Annexure 'A' to Directors' Report

Particulars Required Under the Companies (Disclosure of Particulars in the Report of the Board of Directors) Rules, 1988

A. Conservation of Energy

a. Energy Conservation measures taken :

i. Installation and commissioning of Top Recovery Turbine in 'H' Blast Furnace to generate electrical energy.

ii. Application of fuel catalyst in Loco's to reduce HSD consumption.

iii. Injection of Propane in C.O. Gas for better CV control of Mixed Gas, thereby increasing the productivity of furnace & energy saving.

b. Additional investments and proposal for reduction of consumption of energy :

i. Installation and commissioning of Power House #6 on By-Product gases as a fuel, for 100% utilisation of By-Product gases.

ii. Installation and commissioning of Top Recovery Turbine at 'G' Blast Furnace.

iii. Upgradation of L.D. Gas export system to enhance L.D. Gas recovery.

iv. Recovery of sensible heat of coke by installation of Coke Dry Quenching system in Batteries 5, 6, 7, 8 & 9 at Coke Plant.

v. B.F. Gas fired re-heating furnace at Hot Strip Mill.

vi. Shut down of old & inefficient Blast Furnaces.

c. Impact of the above measures :

Energy Conservation measures during 2008-2009 has resulted in achieving :

i. Lowest ever Plant Specific Energy Consumption i.e. 6.587 Gcal/tcs.

ii. Lowest ever boiler coal consumption i.e. 24.84 kg/tss.

iii. Higher LD Gas Recovery i.e. 38,595 Nm^3/hr.

iv. Higher combine boiler efficiency i.e. 84.76%.

Form - A

Form for disclosure of particulars with respect to Conservation of Energy : 2008-2009

Particulars	2008-2009	*2007-2008*
A. POWER AND FUEL CONSUMPTION		
1. ELECTRICITY		
(a) Purchased		
Units (M. KWH)	**2,194.54**	*2,031.07*
Total Amount (Rs. Lakhs) #	**63,605.96**	*55,934.67*
Average Rate/Unit (Rs. /KWH)	**2.90**	*2.75*
(b) Own Generation		
(i) Through Diesel Generator		
Units (M. KWH)	**12.48**	*14.05*
Units per litre of Diesel Oil (KWH)	**3.91**	*3.91*
Average Cost/Unit (Rs. /KWH)	**15.91**	*12.27*
(ii) Through Steam Turbine/Generator		
Units (M. KWH)	**1,069.45**	*996.85*
Units per tonne of Coal (KWH)	**6,638**	*4,294*
Average Cost/Unit (Rs. /KWH)	**2.05**	*1.88*
(* This includes generation of PH4 in M. KWH * which is operated on by-product gases upto 95%)	**359.59**	*325.52*
2. COAL		
(i) Coking Coal & Cookeries		
Quantity (Million Tonnes)	**4.75**	*3.37*
Total cost (Rs. Lakhs)	**2,87,419.20**	*98,770.88*
Average Rate (Rs. /Tonne)	**6,055.07**	*2,929.54*
(ii) Blast Furnace Injection Coal		
Quantity (Million Tonnes)	**0.52**	*0.39*
Total cost (Rs. Lakhs)	**35,974.50**	*15,946.06*
Average Rate (Rs. /Tonne)	**6,884.06**	*4,122.84*
(iii) Middling Coal and ROM		
Quantity (Million Tonnes)	**0.14**	*0.20*
Total cost (Rs. Lakhs)	**1,509.39**	*1,892.64*
Average Rate (Rs. /Tonne)	**1,107.85**	*942.33*
3. FURNACE OIL		
Quantity (Kilo litres)	**12,520.19**	*12,701.73*
Total Amount (Rs. Lakhs)	**3,020.91**	*2,300.14*
Average Rate (Rs. /KL)	**24,128.28**	*18,108.91*
4. OTHERS		
L.D.O.		
Quantity (Kilo litres)	**6,221.55**	*7,920.11*
Total cost (Rs. Lakhs)	**2,394.17**	*2,294.54*
Average Rate (Rs. /KL)	**38,481.86**	*28,971.05*
5. OTHERS		
L.P.G.		
Quantity (Tonnes)	**3,837.75**	*4,292.69*
Total cost (Rs. Lakhs)	**1,611.53**	*1,512.48*
Average Rate (Rs. /Tonnes)	**41,991.53**	*35,233.88*
6. OTHERS		
NG		
Quantity (Tonnes)	**2,204.84**	*2,217.40*
Total cost (Rs. Lakhs)	**240.77**	*242.14*
Average Rate (Rs. /Tonnes)	**10,920.07**	*10,920.00*

Excludes electricity duty paid on purchases.

Form for disclosure of particulars with respect to Conservation of Energy : 2008-2009

B. CONSUMPTION PER UNIT OF PRODUCTION

Particulars	Steel (per tonne)	Tubes (per tonne)	Bearings (per no.)	F.A.M.D. (per tonne)	Growth Shop (per tonne)	CRC West (per tonne)	Wire Div. (per tonne)
Electricity (KWH)	431.91	114.00	0.66	3704.34	463.87	137.51	214.94
	412.06	*108.00*	*0.76*	*3556.70*	*528.98*	*133.11*	*229.06*
Furnace Oil (Litres)				—	16.94	7.41	24.76
				—	*21.99*	*7.03*	*21.99*
Coking Coal (Tonnes)	0.66						
	0.66						
Others :							
Light Diesel Oil (Litres)	0.83	1.30				—	6.90
	1.21	*1.21*				—	*7.82*
High Speed Diesel Oil (Litres)							
L.P.G. (kg)						12.92	10.39
						13.25	*10.08*
NG (kg)							26.77
							23.21

Form - B

Form for disclosure of particulars with respect of Technology Absorption 2008-09

Research and Development

1. **Specific Areas in which R&D was carried out by the Company :**

   R & D recognise energy and environment as the biggest single issue ever to confront our industry and we are determined to provide the solutions and aimed at reducing CO_2 emissions from the existing process technologies. R & D has taken projects in various areas which are broadly classified in 3 categories, 1) Raw Materials, 2) Processes and 3) Products, with the aim to achieve the goal.

