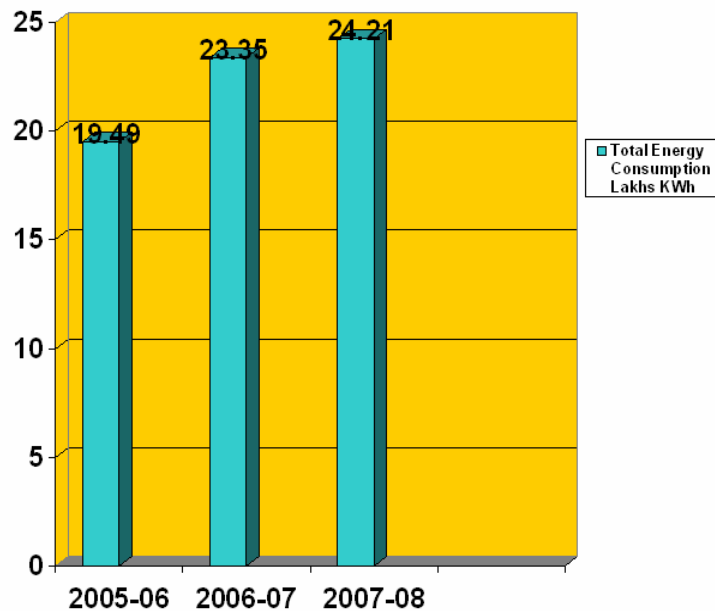
- Optimally utilize various form of energy in cost effective manner to effect conservation of energy sources.
- Maximize the use of renewable energy sources and non-conventional sources of energy.
- Train our employees to make energy conservation as a way of life and recognizing their initiatives in this regard. Also a cash prize has been introduced since 2006 to the employee consuming least Units.
- Carry out external audit in regular interval and to identify the areas of improvement.
- Reduce specific energy conservation by 1% every year till 2010.
- Improve capacity utilization.

Graphical Representation of Energy Consumption

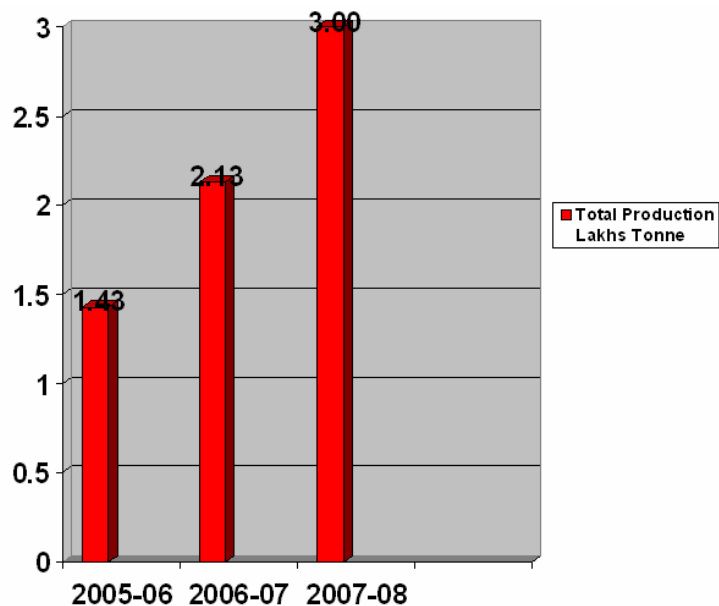
(1) Specific energy consumption



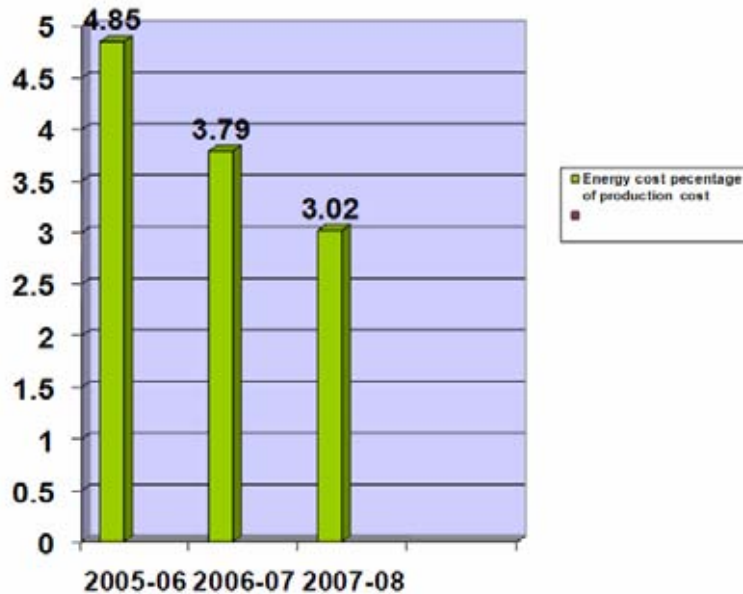
(2) Total energy consumption



(3) Total production



(4) Energy cost percentage of production cost



Energy Conservation Achievements

1. Additional Installation of fixed capacitor banks during 2007-08

In the year 2007-2008 it was decided to incorporate additional capacitor bank to improve power factor due to increase in overall load as well as reactive load. The additional capacitor improved power factor resulting in incentive for higher power factor from electricity board as well as control of MD.

