Chapter

4 Environmental Responsibilities

4.1 Environmental Legislative Framework

The Ministry of Environment & Forests (MoEF) is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. MoEF is also the Nodal agency in the country for the United Nations Environment Programme (UNEP). The principal activities undertaken by MoEF consist of conservation & survey of flora, fauna, forests and wildlife, prevention & control of pollution, afforestation & regeneration of degraded areas and protection of environment, in the framework of legislations.

Under the provisions of The Water (Prevention & Control of Pollution) Act, 1974, the Central Government constituted the 'Central Board for the Prevention and Control of Water Pollution' in September 1974. The name of the Central Board was changed to Central Pollution Control Board (CPCB) under the Water (Prevention & Control of Pollution) Amendment Act 1988.

The main functions of CPCB, as spelt out in The Water (Prevention and Control of Pollution) Act, 1974, and The Air (Prevention and Control of Pollution) Act, 1981, are:

(i) To promote cleanliness of streams and wells in different areas of the States through prevention, control and abatement of water pollution; and,

(ii) To improve the quality of air and to prevent, control or abate air pollution in the country.

State Pollution Control Boards, were constituted under the provisions of the Water (Prevention and Control of Pollution) Act, 1974. This was the first initiative taken by the Government of India for the prevention and control of water pollution with a view to maintain and restore wholesomeness of the water. During the subsequent years, many more federal enactments related to environmental protection came into force, with the State Pollution Control Boards being designated as the implementing authority within the geographical boundary of respective states.

Several regulations have been introduced in the recent past covering Hazardous Wastes, Coke Ovens, Ozone Depleting Substances (ODS) such as Environment Protection Act, 1986 (EPA), Air (Prevention and Control of Pollution) Act, 1981, Hazardous Waste Rules, 1989, Noise Pollution (Regulation & Control) Rules, 2000 etc. These regulations are applicable to steel industries.

4.2 Environmental Management System

Environmental management system (EMS) refers to the management of an organisation's environmental programs in a comprehensive, systematic, planned and documented manner. It includes the organisational structure, planning and resources for developing, implementing and maintaining policy for environmental protection. An EMS serves as a tool to improve environmental performance and provides a systematic way of managing an organization's environmental affairs. EMS gives order and consistency for organizations to address environmental concerns through the allocation of resources, assignment of responsibility and ongoing evaluation of practices, procedures and processes.

SAIL and RINL are building environment management systems at its different plants and units for environmental protection, including acquisition of certification under the international standard ISO

14001 to reduce the environmental impact of its activities. The areas covered in ISO 14001 certification include Environmental policy, environmental aspects and related impacts, legal and other requirements, Environmental management programmes, training awareness and competence, environmental management system documentation, monitoring and measurement, environmental management system audit, management review etc.

EMS certification i.e. ISO 14001 has been accredited to the BSP (whole plant), BSL (10 units), DSP (19 units), RSP (8 units) and ISP (1 unit). There is no plan at present in BSL, DSP and RSP for accreditation of ISO 14001 for remaining units. However, ISP has decided to implement Integrated Management System in all the new units including the units that will remain after implementation of the expansion plan.

RINL has got ISO 14001 certification for whole company (including production & production supporting service departments).

The Ministry while accepting (December 2010) the audit observation stated that SAIL is having no plan at present for accreditation of ISO 14001 for remaining units of BSL, DSP and RSP.

SAIL should take early action to get ISO 14001 certification for the remaining units as EMS enables an organisation to evaluate and continually improve its environmental performance and operating efficiency.

4.3 Environmental Management Plan implementation and monitoring set-up

The production of steel causes air, water and noise pollution and generation of solid wastes including hazardous waste. The main units of steel industry causing pollution are coke oven and by-product plant, steel melting shop, sintering plant, blast furnace, refractory material plant and captive thermal power plant. In India most of the causes of higher pollution are attributed to usage of old technologies besides inherent quality raw material constraints. Therefore, it is necessary to have Environmental Management Plan (EMP) in place to address the environmental concern.

Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The EMP helps reaching identified goals in systematic and cost effective manner. The plan should specify key activities, milestones with timeframe, cost and implementation and monitoring setup.

SAIL has Environment Management Division (EMD) at Kolkata for controlling, monitoring and advising plants/units on the environmental issues. The Environment Policy of SAIL emphasizes on "conducting operations in an environmentally responsible manner to comply with applicable legal and other requirements related to its environmental aspects and strive to go beyond".

Audit noticed that it did not have any structured Environment Management Plan or monitoring mechanism. EMD takes up environment issues faced by the plants, on a case to case basis and monitors the environmental issues at plants through monthly/quarterly reports sent by Environmental Control Division of the plants. No regular visit either monthly or quarterly is conducted by technical executives of EMD at different plants to monitor/guide, educate and to identify the action plans for the steel plants.

