

UNIT PROFILE:

Jindal Steel & Power Limited (JSPL) is the youngest fleet under the flagship of JINDAL Organisation. With the vision to cater the needs of nation & meeting the challenges of global markets, JSPL management embarked on the ambitious mission to establish an Integrated steel plant with perfect blend of in-house & state of art technology. Today JSPL has the largest coal-based sponge iron manufacturing capability in the world, Rails of 120-meter length, the longest produced anywhere in the world & Parallel flange universal beams in larger sizes, manufactured for the first time in India.

Company has a obsession for excellence. Shaping our business in synchronized with the market dynamics. Boldly venturing into new territories and the future. Present manufacturing facilities are:

- Coal based Sponge Iron production from six kilns with annual production capacity of 6,50,000 tonne. Which is the world's largest coal-based sponge iron production capability. One of the lowest cost producer of Sponge Iron, with in-house availability of the three Key raw materials, coal, iron ore and power.
- Blast furnace with the volumetric capacity of 351 m³ and annual production capacity of 2,50,000 tonne. Hot metal produced to fill the requirement of Steel Melting Shop and Pig Iron to fulfil the market demand.
- Steel Melting Shop has an annual capacity of 4,00,000 tonne of cast steel production. Two Steel melting shops have following equipments; One EAF, Two LRF, Two Vacuum Degassing and three Continuous Caster. Caster has facility to cast following section: Slab, Bloom, Round & Beam Blank, which caters to the requirements of our Rail & Universal Beam Mill and Customers.
- Submerged Arc Furnace producing Ferro Chrome from 24MVA furnace, which cater the need of SMS department and Group Company.
- Captive Power Plant with generating more than 205MW, which include power generation from exhaust gases of Sponge Iron Kilns & Blast Furnace and middling from coal washery.
- Rail & Universal Beam Mill with state of art technology, having a capacity of producing 120meter long rail and large size parallel flange Beams. Mill has annual capacity to produce 5,50,000 tonnes of rolled product.
- Machinery Division at Raipur with a manufacturing capacity of 11,500 TPA, along with an annual capacity of 30,000 MT of Steel Ingots & Castings that compares with the best in the region. The Machinery Division plant also has a machine manufacturing facility. This division caters to the in-house maintenance needs of the Raigarh Plant and special maintenance orders from other Group Companies.
- Captive Coal Mines at Tamnar, Raigarh with crushing and washing facility at



mines head. Meeting total wash coal requirement of existing Sponge Iron unit.

- Captive Iron Ore Mines at Tensa Orissa. Meeting partly requirement of existing Sponge Iron unit.

The plant is currently under large expansion programme:

- Four Sponge Iron Kilns with total capacity of 6.60 lac tonnes per annum.
- Power Plant with 50 MW capacities, to utilise the heat of Sponge Iron kiln exhaust gasses.
- Steel Melting Shop with 10 Lac Tonne capacity.
- Eight lac TPA Clean type non-recovery mechanized Coke Ovens.
- Blast Furnace (1670M³) with optimized energy utilization.
- Sinter Plant (2.4 MTPA) with modern pollution control ESP with high capacity.
- Lime and Dolomite Plant (600 & 300 TPD respectively) with latest global technology and features.

JSPL, an ISO 9001:2000 and ISO 14001: 1996 certified company by the BSI.

JSPL has consistent record of achievements. Some of the laurels conferred on the company are listed below,

