

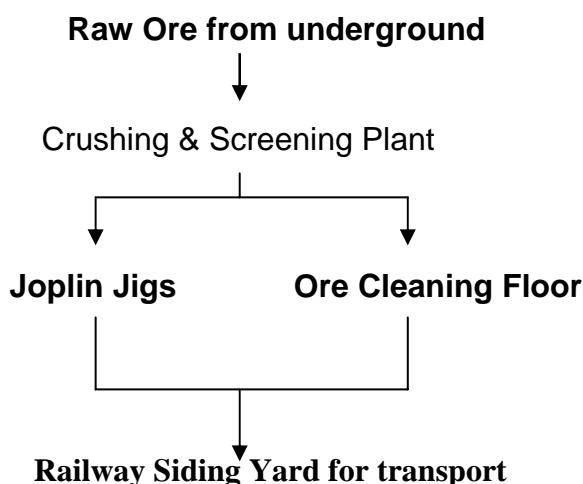
## MANGANESE ORE (INDIA) LIMITED CHIKLA MINE

### UNIT PROFILE

Manganese ore (India) Limited is a leading manganese ore producing company of India, We shares about 55% of manganese ore production of India. Also we have a 1000 TPA capacity Ferro-Manganese plant at Balaghat (M.P.) and a 1000 TPA capacity Electrolytic Manganese Di Oxide plant at Dongri Buzurg in Maharashtra State. MOIL has installed & commissioned **4.8 MW capacity wind Energy generator in Dewas (M.P.) Installation 15.2 MW capacity Wind mill is under progress.**

Chikla Mine was established in the year 1899 earlier it was controlled by Central Provenance of Manganese Ore (CPMO) , latter on it was take over by the MOIL in the year 1962. Chikla Mine is an underground mine of the Manganese Ore (India) Limited, it is situated in Bhandara District of Maharashtra state, The annual production of mine is 1,50,000 Tones of Manganese Ore. The 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 the green plants.

The 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	2004-05	2005-06	2006-07
Annual Production	Lac Ton	1.32	1.43	2.13
Total Electricity Consumption	Lac KWH	19.27	19.36	23.25
Specific Energy Consumption in KWH / T	KWH / T	14.60	13.54	10.96

## ENERGY POLICY

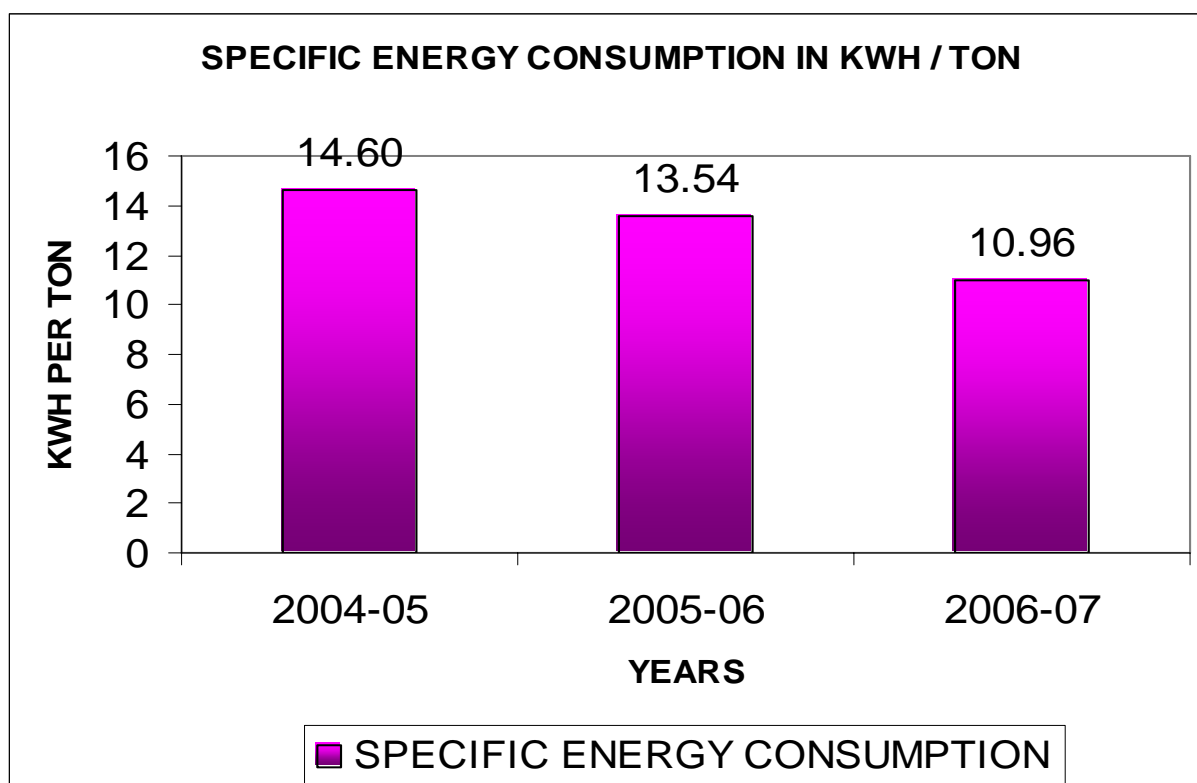
MOIL is the largest producer of Manganese Ore in India and also the market leader, commit to adopt a comprehensive approach towards conservation of energy in all its operations. To accomplish this we will:

- 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.
- 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

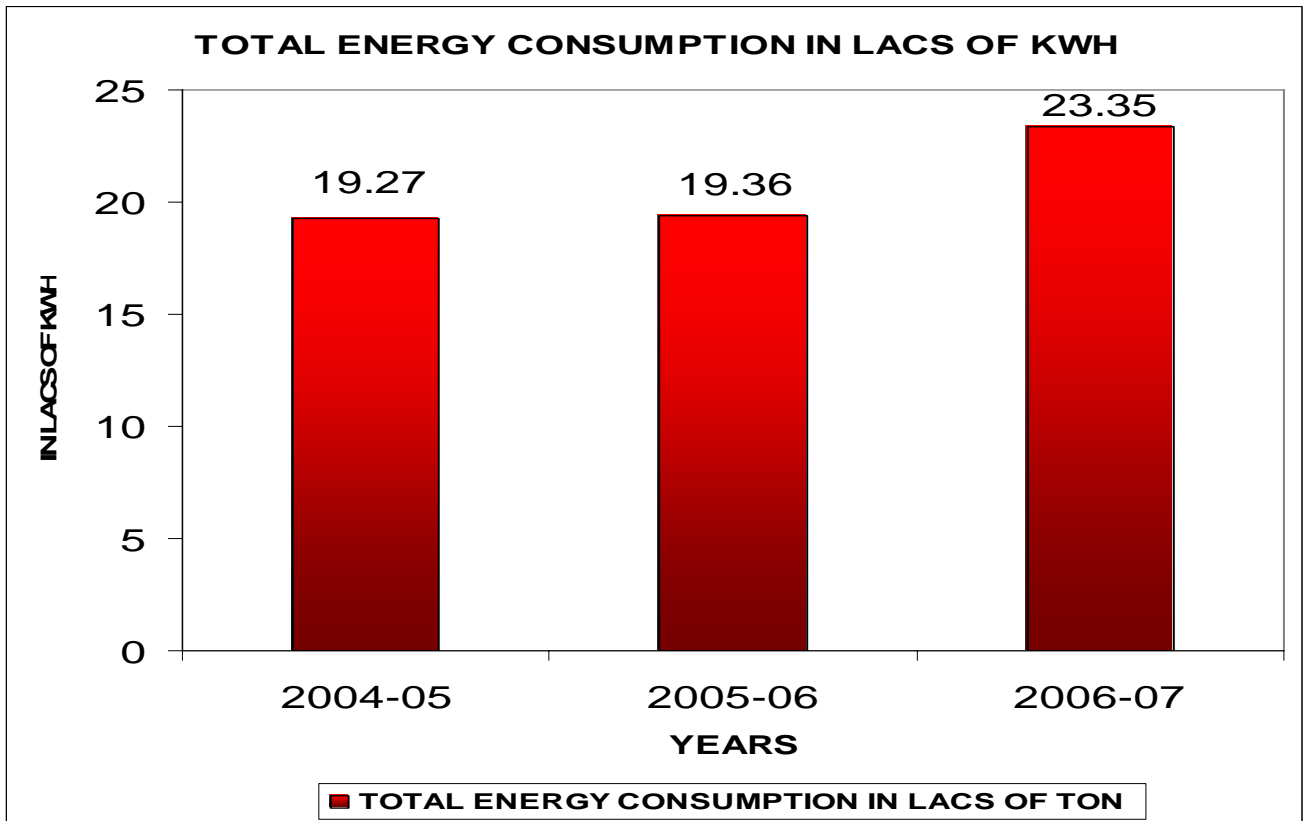
#### (1) Specific energy consumption: --