The Ministry stated (December 2010) that Annual Business Plan (ABP) is made at all the units which also take into account the environmental priorities and the progress of these plans are reviewed at the plant level as also at the corporate level at regular intervals. Further, the Ministry while agreeing stated that

technical executives of EMD make plant visit on need based basis and of late, plant visits are being made regularly by the respective desk officers.

The Company (SAIL) should prepare EMP at the corporate level to mitigate the possible adverse impact of plant operations and for maintaining the existing environmental quality in a structured manner. The EMP should also specify key activities, milestones with timeframe and cost.

RINL established EMD in January 1995 to (i) control air, water and noise pollution (ii) maintain essential dust extraction systems (iii) monitor, control and submit data to pollution control board.

RINL prepares Annual Sustainability Plan as a part of Environmental Management System (EMS). The Management sets the targets for the completion of environmental projects. While setting the targets, Management fixes responsibility to the heads of the respective zones for the implementation of the projects as per the schedule specified in the Sustainability Plan.

4.4 Air Emission Management

The greenhouse gas of most relevance to the world steel industry is carbon dioxide (CO_2). Much of the CO_2 arising from iron production comes directly from the burning of coke or charcoal as fuel and reductant for the blast furnace. Yet more carbon dioxide is produced when limestone is added to the blast furnace to act as a flux. Steel production essentially involves the reduction of the amount of carbon in the iron and this refining process again produces some carbon dioxide. Blast Furnace produces BF gas which contains oxygen, carbon Monoxide, carbon dioxide and nitrogen. They are used as fuel for industrial heating in downstream, upstream processes and in power generation or burnt in air. As of now the BF gas is not being utilized fully as fuel but burnt in air which releases CO_2 gas.

According to the International Energy Agency (IEA), the iron and steel industry accounts for approximately 4-5 per cent of total world CO_2 emissions. On an average (world average), 1.9 tonnes of CO_2 is emitted for every tonne of steel produced. Over 90 per cent of steel industry CO_2 emissions come from iron production in nine countries or regions: Brazil, China, the European Union (EU), India, Japan, Korea, Russia, Ukraine and the US.

Audit analysis revealed that during the years 2004-05 to 2009-10; SAIL and RINL emitted 233.80 million tonne and 59.21 million tonne of CO_2 respectively. The average CO_2 emitted by SAIL and RINL during 2008-09 was 2.99 t/tcs[2] and 3.18 t/tcs respectively as against the average of 2.09 t/tcs of CO_2 emitted by Tata steel which is another steel major in the private sector. Further, audit noticed that SAIL & RINL have not set any targets for reduction in CO_2 emission while on the other hand, Tata Steel set a target of reduction in CO_2 emission to less than 1.7 tonnes per tonne of crude steel by 2012.

The companies were not making any reason wise analysis as regards higher CO_2 emission. However, the several factors determine the CO_2 emission such as specific energy consumption, coke rate for iron making, quality of raw material (coal and iron) and type of fuel used for generation of power. The quantum of excess CO_2 emitted by SAIL and RINL due to excess consumption of energy and coke has been dealt with in para 3.6.1 and 3.6.2.

The Ministry while agreeing with audit stated (December 2010) that consumption of energy and carbon emissions are interlinked and any effort for the reduction of energy consumption has a significant impact on the reduction of CO_2 emissions. As most of the SAIL steel plants are very old and were set with old energy intensive technologies, the specific energy consumption at SAIL was higher compared to the newly installed other steel plants in India. Further, the Ministry also stated that major technological initiatives are being taken at SAIL plants which would have an impact on the CO_2 emissions reduction.

[2] *tonne per tonne of crude steel*

Ministry further added that RINL installed various cleaner technologies which not only reduced energy consumption but also reduced CO_2 emissions. Further, RINL is planning to fix targets for reduction of CO_2 emission commensurate with specific energy consumption as part of sustainability plan 2011-12.

In conclusion, though SAIL and RINL have taken various initiatives for reduction of CO_2 emission but it did not map any specific plan to facilitate further reduction in CO_2 emission.

4.5 Air quality

(i) Respirable Suspended Particulate Matter (RSPM)

RSPM or PM10 is the dust particulates having diameter less than 10 μm (micron) and they are small enough to be inhaled and may enter deep into respiratory tract and pulmonary system of human beings. PM10 is generated in Raw Material Handling Plants, coke oven Batteries, sinter plants, steel melting shops etc. RSPM because of its small size poses health hazard due to easy inhalation and deep penetration in respiratory system during breathing. Mostly diseases of lungs like asthma, bronchitis, allergic disorders etc. are caused by inhalation of respirable dust.

As per the Notification of 1994 issued by the CPCB, norm for industrial RSPM on 24 hourly basis is 150 microgram / cubic meter ($\mu g/m^3$).