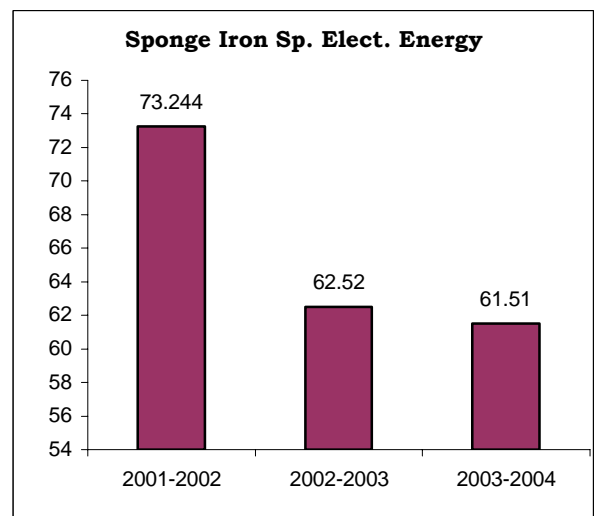
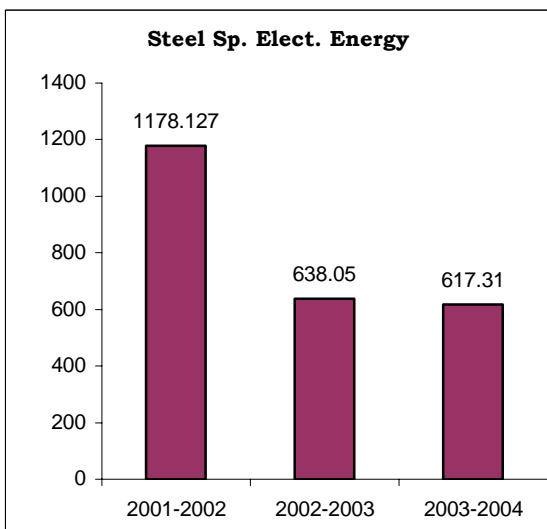
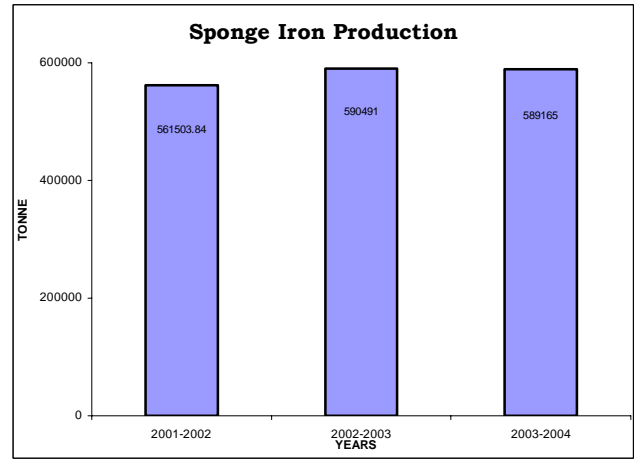
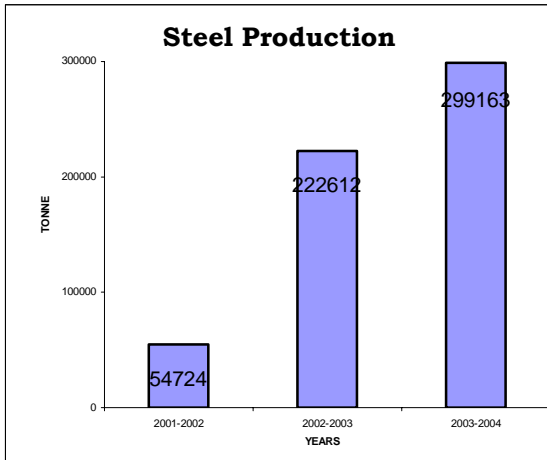
1. 1st Prize in Integrated Steel Plant Sector in National Energy Conservation Award–2003 sponsored by Ministry of Power, Govt. of India
2. 1st Prize of National energy conservation award – 2001 (Integrated Steel Plant Sector)
3. 1st prize for Secondary Steel Plant / Alloy Plant in the IIM Quality Award 2002-03 sponsored by Indian Institute of Metals.
4. 1st prize in “Organization with Innovative HR Practices” at the Asia Pacific HR Congress, held at Mumbai.
5. 1st Prize of Golden Peacock National Environmental Management Award 2002-2003
6. 2nd Prize of National energy conservation award – 2002 (Integrated Steel Plant Sector)
7. Silver Award in the Greentech Environment Excellence Award 2002-03 sponsored by Greentech Foundation.
8. Second prize in Greentech National Safety Award-2002-2003.