2. **Benefits derived :**

   In order to address challenges, three thrust area projects were taken up :

   - Hydrogen Harvesting
   - NanoFluids
   - Power reduction in Ferro Chrome production

   Progress achieved in the above areas is briefly mentioned below :

   Hydrogen Harvesting

   "Several studies have been conducted to develop a process for recovery of waste heat causing environmental problems. One of the source of waste heat is molten slags. However, no process has been commercialised to recover thermal energy from molten slag, in spite of its huge potential. The extremely high temperature (>1500°C) of slag prevents the efficient recovery by conventional technology. Therefore a novel H2H technology is developed at Research & Development Department, Tata Steel Ltd., which can generate hydrogen (H_2)-rich gas by utilising the waste heat of molten slag. This is a step forward towards cleaner steel industry. Being an environmental friendly resource, H_2 is considered as an alternative source of energy. Presently most of the commercial processes used for production of H_2 rely on fossil fuel (coal, natural gas, etc.) or electricity. These processes generate CO_2 gas, hence not environment friendly and require additional process for separation and sequestration of CO_2 which increase the cost of production. On the other hand, the capital investment and cost of production of alternative energy resources (nuclear, solar, wind, tidal, etc.) make these techniques commercially less attractive. This novel H2H method of Tata Steel Ltd. has the potential to generate low cost hydrogen as by-product. Furthermore, it will contribute in promoting energy conservation in the steelmaking industry as hydrogen generated in the process will reduce the consumption of fossil fuels in steel plant or it will save the amount of energy consumed in production of hydrogen in the chemical industry. Thus, this novel process has the potential of solving an environmental problem besides offering substantial cost benefits to the steel industry. Presently research team is focusing on setting-up of technology demonstration plant at FAP, Bamnipal and for development of commercial technology package for steel making slag. The team is also actively pursuing research project on generation of hydrogen and CO_2 sequestration of blast furnace gas in collaboration with Indian Institute of Technology (IIT), Kharagpur."

   Nano-Fluids : Energy Efficient Fluids using nanofluids : Developments and Applications

   A nanofluid is defined as a fluid in which nanometer-sized particles are suspended. Research at Tata Steel in the area of nanofluids focuses on energy reduction, primarily through the development of efficient coolants and lubricants for rolling.

   In early 2007, commercially available metal-oxide nanoparticles were used alongwith additives. The use of commercially available nanoparticles resulted in a better size control and the use of additives resulted in controlled pH and a stable dispersion of more than 240 hours. Five to ten litres of nanofluids were prepared using lab-scale sonicators. These nanofluids were tried out in low temperature regimes using the heat exchanger design and in high temperature regimes of cooling stationary instrumented hot plates. In both cases, the results were encouraging. In the low temperature regimes, overall heat transfer was of the order of 2.5 times that of water. In the high temperature regime, the heat transfer was 1.8 times more efficient. However, scale up was restricted because of handling issues, large scale production.

   One of the innovations was to make an effervescent tablet that would disperse in water in five seconds. This was accomplished and first of its kind. A patent is being filed alongwith a plan for pilot scale manufacture and supply. The other innovation was to use a novel concept of high speed shear mixer for bulk nanofluid generation. This was accomplished in October 2008 and was first demonstrated for 20,000 litres for use in wire box cooling in the wire rod mill of Indian Steel and Wire Products Limited, Jamshedpur. The stable solution was produced in bulk with stability of more than 240 hours. This is also first of its kind. In the application of water box cooling in wire rod mill, a higher cooling rate (by approximately 100°C/sec) compared to normal water was achieved. This opens up a range of applications for new process control and product design.

   A parallel application is presently ongoing in the batch annealing furnace of the cold rolling mill (CRM). Here, savings of one hour is being envisaged that would result in a cost saving of 5.67 crores per annum if the technology is applied to all bases. The target is to complete the installation for one base and take the trails in the first week of January 2009. The Research team is working closely with Tata Chemicals Innovation Centre to explore the use of custom designed nano-formulations. The trial at CRM will

use one of the nano-particles designed at TCIC alongwith the commercially available nano-particles for the nanofluid formulation.

The Research team is also actively pursuing the following areas of application for nano-coolants.

(a) Increasing cooling rates at hot strip mill to enable low cost manufacturing of Dual Phase (DP) steels.
(b) Possibility of stove cooling in blast furnaces.
(c) Possibility of heat recovery from waste gases, exhaust pipes.
(d) Possibility of energy storage and recovery.

Ferro-chrome : Reduction in specific power and coke consumption in Ferrochrome production

Smelting-reduction process is used at Ferro Alloys Plant (FAP), Bamnipal for production of high-carbon ferrochrome from Sukinda chromite ores. Chromite ore is refractory in nature and therefore difficult to reduce. Current process at FAP, Bamnipal uses Submerged electric Arc Furnace (SAF) for smelt-reduction of chromite ore. This process is highly energy intensive and requires low-ash coke as a reducing agent. Low-ash coke and electricity are both expensive and there is also scarcity of these resources. Although Tata Steel has captive raw material (Chromite mine in Sukinda), power and coke availability/cost limits FAP, Bamnipal in global market completion. Therefore, a novel process technology is developed in R & D department which is capable for generating products that can be used either for direct production of stainless steel or for the production of ferrochrome in SAF with lower specific power and coke consumption.

Challenges : (New process)

- Engineering for implementation
- Improve process efficiency
- Utilisation of secondary energy/by-product (slag)

Benefit Potential : (Combined process)

- Value added product for FAMD for export
- 20% reduction in power consumption in SAF
- 30% reduction in coke consumption in SAF

3. Projects in the areas of environment :

The following projects have been taken in the areas of environment are :

Reduction in CO_2 Emission – Carbonation of Slag

It is globally acknowledged that reductions of CO_2 emissions are required for climate change mitigation. Steel industry is one of the major sources of emissions of pollutants where CO_2 emissions are concentrated in one location. At the same time, resources required for CO_2 absorptions or utilisation is also concentrated in the same location. For example, availability of lime in steelmaking slags provides an opportunity for carbonation using emitted CO_2. Significant reductions in CO_2 emission could be achieved by using steelmaking slag for carbon dioxide mineralisation, (i.e. mineral carbonation), and thereby enable realisation of Goal-3 of VISION-2012.