We observed that:

- In BSP, as per management plan, the RSPM sample was required to be taken once in week from five specified locations; however, sample for RSPM was not taken as per plan of the management. Out of the total available 164 weeks from January 2007 to March 2010, percentage of sample taken from the three locations was ranging between 73 and 79. Out of the 378 samples taken during this period, in 146 cases RSPM concentration was more than the norms of 150 $\mu g/m^3$.
- In RSP out of six locations, RSPM exceeded the norm of 150 $\mu g/m^3$ in two locations during 2004-05, in four locations during 2005-06 and in two locations during 2008-09.
- RSPM level in ISP (except in 2009-10), BSL & DSP was within the norm during the years 2004-05 to 2009-10.
- At RINL, RSPM recorded at one location only where it exceeded the norm in 100 out of 419 samples taken during June 2007 and March 2010.

The Ministry stated (December 2010) that installation of new air pollution control facilities in shops and augmenting the capacity of the existing ones at integrated steel plants of SAIL have resulted in improving the air quality both inside and outside the plant premises and the RSPM level has been found to be in the range of 20 – 100 $\mu g/m^3$ which was within stipulated norm. In case of RINL the Ministry did not give specific reply to the issue of excess level of RSPM over the norms, it only stated that Pollution control equipments are being maintained as per requirement of Quality Management System & Environmental Management System by all the Departments.

The fact remains that RINL could not maintain the RSPM level with in the norm which may pose higher risk for respiratory diseases to the employees and the people living in the vicinity of the plant.

(ii) Suspended Particulate Matter (SPM)

SPM are the particulate having diameter less than 100 μm that tend to remain suspended in the atmosphere for a longer period of time. The atmospheric suspended particulate affect the environment by lowering the visibility, producing hazy condition, participating in secondary reactions in atmosphere and affecting biotic population directly or indirectly.

As per the Notification of 1994 issued by CPCB, norm for industrial SPM on 24 hourly basis is 500 $\mu g/m^3$. SPM level in SAIL plants and RINL was within the norm during the years 2004-05 to 2009-10.

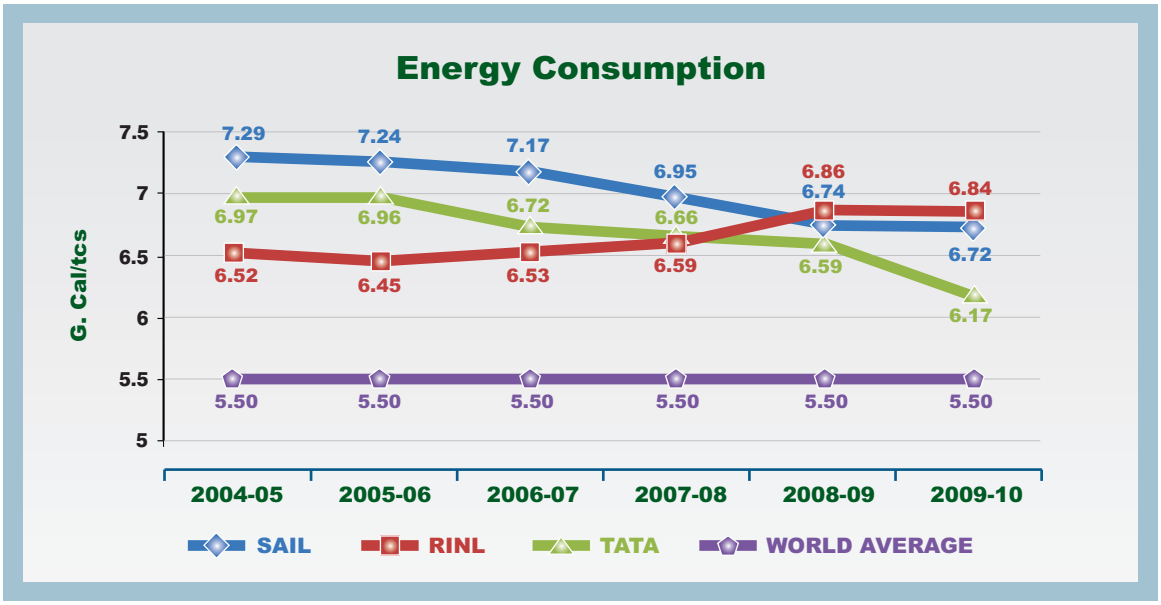
The Ministry stated (December 2010) that SPM content continues to be within norm in all the steel plants.

4.6 Conservation of energy and natural resources

Steel industry is a resource intensive industry. The extraction, transport and production of raw materials for steel making have an impact on the environment. Efficient use of these natural resources is critical to the sustainability of the steel industry. Key raw material inputs needed in steel making include iron ore, coal, limestone and recycled steel. ***On an average 2.6 tonne of raw material[3] is used to produce a tonne of crude steel. The consumption of raw materials in SAIL ranged between 3.26 t/tcs and 3.38 t/tcs.*** Though there has been reduction in consumption of raw materials over the years, SAIL is lagging behind Tata Steel which consumed 3.00 t/tcs in 2008-09. In RINL it ranged between 3.04 t/tcs and 3.10 t/tcs.