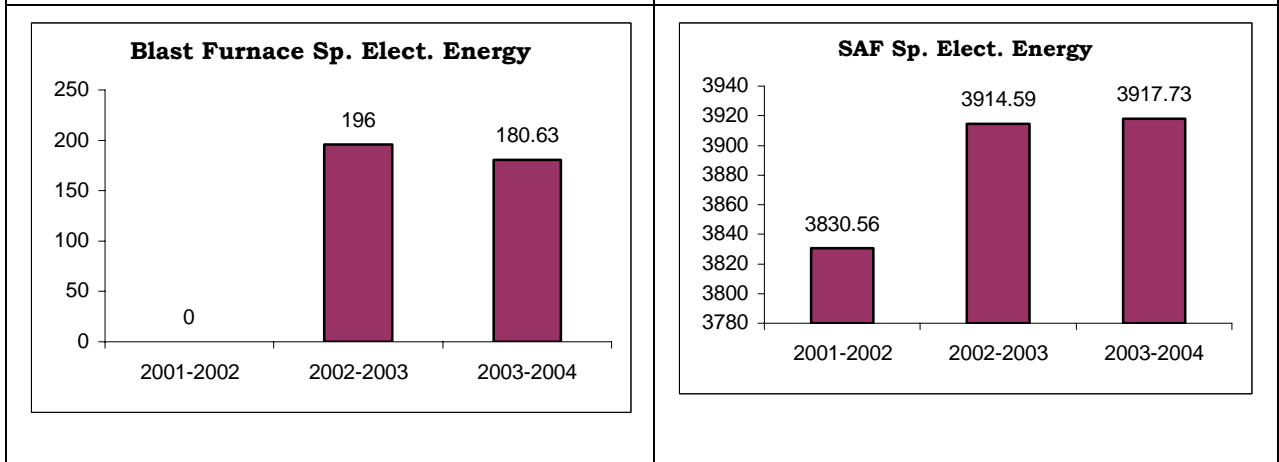
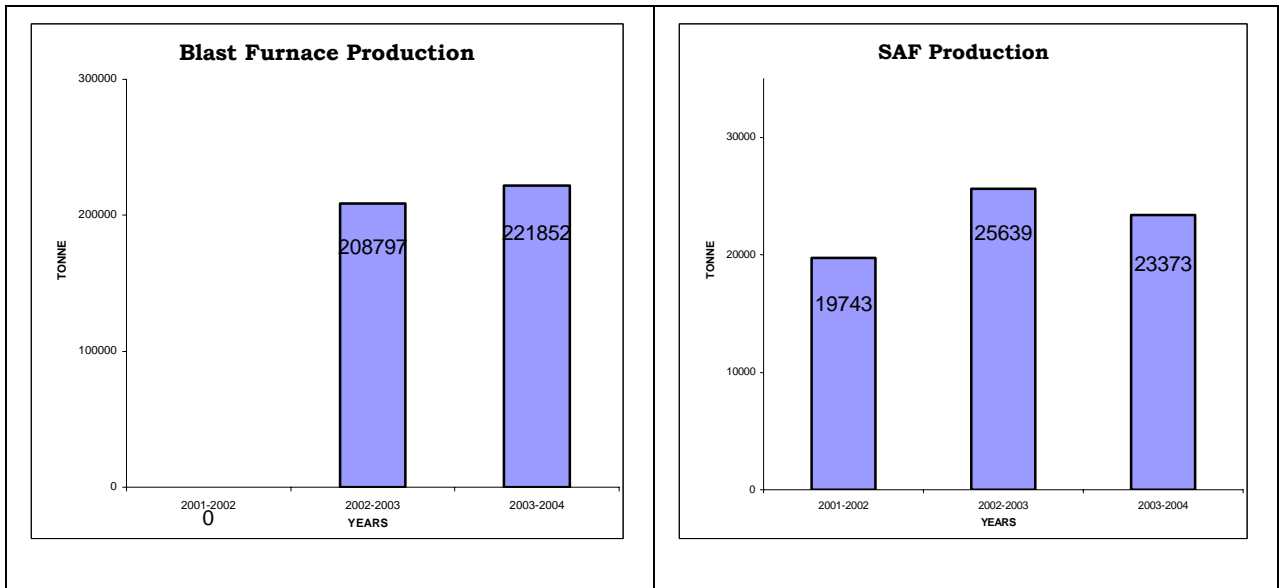
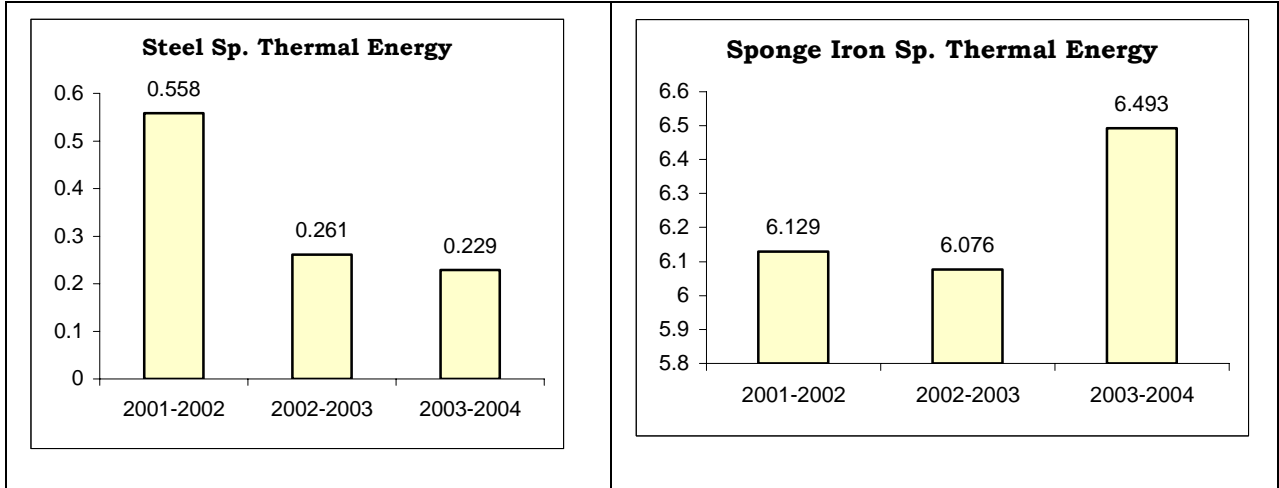


