REPORT OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

UNION GOVERNMENT
NO. 21 (COMMERCIAL) OF 1995

STEEL AUTHORITY OF INDIA LIMITED
(ROURKELA STEEL PLANT)

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CONTENTS

CHAPTER	SUBJECT	PAGE NO.
	PREFACE	i & ii
	OVERVIEW	iii to ix
1.	INTRODUCTION	1
2.	MODERNISATION OF PLANT & TECHNOLOGY	3
3.	PRODUCTION PERFORMANCE	5
4.	FERTILIZER PLANT	27
5.	SOURCES OF RAW MATERIAL	30
6.	SERVICES & FUEL	34
7.	BY PRODUCTS & OTHER ARISINGS	38
8.	FINANCIAL PERFORMANCE	39
9.	MANPOWER ANALYSIS	40
10.	INVENTORY CONTROL	42
11.	INTERNAL AUDIT	44
12.	POLLUTION CONTROL & ENVIRONMENTAL MANAGEMENT	45
13.	OTHER POINTS OF INTEREST	46
	ANNEXURES I TO XIX	

PREFACE

Audit Board are set up under the supervision and control of the Comptroller and Auditor General of India to undertake comprehensive appraisal of the performance of the Companies and Corporations subject to audit by the Comptroller and Auditor General of India.

II. The report on Steel Authority of India Limited, Rourkela Steel Plant was finalised by an Audit Board consisting of the following members:

1.	**Shri N.Sivasubramanian**	**Deputy Comptroller and Auditor General-cum-Chairman, Audit Board from 29 July 1992 to 31 May 1993.**
2.	**Shri U.N.Ananthan**	**Deputy Comptroller and Auditor General-cum-Chairman, Audit Board from 1st June 1993 to 30th November 1993.**
3.	**Shri Ramesh Chandra**	**Deputy Comptroller and Auditor General-cum-Chairman, Audit Board from 6 April 1995.**
4.	**Shri Ravi Saxena**	**Principal Director of Commercial Audit & Ex-Officio Member, Audit Board, Ranchi from 24 February 1992 to 30 March 1995.**
5.	**Shri Utpal Bhattacharya**	**Principal Director of Commercial Audit & Ex-Officio Member, Audit Board-II, Calcutta from 19 November 1990 to May 1993.**
6.	**Shri R.Talwar**	**Part-Time Member Technical Director M.N.Dastur and Company Limited, Calcutta.**
7.	**Shri S.M.Srivastava**	**Part-Time Member Formerly General Manager (Project), Alloys Steel Plant,SAIL.**
8.	**Shri B.B.Manocha**	**Director(Comml.), Office of Comptroller and Auditor General of India, New Delhi from 26 November 1992 to April 1994.**
9.	**Shri R.N. Ghose**	**Director(Comml.), Office of Comptroller and Auditor General of India, New Delhi, from 28 June 1994.**

(Shri R.Talwar could not attend the Audit Board Meeting with the Ministry and Shri S.M. Srivastva could not attend the meetings with the Management and the Ministry)

III. The Part time members are appointed by the Government of India (in the respective Ministry or Department controlling the Company or Corporation) with the concurrence of Comptroller and Auditor General of India.

IV. The report was finalised by the Audit Board after taking into consideration the discussions held with the Ministry of Steel on 18 November 1993.

V. The Comptroller and Auditor General of India wishes to place on record his appreciation of the work done by the Audit Board.

OVERVIEW

1. *INTRODUCTION*

Rourkela Steel Plant (RSP), a constituent unit of Steel Authority of India Ltd.(SAIL), was set up with a capacity of 1 Million Tonnes per annum (MTPA) in November 1962 at a cost of Rs.220.10 crores. The capacity of the Plant was expanded to 1.8 MTPA in February 1969 at a further cost of Rs.160.21 crores.

[Para 1]

2. *MODERNISATION OF PLANT & TECHNOLOGY*

Scheme for modernisation of Plant, taken up in two phases, was approved by the Government in July 1988 and October 1989 at an estimated cost of Rs.2461 crores which was revised to Rs.3954 crores in May, 1992. The modernisation scheme is likely to be completed in August, 1996.

[Paras 2.01 to 2.03]

3. *PRODUCTION PERFORMANCE*

There was continuing low capacity utilisation of the plant in terms of production of ingot steel and saleable steel from 1978-79 to 1993-94. The shortfall in production accounted for loss of contribution margin of Rs.336.10 crores in respect of saleable steel.

[Para 3.01]

The average pushing of ovens per day had been less than the capacity and fluctuated considerably indicating inconsistent performance and low productivity.

[Para 3.02.01]

The actual yield of Blast Furnace (B.F.) coke from raw coal charged ranged from 59.11% (1982-83) to 64.03% (1993-94) against the prescribed norms of 62% (DPR) and 64.5% (Norms Committee). The shortfall in the yield of coke had resulted in loss of production of 5.41 lakh tonnes of gross coke valued at Rs.48.21 crores.

[Para 3.02.02]

The actual production of hot metal in Blast Furnaces was always less than the rated capacity and the annual targets (except in 1988-89 and 1989-90).

[Para 3.03.01]

The plant sold considerable quantity of Pig Iron produced in the Pig Casting Machines to outside parties at a price lower than the cost resulting in loss of Rs.22.92 crores.

[Para 3.04]

The production of ingot steel in Steel Melting Shop (S.M.S.) was always lower than the rated capacity except from 1979 to 1980-81 in the case of O.H.Furnaces.

[Para 3.05]

The loss due to poor handling of hot metal amounted to Rs.45.98 crores.

[Para 3.05.03]

There was short recovery of 2.83 lakh tonnes of steel worth Rs.267.72 crores due to lower yield.

[Para 3.05.04]

4. *FERTILIZER PLANT*

The production of Fertilizer Plant remained very low and ranged between 19.1% (1982-83) and 71.7% (1993-94) even after installation of Naptha Reforming Plant-II (November 1980) and modification of Ammonia Synthesis Loops (March 1982). The cost per tonne of Calcium Ammonium Nitrate (CAN) was more than the net sales realisation; the loss ranged between Rs.37 (1979-80) and Rs.2791 (1982-83) per tonne.

[Paras 4(i) & (ii)]

The excess consumption of Ammonia and Nitric Acid for production of CAN amounted to Rs.23.87 crores.

[Para 4 (iii)]

The value of excess consumption of Coke Oven gas during 1978-79 to 1986-87 amounted to Rs.7.61 crores as compared with norms fixed by the Designer.

[Para 4 (iv)]

The accumulated loss of Fertilizer Plant as on 31st March, 1994 amounted to Rs.169.59 crores.