SPECIFIC ENERGY CONSUMPTION			
S.N.	2004-05	2005-06	2006-07
1	14.60	13.54	10.96



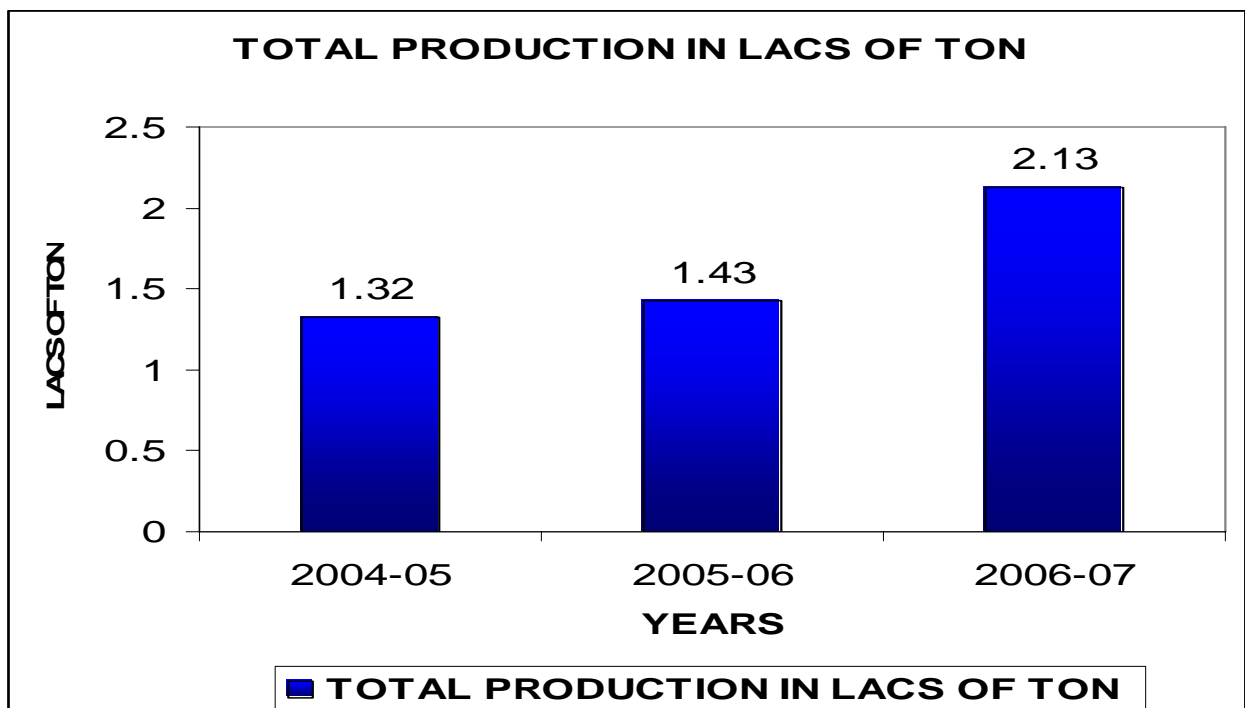
**Total energy consumption**

Description	Unit	2004-05	2005-06	2006-07
Total Electricity Consumption	Lac KWH	19.27	19.36	23.35