The main objective of the current work was to study feasibility of CO_2 absorption in steelmaking slag and to develop a functional sequestration process using steelmaking slag to permanently capture carbon dioxide emitted in steel plant. The study included thermodynamic feasibility and laboratory scale experiments followed by microstructural investigation for developing a functional CO_2 sequestration process through aqueous carbonation of steelmaking slag. All carbonation experiments were performed under atmospheric condition in a laboratory experimental set-up.

The study showed potential for CO_2 sequestration through carbonation of LD slag. Based on laboratory-scale data obtained for aqueous carbonation of LD slag at ambient temperature and pressure for 3 hrs reaction time, estimates show CO_2 capture potential to the tune of 30,000 tons of CO_2/year for 6 MT crude steel productions at Jamshedpur if all the slag is utilised for carbonation purpose.

Further studies are required primarily to enhance the kinetics of reaction for maximising rate of carbonation of slags and to arrive at optimum carbonation process parameters.

CO_2 harvesting and utilisation

As part of the company's vision, the reduction in the emissions of Carbon-di-oxide is attracting significant importance as a corporate strategy. This can be achieved either by improving the performance of the processes or using the emissions for producing valuable products. A number of initiatives have been taken plant-wide to improve the performance of the processes. However, the options in producing valuable products from the emissions are limited. First major challenge is segregating the Carbon-di-oxide from the flue gases of the stack. There are established technologies available to concentrate the Carbon-di-oxide to purity levels as high as 99.9%. It is also necessary to evaluate the cost of recovering pure Carbon-di-oxide from the various gas sources available within the plant such as blast furnace gas, LD gas, coke-oven gas and various other stacks. From the initial studies, the blast furnace gas and the stack of the lime calcination units show promising potentials to recover Carbon-di-oxide in large quantities.

At present, a techno-commercial feasibility study is carried out to establish the cost of recovery of Carbon-di-oxide from the different gas sources within the plant. Subsequently, this study will also provide the feasibility of utilising the recovered Carbon-di-oxide in producing chemicals of value. The study results are expected to be available by May 2009.

4. Expenditure on R&D (Rs. crores)

(a)	Capital	1.89
(b)	Recurring	39.70
(c)	Total	41.59
(d)	Total R&D expenditure as a % of Total Turnover	0.17

Technology Absorption, Adaptation and Innovation

Efforts made On the Process Front …

Hydrogen Harvesting

At Bamnipal "Hydrogen Harvesting" trials were conducted by utilising the waste heat.

The purpose of the trials was to produce Hydrogen from the waste heat and utilise the gas to pre heat the ladles initially and extend further to dry the chrome ore.

We were successful in producing Hydrogen gas and also storing it tanker for a couple of hours. The second phase of the trial is to utilise the gas for Ladle heating which is likely to take place during May 2009.

JODA

The following technological changes/new product developments were carried out :

1) Process for production of +75 grade FeMn was established. This will allow us to increase the market share. This product will help us to enter into international FeMn market. Increased NR is also expected.
2) Improvement in water quality by modifying the water treatment system. New equipments were also installed for the same.
3) Improvement in the pneumatic arrangement to reduce the down time (due to obsolete equipments)

Raw Materials

Column flotation studies were carried out on different seams of coal of West Bokaro. On the implementation of the study results, the prime coal yield in the fine circuit will improve. This provides an opportunity to replace the inefficient mechanical cells.

Process was developed for the washing of Jhama coal to obtain consistency in yield and ash level and this facilitated its regular use in sinter plant as a replacement of imported anthracite.

Laboratory study was made for the direct utilisation of the briquetting of iron ore slime. The trials were successful and we are in the process of developing a party for the commercial production of briquettes. Cold bonded briquettes, produced out of iron ore slime will be used in steel making as coolant to replace prime iron ore, which is being used currently.

"Jhama" – a naturally partially 'burnt' coal found at Jharia, having low volatile matter content, was mined and washed separately; and successfully applied as substitute for imported anthracite in sintermaking.

Iron Making

Application of local raw materials - viz. higher alumina bearing iron ore and higher ash coals – to ironmaking at large scale. The operation of 3800 m^3 'H' BF was stabilised at competitive levels of performance. This was the first example, worldwide, of such a large BF being operated with these levels of alumina and ash loading – and is a landmark development for ironmaking in India.

HBF, the largest BF in India, with latest technological features such as stave cooling in stack, 4 tap hole operation, INBA slag granulation system, 1200 degC blast temperature, 2.5 bar high top pressure, use of electrical blowers for cold blast etc. has given record production and productivity in its very first year of operation.

A number of innovative techniques were developed to 'slow down' processes while continuing to maintain stability of operations in cokemaking and ironmaking. While these were prompted by developments arising from economic slowdown in European plants, the new knowledge developed on use of cheaper coal blends and pre-emptive steps required for slowing or shutting down BFs were leveraged in Indian operations as well.

Presence of carbonaceous materials present in ESP dust of sinter plants was identified as the possible cause of fire in the ESP. These were caused by presence of volatiles in the recycled wastes and solid fuels used in sintering. The study resulted in control over the type and quantity of fuels used in sintering.

SteelMaking

A new ladle furnace has been commissioned at Steelmaking Shop #1.

A new 6-strand billet caster has been commissioned at Steelmaking Shop #1 with Deburring, Billet Marking, Mould & Final EMS Facilities.

Steelmaking Shop #1 started and stabilised 2/2 vessel operations to increase shop production which is not very common in the world.

Casting sequence length increased by 12.6% and 6% for Billet Caster-1 and Billet Caster-2 respectively.

Casting of 150mm square billet has been stabilised at Steelmaking Shop #1.

Installation of hot metal tracking system for display of torpedo position and hot metal buffer available at Steelmaking Shop #2.

Adoption of 100% usage of coated mould in caster B and C in Steelmaking Shop #2 resulting improved surface quality of cast slabs.

Additional tilter installed in the ladle bay to improve ladle management. Better control on superheat has been achieved.

A portable mini-scan technology has been installed to assess online the left over refractory thickness of the vessel and facilitate repair of hot spots.