(i) Energy Consumption

The energy consumption per tonne of crude steel in SAIL & RINL vis-à-vis Tata Steel and world average during last six years ending 2009-10 is depicted below:



As against the international average of energy consumption of 4.5 to 5.5 G.cal/tcs[4], the consumption was 6.72 G.cal/tcs in SAIL and 6.84 G.cal/tcs in RINL during 2009-10.

[3] *1,725 kg of iron ore, 645 kg of coal, 150 kg of limestone, and 138 kg of recycled steel*
[4] *Giga calories per tonne of crude steel*

- The SAIL has not fixed any specific targets for reduction in energy consumption. In RINL, against the commitment of reduction of one per cent per year in specific energy consumption, the actual consumption, on the contrary, increased by one to four per cent year after year during the four years 2006–2010.
- While energy consumption was lowest in DSP (6.55 G.cal/tcs), in ISP it was the highest (8.18 G.cal/tcs) during 2009-10. BSL and RSP made improvement by consistently decreasing the energy consumption. The energy consumption per tonne of crude steel vis-à-vis norms in SAIL plants and in RINL during the years 2004-05 to 2009-10 are given in Annexure I.
- SAIL consumed an extra energy of 118.33 million G.cal during 2004-05 to 2009-10 which contributed to increase in CO_2 emission by 62.10 million tonnes during this period.
- In RINL, excess consumption of 23.83 lakh G.cal of energy contributed to increase in CO_2 emission by 12.51 lakh tonnes during the years from 2004-05 to 2009-10.
- Reasons for consumption of energy in excess of the norms included high fuel rate, coke screening losses in blast furnaces, stoppage of LD gas recovery due to rupture of seal of LD gas holder in SMS and non-availability of gas holder for storing Coke oven & BF gas.

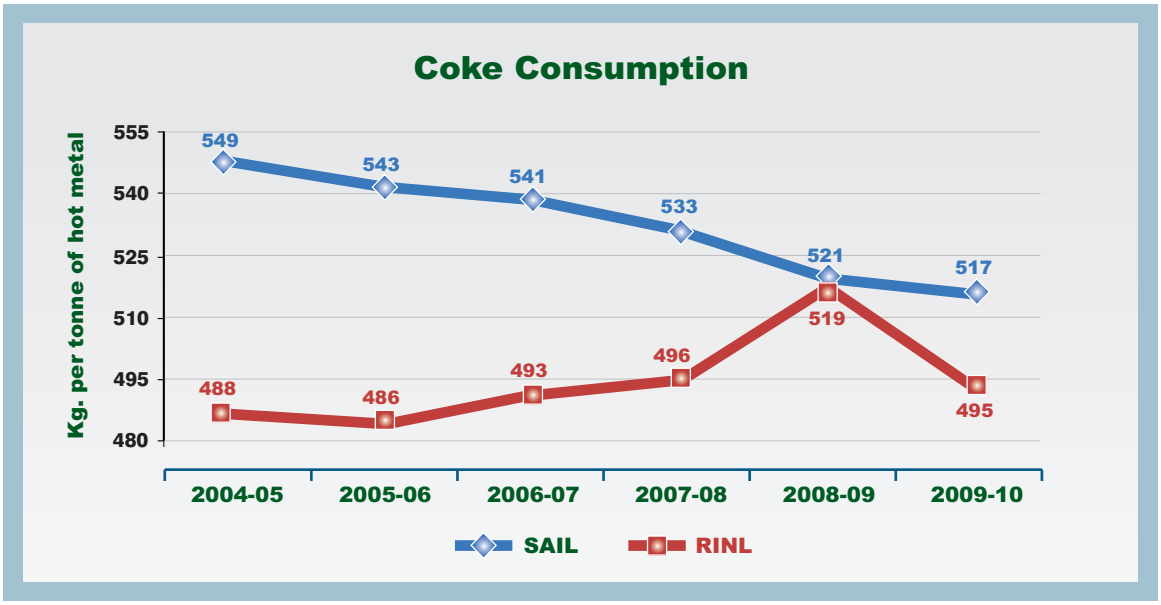
The Ministry stated (December 2010) that energy consumption in ISP has been higher as compared to other integrated steel plants of SAIL due to age and prevalence of obsolete technologies and fixation of target for energy consumption is done by SAIL management keeping in view maximum possible operational improvement and adoption of new technology, if any. RINL is adopting BS EN: 16001 Energy Management System across the steel works which is expected to reduce energy consumption and CO_2 emissions.

We do not agree with the Ministry because SAIL could not achieve the plant wise energy consumption target and RINL could not meet the commitment of reduction of specific energy consumption by one per cent per year which impacted the emission of CO_2.