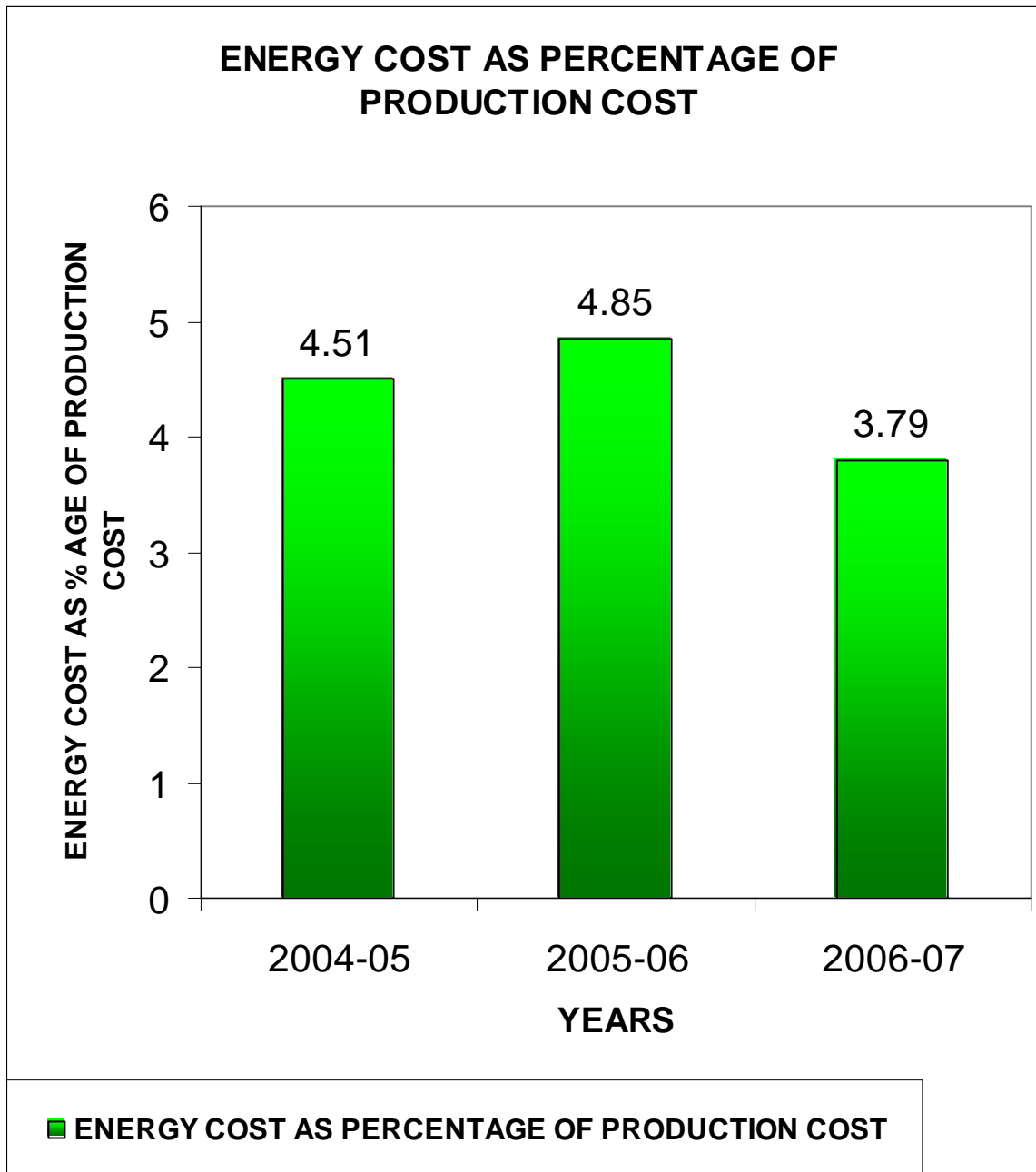
**Total Production in Lacs of Ton :**

Description	Unit	2004-05	2005-06	2006-07
Total Production in Lacs of Ton	Lac KWH	1.32	1.43	2.13



**(D) Energy cost percentage of production cost: ----**

Description	Unit	2004-05	2005-06	2006-07
Energy cost as percentage of Production cost	Lac KWH	4.51	4.85	3.79



## ENERGY CONSERVATION ACIVEMENTS

In the year 2003-2004 at Chikla Mine of Manganese Ore (India) Limited, it was decided to improve the power factor of the system from .90 to the unity. Afterwards the above project has completed in the year 2004-2005, to achieve this target the following exercises had been made at the different load sections,

### (2) Installation of A.P.F.C. Panel and fixed capacitor banks -




The total connected load in the system is 365KW, the power factor found was around .87 to .88, to improve the power factor, a A.P.F.C. panel of 150 KVAR capacity along with a fixed capacitor bank of 50 KVAR was installed.

The power factor of the system had improved to unity value and it is maintained till now.

The total saving in KWH achieved through APFC panel during 200-07	<b>2.56 Lacs Unit</b>
The total saving achieved in Rs. from APFC during 200-07	<b>Rs. 18.24 Lacs</b>

### (4) Saving achieved by replacement of Tube light street fitting and HPSV luminaries

	Presently 20W and 45W CFL out door Type street light Fittings are being used. These are consuming less wattages of Electrical Energy.
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S.N.	PARTICULARS	SANVINGS
a	The total investment in Luminaries	Rs. 0.2875 Lacs
b	Total Savings in KWH	0.088 KWH
c	Total savings in Rs.	0.483 Lacs

Conventional luminaries were replaced by 20 W & 45 W CFL in street light in mines for energy conservation.