Highest ever refractory life of 5014 heats for the vessel achieved at Steelmaking Shop #2.

Highest ever slab production of 3.52 MT achieved at Steelmaking Shop #2.

Long Product

High carbon wire rods with reduced variation in UTS (<40 Mpa) within a lap.

WRM

Increase in yield of TMT rebars at WRM by nearly 1% by improved performance of water boxes.

TMT facilities introduced at WRM (W) and production of rebars started.

Product Development

Obtained CARES certification for reinforcement bars from the Long Product Rolling Mills.

Non-microalloyed, non-TMT, air-cooled reinforcement bars produced for stirrup application for the first time.

Development of Low calcium wire rods for superior welding electrode performance.

Development of Plasma coated rebars for improved corrosion performance in concrete environment.

Flat Products

LD-2

Development of CR grade 440 by batch annealing for the automobile application.

High Strength formable grade such as SPRC-35 for skin panel applications in passenger car segment.

High Strength Steel with UTS 600 MPa with good hole expansion properties for wheel application.

Development of Chrome free passivation for export market

Development of coated Dual Phase Steel with 600 MPa strength.

Technology Upgradation and Absorption in Tubes Division – 2007-08

In Tubes division, the following efforts are made to improve operational efficiency.

ST Mills :

Installation of state-of-the-art HF3 Mill size range ½" NB to 2" NB as a replacement of old FM mill.

Modernisation of Galvanising Bath no. 2.

Installation of screwing socketing and Mair packing machine.

ITW Signode auto strapping unit at HF 1.

PT Mills :

Installation of state-of-the-art Schuler German make Hydroforming unit with automatic & robotic control.

Installation of YLM Taiwan make tube bending machine for feeding to main hydroforming unit.

SOCO machine for precision unit length cutting of high end application tubes.

Replacement of 3 " mill cut off machine by OTO make cold saw cutting machine.

Hexagonal automatic tube packing line for auto and cold draw tubes.

Installation of express Lab at PT4 for in-process metallographic of weld quality.

Some Major New products Developed through new technology absorption :

- Number of new products developed PT 47 and ST 17.
- Development and commercialisation of TFF tubes in single pass 30.25 OD x 24 ID, 31.25 OD x 24 ID.
- Engine Cradle by hydro forming for NANO Car.
- Development of 152.40 mm Idler tubes at ST by in house modification in roll pass design.
- Usage of boron bearing steel for replacement of FM Tubes.
- Development and commercialisation of the 57 x 5 Graziano tube.
- Development of 50 x 6 & 40 x 6 for Rane Madras and TML as replacement of seamless tubes.
- Development of galvanised structural tube from pre-coated strip for Marco polo bus body.
- Development of 100 x 100 x 6.000 mm thick structura tube of Yst 310 grade.

Efforts for Energy Conservation at Jharia

Power generation from Fluidised Bed Power Plant was 55.42 million units in 2008-2009 by using coal washery rejects having more than 60% ash and low calorific value.

The following energy saving measure have been taken in jharia Division.

a. Rearrangement of pumping station at Digwadih and Jamadoba colliery.

b. Reduction in idle running of washing plant.

c. Introduction of power saver CFL Lamp in place of ordinary lamp in lighting load circuit.

The above measures have resulted to maintain the specific power consumption up to 17.79 KWH/ton of Clean coal .

Annual cost of power generation from Fluidised Bed Power Plant was only Rs. 1.95 paisa per unit as against Rs. 3.34 paisa per unit of purchased power.

Particulars of technology imported during last five years :

	Steel Division	Absorption	Status of Implementation
a)	Upgradation of 'G' blast furnace (SMS Demag, Germany)	2004	Commissioned
b)	Upgradation of HSM	2004	Commissioned