(ii) Coke consumption

Coke is a very important ingredient (as a fuel) for the functioning of the Blast Furnace to produce hot metal. Coke rate is denoted in terms of consumption of coke in kilogram per tonne of hot metal (kg/thm) produced. A lower coke rate indicates better performance.

The coke consumption per tonne of hot metal in SAIL & RINL during the years 2004-05 to 2009-10 is shown below:



We observed that:

- The Consumption of coke in SAIL was ranging between 549 Kg. and 517 Kg. per thm during the years 2004-05 to 2009-10 and it was on decreasing trend. Whereas in BSP it was varying between 491 to 509 kg/thm. In ISP it was ranging between 778 and 816 kg/thm. Consumption of coke in other plants was also more than actual consumption of BSP.
- In RINL coke consumption was ranging from 486 kg/thm to 519 kg/thm during the years from 2004-05 to 2009-10 and it was on increasing trend. However in the year 2009-10 it was decreased to 494.6 kg/thm.
- In comparison with RINL (486 kg/thm in 2005-06) SAIL consumed excess coke of 40.8 lakh tonne during 2004-05 to 2009-10 (Annexure II).
- On an average the reduction of one kg in coke rate results in reduction of CO_2 emission by 3.4 kg. Thus, due to excess consumption of 4.08 million tonnes of coke by SAIL resulted in excess emission of 13.87 million tonnes of CO_2 in the atmosphere and RINL emitted excess CO_2 of 0.78 million tonnes due to excess consumption of 0.23 million tonnes of coke.
- The excess consumption of coke was due to adverse quality of input materials such as iron ore and coke and low blast temperature.

The Ministry reply (December 2010) did not address the issue of excess consumption of coke. Since excess consumption of coke has an adverse impact on the overall financial viability of the Company as well as on environment, therefore, it should take all necessary steps to reduce the consumption of coke.

(iii) Water Consumption

Considering the importance of water conservation, CREP[5] provided norm for limiting the water consumption to 5 m^3/tcs for long products and 8 m^3/tcs for flat products plant.

We observed that water consumption in ISP was more than the norm during 2004-05 (8.59 m^3/tcs) 2005-06 (6.96 m3/tcs) and 2008-09 (5.58 m^3/tcs). The actual consumption of water in other SAIL plants & RINL during the last six years ending 2009-10 was within the norm.

The Ministry stated (December 2010) that overall specific water consumption at SAIL plants decreased by 30 per cent during last 6 years from 5.64 m^3/tcs to 3.96 m^3/tcs in 2009-10.

We appreciate the action taken by the management to reduce the water consumption and expect that the same efforts would be continued.

4.7 Solid Waste Management

Wastes are substances or objects, which are intended to be disposed of, or are required to be disposed by the provisions of national laws. Additionally, wastes are such items which people are required to discard, for example, by law because of their hazardous properties.

Municipal waste is generated by households and consists of paper, organic waste, metals etc. The production processes, households and commercial activities generating waste are hazardous waste. Bio-medical waste is waste generated by hospitals and other health providers and consists of discarded drugs, waste sharps, microbiology & biotechnology waste, human anatomical waste, animal waste etc.

Waste represents a threat to the environment and human health if not handled or disposed of properly. ***According to United Nations Environment Programme (UNEP), waste management includes both the components of prevention and disposal of waste. Thus, strategies for waste***

[5] *Charter on Corporate Responsibility for Environment Protection*

disposal should focus on waste prevention and minimization through the '3 Rs' - Reduce, Reuse and Recycle.

In the process of iron and steel making, huge quantity of BF and SMS slag wastes are generated which are to be re-used or disposed of.

(i) Blast Furnace and Steel Melting Slag

BF slag is granulated and sold to cement plants whereas the unprocessed BF slag and SMS slag are used for refilling of low lying areas. As per CREP, BF and SMS slag were to be utilized to the extent of 70 per cent by 2004, 80 per cent by 2006 and 100 per cent by 2008.

- Though SAIL and RINL have plans to utilize slag which include interface with cement manufacturers, soil conditioners and setting up of cement plants etc., utilization of slag in SAIL & RINL was less than the CREP requirement.
- In SAIL, utilization of BF slag ranged between 54.49 percent and 84.41 per cent during the years 2004-05 to 2009-10 whereas utilization of SMS slag ranged between 56.22 per cent and 75.24 per cent during this period. Similarly in RINL, utilization of BF slag was in the range of 62 per cent and 107 per cent whereas in respect of SMS slag, the utilization ranged between 35 per cent and 82 per cent during 2004-05 to 2009-10.
- In respect of utilization of BF slag, BSL is far behind the CREP commitment. So far as utilization of SMS slag is concerned, none of the plant could meet the target of CREP and at ISP the disposal of SMS slag is nil.
- Concept of 3Rs (Reduce, Reuse and Recycle) emphasizes more on reduction in waste generation. Although there has been reduction in BF slag generation per tonne of crude steel production in DSP and ISP, there has been increase in generation of BF slag from 374 kg/tcs in 2004-05 to 431 kg/tcs in 2009-10 in BSP and from 415 kg/tcs in 2004-05 to 431 kg/tcs in 2009-10 in BSL.
- The reasons for low utilisation of BF slag in BSL was lack of adequate facility (only two out of five BFs have granulation facility) to granulate the BF slag which has huge demand in the market, non existence of cement plant in nearby areas etc. which resulted in no/less off take of BF slag.