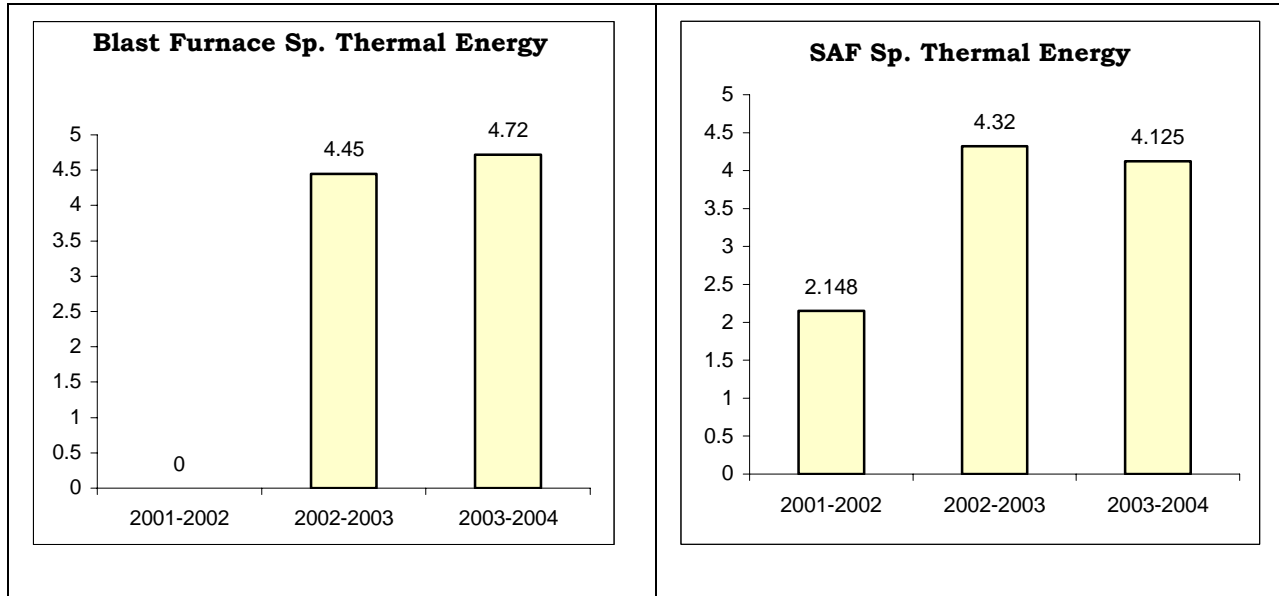
ENERGY CONSUMPTION:				
DESCRIPTION	UNIT	2001-2002	2002-2003	2003-2004
<u>PRODUCTION:</u>				
Sponge Iron	Tonnes	561503.84	590491.00	589165
Steel	Tonnes	54724.00	222612.00	299163
Ferro-Chrome	Tonnes	19743.00	25639.00	23373
Power	Lac Kwh	7195.37	10439.10	11796.0
Hot metal/ Pig Iron	Tonnes	-	208797.00	221852
Rolled Product	Tonnes	-	-	100129
<u>Total Elect. Energy Consumption</u>	Lac Kwh	2656.04	4910.69	5917.117
<u>Sp. Elect. Energy Consumption:</u>				
Sponge Iron	Kwh / Tonne	73.244	62.52	61.51
Steel	Kwh / Tonne	1178.127	638.05	617.31
Ferro-Chrome	Kwh / Tonne	3830.56	3914.59	3917.73
Power	%	10.13%	10.89%	11.27%
Hot metal/ Pig Iron	Kwh / Tonne	-	196.0	180.63
Rolled Product	Kwh / Tonne	-	-	335
<u>Total Thermal Energy Consumption</u>	G Cal	3404133.46	4513140.15	4981187.57
<u>Sp. Thermal Energy Consumption:</u>				
Sponge Iron	G Cal / Tonne	6.129	6.076	6.493
Steel	G Cal / Tonne	0.558	0.261	0.229
Ferro-Chrome	G Cal / Tonne	2.148	4.32	4.125
Hot metal/ Pig Iron	G Cal / Tonne	-	4.45	4.72
Rolled Product	G Cal / Tonne	-	-	1.09
<u>Total Manufacturing Cost</u>	Lac Rs.	31,486.48	55,612.88	79,778.43
<u>Total Energy Cost</u>	Lac Rs.	6125.17	15,955.17	23,299.89
<u>Energy Cost / Total Manuf. Cost</u>	%	19.45 %	28.69 %	29.20 %



Specific Energy consumption figures over last three years show steady decline, due to continuously effort towards energy conservation.







ENERGY CONSERVATION COMMITMENT, POLICY & SETUP.

All the above figures clearly indicate the culture of energy conservation imbibed right from initiation of the company in 1991. When the plant started, to utilize the waste heat of rotary kilns, producing Sponge iron, waste heat recovery boilers (WHRB) were installed on-line and the steam used for generation of electrical power. Thus all the six kilns are fitted with WHRB. Boilers generating steam utilize the in-house waste of washery reject and rotary kiln char. In fact, commitment for energy conservation and waste utilization is so high in the plant that the Power Plant unit-II was planned for utilization of waste basically. Towards this end, energy policy has been formulated and Executive Director takes structure monthly meeting on energy conservation.

JINDAL STEEL & POWER LTD., RAIGARH

(AN ISO 9001 & ISO 14001 CERTIFIED COMPANY)

E N E R G Y P O L I C Y

Jindal Steel & Power Ltd., Raigarh, is committed to work for effective utilization of all types of energy. This is achieved by:

- taking specific objective of energy conservation through process / equipment modification.





- monitoring of energy consumption.
- creating innovativeness in employees through awareness.
- converting waste as resource.
- benchmarking the energy consumption norms.
- adherence to statutory requirements.