[Para 4(v)]

5. *SOURCES OF RAW MATERIALS*

The Plant has its own mechanised mines of iron ore at Barsua and manually operated mines at Kalta. Due to low production of Iron Ore the Plant had to purchase iron ore from outside at an extra expenditure Rs.7.11 crores.

[Para 5.01]

The capacity of the Beneficiation Plant installed at a cost of Rs.4.09 crores was underutilised in all the years.

[Para 5.01.01]

The production of limestone at Purnapani had always been lower than the rated capacity inspite of massive development work done.

[Para 5.02]

6. *SERVICES & FUEL*

The consumption of costly fuels like furnace oil for generation of steam resulted in extra expenditure of Rs.84.86 crores.

[Para 6.02]

The generation of electricity in Captive Power Plant-I decreased steadily from 64.192 MW (1978-79) to 20.550 MW (1993-94) against the capacity of 125 MW. There was also excess consumption of steam for generation of electricity resulting in extra expenditure of Rs.25.15 crores.

[Para 6.03]

Oxygen and Nitrogen produced could not be consumed fully and as a result substantial quantities of Oxygen valuing Rs.19.59 crores and Nitrogen valuing Rs.29.73 crores were bled out.

[Para 6.04]

Production of Coke Oven gas did not improve even after incurring an expenditure of Rs.33.81 crores on repair of batteries. The value of shortfall in production of Coke Oven gas and B.F. gas worked out to Rs.227.11 crores and Rs.694.58 crores respectively as compared to DPR norms.

[Para 6.05]

7. ***BY PRODUCTS & OTHER ARISINGS***

The actual yield of By products viz. Crude Tar, Crude Benzol & Ammonium Sulphate (except Crude Tar for 1978-79) was less than the DPR norm as well as norms fixed by the Norms Committee.

[Para 7.01]

The actual production of hot pressed and brown napthalene in Napthalene Plant was always less than the rated capacity.

[Para 7.02]

The arising of steel scrap in SMS ranged between 4.9% (1978-79) to 10% (1984-85) as against DPR norm of 2%. The stock of iron & steel scrap as on 31st March 1994 was 0.49 lakh tonnes.

[Para 7.03]

8. ***FINANCIAL PERFORMANCE***

The net profit of the Plant was continously declining from 1989-90.

[Para 8]

9. ***MANPOWER ANALYSIS***

The actual manpower was more than double the requirement as compared to Project Report.

The labour productivity per man year was always below the norm of 95 ingot tonnes fixed by the Plant.

[Paras 9.01 & 9.02]

10. *INVENTORY CONTROL*

Stores and spares valuing Rs.22.10 crores had been lying unmoved for more than 5 years as on 31st March, 1994. The value of stores & spares declared surplus/obsolete and awaiting disposal as on 31st March,1994 was Rs.4.14 crores.

[Para 10.01]

The abnormal shortages of raw material during 1988-89 to 1993-94 amounted to Rs.13.98 crores.

[Para 10.02]

11. *INTERNAL AUDIT*

The Internal Audit Department has not undertaken any appraisal of the performance of the steel plant as recommended by the COPU in their Fifteenth Report (1968), 4th Lok Sabha.

[Para 11]

12. *POLLUTION CONTROL & ENVIRONMENTAL MANAGEMENT*

Although the Orissa State Pollution Board certified the position as satisfactory in many of the areas but they also specified inadequacy in some other areas where the requirement is yet to be fulfilled.

[Para 12]

13. *OTHER POINTS OF INTEREST*

The supply of coke oven gas to Fertilizer Plant continued to suffer and became negligible during 1986-87 onwards even after installation of 2 Compressors at a cost of Rs.7.75 crores in May, 1984 and December, 1985.

[Para 13.01]

The total value of excess handling shortage of coal as compared to norms during 1978-79 to 1993-94 amounted to Rs.23.78 crores.

[Para 13.02]

Reimbursement of an amount of Rs.1.53 crores towards customs duty had to be made to the contractor as he delayed the placing of the order for replacement of damaged goods.

[Para 13.03]

Excess freight amounting to Rs.50.28 lakhs was paid to Railways on transportation of imported coal during May 1987 to February 1988.

[Para 13.04]

CHAPTER-1

1. *INTRODUCTION.*

Rourkela Steel Plant (RSP), one of the units of Steel Authority of India Limited (SAIL) was started in 1956 in collaboration with leading steel makers from Federal Republic of Germany. The location -Rourkela- in the north of western tip mineral belt, was chosen for installation of the Plant. The Plant set up with a capacity of 1 million tonne per annum (MTPA) of steel ingots, was completed in November 1962 at a cost of Rs.220.10 crores. The capacity of the Plant was expanded to 1.8 MTPA in February, 1969 at a further cost of Rs.160.21 crores. In addition Rs.1533.20 crores on other capital schemes including Addition, Modification and Replacement (AMR) schemes and Township, and Rs.1136.27 crores on modernisation of Plant & Technology were also spent upto March 1994.

The main units of the Plant upto 1.8 million tonne stage are Coke Oven, Blast Furnace, Sintering Plant, Steel Melting Shop and Rolling Mill consisting of mainly Hot Rolling Mills and Cold Rolling Mills with various constituent units viz. Blooming and Slabbing Mill, Plate Mill, Hot Strip Mill, Electric Sheet Mill, Electric Resistance Welding Pipe Plant, Spiral Welding Pipe Plant, C.R.Sheets and Strips, Galvanising Lines, Electrolytic Tinning Lines. In addition the plant has a Silicon Steel Mill consisting of Cold Rolled Grain Non Oriented (CRNO) and Cold Rolled Grain Oriented (CRGO) units, a Fertilizer Plant at Rourkela, Captive Iron Ore mines at Barsua and Kalta, Lime Stone mines at Purnapani.

The product mix as envisaged in Detailed Project Report (DPR) and as fixed by the Management (October,1988) after commissioning of Spiral Welding Pipe Plant were as follows :-

Table 1.

(in lakh tonnes)

Product	Quantity as per DPR	Quantity as fixed in Oct'88	Remarks
1. Plates	2.80	2.80	
2. HR sheets, plates & coils	2.00	1.58	
3. CR sheets and strips	2.60	3.12	
4. Hot dip Tin plates	0.50	-	The unit has since been written off.
5. Electrolytic tin plates	1.50	1.50	
6. Galvanised sheets	1.60	1.60	
7. Electrical sheets	0.50	0.35	Capacity reassessed by Consultant(MECON) as 0.35 lakh tonnes.
8. E.R.W. pipes	0.75	0.75	
9. S.W. pipes	-	0.55	
	12.25	12.25	

The working of the Plant from 1970-71 to 1977-78 was discussed in the Report of the Comptroller & Auditor General of India-Union Government (Commercial) 1981 Part-IV. This report appraises the working of the Plant from 1978-79 to 1993-94.

