

## **CHAPTER-VIII**

### **POLLUTION CONTROL AND WASTE MANAGEMENT**

#### **STEEL AUTHORITY OF INDIA LIMITED**

Environment Laboratory of RDCIS primarily undertakes various time bound projects aimed at providing innovative and cost effective solution to typical pollution related technological problems faced by SAIL steel plants. RDCIS also undertakes monitoring work for specific pollutants. Few new areas in which projects have been undertaken and services were offered during 2002-2003 (upto Sept, 2002) are :

- Life cycle assessment of blast furnace iron making process and steel making process.
- Studies on reduction of suspended solids in converter underflow
- Determination of hazardous nature of wastes in accordance with amended rules
- Improvement in thickener efficiency of coal washery for reduction of suspended solids in overflow
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In addition, polycyclic aromatic hydrocarbon (PAHs) levels in coke oven areas of most steel plants are regularly monitored by HPLC based method already developed by RDCIS. Being a recognised laboratory of Central Pollution Control Board (CPCB), it has also offered monitoring and testing services to various agencies outside SAIL steel plants with the aim of generating reliable data for better management of environmental pollution.

#### **Pollution Control Efforts in SAIL**

##### **Environmental Quality**

- About 98% stacks are complying with emission standards in the SAIL plants.
- Ambient air quality is within the statutory norms.
- 62.5% of the solid waste generated in steel plants are being utilised either through recycling/reuse or commercial disposal.
- Discharge water quality for plants/units are generally within norm. Stipulated norms by CPCB

#### **ENERGY CONSERVATION**

##### **Measures Taken**

The overall specific energy consumption in SAIL (4 integrated steel plants) during 2002-03 (April'02 to Sept'02) has been 7.61 Gcal/tcs, which is less than previous year's figure of 7.69 Gcal/tcs. Few important energy conservation schemes under implementation in the year 2002-03 are listed below :

### **Bhilai Steel Plant (BSP)**

- Restoration of back pressure system in Exhauster # 4 in Coke Ovens
- Improvement in the productivity of Wire Rod Mill by rolling 105x105 mm billets
- Improvement in productivity of Sinter Plant-II
- Computer control system in reheating furnaces of Merchant Mill
- Enhancement of coal dust injection in Blast Furnace # 6.

### **Durgapur Steel Plant (DSP)**

- Computerised heating control in reheating furnaces of Section Mill
- Computerised heating control in reheating furnace in Skelp Mill.

### **Rourkela Steel Plant (RSP)**

- Utilisation of wash oil in place of furnace oil in the boiler and reheating furnaces
- Optimisation of operation of reheating furnace in the Hot Strip Mill
- Improvement in the design and operation of annealing furnaces in Cold Rolling Mill.
- Optimisation of burden distribution using MTA in Blast Furnace # 1.
- Introduction of slit burners in the sinter ignition hood at Sinter Plant-II.

### **Bokaro Steel Plant (BSL)**

- Installation of Duplex type burners in Lime/Dolo Kilns for firing PCM and coke oven gas in lime kilns
- Supply of surplus PCM in CPP boilers to replace furnace oil and coal
- Introduction of slit burners in the ignition hood at Sinter Plant
- Commissioning of 3rd walking beam furnace in Hot Strip Mill
- Commissioning of Duplex burner in Kiln # 6.

## **INDIAN IRON & STEEL COMPANY LIMITED**

Environment Management and pollution control has been given priority in all the activities of the Company. Ambient air, stack emission and work environment quality are within limits specified by the Statutory Authority. Industrial water consumption was limited per tonne of crude steel to 7.66 Cu.M/tcs in 2001-2002.

Environment Awareness campaign through observance of the World Environment Day, SAIL Environment Month and workshop/training on environment Management were organised for different sections of employees at Burnpur, and Eco-Club Members and students of affiliated schools. Pollution Control Laboratory, Burnpur have received recognition

from Central Pollution Control Board, New Delhi. About 1200 saplings of different plants were planted in township and works area. Dust extraction system at A & B boilers, dolomite Plant & T.H.F. have been working effectively. Consent for air emission, effluent discharge and hazardous waste handling/disposal have been received from State Pollution Control Board.