c)	Upgradation of billet caster-1 at LD1 (Concast, Zurich)	2004	Commissioned
d)	Ladle furnace-2 at LD1 (SMS Demag, Germany)	2004	Commissioned
e)	New Rabar Mill (Morgan, USA)	2004	Commissioned
f)	Upgradation of caster at LD2 (Voest Alpine, Astria)	2004	Commissioned
g)	Imported design and engineering for hot metal desulphurisation unit at LD1 (Kuettner GmbH)	2005	Commissioned
h)	Supply of imported engineering for new induced draught fans, electrics & accessories for the LD Converter GCP at LD1 (Ebara Corporation)	2005	Commissioned
I)	Adequacy checking BOF converters for augmentation of heat size at LD2 (SMS Demag, Germany)	2005	Commissioned
j)	Imported design and engineering for upgradation of Caster 2 & 3 at LD2 (VAI, Astria)	2005	Commissioned
k)	Imported design and engineering for hot metal desulphurisation unit 2 & 3 at LD2 (Kuettner GmbH)	2005	Commissioned
l)	Imported design and engineering for capacity increase of slab reheating furnace nos. 1 & 2 of HSM (Techint)	2005	Commissioned
m)	Supply of design and engineering and training for 150 tph walking beam furnace to Rebar Mill (Bricmont)	2005	Commissioned
n)	Imported design and engineering (Mother well Bridge - Clayton walker)	2005	Commissioned
o)	Supply of imported design and engineering for LD gas b;oosters (Howden Power Ltd. U.K.)	2005	Commissioned
p)	Supply of imported design and drawing for Technology control system at HSM (SMS Demag, Germany)	2005	Commissioned
q)	Supply of imported design and drawing for Basic level automation at HSM (Alstom, USA)	2005	Commissioned
r)	Supply of imported design and drawing for dual zinc pot at CRM (CMI, Belgium)	2005	Commissioned
s)	Supply of imported design and drawing for BAF, CRM (LOI, Germany)	2005	Commissioned
t)	Supply of imported design and drawing for 4th Stove of 'G' Blast Furnace (Paul Wurth Italia, Italy)	2006	Commissioned
u)	Supply of imported design and drawing for 'H' Blast Furnace (Paul Wurth Italia, Italy)	2006	Commissioned
v)	Supply of imported design and drawing for Sinter Plant No. 4 (Outokumpu Technology , Germany)	2006	Commissioned
w)	Supply of imported design and drawing for LD2 expansion project. (SMS Demag, Germany)	2006	Commissioned
x)	Supply of imported design and drawings for convertor gas cleaning plants in LD shop 1 & 2 (SMS Demag, Germany)	2006	Commissioned
y)	Facility for quantitative estimation of minerals through Scanning Electron Microscope (Intellection Pty. Ltd., Australia)	2006	Commissioned
z)	Polarising Microscope with Photometer and Imaging at R&D (Leica Mikrosysteme Vertrieb GmbH, Germany and PRESI S.A., France)	2006	Commissioned
aa)	Variable Frequency Drive for Descaling Pump Motor at Hot Strip Mill (ABB, India)	2007	Commissioned
ab)	Sinter Plant No. 4, having a bed area of 204 sq. mtr. with ESP having lesser emission of 50 mg/ Nm^3	2007	Commissioned
ac)	Double Jaw Eye Vertical Tong For Batch Annealing Furnace at CRM	2007	Commissioned
ad)	SCADA System for Water Utilities	2007	Commissioned
ae)	Quantitative Estimation of Minerals by SEM (Scanning Electron Microscope)	2007	Commissioned
af)	XRD (X-Ray Defraction) for quantitative phase and texture analysis	2007	Commissioned
ag)	Electric Blowers for 'H' Blast Furnace	2009	Commissioned
ah)	Top Gas Recovery Turbine for 'H' Blast Furnaces	2009	Commissioned
ai)	Flat Cast House Design for 'H' Blast Furnace	2009	Commissioned
aj)	Internal Stoves for 'H' Blast Furnace	2009	Commissioned
ak)	Use of mixed gas in place for CO gas, for firing in 7th Lime Kiln	2009	Commissioned
al)	New Billet Caster having all the latest facilities and having 9 m casting radius installed in an existing building suitable for 6 m casting radius, by going underground and taking the pass line to (-)3.3 m level.	2009	Commissioned
am)	Use of hydraulic mould occilator and hydraulically operated turn over cooling bed at CC 3 at LD Shop 1	2009	Commissioned
an)	Robotised Sample Testing Laboratory at LD Shop No 1.	2009	Commissioned