## **MODIFICATION OF CRUSHING AND SCREENING PLANT & MONITORING PROCESS PARAMETERS**

The ROM generated from mines is beneficiated in crushing and screening plant. It was observed that crusher gets overloaded leading to failure of electrical and unwarranted maintenance of various assemblies. A separate small conveyor belt was installed to convey material to screen and only over size material were fed to crusher. This reduced the load on crusher and the break down reduced to a minimum.

The total expenditure on conveyor belt and other modification and internal resources were Rs. 1.00 Lacs. There was a total saving of 70000 KWH, amounting to Rs. 4.20 Lacs. There are other numerous benefits due improve in efficiency of crusher and lesser break down which can not be quantified.

### **MONITORING WINDER OPERATION**

Certain minor modification in winder were carried out and a separate Maximum demand controller was installed for monitoring of winder. It was observed that caliper brakes installed in winder were not properly set resulting frictional losses. No means were available exactly find out the load on winder and other power parameters.

After providing proximity switch to indicate caliper brake position, monitoring all power parameters of winders and repairs of hydraulic brake for winder resulted in substantial savings as compared to investment made.

The investment was worth hardly Rs. 0.50 Lacs and saving in KWH was 50000 Units worth Rs. 3.00 Lacs

### **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.

The consent under section 26 of the water (prevention and control of pollution) Act 1974 under section 21 of the Air (prevention & Control of pollution) Act, 1981 and authorization under rule 5 of the Hazardous wastage management handling, issued by the Maharashtra pollution Control Board is enclosed.

**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 finding in the meeting is strictly implemented and the status of the implication is reviewed in the next meeting

Chikla Mine has begged first prize in underground under ground safety week organized by the DGMS Nagpur region for metal ferrous mines. Safety policy of the company is enclosed in Annexure "C".

## HUMAN RESOURCES DEVOLPMENT FOR ENERGY EFFICIANCY IMPROVEMEENT

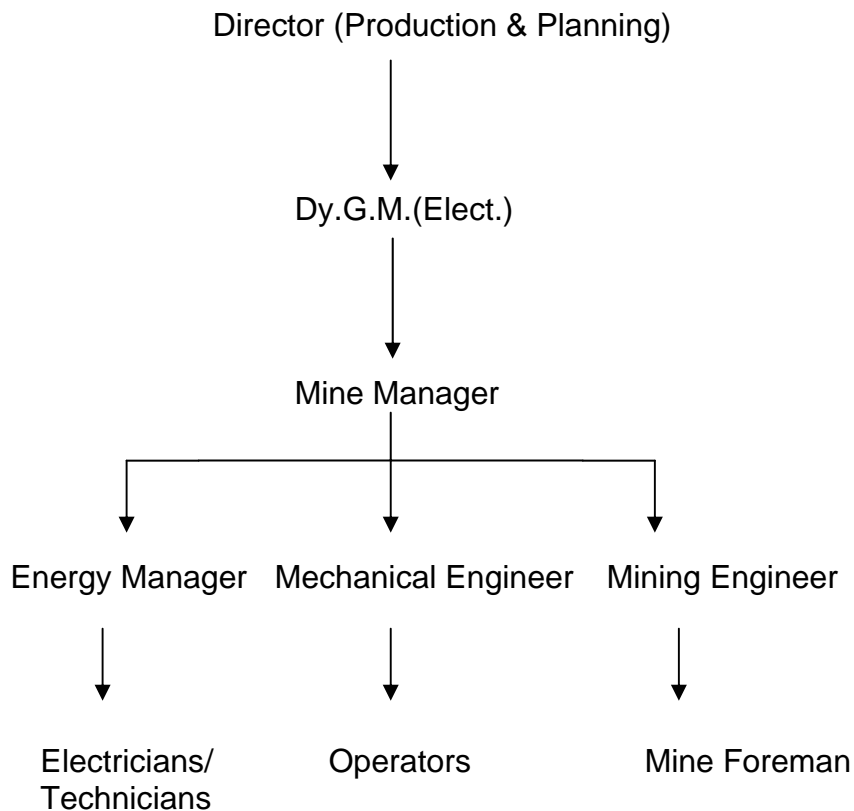
Manganese Ore (India) Limited is having well equipped in house training facility, In house training Programme is being conducted regularly, periodically in all the mines creating awareness for the energy conservation, improving managerial skill in turn improving the efficiency operational skill in turn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