## **RASHTRIYA ISPAT NIGAM LIMITED**

At, RINL, utmost priority is given to environment management. Several initiatives are taken to ensure a clean and green environment. Some of the salient features are:

- Ambient air parameters (SPM, SO<sub>2</sub> NO<sub>x</sub>) are maintained within norms.
- Effluent parameters are by and large within the norms except ammonical nitrogen. Efforts are on to bring the ammonical nitrogen within the norms by March 2004.
- Stack emissions are within the norms.
- Ambient noise levels are monitored as per consent and are within norms.
- Fugitive emissions from coke oven batteries are monitored and are within norms.

### **Major initiatives:**

Some of the major initiatives taken during the year include:

- The implementation of Environment Management System as per ISO-14001 has resulted in the continual improvement of environmental performance. Two surveillance audits were carried out by M/s BVQL.
- Eight additional dust extraction (DE) systems in various zones were revived, commissioned and regularly maintained to improve the work zone air quality.
- Roof monitors are provided in converter shop to improve work zone environment.
- Various programmes launched by Andhra Pradesh Government like "Clean & Green" and "Neeru & Meeru" (rain water harvesting) etc. were implemented.

## Waste Management

(Quantity in million tonnes)

Year	Generation Qty (Mt.)	Utilisation		Stacked	
		Quantity	%	Quantity	%
2000-01	3.52	2.66	78	0.86	22
2001-02	3.22	2.63	82	0.59	18

### NATIONAL MINERAL DEVELOPMENT CORPORATION LTD

- I. Details of action taken in the current year 2002-03 to control air, water, noise and land pollution:

#### Bailadila.14/11C Project, Kirandul, Dantewada Dt, Chhattisgarh.

Maintenance of plantation works of the years 1998-99, 1999-2000, 2000-01 and 2001-02 is under progress.

Plantation of 50,000 trees in 91 hectares of forest blank area during the year 2002-03.

Maintenance of existing bund in the tailing dam at Kadampal for control of suspended solids in the slimes.

Desilting of check dam no: 8 at down stream side of steel foot bridge near Patel Nagar and check dam no: 5 up stream of Dugeli bridge.

Development of park near SKMS union office building at Kirandul.

Extension of existing check dam no: 9 near Patel Nagar at Kirandul.

Desilting of check dam nos: 2, 3 & 4 at down stream side of Kadampal Tailing Dam.

Desilting of Kirandul nalla at up stream side of fine ore road bridge.

Earth work for rain water harvesting at in takewell, Kirandul.

Construction of ponds cum check dam no: 9 at Kirandul nallah.

Desilting of check dam no: 7

Desilting of nalla at Loading plant

#### **Bailadila. 5 Project, Bacheli, Dantewada District, Chhattisgarh.**

3 nos. of 30KL water sprinklers are used for dust suppression on haul roads and mine benches.

Dust suppression and extraction systems were provided by cyclones at the crushing plant.

Water sprinkling over the dumper platform area during unloading of dumpers. Wholly covered conveyors and using of properly designed telescopic chutes at transfer points.

Dense belt of trees as dust arrests on all major roads, main haul roads, crushing plant, near service centre, loading plant, Bacheli township etc. were undertaken. Ensuring good house keeping within plant and mine premises.

For controlling the dust on the tailing dam vegetation/surface stabilization through grasses/shrubs were undertaken.

In order to protect nala no.25 flowing within the project area from contamination with fine, an RCC diversion channel measuring a total length of 2.7 Km from source point up to drop point near PWD main road bridge, Bacheli has been constructed due to which only the clear water is now passing in to the down stream nala.

30,500 cu. m. of silt have been desilted from various check dams in order to make room for incoming runoff of silt during the rainy season.

### **Donimalai iron ore project, Donimalai township, Bellary Dt, Karnataka**

Effluent treatment plant at auto garage and service centre commissioned on 23rd May 2002 and the same is working satisfactorily.

Plantation of 10, 000 saplings and 50,000 agave suckers as a part of regular annual afforestation and waste dump stabilization programme respectively.

Desilting of check dam no: 8 situated on the up stream of Ubbalagandi village nalla on the eastern side of the mine – South block.

Completion of earthen bund check dam with spillway facility (check dam no: 9) situated in between check dam nos: 8 and 4 on the upstream of Ubbalagandi nalla.

Desilting of check dam no: 6 situated below screening plant fine ore dump shall be taken up shortly.

Environmental monitoring studies for the post monsoon season, 2002 are under progress from October 2002.

Construction of check dam in the beyond MM cross section area on the western flank of the South block is under progress.

3 water sprinklers are used regularly for dust suppression on the haul roads and bench floors.