Annexure 'B' to Directors' Report

Statement pursuant to Section 217(2A) of the Companies Act, 1956 and the Companies (Particulars of Employees) Rules, 1975

Sr. No.	Name	Age (Years)	Designation/ Nature of Duties	Gross Remuneration Rs.	Net Remuneration Rs.	Qualifications	Total Experience (Years)	Date of Commencement of Employment	Last employment held Designation – Period for which post held
1	Ansari N. A. *	57	General Manager (Project)	21,89,759	13,17,470	B.Sc. (Engg.)	34	28.12.1974	–
2	Anupam Ashish	40	Chief (Marketing & Sales)	26,76,603	15,09,690	B.E.	17	01.07.1991	–
3	Asokan S.	61	EIC (Titania Project) & GM (Geolo. Srv.)	33,66,008	18,41,845	B.Sc., M.Sc., Ph.D., Cer. (Computer)	34	09.12.1998	HCL Group company, executive Director - 3 years
4	Baijal A. D.	61	Group Director, Global Minerals	1,14,36,482	60,82,710	B.Sc. (Engg.), (Met.), P.G.D.B.M	39	13.12.1969	–
5	Bham J. C.	59	Company Secretary	25,66,523	14,71,230	B.Com, C.S., C.A.	36	17.10.2001	OTIS Elevator Company (India) Limited, Company Secretary - 24 years
6	Bhaskar S.	51	Chief Mills & Utilities (Mech. Maint.)	32,69,133	19,37,279	B.E., Diploma in Management	27	01.07.1981	–
7	Bhaskaran Sunil	44	Executive-in-Charge (Global Wires)	28,74,490	15,75,409	B.Tech., PGD (Mgmt.)	21	01.07.1987	Tata International - 3 years
8	Bhattacharjee Debashish	44	Director Research, Develop. & Technology	28,79,618	16,83,590	B.E., M.Tech., Ph.D.	12	01.04.1996	–
9	Biswas Sandip	40	Group Head Corporate Finance, Treasury & Investor Relations	39,06,638	22,90,782	B.Com. (Hons), ACA, ACS	16	01.04.2005	First India Asset Management Co. (P) Ltd., Head Eastern India - 3 years
10	Chakrabarti Indranil	56	Chief (Scientific Services)	24,09,444	14,54,703	AMIE, B.E., M.E.	24	03.05.1984	–
11	Chakrabarty Asoke Kumar	58	Chief Cost Research & Standard Costing G	28,47,863	17,26,106	B.Sc., B.Com., I.C.W.A	30	08.01.1981	SAIL, Bokaro Steel Plant, Finance Executive - 2 years
12	Chakraborty Jayant	43	Chief (Corporate Acc. & Fin. Reporting)	28,54,687	16,53,365	B.Com. (Hons), C.A.	18	30.04.1990	–
13	Chandra Sanjay	48	Chief (L P Tech. Group)	27,08,194	16,48,796	B.Tech., Ph.D. (Engg.)	25	08.08.1983	–
14	Chatterjee Amit Kumar	46	Chief Electrical Maintenance	30,76,875	19,84,316	B.E.	21	27.07.1987	–
15	Chatterjee Koushik	40	Group Chief Financial Officer	1,06,98,186	60,50,380	B.Com. (Hons), F.C.A.	13	13.11.1995	Tata Sons Ltd. – General Manager - Corporate Finance - 4 years 7 months
16	Chaudhary Chanakya	43	Chief Resident Executive, New Delhi	36,80,220	24,80,956	B.E.	20	16.12.1988	–
17	Chaudhury S. B.	53	Head (System Integration)	26,33,106	15,90,217	B.E., M.Tech.	16	22.04.1992	RDCIS SAIL, Manager - 9 years 7 months
18	Chintak Rajesh	41	Chief Resident Executive, Bhubaneshwar	26,06,157	17,70,901	B.Sc. (Engg.)	19	01.07.1989	–
19	Choudhry Sanjay	52	Chief Corporate Affairs & Communications	31,74,087	18,39,373	M.A., P.G.D.B.M.	28	16.09.2002	Coca Cola Industries - Corporate affairs Manager - 6 years
20	Choudhury Dr. Shyamal Kumar	57	Sr. Specialist	26,13,418	14,90,333	MBBS, MD	28	01.08.1980	–
21	Chowdhary D. M.	57	Chief (Electrical Maint.)	34,58,941	19,96,409	B.Sc. (Engg.), P.G.D.B.M.	33	20.03.1976	–
22	Das Binod Kumar	51	Chief (Sinter Plant)	35,99,321	21,13,066	B.Tech., M.Tech.	29	01.08.1980	–
23	Das Debashis	49	Chief (LD1)	32,10,072	19,02,609	B.Tech.	26	02.08.1982	–
24	Das Dr. N. K.	58	Chief Medical Services	30,32,925	17,74,495	MBBS, MD	26	29.01.1983	–
25	Deshpande D. P.	52	Chief (Coke, Sinter & Iron)	41,89,713	22,26,307	B.Tech., P.G.D.B.M	30	01.01.1979	–
26	Dhar G. S.	56	Chief (Raw Material Project)	28,58,511	16,90,453	B.Tech.	32	07.02.1977	–
27	Divaker Chavala	56	General Manager (Jharia)	33,43,987	19,58,834	B.E.	33	27.01.1977	Singereni Collieries Company Limited
28	Garg C. P. *	66	Sr. Consultant Pilot	28,16,121	18,13,492	B.Com.	46	13.08.2007	Jagsons Airlines Pilot - 11 months
29	Ghatak S. N.	59	Chief Engineering Civil & Structurl	27,05,116	14,25,163	B.E.	38	01.09.1970	–
30	Ghose P. K.	39	Chief RM Project	33,33,745	19,51,353	B.Tech.	17	01.07.1991	–
31	Ghosh Santanu	52	Chief (Project Engg.)	33,68,026	21,95,324	B.E.	28	01.08.1980	–
32	Gupta Avneesh	45	Chief (TQM)	25,61,882	15,40,503	B.Tech., P.G.D.B.M.	22	01.07.1986	–
33	Gupta Dr. G.	56	Chief Medical Officer	25,48,050	13,65,695	MBBS, MS	26	01.10.1982	–
34	Gupta Peeyush	40	Chief (Marketing & Sales - Flat Products)	32,21,090	17,95,981	B.E., M.B.A.	16	01.01.1993	–
35	Hariharan S.	56	Chief (3MT Expansion Project)	33,37,391	19,73,587	B.Sc. (Engg.)	35	29.12.1973	–
36	Iyer Ramesh B.	43	Chief (LD#3 & TSCR)	36,44,365	21,36,801	B.E.	20	01.07.1988	–
37	Jha Bimlendra	41	Principal Executive Officer	34,36,039	22,39,353	B.Tech, P.G.D.B.M.	18	02.07.1990	–
38	Jha Dwarika Nand	49	Chief (Blast Furnace), Kalinganagar Proj.	48,45,461	26,21,749	B.Sc,. (Engg.), PGD (Mgmt.)	28	01.08.1980	–
39	Jha Hridayeshwar	53	Vice-President (Safety & Long Product)	60,53,679	33,78,079	B.Tech., M.Sc. (Engg.), P.G.D.B.M.	30	01.01.1979	–
40	Jha Varun K.	57	Vice-President (Chattisgarh Project)	99,76,684	52,69,268	B. Tech. (Hons), P.G.D.B.M.	36	03.10.1972	–
41	Kalha Sarbraj Singh	63	Sr. Consultant Pilot	43,69,558	27,03,376	—	1	01.10.2007	–
42	Kamra Vivek M.	41	Executive-in-Charge (Tubes)	36,72,510	20,48,505	B.Tech., Management Prog.	19	01.07.1989	–