The Ministry stated (December 2010) that SAIL plants have effectively adopted waste minimization strategies including conservation at source, recovery and recycling. Further, at ISP, total SMS slag generation is from Twin Hearth Furnace (THF). The physio-chemical characteristics of this slag are such that it finds no use. However, after completion of the on-going modernisation at ISP expected by Dec. 2011, the operating THFs shall be phased out and the total steel making would be from Linze Donawitz (LD) converters. Work order for installation of Cast House Slag Granulation Plant for the other three Blast Furnaces at BSL has already been placed. All these plants are expected to be commissioned by the end of 2012.

Though SAIL and RINL have taken action to utilise the slag but they were still lagging behind the CREP target of utilization of SMS and BF slag.

(ii) Hazardous waste

Steel plant generates hazardous wastes such as tar sludge, used batteries, benzol acid sludge, used oil etc. Disposal of such waste on land affects the soil & water and leads to environmental problems.

As per Hazardous Waste (Management and Handling) Rule 1989, the occupier or operator of a facility (steel plants in this case) shall be responsible for identifying sites for establishing hazardous wastes disposal facility. Considering the seriousness of the environmental pollution being caused by the hazardous waste, the Supreme Court of India issued (October 2003) comprehensive directives on

hazardous waste. As per directives, MoEF also constituted a Supreme Court Monitoring Committee in November 2003 which had set time limit for setting up of common facilities for land filling of hazardous waste latest by June 2006.

In this regard we observed that:

- In BSL secured landfill is in operation and for DSP and ISP agreement has been made with West Bengal Waste Management Limited for disposal of the hazardous waste at a common place.
- BSP is yet to construct secured landfill for storage of hazardous waste despite getting regular show cause notices from Chhattisgarh Environment Conservation Board (CECB). For handling hazardous waste, the plant obtains authorization from CPCB in every three years. As per the terms and conditions of this authorization, BSP has to display on- line data outside the factory gate on quantity and nature of hazardous chemicals being used in the plant, water & air pollution and solid waste generated within the factory premises. However, BSP has not fulfilled this condition so far.
- In RSP clearance has been obtained from State Pollution Control Board for development of new secured land fill facility.
- RINL has not constructed secured landfill as all hazardous waste generated in the company are either recycled or sold to authorized parties as per Andhra Pradesh Pollution Control Board directive.

The Ministry stated (December 2010) that actions have already been initiated for construction of secured landfill at BSP. Display board has been installed at the factory main gate of BSP, where the quantity and nature of hazardous chemicals and other details are being displayed.

The Companies should take early action for proper disposal of hazardous waste as dumping of such waste on land affects the soil & water which could lead to environmental problems.

(iii) Municipal Waste

In 2000, under the powers conferred by the Environment (Protection) Act, 1986, the Municipal Solid Wastes (Management and Handling) Rules were notified which made every municipality, within its territorial jurisdiction, responsible for management and handling of solid waste. Since SAIL and RINL are responsible for maintenance of their townships, they need to make proper arrangements for disposal of municipal waste.

- In SAIL (except DSP where handling and disposal of municipal waste is done by Durgapur Municipal Corporation) the municipal waste is not disposed of properly. There was no waste processing and disposal facility required as per Municipal Solid Wastes (Management and Handling) Rules.
- RINL was having proper facility for collection, transportation and disposal of municipal waste.

The Ministry stated (December 2010) that in SAIL adequate facilities exist at all the steel townships for collection, transportation and disposal of municipal wastes.

The Ministry's contention was not acceptable as municipal waste was not properly disposed at BSL, ISP and RSP, as the required facilities for disposal were not available at these plants.

The Company should make expeditious arrangements for proper disposal of municipal waste to avoid any kind of disease outspread.

(iv) Bio-Medical Waste

To ensure proper management of bio-medical waste, Bio-Medical Waste (Management and Handling) Rules, were notified in 1998 with amendments in 2000 and 2003. Under the rules, the institutions generating bio-medical waste were responsible for management and handling of bio-medical waste.

- In SAIL (BSP, DSP and ISP) and RINL disposal of bio medical waste was assigned to private party authorised by state pollution control boards.
- In RSP disposal of bio medical waste was as per norms whereas the BSL has not complied with the requirement of Jharkhand State Pollution Control Board to install a two stage incinerator of adequate capacity for processing of bio medical waste.