### **Diamond Mining Project, Majhgawan, Panna**

Planted 2000 saplings on over burden (sand stone) dumps for stabilization.

Using 18KL water sprinkler, haul road dust suppression is undertaken.

Planted 4400 saplings on coarse tailings dumps and along the roadside leading to National park.

2 soak pits were constructed for treatment of domestic effluents. Tendering action is in progress for construction of sewage treatment plant utilizing Rotating Biological Contactor (RBC) for treatment of domestic effluents of Majhgawan township.

1000 cu. m of silt was removed from Kaimason nalla and 30000 cu. m of silt was removed from tailing dam.

Effluents generated in beneficiation plant are treated in tailing dam and the clear water is reused in the plant.

Dust collector installed at primary crusher controls dust levels at primary crusher.

2 check dams of length 30m and height 1m of dry stone masonry with dry earth filling in toe wall are constructed on Kaimason nalla to control water pollution.

### **Environmental monitoring studies:**

The environmental monitoring studies such as collection of meteorological data, ambient air quality monitoring as per National ambient air quality (NAAQ) standards, water quality monitoring and analysis as per GSR: 422E parameters (effluent standards), IS: 2296 standards (stream standards) and IS: 10500 (drinking water standards), water flow measurement and ambient noise level measurement are conducted at all production projects during 4 seasons of a year (except during monsoon season) studies by engaging the services of MOEF, GO, New Delhi recognized consultants / laboratories. It is observed from monitoring data that the suspended particulate matter (SPM) is well below the permissible limit of 500 micro gram per cu.m at industrial areas and below 200 microgram per cu.m at residential area. Similarly, the levels of SO<sub>2</sub> and Nox are much below the permissible limit of 120 microgram per cu.m at Industrial areas and below 80 microgram per cu.m at residential area. The treated water from tailing dam and oxidation ponds are meeting the water quality parameters stipulated under GSR: 422E standards. The ambient noise level is also well within the limits of 55dbA and 45dbA respectively during day and night times at residential areas and also within the permissible limit of 90dBA in industrial area. All the industrial work persons exposed to high noise zone are provided with ear plugs for regular usage.

### **KUDREMU KH IRON ORE CO. LIMITED**

The Karnataka State Pollution Control Board has prescribed standard norms in respect of water and air quality monitoring They are being adhered to.

### **Pollution Control measures carried out during current year (2002-2003):**

- Series of check bunds, which have been constructed arrest mine, wash on the down stream of pollution control dams.
- 3 catch pits of size 50 x 10 x 5 M, excavated below CB – 05 / 06 conveyor valley.

- 1 catch pit of size 130 x 5 x 3 M, excavated on the right bank of Bhadra River from CB – 05 / 06 and Crusher – I to contain the conveyor wash.
- 4 RCC hume pipe culverts were constructed to divert the mine wash to pollution control dams and to contain the conveyor wash.
- Suppression of dust in the mine haul roads by sprinkling water regularly with the help of water sprinkler.
- 60,000 saplings have been planted in 20.2 hectares mine abandoned area to re-vegetate the area during 2002-2003.
- At Mangalore and Kudremukh regular analysis is jointly done alongwith KSPCB for all the parameters and the results are within limits.

Total Expenditure incurred for pollution control measures, (including desilting of mine-wash collected in pollution control dams and afforestation measures etc) is indicated in the table below :

<b>Year</b>	<b>Amount Spent in Crore</b>
1999-2000	5.65
2000-2001	7.57
2001-2002	11.29

Steps taken by KIOCL to conform to the norms prescribed by Central Pollution Control Board and State Pollution Control Board in respect of air, water and noise pollution are as under:

### **Air Pollution**

At Kudremukh air monitoring is being done regularly and the results are within limits prescribed by the State Pollution Control Board (KSPCB).

At Mangalore, emission monitoring is done regularly and the ambient air has 215 micrograms per cubic meter. of particulate matter as against standard norms of 500 micrograms per cubic meter.

### **Water Pollution**

At Kudremukh and Mangalore, regular analysis is jointly being done along with KSPCB for all the parameters and the results are within limits.

## **MANGANESE ORE (INDIA) LTD.**

### **Eco-Development and Environmental Preservation**

It is recognised that Exploitation of natural resources, often leads to environmental degradation and instability of the ecosystem. Mining of minerals, particularly by the open cast method, adversely affects the

environment, resulting in degradation of land on large scale. Water and air pollution and noise pollution are also of concern. Considering the nature and extent of the problem and concern for conserving the environment, MOIL, took a lead in massive afforestation in the company's mines, with special emphasis on reclamation of mined areas and rehabilitation of soil dumps, supported by exhaustive research and development. This has helped to improve the mine environment. An integrated biotechnological approach has been adopted to achieve the goal of sustainable and eco-friendly mining.