## ORGANIZATIONAL SET-UP OF ENERGY CONSERVATION CELL

### The energy conservation cell structure



The unit has Energy Conservation Cell headed by Director (Prod. & Pl.) assisted by Sr. Dy. Gen. Manager (Elect. – P.P.) and supported by unit head of the Mine with his team. This team finds various means to bring the energy saving in the working areas through various Quality Circle meetings in which various techniques such as brain storming, bench marking, parato diagram analysis, 5'S techniques are used. The outcomes of the team findings are implemented very sincerely and have been followed with continue monitoring.

It already achieved the goal the team is committed for technical up gradation to avoid any energy losses by continuous maintenance and replacement of equipment where was necessary. The team has been interested with the work of reducing electric power. The Quality Circle team has been exposed for training relating to the statistical process control techniques to enable them to adopt at the shop floor.

### **OTHER PROJECTS IMPLEMENTED DURING THE YEAR 2006-07**

- (1) Stoppage of leakages in air and water pipeline.
- (2) Replacement of partial conventional street light fittings by CFL fitting.
- (3) Reduction in operating cycles of 150 H.P. winder by enhancing its load capacity
- (4) Switching off lights and fans when it is not in use.
- (5) Reduction in pumping of underground pumps by surface water management.

### **FUTURE ENERGY CONSERVATION PLANS AND TARGETS**

Sr.no.	Energy Saving measures	Investment (Rs.Lakhs)	Project
(1)	Shifting of compressor units to nearer location to the mine	35.00	2006-07 (Work is under progress)
(2)	Installation of variable frequency drives	8.00	2007-08
(3)	Installation of photo switches for street	0.40	2007-08
(4)	Installation of solar street lights	1.50	2007-08

**VERY IMPORTANT**

**During the year 2005-06 the energy conservation is achieved by enhancement of hoisting capacity of 150HP winder**

A 150 HP DC winder is installed at Chikla Mine for hoisting of manganese ore generated in underground , earlier since the beginning 16 cft size tubs which has the capacity of 1 ton was used , by making some changes and modification in headgear structure, Cage suspension gear, the hoisting capacity is increased to 1.5 ton, now 24 cft. Capacity tubs are used for hoisting from the underground , the following study and the changes had done to make the system capable for hoisting of 24 cft. Tubs,



- (a) The structure stability was studied, an external agency who are the expertise in this work were engaged for this purpose, and as per their advice the necessary strengthening work had been done.
- (b) Rope strength of the winder and its factor of safety were calculated for 24 cft. Tubs with 1.5 tons of loads. Both factors are found adequate.
- (c) Earlier we were using 5-ton SWL 4-legged suspension gear with 16 cft. Tubs and 1 ton load it is replaced by, 8 ton SWL, 6 legged suspension gear which have the sufficient strength to hoist the 24 cft. Tubs.
- (d) Torque setting of the 150 HP motor increased by 25%, with the increased load the temperature of the motor and other parameters are checked and found within the norms.

A comparison between the old and the new system is as below,

Description	Old system	New system
(a) Cycle time	128Sec.	128sec.
(b) Load factor	75%	85%
(c) No of cycles /hour	27	27
(d) Hoisting capacity/hour	27 ton	41ton
(e) Hoisting capacity/day	297 ton	451ton
(f) Increase in hoisting capacity ----- 60%		

**Energy saving: --**

- (1) Capacity of the winders motor – 150 HP/110KW
- (2) Load factor in the old system --- 75%
- (3) Energy consumption in the old system-  $110 \times 0.75 = 82.5$  KWh /hour
- (4) Energy consumption in the new system –  $110 \times 0.85 = 93.5$  KWh/hour
- (5) Energy consumption in hoisting of per ton of ore in old system- -  $82.5/27 = 3.05$  KWh.
- (6) Energy consumption in hoisting of per ton of ore in new system -  $93.5/41 = 2.28$  KWh.
- (7) Saving in hoisting of per ton of ore –  $3.05 - 2.28 = 0.77$  KWh.
- (8) During the year around 2 lakh tons of ore and other materials is hoisted, the net saving is  
 $200000 \times 0.77 = 1,54,000$  KWh

Amount saved @ Rs.4.50 /KWh =  $154000 \times 4.5 = 6.93$  Lakhs