The Ministry stated (December 2010) that action has been initiated for installation of bio-medical incinerator at BSL, which is expected to be completed by June 2011.

4.8 Effluent Discharge

Used water in the steel plant contains harmful contents viz. phenol, cyanide, ammonia, oil & grease etc. These chemical contents have adverse effect on human beings as stated below:

Phenol: Drinking water containing phenol for a long period of time can cause diarrhea, mouth sores, corrosive damage and death. If skin comes into contact with phenol for a long time, people may get liver or kidney damage, dark urine, damage to the red blood cells etc.

Cyanide is acutely toxic to humans and it makes the cells of an organism unable to use oxygen.

Ammonia can affect respiratory system and repeated exposure can cause respiratory tract irritation.

To maintain quality of water for re-use, the prescribed norms as per EPA notification dated 24/10/1989 are given below:

Parameters	Std-Concentration in milligram/liter (mg/ltr) except pH (not to exceed)
pH[6]	6.0 to 8.5
Suspended solids	100
Phenol	1.0
Cyanide	0.2
BOD	30
COD	250
Ammonical Nitrogen	50
Oil and grease	10

We observed that:

- In BSL, BSP & ISP Effluent discharge level was within the norm.
- In RSP the suspended solid exceeded the norm in 2005-06 although in other years it was within the norm.
- In DSP elements like phenol, ammonia & cyanide at outfall number 5 were much above the prescribed norm despite censure and imposition of penalty by SPCB and CPCB during 2007-08. However, the effluent discharge level in 2009-10 was within the norms.

[6] *measure of the acidity or basicity of a soluiton*

- In RINL the effluents were within the norms during the years 2004-05 to 2009-10 except Ammonical Nitrogen which was ranging between 76.2 to 87.2 mg/ltr as against the statutory norm of 50 mg/ltr. For this the Russian supplier suggested (August 2002) modifications to the effluent treatment plant, which were yet to be done by the company.

The Ministry stated (December 2010) that all the SAIL plants are meticulously maintaining the various Effluent Treatment Plants so that the effluent quality is well within the stipulated norms when let out from the plant boundary to the receiving bodies. In RINL Modifications to the effluent treatment plant as suggested by Russian supplier is at final stages of commissioning and stabilization at the total estimated cost of Rs. 46 crore.

RINL should commission the effluent treatment plant at the earliest and the Companies should make continuous efforts to keep the level of the quality of effluent in the water discharged from the plants within the norm to avoid adverse effect of these chemicals.

4.9 Noise Pollution

Since noise pollution has deleterious effects[7] on human health and the psychological well being of the people, MoEF issued (February 2000) the 'Noise Pollution (Regulation and Control) Rules 2000' and specified the AAQ standards for noise. As per section 4 of the said rule, the noise levels in any area/zone shall not exceed the specified limits as detailed below:

Category of Area/Zone	Limits in dB(A) Leq [8]	
	Day Time	Night Time
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence Zone	50	40

We observed that:

- Noise level was more than the prescribed level in residential and silence zone areas in BSP and ISP. In BSL, noise level was more than the norm (75 dB) during the period 2004-05 to 2009-10 in the various shops particularly in blast furnaces, sintering plant, slabbing mill, SMS, hot rolled coil finishing and coke oven & by product plant. In RSP, noise level remained well within the norm except in SMS during 2009-10. DSP started measuring noise level in industrial area only from 2009-10, which was well within the norm. However, noise monitoring in other areas in DSP was not done.
- As against the norm of maximum noise level of 55 dB(A) for residential areas in day time, actual level in RINL during the review period was ranging between 43 dB(A) and 69.3 dB(A). The rules also stipulated that the ambient noise levels in respect of industrial and residential areas are to be measured during night time. The Company, however, started measuring the noise levels in respect of industrial area and residential areas during night time from 2007-08 and 2009-10 respectively and the same were within the norm.

The Ministry stated (December 2010) that SAIL has taken up ambitious expansion/ modernisation projects at all the integrated steel plants under which state-of-the-art technology is being implemented in most of the work zone areas. After completion of these on-going projects, the noise levels are expected to come down below the prescribed noise levels in all the areas.

The Ministry has not indicated any time frame for completion of the projects. There is an urgent need to control the noise level as per MoEF regulations.