CHAPTER - 2

2. *MODERNISATION OF PLANT AND TECHNOLOGY.*

2.01 The rated capacity of 1.8 MT of steel ingot could not be achieved by RSP due to unstable and unsatisfactory performance of the existing plant and machinery on account of inherent design deficiencies and poor quality of input raw materials and coking coal. This necessitated the modernisation of plant and technology. The study for removing constraints was initially conducted by Metallurgical & Engineering Consultants of India Limited (MECON) during 1984. However, the project report for modernisation of plant was prepared by M/s. M.N. Dastur & Co., the consultant appointed in 1986. The modernisation scheme envisaged augmentation of production capacity of Hot Metal from 1.525 MT to 2 MT, Ingot steel from 1.8 MT to 1.9 MT and saleable steel from 1.225 MT to 1.66 MT per annum. The modernisation also envisaged creation of Raw Material Handling System from manually run to mechanised and setting up of a new Steel Melting Shop. The project was approved by Government in two phases i.e. in July,1988 and October,1989.

2.02 *COST ESTIMATES*

The estimated cost of modernisation as approved by Government in July 1988 and October 1989 was Rs.2461 crores (including foreign exchange (FE) component-Rs.396 crores) which was revised to Rs.3954 crores (FE component Rs.714 crores) in May 1992. The cost over run of Rs.1493 crores was due to increase in price & foreign exchange rate etc. The modernisation scheme was being financed through Steel Development loans, market borrowings, suppliers' credit and internal resources.

2.03 *DELAY IN COMPLETION*

The RSP has taken up modernisation in two phases, the phase-I with the concept of installing facility for creation of mechanised raw material handling system. The phase-II would include rationalisation of production facilities to a limited extent, retiring of open hearth furnace and 50T LD converters, installation of a modern Basic Oxygen Furnace (BOF) in Steel Melting Shop with continuous casting facilities and introduction of new technologies. While approving the proposal for implementation of phase-I in July

1988, the Government indicated a completion schedule of 5 years i.e. by 6th July 1993. However while approving the total modernisation scheme i.e. Phase-I and Phase-II in October 1989, the Government indicated a completion schedule of 66 months i.e. by 11th April,1995, which was shifted to December 1995 and again to August 1996. The Phase-I of the modernisation was completed in March 1994 and the implementation of phase-II was at different stages of completion. The actual expenditure incurred upto 31st March 1994 was Rs.1136.27 crores (FE component - Rs.135.22 crores).

The progress of critical packages of phase-II viz.Sinter Plant-II, Basic Oxygen Furnace (BOF), Continuous Casting Plant-II and Reheating Furnace was not satisfactory. The reasons for delay/ slippages according to Management (December 1994) were inadequate deployment of resources, delay in supply of equipments, slow progress of structural & fabrication work by the contractors.

Although the main thrust of modernisation was on improving productivity, saving in energy consumption, improvement in yield, better quality and updated technology, the actual financial gain would be ascertained only after completion of modernisation.

CHAPTER-3

3. *PRODUCTION PERFORMANCE*

3.01 *PRODUCTION STATISTICS*

The table below indicates the rated capacity for production of ingot/saleable steel, annual target and actual production thereagainst during the years 1978-79 to 1993-94 :-

Table 2 : (Figures in lakh tonnes)

Year	Particulars	Rated Capacity	Annual Target	Actual Production	Percentage of actual production to Rated capacity	Annual Target
1978-79	Ingot Steel	18.00	15.50	13.19	73.28	85.10
	Saleable Steel	12.25	11.70	10.42	85.06	89.06
1979-80	Ingot Steel	18.00	14.40	12.68	70.44	88.06
	Saleable Steel	12.25	11.72	10.45	85.31	89.16
1980-81	Ingot Steel	18.00	14.60	11.65	64.72	79.79
	Saleable Steel	12.25	10.80	9.85	80.40	91.20
1981-82	Ingot Steel	18.00	14.00	12.03	66.83	85.93
	Saleable Steel	12.25	10.80	10 91	89.06	101.02
1982-83	Ingot Steel	18.00	15.30	11.44	63.56	74.80
	Saleable Steel	12.25	11.87	9.92	80.98	83.57
1983-84	Ingot Steel	18.00	10.64	10.88	60.44	102.26
	Saleable Steel	12.25	8.38	8.62	70.37	102.86
1984-85	Ingot Steel	18.00	11.13	11.18	62.17	100.45
	Saleable Steel	12.25	9.40	10.13	82.69	107.77
1985-86	Ingot Steel	18.00	12.70	11.77	65.39	92.68
	Saleable Steel	12.25	10.00	10.05	82.05	100.50
1986-87	Ingot Steel	18.00	11.81	11.00	61.11	93.14
	Saleable Steel	12.25	11.60	11.40	93.06	98.28
1987-88	Ingot Steel	18.00	12.80	11.15	61.94	87.11
	Saleable Steel	12.25	12.00	11.56	94.37	96.33
1988-89	Ingot Steel	18.00	11.90	11.90	66.11	100.00
	Saleable Steel	12.25	11.20	11.68	95.35	104.29
1989-90	Ingot Steel	18.00	12.40	11.70	65.00	94.36
	Saleable Steel	12.25	11.50	11.11	90.69	96.61

1990-91	Ingot Steel	18.00	14.00	12.46	69.22	89.00
	Saleable Steel	12.25	10.60	10.87	88.73	102.55
1991-92	Ingot Steel	18.00	13.30	12.34	68.56	92.78
	Saleable Steel	12.25	10.80	11.25	91.84	104.17
1992-93	Ingot Steel	18.00	13.30	12.57	69.83	94.51
	Saleable Steel	12.25	11.00	11.79	96.24	107.18
1993-94	Ingot Steel	18.00	13.40	11.48	63.78	85.67
	Saleable Steel	12.25	11.75	11.30	92.24	96.17

Note : The graphic presentation of production performance is at Annexure I(i & ii).

The Plant could not achieve the rated capacity either in respect of ingot steel or saleable steel in any year. The production of ingot steel ranged between 60.44% (1983-84) and 73.28% (1978-79) whereas that of saleable steel between 70.37% (1983-84) and 96.24% in (1992-93) of rated capacity.

The loss of contribution (sale price minus variable cost) towards fixed cost and profit due to shortfall in production of saleable steel (18.72 lakh tonnes) during the years 1978-79 to 1993-94 works out to Rs.336.10 crores. The Management attributed shortfall in production to internal and external causes like industrial relations, power & coal shortages and poor quality of raw materials, breakdown etc. The actual loss of production as compared to target during intervening period was 3.81 lakh tonnes. The Management further added that the expanded capacity of 18.0 lakh tonnes could not be attained due to fluctuations in ore quality, variations in the alumina/silicon ratio and failure to create facilities for ore blending at the plant originally i.e. at the time of investing Rs.160.21 crores in 1969.