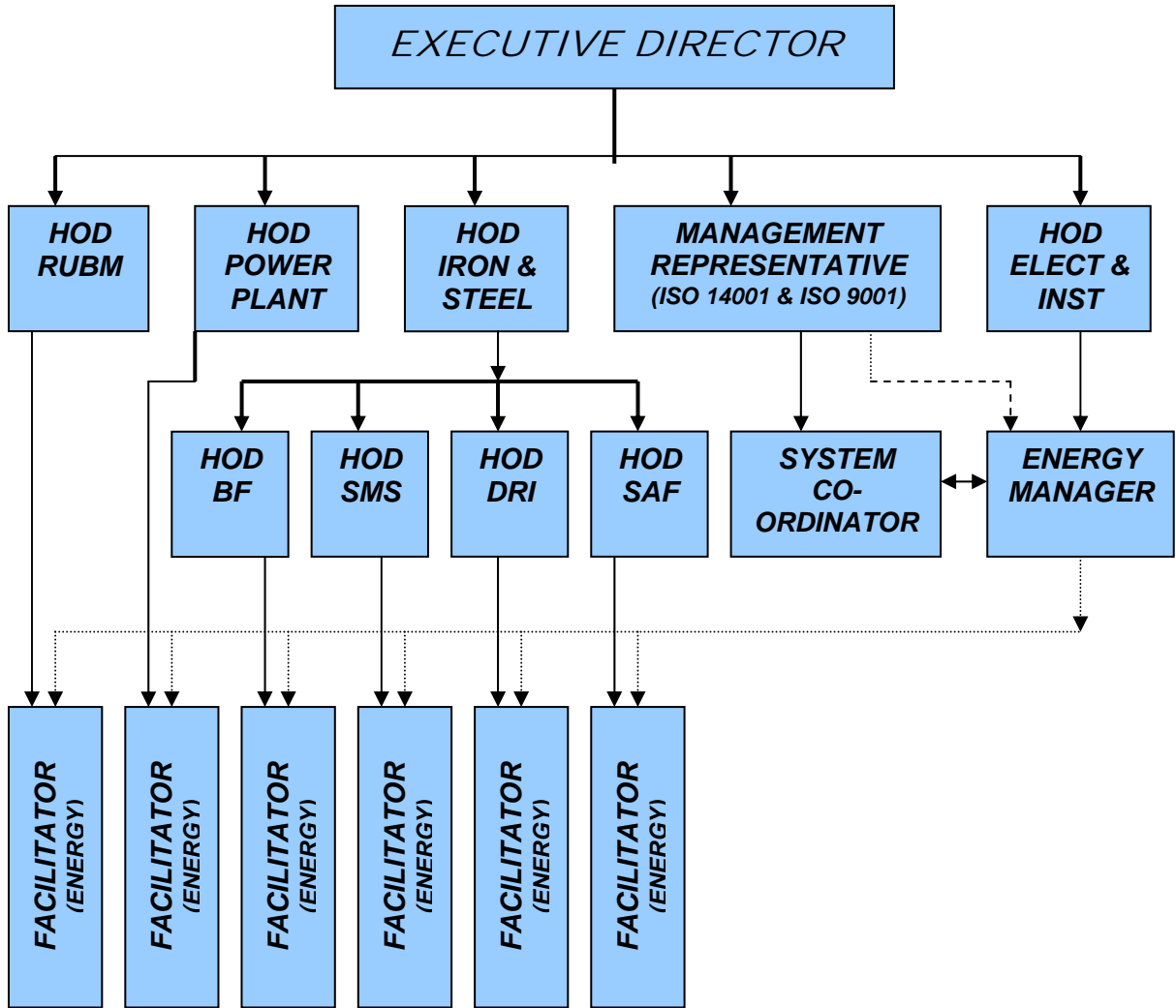
16 September 2002

Naveen Jindal
(Executive Vice Chairman
&
Managing Director)

An Energy Management organization set up has been made for the philosophy of the management, energy management is part of the total management system, and that is why HODs are the key elements in the total structure, for planning and execution of the action plans, Supported by Energy Coordinator.



ORGANISATION STRUCTURE
OF
ENERGY MANAGEMENT CELL



ENERGY CONSERVATION ACHIEVEMENTS:

Major achievements are:

1. Since it was decided to commission one Blast Furnace at Raigarh it was the challenge to utilize the excess of BF Gas of Blast furnace most profitably. During study it was highlighted that Blast Furnace gas required at various points but at higher pressure. So it was decided to install the one booster station to pump the gas in various location of the plant with required pressure. It was decided to utilized at;
 - a. Ladle pre-heating of Blast furnace,(Implemented in 2002-2003)
 - b. RUBM reheating furnace. (Implemented in 2002-2003)
 - c. AFBC Boiler,
 - d. Coal dryer hot air generator,
 - e. In the place of injection coal at Kilns.
- c. One AFBC Boiler (65 ton/hr capacity) with dual fuel type burner that utilizes the Blast Furnace gas along with washery rejects (Boiler will run on total waste) has been installed. Steam is used to generate 25 MW power. On annual basis 1751 lac unit extra power is generated and in terms of money 4027 Lac rupees.