[7] *Noise induced hearing loss, increased heart respiration rate, elevated blood pressure, psychological disturbances like sleeplessness, tinnitus, annoyance, poor work performance etc.*

[8] *Db(A) Leq denotes the time weighted average of the level of sound in decibels on Scale A which is relatable to human hearing.*

4.10 Tree Plantation

Trees are natural sink for CO_2 gas. The green belt developed by afforestation adds to aesthetic environment which also become dust and noise barrier as well as heat absorber. *On an average, a tree can absorb CO_2 at the rate of 6 kg/year and SAIL and RINL emit 40 million tonne and 10 million tonne of CO_2 per year respectively. Therefore, on an average 6700 million trees are required for absorbing CO_2 generated by SAIL and 1645 million trees are required for RINL. As this is not possible, both the companies need to reduce CO_2 emission considerably.*

We observed that:

- Though SAIL in its corporate environment policy has emphasized on increasing greenery in and around plant and afforestation programme on a company wide basis is included in the annual business Plan, **it has not set any target for tree plantation for the year 2004-2009.**
- During the years 2004-05 to 2009-10, SAIL has planted 8.95 lakh trees.
- The total inventory of trees in SAIL plants was 14.32 million trees as on 31 March 2010.
- RINL has planted 8.39 lakh trees during the years 2004-05 to 2009-10 against the target of 30.72 lakhs.
- The total inventory of trees in RINL as on 31 March 2010 was 4.59 million trees.

The Ministry stated (December 2010) that with increased thrust on environment protection, SAIL plant/unit level targets for tree plantation are kept and performance monitored on a regular basis. During the year 2009-10, 2.1 lakh trees were planted against the target of 2.88 lakh and in 2010-11, 1.44 lakh tree were planted (upto September 2010) against the target of 1.95 lakh. RINL is maintaining green belt as per norms of MoEF and has fixed the target of 2.5 lakh trees per year for the years 2010-11 and 2011-12.

The targets for tree plantation set by the Companies were not commensurate with the quantum of CO_2 emitted by them and even SAIL could not met the target set by it for the year 2009-10. Therefore, the Companies should step up the tree plantation and also take effective measures to reduce the CO_2 emission.

4.11 Clean Development Mechanism

To tackle climate change through reduction of GHGs emission, Kyoto Protocol came into force in February 2005, which sets limits to the maximum amount of emission of GHGs by developed countries. To meet the emission reduction target, Kyoto protocol, inter-alia, provided market based mechanism called Clean Development Mechanism (CDM). In CDM, entities in developing countries can set up a GHG reduction project, get it approved by United Nations Framework Convention on Climate Change (UNFCCC) and earn carbon credits, which can be bought by entities of developed countries with emission reduction targets. Implementation of CDM projects not only results in reduction of GHGs but also yields revenue by selling carbon credits.

In this regard we observed that:

- SAIL and RINL have no company level CDM or Carbon policy.
- SAIL identified 71 CDM projects, categorized as Category A (38 nos) and Category-B (33 nos) in its five steel plants. SAIL acted belatedly (May 2007) and took 32 months from February 2005 (Date of Kyoto protocol) in appointment of consultant (November 2007) for category A projects. Consultants for category B projects have not been appointed as yet.

- RINL identified 27 projects as CDM and appointed consultant belatedly in October 2010.
- It was observed that SAIL could complete only six projects (March 2010) and is lagging behind the schedule. Since Kyoto Protocol is going to expire in 2012 and Copenhagen climate change summit has failed to take any decision on extension of Kyoto Protocol agreement beyond 2012, accruing of benefits of carbon credit from these projects was uncertain.

The Ministry stated (December 2010) that in SAIL six projects out of 38 projects of Category A were validated in the year 2009. Out of these, three projects were verified and action has been initiated for monetisation. For other projects (Category B), tenders were floated four times for appointment of CDM consultant. However, no suitable offer was received from these tenders. The tender document has been recently modified for re-tendering. In RINL claiming CDM benefits has been expedited.

Efforts need to be made for early completion of CDM projects so that carbon credit could be earned and sold before expiry of Kyoto protocol in 2012.

4.12 Charter on Corporate Responsibility for Environment Protection

"Charter on Corporate Responsibility for Environment Protection" (CREP) released by the Ministry of Environment and Forest (MoEF) in 2 003 for compliance of pollution control norms identified iron and steel sector as one of the 17 major polluting industries. SAIL and RINL have agreed to adopt the guidelines as set in the CREP. The compliance status of the clauses incorporated in the CREP by SAIL and RINL as on 31 March 2010 has been detailed in Annexure – III.

4.13 Conclusion

In essence the energy consumption in SAIL and RINL was more than the world average and Tata Steel. SAIL has not set any target for reduction in energy consumption whereas RINL could not meet the targets set by it for reduction in consumption of energy resultantly the average CO_2 emission in both the Companies was higher as compared to Tata steel (2.09 t/tcs) and world average (1.9 t/tcs). Further, the tree plantation by the Companies was also not commensurate with the amount of CO_2 emitted by these companies. Therefore, the companies have to step up the tree plantation and take the concrete measures for reduction of CO_2 emission.

Recommendation

ii. The Companies should fix specific targets for reduction of CO_2 emission.

iii. The possibility of slag transportation to the abandoned mines to fill up the cavities may be examined.

iv. The effective measures for reduction in generation of slag should be taken.

v. The SAIL should set specific targets for tree plantation and RINL should take concrete steps to achieve the targeted afforestation.