Annual Savings : Rs 3.20 lakhs
Annual Investment : Rs 0.75 lakhs

2. Savings achieved by replacement of Tube light type street light fitting and HPSV Luminaries with CFL during 2007-08

Tube light and out door type conventional street light fittings has been replaced by energy efficient CFL fittings. 250Watts HPSV street light fittings have been replaced by energy efficient street light CFL fittings. The CFL lamps provide adequate illumination and it also enable to reduce the electrical energy consumed.

Annual Savings : Rs 0.312 lakhs
Annual Investment : Rs 0.10 lakhs

3. Saving achieved by shifting of Compressor unit from Main Hill to New 14-16 Substation i.e. Nearer to Load center to reduce the line losses and build up pressure timely.

Annual Savings : Rs 4.90 lakhs
Annual Investment : Rs 35.0 lakhs

4. Savings achieved by using 1ST level underground as a sump in place of over head tank on Surface for Sand Stowing.

Earlier water for sand stowing was used through continuous pumping from underground pumps. As energy savings measure dewatering from under ground to surface has been stopped for sand stowing purpose. The below ground level i.e. "1st Level" sump is being used as storage tank and water for sand stowing at 3rd level is being received through gravity from 1st Level. This has reduced the head of pumping as well as time required for pumping resulting in lesser pumping hours as well as lesser energy consumption.

Annual Savings	:	Rs 2.48 lakhs
Annual Investment	:	Rs 1.80 lakhs

Environment and Safety

Environment

The environment around the mine is being maintained in a good condition by a regular plantation near in the mine areas and residential colonies. About 58% of total land is covered with the green trees and the percentage is increasing every year.

Safety

The safety in the mine is maintained as per the MMR 1961, a senior executive in the mine is deputed as a safety officer, he takes a monthly meeting with the departmental heads and the workers representatives, the findings in the meeting is strictly implemented and the status of the implication is reviewed in the next meeting.

Human Resources Development for Energy Efficiency Improvement

Manganese Ore (India) Limited is having well equipped in house training facility. In house training Programme is being conducted regularly, periodically in all the mines creating awareness for the energy conservation, improving managerial skill in turn improving the efficiency operational skill in turn improving the efficiency resulting in energy conservation.

In addition to this the training regarding safety and the basic trade training is being implemented regularly, also required under Mines Vocational Rule 1966.

Also officers and staffs are being sent regularly in phased manner for training within India at OEM's premises, training institutes to gain the knowledge of equipments and to know the proper operation, so that it can be used efficiently and energy can be saved. The finding of the programme is circulated between the workers to make awareness among them; also the posters related to the energy conservation are displayed in working areas and residential colonies.

RAJPURA DARIBA MINES - HINDUSTAN ZINC LIMITED

Distt. Rajsamand (Rajasthan)

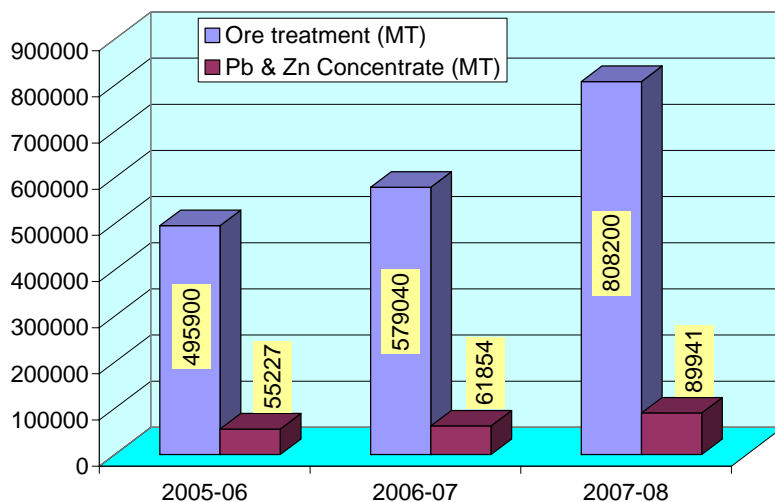
Unit Profile

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.

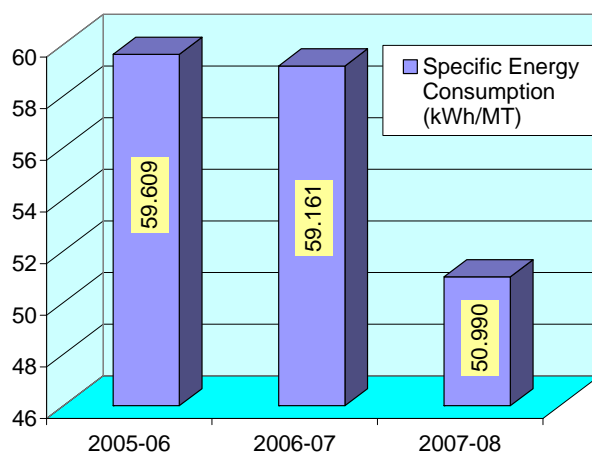


The graph below shows the mine and concentrate production for the last three years