Sr. No.	Name	Age (Years)	Designation/ Nature of Duties	Gross Remuneration Rs.	Net Remuneration Rs.	Qualifications	Total Experience (Years)	Date of Commencement of Employment	Last employment held Designation – Period for which post held
43	Kant Neeraj	45	Chief Sales Manager (North)	26,18,596	16,84,178	B. Tech., M.B.A.	23	16.07.2001	SAIL, Asst. Divisional Manager - 15 years 9 months
44	Kharkar Hement C. *	52	Vice-President	37,05,083	18,51,331	B.E. (Met), P.G.D.B.M.	31	22.01.1978	–
45	Kumar Ashok	47	Chief (I M T G)	34,76,986	19,81,573	B.Tech.	24	01.07.1984	–
46	Kumar Rajiv	41	Chief (HSM)	27,68,880	18,53,010	B.Sc. (Engg.)	18	01.10.1990	–
47	Kumar Sanjay	46	Chief (G Blast Furnace)	32,87,053	19,54,631	B.Tech., P.G.D.B.M.	24	02.07.1984	–
48	Kumar Sudhanshu	50	Chief (Customer Service Division)	27,06,325	16,68,808	B.Sc. (Engg.), P.G.D.B.M.	25	08.08.1983	–
49	Kumar Suresh	51	Chief (Mechanical Maintenance)	32,12,005	16,38,141	B.Tech., P.G.D.B.M.	29	01.08.1980	–
50	Lal Mohan	56	Chief (Manufacturing), Long Product	37,00,512	21,69,121	B.Sc. (Engg.), P.G.D.B.M.	30	09.01.1978	–
51	Mahashabde Vinay V.	43	Chief (SMCT) and AGM (Steel), KPO	28,38,213	17,16,263	B.Tech.	22	01.07.1986	–
52	Makashir Wg. Cd. S. D.	62	Sr. Consultant Pilot	44,54,694	28,60,178	M.Sc. (Defence Studies)	41	02.09.1997	Indian Air Force, Wg. Commander - 12 years
53	Mangal Rajiv	41	Chief (Wire Division)	35,02,124	19,92,140	B.E., P.G.D.B.M.	19	01.07.1989	–
54	Mani R.	51	Chief (Corporate and International Taxation)	28,87,045	19,14,567	B.Com., C.A., I.C.W.A.I	26	18.10.1982	–
55	Misra Abanindra M.	57	VP (Raw Materials & Coke Sinter & Iron)	80,42,438	43,98,628	B.E., M.B.A.	35	29.12.1973	–
56	Misra Arun	43	General Manager (O M & Q)	30,52,384	18,80,098	B.Tech.	20	01.07.1988	–
57	Misra N. K.	53	Group Head - Mergers & Acquisition	63,00,916	30,09,162	B.Sc. , A.C.A.	28	21.02.1981	–
58	Mitra Nil Ratan *	51	Pilot	34,33,614	21,41,198	B.Sc., Commercial Helicopter Pilot's Licence	30	02.06.2008	Indian Air Force, Commissioned officer - 26 years
59	Mitra Samindra Narayan	45	Executive-in-Charge (Iran Chrome Project)	24,72,712	14,21,736	B.Tech., PGD (Mgmt.)	18	02.07.1990	Tata International limited, Chief (International Op.) - 3 years 8 months
60	Mokashi S.	51	Chief Information Technology	39,39,269	22,62,944	B.Tech., P.G.D.B.M	27	01.02.1982	–
61	Murthy R. N.	44	Chief Marketing OE	28,14,540	16,95,436	B.Tech.	22	01.07.1986	Tata International Limited, Product Manager - 3 years 8 months
62	Murty V. S. N.	57	Chief Financial Controller (Corporate)	51,77,919	28,04,670	B.Com., C.A.	32	01.06.1976	–
63	Muthuraman B.	64	Managing Director	4,03,13,211	2,27,05,260	B.Tech. (Met), P.G.D.B.M.	42	14.11.1966	–
64	Nair K. P. G.	59	Chief (Design & Technical Services)	27,68,918	16,45,738	Dip. in Mech. Engg., AMIE (India), P.G.D.B.M.	37	04.10.1971	–
65	Nair Radhakrishnan	49	Chief Human Resource Officer	72,72,110	41,14,234	B.Com., PGD (PM & IR)	24	01.04.2007	Tata Sons, Vice President - 5 years
66	Nandan Krishna	53	Head Corporate Relations	24,37,587	15,04,831	L.L.B.	31	07.12.1977	–
67	Narayan Om	58	Vice-President (Shared Services)	78,28,807	41,44,762	B.Sc. (Engg), P.G.D.B.M.	36	03.10.1972	–
68	Nerurkar H. M.	60	Chief Operating Officer (Steel)	1,51,87,370	79,08,877	B.Tech. (Met)	37	01.02.1982	U.M.I. Ltd., Manager (QC) - 5 years
69	Ojha Awadhesh Kumar	57	General Manager (W B)	33,97,649	17,68,389	B.Sc. (Engg.)	33	01.08.1975	–
70	Panda Amitabh	40	Chief (Procurement)	26,06,165	15,63,189	B.E., P.G.D.B.M.	19	01.10.2004	Free Markets Services Pvt. Ltd.
71	Pandey Subodh	39	Chief (Marketing - LP)	24,39,863	13,76,166	B.Tech.	16	13.07.1992	–
72	Pathak Sudhansu	47	Chief (LD2 & SC)	35,39,411	21,17,892	B.E., P.G.D.B.M.	24	02.07.1984	–
73	Pati Srikant Kumar	50	Chief (Power Systems)	27,21,635	16,42,598	B.Sc. (Engg.), P.G.D.B.M.	27	01.07.1981	–
74	Pattanaik S. K.	49	Chief Raw Material Strategy Group	28,11,867	18,00,384	B.E.	25	01.07.1983	–
75	Pattanayak Pradip K. R.	55	Chief (IR and R&R)	24,62,044	14,14,118	B.Sc. (Hons), M.A.	30	01.03.1979	–
76	Pillai Satish	57	Chief (Corporate Sustainability Services)	26,58,622	15,62,219	B.A.	37	16.06.1971	–
77	Pradhan Ganesh Chandra	61	Sr. Consultant Pilot	25,57,418	16,82,712	B.Sc., Commercial Pilot's Licence	14	01.09.2008	Poonawala Aviation Services - 2 years 8 months
78	Prakash Sunil	55	Chief (Manufacturing), Flat Product	31,50,771	18,82,130	B.Tech.	16	14.05.1992	–
79	Prasad Avinash	61	Chief Resident Executive, Ranchi	58,47,830	34,43,664	B.E. (Met.)	37	14.06.1971	–
80	Prasad Priya Ranjan	48	Chief (Sinter Plant)	26,78,286	16,39,659	B.Tech.	25	08.08.1983	–
81	Purohit Sushil Kumar	46	Pilot	39,52,844	24,36,337	L.L.B.	16	03.04.2006	Ran Air Limited, Pilot - 1 month
82	Rajesh N.	42	Chief (CRM)	26,65,071	16,31,034	B.Tech.	20	01.07.1988	–
83	Rammurty N.	58	Chief Strategic Project Procurement	31,14,647	19,11,352	B.Sc. (Engg.), P.G.D.B.M.	35	03.01.1974	–
84	Ranjan Amrendra	49	Chief Mills & Utilities (Elect. Maint.)	26,97,086	15,96,875	B.Tech., P.G.D.B.M.	28	01.07.1980	–
85	Ranjan Rajiv	50	Chief (1.8 MT Project)	26,11,139	14,38,419	B.Sc. (Engg.)	28	01.08.1980	–
86	Raste Pramod R.	56	Chief (IR-West)	24,95,670	16,57,895	B.A. (Hons), M.A.	23	01.06.1985	–