- d. Coal (Coal for DRI rotary kiln) Dryer for enhancing the capacity, productivity and efficiency and use of Blast Furnace gas led to reduction in Furnace Oil consumption from 2.5 ltr. To 1.2 ltr. Per tonne of coal per percent of moisture removal. In terms of money savings are 16.8 rupees per tonne of coal per percent of moisture removal. On annual basis 318 KL of Furnace Oil has been saved and in terms of money 41.26 lac rupees.



e. Blast furnace gas charging in rotary furnace (DRI KILN) to utilize the CO of Blast Furnace Gas has provided the advantage of increase in campaign life of KILN, stability in kilns with low temperature profile at discharge section and reduction in specific coal consumption by 20 kg per tone of sponge Iron production. On annual basis saving of 11783 tonne of coal and in term of money 117.8 lac rupees.

2. In DRI Kilns transfer chute jamming was teething problem as every time the transfer chute was cleaned after jamming approx 5 tonne of product was wasted. After modifying the upper and lower rings, opening of the transfer chute increased. It resulted in drastic reduction in transfer chute jamming from approx 585 times in a year to 85 times in a year.

Total saving :

Reduction in opening frequency :- 585-85	= 500 nos
Reduction in wastage of product @ 5 mt/jamming	=2500 ton
Coal saving @ 1.4 mt /sponge iron	= <u>3500 ton</u>
Saving in term of money @ 1000/tonne of coal	= Rs 3500000

Total saving 3500 tonne of coal and in term of money 35 lac rupees.

3. The performance data of TG#5 of Power plant has been analyzed and it was found that TG#5 has high backpressure i.e low vacuum. After doing the in-depth analysis it was found that causes of low vacuum is due to the deterioration of condenser performance and cooling tower performance. To improve the performance of Condenser online ball cleaning done with replacement of some tubes. And to improve the performance of Cooling tower #2 low pH water was circulated in the cooling water circuit. Both the action resulted in

- Condenser vacuum has increased from 0.76 to 0.80 kg/cm²
- Cold-water temperature reduced from 38.5°C to 33°C.



By improving the condenser and cooling tower performance resulted in energy saving of 84 Kcal/ kWh. On annual basis 16800 Gcal energy saving and in terms of money 217.9 Lac rupees saving incurred.



4. To control the non-productive losses of RUBM like continuous running of all main & auxiliary system without any production due to delay in rolling or any hurdle generated from operation/ maintenance end for rolling.
To overcome these losses, RUBM has been workout one action plan to switch off certain drives after some per defined time if any rolling will not take place.
By these very simple corrective measure, RUBM achieved saving of Rs.356.5 lacs without doing any financial investment.

5. Installation of two supersonic oxygen blowing lance at EAF in place of single sub sonic oxygen lance.
To reduce tap-to-tap time and use energy more efficiently, two supersonic oxygen blowing lance has been installed. This is used to inject more oxygen leading to faster reaction during heat making, which reduce electricity consumption and improve metallurgical consistency. EAF electricity consumption reduced from 370 to 350 kilowatt-hours (kWh) per ton. It consistently has reduced the EAF's power-on time from 50-55 minutes to 40-45 minutes.



Power Consumption with single sub sonic oxygen lance	370kWh / tcs
Power Consumption with two supersonic oxygen lance	350 kWh / tcs
Power consumption at LRF(kWh) before installation of super sonic oxygen lance	91 kWh / tcs
Power consumption at LRF(kWh) after installation of super sonic oxygen lance	88 kWh / tcs
Aux. Power consumption (kWh) before installation of super sonic oxygen lance	111 kWh / tcs
Aux. Power consumption (kWh) after installation of super sonic oxygen lance	105 kWh / tcs
No. of Heats/ day with single sub sonic oxygen lance	20-22 heats
No. of Heats/ day with two supersonic oxygen lance	25-26 heats

On annual basis 87 lac unit of power saving and in money term 200 lac rupees saving incurred.

(v) ENERGY CONSERVATION PLANS AND TARGETS.				
	ENERGY CONSERVATION PLANS	Savings in Lac Rs.	Approx. Investment in Lac Rs.	Project commencement & completion year
1.	Installation of 5 nos of Producer Gas Plant to replace the Furnace Oil in plant.	250.38	1500	Nov. 2004
2.	Installation of 2x25 MW power generation unit to utilize the waste heat of upcoming DRI Kilns.	9660	13744	March 2005
3.	Installation of Air Pre- heater in WHRB#2.	175	30	Jan.2005
4.	Replacement of old ID fan at WHRB#2 with efficient ID fan.	12.97	15	Nov. 2004
5.	Installation of online oxygen analyzer in flew gases of reheating furnace.	7.8	5	Nov.2004
6.	Insulation of expansion bellows in hot air line of reheating furnace.	120	60	March 2005
7.	Installation of high efficiency screen in coal and iron ore circuit at day bins of Kilns.			