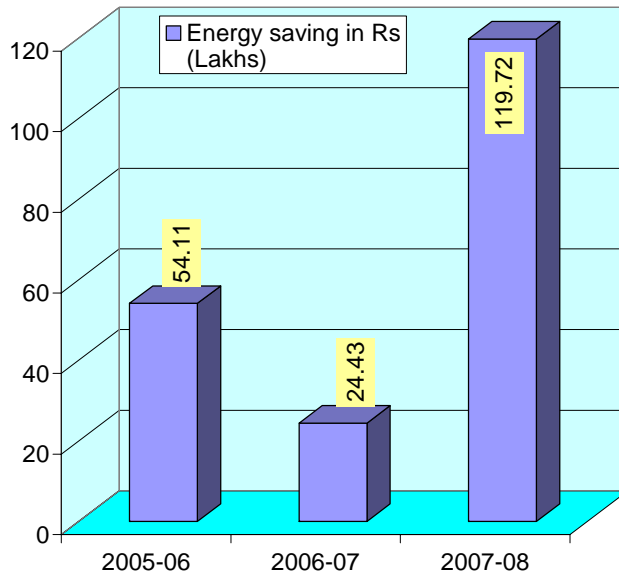


Energy Consumption

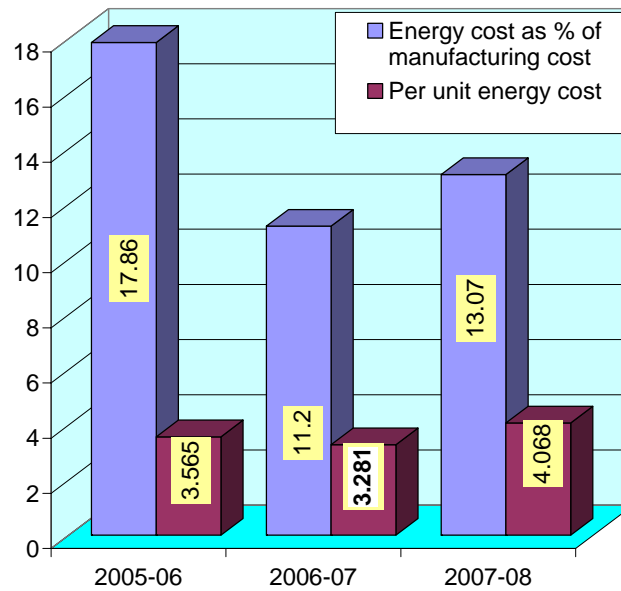
All the activities and processes use electrical energy at this unit. Thermal energy is not required in any of the activities. Diesel Generator is used for emergency lighting and man winding (evacuation from underground mine) only during power cuts. Electrical energy consumption of each section and specific 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. Graph below show the energy consumption trends and savings achieved



Specific Energy consumption trend for the last three years



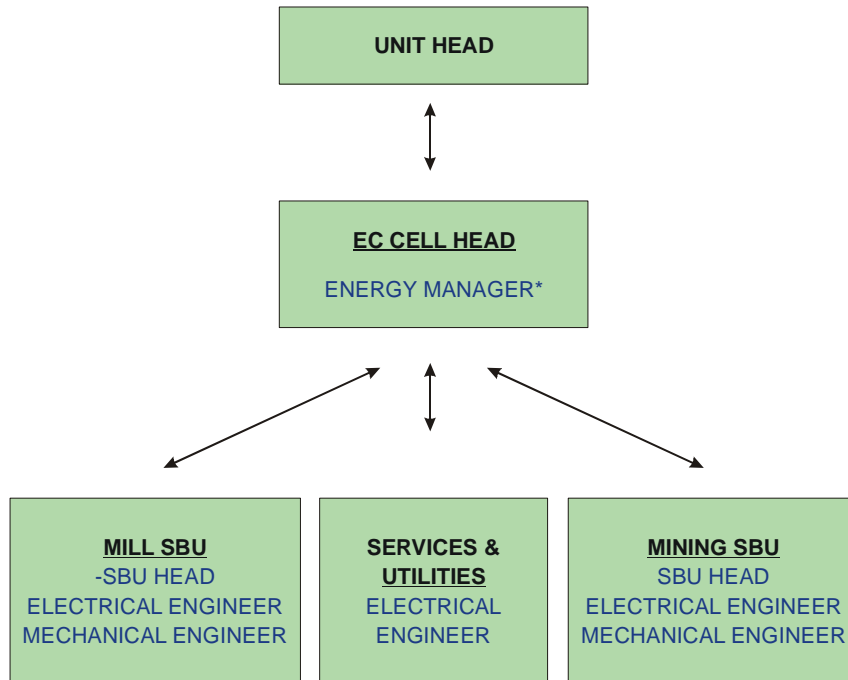
Energy saving in Rs Lakhs for the last three years



Energy cost as % of manufacturing cost

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.

Energy Policy



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 %. 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 and 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).