As per the Ministry (November 1995) the ore bedding or blending facilities could not be provided at the time of expansion from 1.00 MT to 1.80 MT due to lack of operational experience of both the Management as well as indigenous consultants. The said scheme was, however, included in the modernisation scheme to be completed by December, 1995, i.e. after 25 years of expansion. As regards shortage of power, the Ministry further added that against the contractual demand of 90/144 MW from Orissa State Electricity Board (OSEB) the actual supply was around 60 MW. It was also stated that there was serious power restriction during the summer months and various other restrictions were also imposed by the State Government during the balance part of the

year. Further, production in terms of rated capacity can be achieved provided the assumption regarding technology, raw material quality, maintenance of plant and equipment etc., as per Detailed Project Report (DPR) are met with. The capacity utilisation should be compared with base capacity i.e. achievable capacity determined by the consultants based on past optimum performance.

Inspite of the difficulties faced by the Management, installation of Captive Power Plant-II could not be completed earlier due to delay at various stages. It has been noted that only rated capacity and not the base capacity has been indicated in the Performance Budget of Ministry of Steel for 1993-94.

UNIT WISE PERFORMANCE

3.02 *COKE OVEN BATTERIES*

Four coke oven batteries (three batteries with 70 ovens each and the 4th battery with 80 ovens) were commissioned upto February, 1969. The total input capacity of these batteries as per DPR is 23.80 lakh tonnes of coal (dry basis) per annum and these are expected to yield 17.36 lakh tonnes of coke of different sizes. To facilitate the repair programme of the existing batteries without affecting production, an additional half battery (5 A) was commissioned in September 1974 and the remaining half battery in December 1983.

The actual production during the period from 1978-79 to 1993-94 however, ranged between 67.51% (1991-92) and 107.55% (1980-81)of the rated capacity. In 1993-94 the actual production was 76.44% of the rated capacity (Annexure-II).

3.02.01 CAPACITY UTILISATION.

The rated capacity of coke ovens depends upon the number of ovens in operation and the normal coking time as per design, which is 16 hours. The Norms Committee (constituted by SAIL) refixed coking time at 18 hours in 1979. The table below indicates the performance of coke ovens year-wise:-

Table - 3

Year	No. of Ovens in operation per day	Ovens pushed/day			Coking time	Capacity Utilisation	
		Capacity		Actual	hrs./ min		
		*	**			*	**
1979-80	253	380	337	312	19.31	82.1	92.6
1980-81	244	366	325	302	19.25	82.5	92.9
1981-82	248	372	330	315	18.55	84.6	95.4
1982-83	225	337	300	285	18.57	84.5	95.0
1983-84	228	342	304	274	19.56	80.1	90.1
1984-85	236	354	314	297	19.02	83.9	94.6
1985-86	255	382	340	306	19.59	80.1	90.0
1986-87	232	348	309	268	20.51	77.0	86.7
1987-88	228	342	304	281	19.26	82.2	92.4
1988-89	250	375	333	286	20.59	76.3	85.9
1989-90	243	364	324	284	20.33	78.0	87.7
1990-91	238	357	317	268	21.17	75.1	84.5
1991-92	221	329	293	249	21.18	75.7	85.0
1992-93	237	355	316	271	20.50	76.3	85.8
1993-94	248	372	331	278	21.28	74.7	84.0

*** Based on 16 hours coking time as per DPR**
**** Based on 18 hours coking time as per Norms Committee**

Over the years the average pushing of ovens per day had been less than the capacity (as per DPR and also as recommended by Norms Committee) and fluctuated considerably indicating inconsistent performance and low productivity.

The reasons for low productivity were:-

i) Unsatisfactory condition of the battery and the oven machines which had resulted in increase in coking time.

ii) Poor performance of Coal Handling Plant (CHP) due to improper stacking of different grades of coal and their procurement from different suppliers, unsatisfactory working of feeders, conveyors, crushers, mixers and improper blending due to inconsistent working of vibratory feeders.

iii) Problem in Coke handling section like spillage from conveyors, and choking of chutes due to uneven loading of coke on the belt conveyors, irregular and over-sized Blast

Furnace (BF) coke, sometimes much bigger than the required size range of 40-100 mm, very large feed size into the roll crushers, frequent break-down of coke belts & screens and poor maintenance of equipment.

An amount of Rs.33.81 crores was spent on extensive repairs of Coke Ovens during 1978-79 to 1993-94. As per the Ministry (November 1995) the two factors, i.e. ageing of the batteries and poor quality of repairs due to problem of carrying out preventive maintenance and running maintenance of batteries carried out through contractual agencies, were responsible for less number of pushing.

3.02.02. ***YIELD OF BF COKE & GAS.***

The actual yield of BF coke from coal charged ranged between 59.11% (1982-83) and 64.03% (1993-94) against the prescribed norms of 62% (DPR) and 64.5% (Norms Committee) during the years 1978-79 to 1993-94. The actual yield of gas per tonne of coal charged ranged between 253 NM^3 (1981-82)and 287 NM^3 (1991-92) and had been lower than both the DPR and Norms Committee norms in all the years excepting 1990-91 to 1992-93 when it exceeded the norms fixed by the Norms Committee. (Annexure - III).

The shortfall in the yield of coke after taking into account the quality (i.e. excess carbon, ash and volatile content) had also resulted in loss of production of 5.41 lakh tonnes of gross coke valued at Rs.48.21 crores (approx.) during 1978-79 to 1993-94.

The Ministry attributed (November 1995) the shortfall in the yield of coke to inferior and inconsistent quality of coal which had an impact on the performance of coke oven batteries. The Ministry and SAIL have been continuously following up with Ministry of Coal and Coal India Limited to improve quality of indigenous coal. A new Coal Handling Plant costing Rs.65.71 crores has also been included under ongoing modernisation programme to improve coke quality.

However, the fact remains that RSP has been using imported coal (from 1978-79 onwards) with low ash content to partially offset the high ash content of indigenous coal.

3.02.03 *OVEN HOURS WORKED*

The number of hours the coke ovens actually worked during the period was also less than that envisaged in the Project Report (24,48,875) as well as Norms Committee (25,40,400) even after installation of additional Battery as evident from the following table:

Table 4 -

Year	Total Oven Hours			Shortfall in hours with reference to	
	As per Project Report	As per Norms Committee	Oven hours actually worked	Project Report (2-4)	Norms fixed by Norms Committee (3-4)
1.	2.	3.	4.	5.	6.
1980-81	2448875	2540400	2142377	306498	398023
1986-87	2448875	2540400	2035063	413812	505337
1987-88	2448875	2547360	2001089	447786	546271
1988-89	2448875	2540400	2193891	254984	346509
1989-90	2448875	2540400	2129514	319361	410886
1990-91	2448875	2540400	2084823	364052	455577
1991-92	2448875	2547360	1939535	509340	607825
1992-93	2448875	2540400	2078567	370308	461833
1993-94	2448875	2540400	2176198	272677	364202

The number of hours coke oven batteries actually worked declined from 21,93,891 hours in 1988-89 to 19,39,535 hours in 1991-92, though it increased to 21,76,198 hours in 1993-94.