The company's strategy towards eco-friendly mining encompasses the following,

- Scientific Mine Planning
- Effective pollution control measures.
- Optimisation of resource utilisation.
- Regular monitoring.
- Biological reclamation.
- Rehabilitation of reclaimed areas.
- Rural and community development.

### **Strategy for Afforestation**

Eco-development and creation of massive green cover envisages plantation of hard wood trees to meet the future timber needs of the country, besides restoration of ecology. Additionally, certain areas have been covered by shrubs and grass for greening effect and checking erosion. The company's approach towards afforestation incorporates the following :

- i) General afforestation in and around mines with appropriate scientific techniques with species suitable for the area.
- ii) Specific afforestation on mine spoil dump using integrated biotechnology.
- iii) Rejuvenation of mine spoil dumps through integrated bio-technical approach.



## **Integrated Bio-Technological Approach**

Scientific studies were initiated as early as 1987 for evaluating physico bio-technological factors in MOIL spoil dumps alongwith technological intervention to achieve appropriate ecosystem restoration. This indicated the need for development of supportive and nutritive thizosphere through appropriate blending with pressmud, isolation endomyconhizal fungi and inoculation of plants for profuse root development, development of specialised cultures of biofertilizers and establishment of eco-system soil-plant-microbial and restoration of carbon and nitrogen in degraded lands.

## **Status of afforestation and future plans**

The total lease-hold area held by the company is 2145.89 hectares out of which 386.40 hectares or roughly 18% falls under spoil dumps. The total area covered under afforestation upto the 2000-2001 plantation season was 405 hectares, about two third of which was on soil dumps. More than 12 lakh saplings have been planted upto the 2000-2001 plantation season, and the survival rate is around 80%. The major species planted are shishum, cassia, teak, neem, eucalyptus and mangoes.

Almost three fourth of the total land available within the compay's lease hold area and separable for plantation activity has already been covered under plantation. While afforestation to the tune of 40,000 to 50,000 saplings every year will be continued in the coming years also until the entire separable area is fully covered under plantation, the emphasis however, has now shifted to the maintenance of the existing plantation. It is planned to cover the entire area available for afforestation within the coming 3 to 4 years, and also to ensure high survival rate of the existing plantation including replantation/ rejuvenation of the saplings wherever necessary.

MOIL, is also taking initiative to arrange plantation in the nearby public places such as local schools, along road side and even at Govt. land adjacent to the lease-hold areas.

## **Other parameters affecting the environment**

### **i) Water Regime :**

Only pure water is discharged to nearby nallas and agricultural land after duly ensuring that the suspended solids are removed. The mine water has no toxic effect and is chemically harmless. Drinking water is provided to the employees both at mine and residential areas from public water distribution system, tube well etc. Regular monitoring of water quality is done.

### **ii) Air borne Dust in Open Cast Mines :**

To keep air free from dust regular sprinkling is carried out on the mine roads in a regular and systematic manner. Regular monitoring of dust levels, oxides of nitrogen and SO<sub>2</sub> are carried out.

### **iii) Noise :**

Generally noise level on the mine is very much below the threshold limit and only at certain spots i.e. in compressor house and drilling site, the noise level is high. To keep the level within the threshold limits, regular maintenance of machines is done. Employees at these sites are also provided with earplugs.

### **iv) Vibrations :**

Regular R & D inputs are made available in respect of heavy blasting, for reduction in blasting vibrations, improvement in regular fragmentation by engaging specialised research institutes and academic bodies such as CMRI and VRCE. Amplitude of ground vibrations due to heavy blasting is normally within the threshold limits and is harmless for the type of structures located in the surrounding areas. Delay action detonators and restricted charge per hole/per delay are used to limit the ground vibrations due to blasting and its effects.

### **v) Solid Waste Management :**

MOIL believes in the philosophy that "Today's waste is tomorrow's wealth", and, in fact, has recovered ore worth crores of Rupees by secondary recoveries. The process of mining generates huge solid waste

to be dumped on surface and the incidence of solid waste is very high in open cast mines. MOIL, is now systematically dumping solid waste separately for manganiferous rock and non manganiferous rock so that in future when the technology for utilising low grade manganese ore is developed these manganiferous dumps can be worked at much lesser cost to win low grade manganese ore. Waste dumps are now planned in such a way that future handling and re-handling of these dumps are avoided. Dump height is now planned for 30 MT, so as to occupy less space. The dump spoil already matured are now being systematically covered with either plantation or with shrubs/grass to prevent erosion due to rain and to give better aesthetic view.