(vi) ENVIRONMENT AND SAFETY:



ENVIRONMENT MANAGEMENT:

JSPL is Certified with Environmental Management System, ISO 14001, which is mark of excellence in environmental performance. Different types of pollution control equipments have been installed in various production units in the plant to control the air pollution. A state of art technology based Fume Extraction System (F.E.S.) has been installed in Steel Melting Shop. In the entire plant total 16 nos. of

Bag filters have been installed in various locations like cooler discharge at the end of DRI unit, Product Hopper, Packing Plant, raw material handling in Steel Melting Shop for dust control. To control flue gas emission from power plant, efficient Electrostatic Precipitators (ESPs) have been installed. Producer Gas Plant & Lime Kiln units are equipped with Ventury Scrubber and wet scrubber respectively for controlling the emission. We have also installed water-spraying system in RMH unit to control the fugitive emission. In addition to above stationary air pollution control facilities, we have also procured number of movable water sprinklers to suppress the dust generated from vehicle movement etc and make work environment dust free.

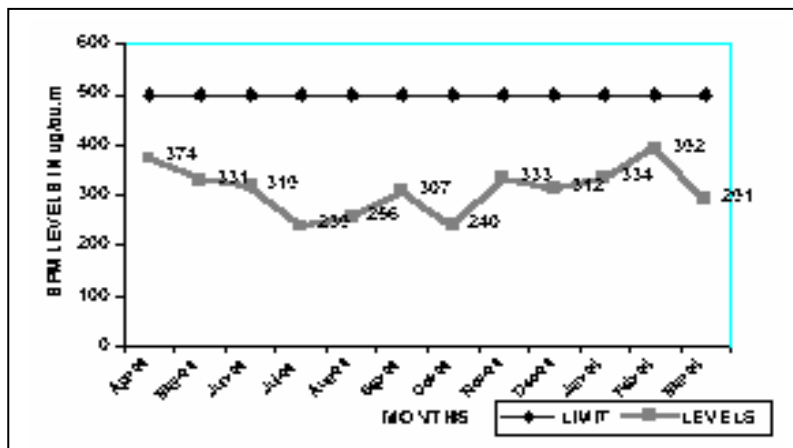
As far as water pollution management is concerned, a close water cycle network has been established in the plant, which ensures 100% water recycling and reuse after necessary treatment and settling. DRI, Power Plant etc close cycle system has been established and entire wastewater is reused in various purposes. Two nos. Sewage Treatment Plants has been installed for the treatment of domestic wastewater of Colonies and Offices. Treated water is reused for irrigation of tree plantation areas. Vermin-composite unit has been installed to utilize biodegradable waste of the company and colonies. Company has installed fly ash Brick making plant to utilize the fly ash waste generated from the Power Plant.

A. Environment Management:

In quest of Environment Management we have done improvements in following area:

i. Air Quality:

- i) Installation of FDC in SAF unit. – Force draft cooler has installed in Submerged Arc Furnace to bring down the emissions through bag filters when temperature is high.
- ii) Installation of ESP in 2 x 55 MW Power Plant – BHEL make Electrostatic precipitators has been installed having 99.9% efficiency in 2nd unit of 55 MW AFBC Power Plants.
- iii) Nine Nos. of opacity meters has been installed in various stacks for continuous dust emissions monitoring which has improved our monitoring system. We are in the process of installing of opacity meters in remaining 4 stacks very shortly.

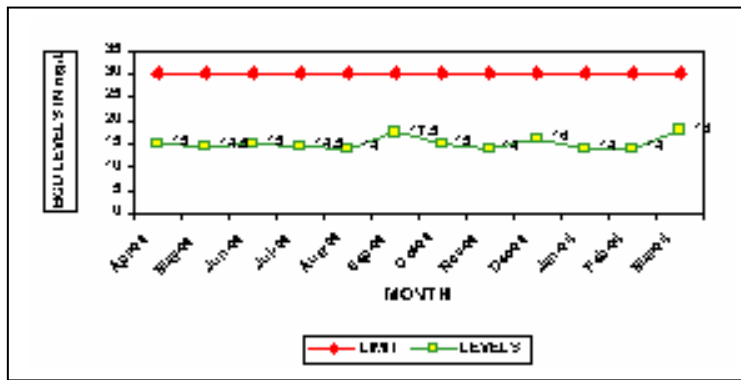


Ambient Air Quality Monitoring



ii. **Water Quality:**

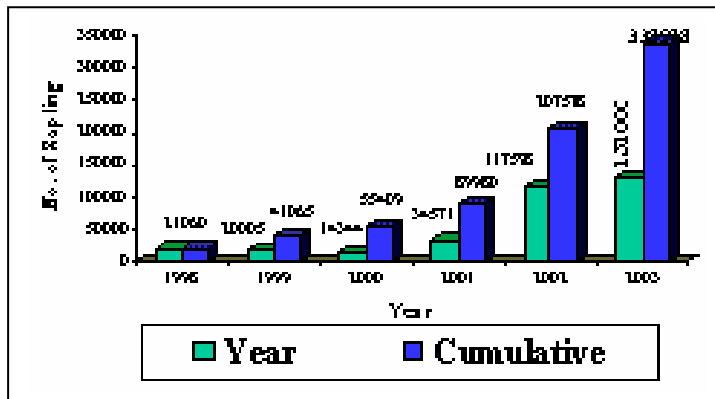
A new Sewage Treatment Plant has been installed for new residential colonies of JSPL. Total expenditure on this has been about 100.0 lac rupees. Treated effluent is being entirely utilized for watering of green areas. Industrial effluents are also being properly treated and recycled back to process. No effluent is discharged outside the factory premises.