Sr. No.	Name	Age (Years)	Designation/ Nature of Duties	Gross Remuneration Rs.	Net Remuneration Rs.	Qualifications	Total Experience (Years)	Date of Commencement of Employment	Last employment held Designation – Period for which post held
87	Rattan G. S.*	61	Executive-in-Charge (Bearings)	28,19,087	15,22,725	B.Sc. (Engg.)	30	10.11.1978	–
88	Ray Dr. Banambar	61	General Manager (Medical Services)	47,02,487	24,77,252	MBBS, MD	29	01.03.1980	–
89	Reddy P. S.	45	Chief MRO	28,15,816	17,26,023	B.Tech., M.Tech.	21	30.01.1988	Telgu Ganga Project - Asst. Excecutive Engineer - 4 months
90	Roy S. K.	56	Chief ('H' Blast Furnace)	46,18,412	26,62,501	B.Sc. (Engg.)	32	19.03.1977	–
91	Sachdev Harsh V.	48	Executive-in-Charge (Bearings)	24,15,047	13,60,498	B.Tech.	25	01.07.1983	–
92	Samaddar Dr. D. P.	55	Sr. Specialist & HOD (Anaesthesia)	26,41,546	15,61,185	MBBS, M.D	23	03.06.1985	–
93	Samaradivakera Lalith	54	General Manager (Operations)	27,80,697	18,62,215	B.Tech.	31	01.09.1977	–
94	Sarangi B. N.	58	Chief (Employee Training & Development)	30,22,051	17,54,184	B.A., PGD (Mgmt.)	39	20.12.1969	–
95	Sastry C. V.	45	Chief Corporate Quality Assurance & FPTG	33,03,867	19,29,788	B.E, P.G.D.B.M	23	15.07.1985	–
96	Satyanarayana Sistla	53	Chief (Automation)	27,79,805	16,38,696	M.Tech.	30	07.04.1993	Instrumentation Limited, Kota (Public Enterprice), Deputy Manager -14 years
97	Sen Anand	49	Vice-President (TQM & Flat Products)	96,15,675	51,16,877	B.Tech. (Hons), Met. Engg., P.G.D.B.M.	27	27.07.1981	–
98	Sengupta Dipankar	63	Adviser to M. D.	53,04,919	29,77,993	B.E.	41	30.12.1967	–
99	Sengupta Indronil	38	Executive-in-Charge (Vietnam Project)	25,14,121	15,43,855	B.E., P.G.D.B.M.	16	13.07.1992	–
100	Sengupta Partha	51	Vice-President (Corporate Services)	59,18,283	29,85,896	B.Tech. (Metallurgical)	28	01.08.1980	–
101	Sengupta Sibaji	52	Chief (Financial Reporting Center)	26,25,316	16,03,849	B.Com., C.A.	27	12.12.1983	Bank of Baroda, Dy. Manager - 1 year 3 months
102	Shukla Shobhit	51	Chief (Financial Transaction Center)	25,37,667	15,60,300	B.Com., C.A.	23	19.03.1986	–
103	Singh A. K.	58	Chief (IR - RM)	25,88,375	15,43,846	PGD (PM&IR)	34	03.06.1974	–
104	Singh Binay Kumar	61	Vice-President (Orissa Project)	56,00,135	33,62,730	B.E. (Met), M.Tech. (Process Metallurgy),	38	19.12.1970	Hoogly Met Coke & Power Co. Ltd., Managing Director - 3 years
105	Singh Jai Prakash	52	Chief, Blast Furnaces up-gradation Pelle	25,25,102	15,02,827	B.Sc. (Engg.)	28	30.03.1981	–
106	Singh P. K.	59	Chief (Spares & Services)	24,71,535	15,08,115	B.Sc. (Engg.)	36	03.10.1972	–
107	Singh Ram Prit	64	Vice-President (Engineering & Projects)	1,17,32,754	58,81,116	B.Sc. (Engg.) (Mech.)	43	01.03.1996	SAIL & R I N L, General Manager (Project) - 30 years
108	Singh R. P.	56	General Manager (IR)	35,55,778	20,22,343	B.Com, PGD (PM&IR)	31	14.04.1977	–
109	Singhal Rajeev	45	Chief (M & S - LP)	30,44,061	17,18,839	B.Tech., P.G.D.B.M.	23	01.07.1985	–
110	Singh S. K.	40	Chief (S E Block)	25,21,970	14,96,166	B.Tech.	17	01.07.1991	–
111	Singh Uttam	40	Chief ('I' Blast Furnance)	27,85,154	16,66,881	B.Tech.	16	13.07.1992	–
112	Sinha Arvind Kumar	52	Chief (Electrical T & D)	27,03,018	16,34,063	B.Tech., P.G.D.B.M.	30	01.01.1979	Hooglty Met Coke & Power Co. Ltd., Chief Construction - 1 year 5 months
113	Sinha Vinod Prasad	60	Advisor	25,61,849	16,44,678	B.Sc. (Hons), Ph. D.	39	01.01.1970	–
114	Srikanth R.	46	General Manager (Raw Material Projects)	39,48,173	22,58,013	B.Tech, M.S (Engg.), Ph.D.	24	10.02.1997	Penn State University USA, Research Assistant - 6 years
115	Srivastava Ved Prakash	49	Chief IT - Architecture	28,69,241	17,25,994	B.Tech., PGD (Mgmt.)	28	01.08.1980	–
116	Sundara Ramam D. B.	39	Chief (Noamundi)	30,53,172	18,45,751	B.Sc. (Engg.)	18	28.07.1990	–
117	Sunder Shyam	47	Chief Operations, Wire Division	27,21,578	15,00,953	B.E.	25	08.08.1983	–
118	Tiwari Kalika	58	Pilot	33,17,715	22,36,416	B.Sc.	26	01.06.2006	I.S.W.P. Chief Pilot - 15 years
119	Venugopalan T.	56	Chief Technology Officer	43,17,226	25,04,000	B.Tech. (Met. Engg.), M.Tech. (Ind. Metallurgy	31	04.05.2001	Ispat Ind., V.P. (Technical Services) - 4 years
120	Verma Gyan Prakash	51	Chief (Budgeting & Construction Plannin)	25,44,782	15,27,661	B.Sc. (Engg.), P.G.D.B.M.	27	13.07.1981	–
121	Verughese K. K.	57	Chief (Corporate Audit)	35,49,754	20,91,840	B.Sc., C.A.	32	23.12.1976	–

Notes : (1) Gross remuneration comprises salary, allowances, monetary value of perquisites, commission to the Directors and the Company's contribution to Provident and Superannuation Funds but excludes contribution to Gratuity Fund on the basis of actuarial valuation as separate figures are not available.
(2) Net remuneration is after tax and is exclusive of Company's contribution to Provident and Superannuation Funds and monetary value of non-cash perquisites.
(3) The nature of employment in all cases is contractual.
(4) None of the employees mentioned above is a relative of any Director of the Company.

* Indicates earnings for part of the year.

On behalf of the Board of Directors

RATAN N. TATA
Chairman

Mumbai, 25th June, 2009.