The Management stated that the number of oven-hours worked is very much a function of number of ovens pushed and coking time. Due to increased coking time on account of ageing of Coke Oven Batteries, the number of pushing was less resulting in reduced number of hours the Coke Ovens worked. The fact, however, remains that despite an expenditure of Rs.33.81 crores on capital/ordinary repairs of Coke Ovens the longer coking time could not be reduced.

3.03 *BLAST FURNACES*

3.03.01 *PRODUCTION PERFORMANCE*

The rated production of the 4 blast furnaces was estimated in the Project Report as l6 lakh tonnes per annum (15.25 lakh tonnes of basic grade and 0.75 lakh tonnes of foundry grade) of hot metal. The targetted production of blast furnace was less than the rated capacity and the actual production was even lower than the targetted production except in 1988-89 and 1989-90 as shown in the table given below:-

TABLE 5

(in lakh tonnes)

Year	Rated capa-city	Targetted produc-tion	Actual produc-tion	Percentage of production with reference to	
				Rated capa-city	Targetted produc-tion
1978-79	16.00	14.20	13.24	82.8	93.2
1980-81	16.00	14.20	12.27	76.7	86.4
1986-87	16.00	12.33	12.23	76.4	99.2
1987-88	16.00	12.50	12.12	75.8	97.0
1988-89	16.00	12.50	12.52	78.3	100.2
1989-90	16.00	12.60	12.61	78.8	100.1
1990-91	16.00	14.12	13.25	82.8	93.8
1991-92	16.00	13.60	13.18	82.4	96.9
1992-93	16.00	13.60	12.93	80.8	95.1
1993-94	16.00	13.50	12.05	75.3	89.3

The Management and the Ministry attributed (November 1995) the low production to wide fluctuation in quality of input materials, absence of bedding and blending yard and linking of the plant to the worst quality of iron ore and fluxes. It was further stated that capacity of hot metal has been reassessed by consultants (M/s. M.N. Dastur & Co.) as 14.12 lakh tonnes per annum against 16 lakh tonnes. However, the revision of rated capacity has not been approved by Government.

3.03.02 PRODUCTIVITY

The furnace-wise productivity achieved against the DPR norms is given below:-

Table 6

	(Small furnace)		(Big furnace)	
DPR Norms	**1.01 BF 1 t/m3/d**	**1.01 BF 2 t/m3/d**	**1.01 BF 3 t/m3/d**	**1.04 BF 4 t/m3/d**
Actual				
1980-81	**0.85**	**0.82**	**0.79**	**0.77**
1986-87	**0.69**	**0.80**	**0.80**	**0.72**
1987-88	**0.87**	**0.81**	**0.86**	**0.75**
1988-89	**0.94**	**0.84**	**0.91**	**0.61**
1989-90	**0.94**	**0.93**	**0.91**	**0.75**
1990-91	**0.87**	**0.78**	**0.86**	**0.86**
1991-92	**0.88**	**0.82**	**0.94**	**0.75**
1992-93	**0.84**	**0.83**	**0.95**	**0.72**
1993-94	**0.99**	**0.91**	**0.91**	**0.54**

The productivity of all blast furnaces had all along been less than DPR norms. The productivity of Blast Furnace No.4 has been particularly low in 1988-89 and 1993-94.

The blast furnace productivity is directly related to the coke rate and the wind pressure/volume blown into the furnace. The cold blast pressure, coke rate, wind volume and the furnaces productivity are tabulated below:-

Table-7

Year	Ash Content in Coke percentage	in Kg coke rate per/thm	in Kg Slag rate per/thm	Cold blastpr. cm2	Wind volume 10 Nm3	Productivity t/m3/d
1980-81	26.5	875	584	1.163	3043	0.701
1986-87	23.2	792	451	1.190	3007	0.675
1987-88	23.2	764	442	1.230	3015	0.710
1988-89	22.7	736	396	1.195	2822	0.710
1989-90	22.7	725	367	1.210	2815	0.770
1990-91	22.8	728	404	1.142	2884	0.740
1991-92	23.2	709	354	1.157	2845	0.730
1992-93	23.5	740	379	1.145	2439	0.720
1993-94	23.8	705	362	1.093	2086	0.700

Despite drop in ash content in coke, lowering of coke rate and the slag rate, the productivity of furnaces did not improve correspondingly.

The Ministry stated (November 1995) that the low availability of furnaces was due to inferior and highly fluctuating quality of input raw materials. This resulted in frequent hanging and slippage and high ash coke, with adverse micum values, led to coke mesh and tap hole jamming.

3.03.03 FURNACE UTILISATION

The blast furnaces were operated for fewer hours than envisaged in the DPR (32640 hours) and for fewer hours than the available hours as could be seen from the table below:

Table 8

Year	Total Calendar hours	Actual Capital repairs/ schedule mainte-nance	Total avail-able hours	Delays (Hours)			Total	Furnace Utilisation	
				Mech.	Elec.	Misc		Hours	as %age of available hours
1980-81	35040	2113	32927	373	195	2604	3172	29755	90.37
1986-87	35040	636	34404	207	125	2334	2666	31738	92.25
1987-88	35136	3061	32075	315	217	2918	3450	28625	89.24
1988-89	35040	1291	33749	462	264	4084	4810	28939	85.75
1989-90	35040	3308	31732	273	240	2577	3090	28642	90.26
1990-91	35040	980	34060	244	267	4857	5368	28692	84.24
1991-92	35136	1089	34047	181	313	7252	7746	26301	77.25
1992-93	35040	1086	33954	157	232	8253	8642	25312	74.55
1993-94	35040	2598	32442	151	177	8292	8642	23822	73.43

The total delay of all 4 furnaces increased from 2,666 hrs. in 1986-87 to 8642 hrs. in 1992-93. Further, the furnace utilisation declined from 92.25% in 1986-87 to 73.43% in 1993-94 as compared to available hours due to increase in miscellaneous delays.

As per the Ministry (November 1995) the total delays in all the furnaces had gone up mainly due to operational problems like inferior quality of raw material, coal

quality etc. However, in order to safeguard the furnaces from damages, these had to be kept on reduced wind and low blast resulting in lower utilisation.