In order to generate environmental awareness amongst mine employees, training programmes are organised and MOIL takes active part in observing annual mine environment and mineral conservation week being observed every year under the auspices of Indian Bureau of Mines.

#### **Expenditure incurred on pollution control measures**

The expenditure incurred on Pollution Control Measures during the last 5 years is as follows :

	(Rupees in lakhs)
1997-1998	23.93
1998-1999	19.35
1999-2000	27.00
2000-2001	22.50
2001-2002	25.00
2002-2003 (upto 31.12.2002)	18.00

#### **MECON LIMITED**

MECON does not have any industrial unit so industrial pollution does not take place. However, one sewage treatment plant is working at MECON's township at Shyamali, Ranchi. In the office premises of MECON the waste paper is incinerated after shredding. Due precaution is

taken as per statutory requirements in regard to DG Sets which supply emergency power.

### **M/s. JINDAL VIJAYANAGAR STEEL LIMITED**

Jindal Vijayanagar Steel operates with the mission to transform the steel domain through innovation and to facilitate the mission the company has decided to champion the cause of sustainable development as a key model for growth.

JVSL is the first Steel Plant to amalgamate the quality, environment, safety, and health through a common policy statement to make these complementary to each other and to create a synergic effect on the plant operation.

#### **New initiatives**

- As a part of it's responsibility towards it's committed workforce, JVSL is the first among the Indian steel plants to implement OSHAS – 18001 Safety Management System and acquire the OSHAS 18001 Certification.
- It is the first Indian industry to utilize the carbon trading facilities approved by the Kyoto Protocol and has already submitted its application for host country endorsement.
- 100% utilization of COREX sludge at pelletisation plant.
- 100% utilisation of bag house dust.
- 100 % utilization of granulated slag for production of cement.
- Conversion of lime fines to briquettes and subsequent reuse in the BOF.
- Total utilization of BOF sludge at pelletisation plant.
- Part use of BOF slag as coolant in Corex furnace.

### **ESSAR STEEL LIMITED**

As an environmentally responsible company, Essar Steel is practising environmental friendly techniques to achieve sustainable development. Essar Steel has been accorded a prestigious award – “Indo-German Environmental Excellence Award” for the Year 1999-2000 in the Metallurgy & Mining Sector, instituted by “Green Tech Foundation, New Delhi”. Essar Steel has also achieved ISO 14001 for Environmental Management System, the first steel Company to have achieved this in India.

At Essar Steel, all solid wastes are segregated at source through separate storage bins – one each for land filling, burning, recycling and onward selling. With these better solid waste management practices, most of the solid wastes are being either reused, wherever applicable, or being sold.

## **JINDAL STEEL & POWER LIMITED, RAIGARH**

JSPL has been accredited with 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 air pollution. A state-of-the-art fume extraction system (FES) has been installed in Steel Melting Shop. In the entire plant, total 19 bag filters have been installed in various locations like cooler discharge at the end of DRI unit, product hopper packing plant, Raw Material Handling (RMH) in Steel Melting Shop, SAF & MBF for dust control. To control flue gas emission from power plant, efficient electrostatic precipitators have been installed. Producer gas plant & Limekiln units are equipped with ventury scrubber and wet scrubber respectively for controlling the emission.

JSPL has been integrated in such a way that most of the solid waste is gainfully utilized within the plant and rest is disposed off for use by other suitable industries. For example, coal reject is generated as waste from coal washery. To utilize this reject, fluidized bed combustion based AFBC boilers have been installed, which not only helps in solid waste management, but is also gainfully utilized in generating power.

JSPL is putting all possible efforts to create clean and healthy workplaces and protecting the environment in the area by using state-of-the-art technology of anti pollution measures and taking up the greening drive. Due to all these efforts, this plant has become an example of eco-friendliness where industrial growth co-exists in harmony with nature to maintain ecological balance.

Considering the above significant steps and contributions, social societies of Raigarh city have awarded JSPL with "Paryavaran Shree" during the celebration of "Industrial Environmental Protection" on 12<sup>th</sup> March 2000 at Raigarh.