STP treated effluent Quality Monitoring

iii. **Greenery:**

Tree plantation and gardens have been developed in entire plant wherever space is available. Out of 1200 acres about 200 acres area is green.



Tree Plantation trends

iv. **Natural Resources Conservation:**

Flow meters have been installed in all fresh water make up lines for day to day monitoring of water consumption. This has result in reduction of fresh water consumption. Our present make up water consumption is about 5.5 cum/ton of long

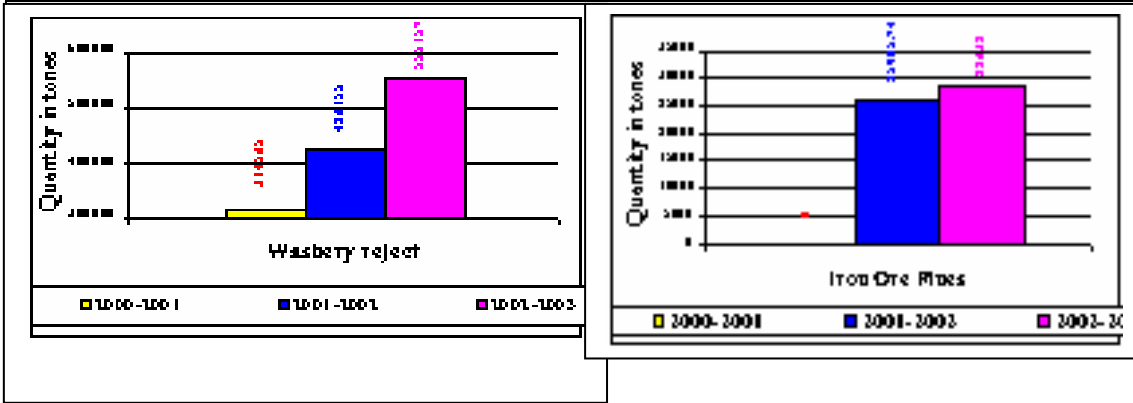


steel products against the national standard of 5, which we will achieve during 2004-05

v. Solid Waste Utilization:

Total plant has been integrated in such a fashion that wastes generated from various units are reused in various other units. For example wastes of coal washery is used in fluidized bed combustion based thermal power plant as fuel. Utilization of wastes is increasing year by year. Last year fly ash utilization was 27% whereas during the year of 2003 fly ash utilization was 37% which will be further increased after installation of second fly ash silo by May 2004. Similarly other wastes are also utilized. Overall present waste utilization is about 60%.

	Washery Rejects	Char	Iron Ore Fines
2001-02	314565 MT	86110 MT	0 MT
2002-03	426156 MT	166637 MT	25905 MT
2003-04	555157 MT	215768 MT	28632 MT



B. Safety Control:

Safety is our prime concern and our target is zero accident. To keep employees aware about safety and maintain zero accident targets several activities and program are being conducted in our plant. A few important activities are given below:

- i) **SAFETY OATH:-** On 1st of every month safety oath program is being organized which is attended by employees of every level. After his message of safety Oath administrated by Executive Director.
- ii) **SAFETY APPLIANCES:-** All safety appliances such as helmet, Shoes, Hand gloves, aprons, safety belts etc are provided to all employees. The importance of these appliances is being communicated through field and classroom training.
- iii) **SAFETY AWARENESS CAMPAIGN:-** To generate safety awareness among the employees campaigns are being conducted. All departments are covered during the campaign. Employees of all levels including staff, workers & contract workers are covered. Awareness provides information about the type of Hazard, importance of





safety appliances and preparedness for emergency situations related to the concerned departments.

- iv) **FIRE SAFETY:-** Being an hazardous industry more attention has been paid to enrich the knowledge of employees in field of industrial fire safety. Faculties from National Institute of fire Engineering Nagpur and other external agencies are called for this program time to time. Two fire tenders are available in the plant. Also, a network of fire hydrants has been installed through the plant to combat any fire hazard.
- v) **SAFETY AUDIT:-** To eliminate unsafe conditions & unsafe practices external and internal auditing are being conducted. This technique helps in systematic and critical assessment of major work hazards, so as to eliminate, control and contain them by minimizing risk to the life.

ACTION CENTER KORBA AT JSPL:- Safety activities of National Safety Council (M.P. Chapter) Action Center Korba , is being organized by the company for the year 2001-2003. This is an opportunity and responsibility given to JSPL. Raigarh. We have organized safety programs for JSPL and also for other member industries also to achieve a good safety record of this zone.