3.04 *PIG CASTING MACHINE*

The Plant has two pig iron casting machine each with the capacity of converting 1,600 tonnes of foundry grade hot metal per day (two shifts basis) into pig iron and also to handle surplus hot metal when the steel melting shop is not in a position to take it. However, only a small quantity of pig iron was used by the plant in its foundry and considerable quantity was sold at a price less than the cost of production to outside parties during 1981-82 to 1993-94 resulting in loss of Rs.22.92 crores.

The Ministry stated (November 1995) that the pig iron produced was not fully suitable for consumption in their foundries. Only a part of total production was consumed and balance quantity was sold at a price fixed by Joint Plant Committee. Further, the pig iron was not sold at a loss but there was positive contribution in all the years from the sale of pig iron. The contention of the Ministry is untenable as the total cost of production could not be recovered from the sale proceeds. Therefore, there was a real loss.

3.05 *STEEL MELTING SHOP*

The actual production of ingots in Open Hearth (O.H.) Furnaces and L.D. (Lindz Donavej) converters was below the rated capacity of 2.5 lakh tonnes and 15.5 lakh tonnes per annum respectively in all the years from 1978-79 to 1993-94 (except during 1978-79 to 1980-81 in case of OH Furnaces). The shortfall in production was more in L.D. converters than in Open Hearth Furnace as could be seen from the table below:-

Table 9

(Figures in lakh tonnes)

Year	Budgeted Production			Actual Production			%age of actual production to	
	O.H.	L.D.	Total	O.H.	L.D.	Total	Rated capacity	Budgeted production
1978-79	4.41	11.09	15.50	2.96	10.22	13.18	73.22	85.03
1979-80	3.00	11.20	14.20	3.01	9.67	12.68	70.44	89.30
1980-81	3.00	11.60	14.60	2.68	8.97	11.65	64.72	79.79
1981-82	3.00	11.00	14.00	2.48	9.55	12.03	66.83	85.93
1982-83	3.30	12.00	15.30	2.21	9.23	11.44	63.55	74.77
1983-84	2.27	8.37	10.64	2.14	8.74	10.88	60.44	102.26
1984-85	2.60	11.05	13.65	2.43	8.76	11.19	62.17	81.98
1985-86	2.60	10.10	12.70	2.41	9.35	11.76	65.33	92.60
1986-87	2.80	11.20	14.00	1.98	9.02	11.00	61.11	78.57
1987-88	2.80	10.00	12.80	2.01	9.13	11.14	61.89	87.03
1988-89	2.40	9.50	11.90	2.19	9.71	11.90	66.11	100.00
1989-90	2.45	9.95	12.40	2.38	9.32	11.70	65.00	94.35
1990-91	2.60	11.40	14.00	2.23	10.23	12.46	69.22	89.00
1991-92	2.65	10.65	13.30	2.27	10.07	12.34	68.56	92.78
1992-93	2.65	10.65	13.30	2.19	10.39	12.58	69.89	94.59
1993-94	2.50	10.90	13.40	1.80	9.68	11.48	63.78	85.67

Note: **Rated capacity - 18 lakh tonnes (2.5 lakh tonnes from O.H. Furnaces and 15.5 lakh tonnes from L.D. converters)**

The Ministry stated (November 1995) that lower output and inconsistent quality of hot metal due to poor quality of raw materials has had a direct impact on the production of steel ingots in the Steel Melting Shop.

3.05.01 *FURNACE UTILISATION*

On the basis of 300 working days the four OH Furnaces are expected to work for 28,800 hours. Project Report envisaged that 3 out of 5 LD converters would work at a time for 22,464 hours in a year. The actual number of hours for which OH furnaces and LD converters worked during 1978-79 to 1993-94 was less as per detail given in Annexure-IV (i) & (ii). It would be observed therefrom that the hours worked have always been less than the norms. In fact, hours worked in OH Furnaces declined over the years due to increase in down time hours. As per Management, this was due to operational, mechanical, electrical problems etc. and low availability of other services like oxygen, refractory, crane maintenance, energy economy etc. However, lining life of steel ladles had shown some improvement from 1988-89 onwards. Low life prior to that year

was due to poor quality of refractory bricks and fire clay mortar and low temperature of steel tapped in ladles. The Ministry attributed (November 1995) the lower working hours to high silicon contents in hot metal, poor quality of dolomite, poor quality of refractories and also due to inherent design deficiencies in the lay out of Steel Melting Shop complex. The shortfall in converters was attributed mainly to poor lining life.

3.05.02 *NUMBER OF HEATS TO BE TAPPED DURING THE HOURS WORKED*

The table below compares the number of heats actually tapped with the number of heats that should have been tapped during the hours worked on the basis of the tap to tap time as per DPR (8 hours in case of OH Furnaces and 45 minutes in case of LD Converters) and as per the Norms Committee (8 hours in case of OH Furnaces and 55 minutes in case of LD Converters) for the period upto 1993-94.

TABLE 10

Year	Actual working hours			No. of heats/blows that should have been tapped during the hours worked.			No. of heats blows actually tapped.	
	O.H.	L.D.	Total	O.H.	L.D.		O.H.	L.D.
				As per DPR as well as Norms Committee (8 hrs./ Heat)	As per DPR (45 Mts.) per blow	As per Norms Committee (55 Mts.) per blow		
1978-79	25919	18382	44301	3239.88	24509.33	19980.43	3342	19014
1979-80	26396	17957	44353	3299.50	23942.67	19518.48	3384	17961
1980-81	24545	17076	41621	3068.12	22768.00	18560.87	3031	16700
1981-82	24240	18864	43104	3030.00	25152.00	20540.35	2931	18197
1982-83	23328	18952	42280	2916.00	25269.33	20600.00	2792	18012
1983-84	23859	17394	41253	2982.37	23192.00	18906.52	2506	16650
1984-85	24324	17154	41478	3040.50	22872.00	18645.65	2727	16393
1985-86	23887	17594	41481	2985.87	23458.76	19123.91	2657	17723
1986-87	22185	19794	41979	2773.12	26392.00	21515.22	2369	17072
1987-88	20640	17957	38597	2580.00	23942.67	19518.48	2449	16752
1988-89	19779	17642	37421	2472.37	23522.67	19176.09	2495	17667
1989-90	20353	17035	37388	2544.12	22713.33	18516.30	2726	17041
1990-91	19272	18459	37731	2409.00	24612.00	20064.13	2562	18326
1991-92	20454	18092	38546	2556.75	24122.67	19665.22	2592	17842
1992-93	19686	18097	37783	2460.75	24129.33	21397.83	2562	17558
1993-94	18690	16851	35541	2336.25	22468.00	18316.34	2247	15703

The Management attributed the shortfall in number of heats to fluctuating quality of raw materials, unstable operation and unfavourable quality of hot metal produced and abnormal fluctuation in the calorific value of fuel etc.

The Ministry stated (November 1995) that higher tap to tap time was mainly due to longer duration of heat processing for refining hot metal with higher silicon content, low temperature of hot metal and poor quality of limestone.

The efficiency in tap to tap time could have been improved by the Management by using quality raw materials and proper planning to ensure stable operation of Blast Furnace.

3.05.03 *LOSS OF HOT METAL IN TRANSIT*

The actual handling loss of hot metal in transit ranged between 4.24% (1986-87) and 8.60% (1990-91) as against the norm of 2.5% laid down by Norms Committee. The loss due to poor handling resulted in an extra loss of Rs.45.98 crores even after giving credit for scrap arising out of excess loss upto 1993-94. (Annexure V).

The Ministry stated (November 1995) that higher handling loss was mainly due to lower hot metal temperature and higher slag carry over. The handling loss consisted of two portions viz.skull loss in hot metal ladles and mixer loss at the mixers. The abnormal increase in handling loss since 1987-88 was due to change in reporting system i.e. taking hot metal produced at BFs as hot metal production as against the earlier system of hot metal supplied to SMS. Due to the new system, the hot metal which got solidified as skull in the ladle added to the transit loss.

3.05.04 ***METALLIC YIELD***

According to the project report, metallic yield (the ratio of metallic output to input) was as follows :-

Table 11

(Quantity in lakh tonnes)

	Metallic input	Output in terms of rollable ingot steel	Percentage of column 3 to 2
1.	2.	3.	4.
L.D.Converters	17.574	15.500	88.20
Open Hearth Furnace	2.742	2.500	91.17

However, the actual yield ranged between 80.87% (1982-83) and 84.04% (1988-89) in case of LD converters and 85.56% (1981-82) and 89.23% (1988-89) in case of OH Furnaces. The lower yield in terms of short recovery of steel worked out to 2.83 lakh tonnes valued at Rs.267.72 crores (approx.) during 1978-79 to 1993-94 as per details given in Annexure-VI.

According to the Management since the proportion of scrap and hot metal and quality of hot metal used was not as per the DPR norm, the metallic yield can not be equal to Project Report norm. Therefore, it would not be correct to compare metallic yield with DPR norm and calculate the resulting loss.

The Ministry stated (November 1995) that metallic yield had been adversely affected on account of higher silicon content in hot metal and poor quality of lime. Further, low temperature of hot metal resulted in lower levels of scrap consumption than envisaged in DPR. The low metallic yield was mainly due to lack of ore bedding facility which could not be provided due to paucity of funds.

The fact remains that low matallic yield resulted in short recovery of steel valuing Rs.267.72 crores.

3.06 *ROLLING MILLS*

3.06.01 The Rolling Mills complex consists of mainly Hot Rolling Mills and Cold Rolling Mills with various constituent units.

The Rolling Mills have been designed to produce 1.225 million tonnes of saleable steel out of ingot steel input of 1.8 million tonnes; the remainder representing scrap, burning and scale losses.

The actual production of saleable steel over the years was as under:-

Table 12

(Figures in lakh tonnes)

Year	Rated Capacity	Annual Target	Actual Production	%age of actual production to	
				Rated Capacity	Annual Target
1978-79	12.25	11.70	10.42	85.06	89.06
1987-88	12.25	12.00	11.56	94.37	96.33
1988-89	12.25	11.20	11.68	95.35	104.29
1989-90	12.25	11.50	11.11	90.69	96.61
1990-91	12.25	10.60	10.87	88.73	102.55
1991-92	12.25	10.80	11.25	91.84	104.17
1992-93	12.25	11.00	11.79	96.24	107.18
1993-94	12.25	11.75	11.75	92.24	96.17

Actual production ranged between 70.37% (1983-84) and 96.24% of the rated capacity and 83.57% (1982-83) and 107.77% (1984-85) of annual target.

3.06.02 *YIELD*

The yield from ingot to the finished product varied considerably over the years (from 1978-79 to 1993-94) as summarised below:-

Table 13

Minimum & Maximum yield

(in percent)

Product	Minimum yield (year)	Maximum yield(year)	Difference between Min.& Max.
Slabs	83.7 (83-84)	85.2 (85-86)	1.5
Plates	69.8(83-84)	75.3(91-92)	5.5
H.R.Coils	80.1(80-81)	81.6(89-90)	1.5
H.R.Si.Sheets	51.9(86-87)	58.2(1985-86)	6.3
E.R.W.Pipe	68.1(93-94)	72.6(79-90)	4.5
S.W. Pipe	71.1(78-79)	75.8(88-89)	4.7
C.R. Sheets	60.9(80-81)	68.4(78-79)	7.5
Galv. Sheets	67.3(80-81)	72.1(85-86)	4.8
E.T.P.	57.3(84-85)	60.6(78-79)	3.3

The wide variance in the yield indicates that controls necessary to increase the yield were not being applied.

The Ministry attributed (November 1995) the lower yield to quality of iron and steel, number of stages of processing from ingot to ultimate products, physical dimension of the products, campaign sizes and trimming allowance. Further, there were severe imbalances in the availability of power from the State grid between 1980-81 to 1986-87.

Mill-wise rated capacity, annual target and actual production are given in the succeeding paras. Notable features of performance of individual mills are as under:-

HOT ROLLING MILLS (HRM)

3.06.03 *BLOOMING AND SLABBING MILL*

The mill could neither produce the rated capacity nor meet the annual target in any of the years (except in 1984-85, 1988-89 and 1992-93). The production

varied from 60.3% (1983-84) to 74.2% (1992-93) as compared to rated capacity (Annexure-VII(a)). The Ministry stated (November 1995) that production depends upon the steel availability. This was further augmented with rolling of cold steel which again depends upon energy balance obtained at that point of time.

3.06.04 *PLATE MILL*

The mill did not attain the rated capacity in any of the years (except in 1981-82 and 1991-92). The actual production ranged between 85.8% (1984-85) and 100.4% (1981-82) of the rated capacity. The mill also could not achieve the targetted production in any year (Annexure-VII(b)). The operating indices of mill are given below:-

Table 14

	Slab input tonnes	Prodn.of plates tonnes	Yield(%) prime	Yield(%) Total	Available Hours	Utilisation Hrs.	Utilisation %	Spl.Consmp./t Heat 10^3 Kcal
1980-81	314,760	263,899	78.6	83.8	7002	4336	61.9	761
1986-87	305,276	262,111	80.9	85.9	7111	4156	58.4	599
1987-88	279,510	239,116	79.5	85.5	7340	3909	53.3	667
1988-89	298,234	254,151	80.2	85.2	7312	4185	57.2	656
1989-90	292,357	255,443	82.2	87.4	7200	4081	56.7	663
1990-91	301,127	262,241	81.3	86.8	7315	4155	56.8	605
1991-92	315,970	280,483	83.3	88.8	7256	4402	60.7	569
1992-93	290,082	253,491	79.6	87.4	7272	4043	55.6	576
1993-94	297,539	257,496	78.5	86.5	7328	4064	55.5	558

It is observed that while the yield was generally as per the norms, the mill utilisation varied between 53.3% (1987-88) and 61.9% (1980-81) and the heat consumption averaged 6,37,000 K Cal/t against the norms of 4,80,000 K Cal/t.

The Ministry attributed (November 1995) the lower utilisation of the mill to severe imbalance in the quality of material and availability of power from the State grid.

3.06.05 *HOT STRIP MILL (HSM)*

The Mill did neither produce to its rated capacity nor achieve the annual target in any of the years excepting 1992-93 (AnnexureVII-c) though the mill was modernised at a cost of Rs.29.69 crores in August, 1980. The Management attributed lower production to unprecedented power shortage during the period 1980-81 to 1986-87 from State grid. The operating indices for the HSM are given below:-

TABLE - 15

	Slab input t	HR Coil produ-ction. t	Yield %	Defe-ctive/ Salv-. aged %	Avail-able Hrs.	Utilisation Hrs.	%	Coil output t/hr.	Sp. Consump./t Heat 10^3Kcal	Elec. KWh
1980-81	630,216	600,251	95.2	1.73	6549	3369	51.4	187	643	139
1986-87	673,215	642,512	95.4	1.53	7416	3575	48.2	188	566	127
1987-88	738,358	704,047	95.3	1.75	7233	3943	54.5	187	571	127
1988-89	842,111	804,809	95.6	1.64	7255	4215	58.1	200	520	126
1989-90	831,637	797,000	95.8	1.27	7320	4343	59.3	191	549	129
1990-91	829,514	794,289	95.8	1.27	7277	4276	58.8	194	481	132
1991-92	849,720	810,678	95.4	1.57	7234	4350	60.1	195	498	121
1992-93	965,676	922,702	95.5	1.26	7322	4809	65.7	201	484	111
1993-94	824,973	790,007	95.8	1.42	7464	4367	58.5	181	520	116

The average yield achieved is about 95.6%. However, the mill utilisation has been low and varied between 48.2% in 1986-87 to 65.7% in 1992-93. The incidence of defective/salvaged plates ranged between 1.27% in 1990-91 to 1.75% in 1987-88 but decreased to 1.26% in 1992-93. The coil output had an average of about 192 t/per hr. during last 8 years which is lower than the mill capacity.

The Ministry attributed (November 1995) the lower utilisation to poor quality of voltage frequency in OSEB system. Further, with the voltage fluctuating beyond threshold limit, the high tension drives of Mill tripped resulting in power delays.

3.06.06 *ELECTRIC SHEET MILL (ESM)*

The unit was installed in 1968 with the DPR capacity of 50,000 tonnes per annum of hot rolled electrical sheets of transformer and dynamo grades. The capacity of the mill was subsequently reassessed as 35,000 tonnes per annum by the consultants

(MECON) in December,1976. The production of electric sheets was low in all these years as compared to its rated capacity (Annexure VII-d). The operating indices for ESM are given below:-

Table-16

	Rated cap. tonnes	ESM prod. tonnes	Def./ salv. %	Stick-ers %	Utilisation Hot Mills %	Neviges Fces %	OFU Fces %	Sp.Consumption/ton Heat 10^3 Kcal	Elec. KWh
1980-81	35,000	19,457	7.1	NA	62.9	33.8	79.5	2576	277
1986-87	35,000	16,001	3.2	5.7	53.8	13.3	77.7	2563	313
1987-88	35,000	18,147	4.8	9.6	65.8	31.7	89.9	2602	370
1988-89	35,000	19,662	4.1	9.8	70.5	44.1	89.4	2489	367
1989-90	35,000	16,591	2.6	4.0	66.9	28.8	89.1	3188	335
1990-91	35,000	18,349	2.1	15.3	64.1	24.4	88.7	2667	290
1991-92	35,000	17,263	1.0	11.9	66.3	30.6	90.7	3089	358
1992-93	35,000	19,004	1.2	15.3	69.5	44.3	93.2	2332	285
1993-94	35,000	18,266	1.0	10.8	64.1	8.6	83.4	3643	298

According to the Ministry (November 1995) as against the provision of 2 finishing strands from December, 1976 only single strand was operated due to poor order position. The comparison would be more realistic if the capacity of 25,000 tonnes was considered.

Further, utilisation of the hot mills and neviges furnaces was low, the incidence of defectives/salvaged & stickers though decreasing had been high (due to low calorific value of gas and power failure) and specific consumption of heat and electricity were on high side (due to repeated power interruption).

3.06.07 *ELECTRIC RESISTANCE WELDING PIPE PLANT (ERWPP)*

The Plant neither produced to its rated capacity nor achieved the annual target in any of the years except in 1989-90, 1991-92 & 1992-93. The production varied between 37.4% (1984-85) and 68.1% (1979-80) of the rated capacity. However, there was a marked increase in the power consumption in the unit from 1987-88 as could be seen from Annexure VIII(a & b).

The Management attributed poor production to fluctuating market situation and processing of different sizes and quality of pipes. The Ministry attributed (November 1995) the increase in power consumption from 1987-88 to introduction of Steam Normalising facilities for meeting the stringent quality requirements from API grade pipes.

3.06.08 ***SPIRAL WELDING PIPE PLANT (SWPP)***

The Plant never achieved the rated capacity during the years from 1978-79 to 1993-94 with production ranging between 49.1% (1983-84) and 87.3% (1990-91). It will be observed from the details given in Annexure IX(a & b) that :-

i) the yield of pipes declined from 95.3% (1989-90) to 88.6% (1993-94);

ii) the mill utilisation was lower as compared to available hours;

iii) the mill suffered heavily due to material shortage during 1983-84 to 1985-86 and due to power shortage during 1984-85 and 1985-86.

iv) the power consumption increased over the years; and

v) the rate of rejection of pipes by quality control unit increased from 0.15% in 1978-79 to over 1% in subsequent years excepting the years 1979-80 (0.40%), 1980-81 (0.66%), 1991-92 (0.89%) and 1993-94 (0.67%).

The Management attributed low production to lack of sufficient orders for large diameter pipes, numerous changes and processing of SLX 60 grade of API steel against order conforming to exceptionally stringent quality parameter.

According to the Ministry (November 1995) the plant had been producing higher diameter pipes with higher wall thickness which need more power. Further, exclusion of pipe and cutting from production has resulted in increase in rejections.

3.06.09 ***COLD ROLLING MILLS (CRM)***

The products of the Mills comprise CR (Cold Rolled) Sheets and Strips, Galvanised sheets and Electrolytic tinning lines.

The actual production in CR Sheets and Strips units was less than 67% of the rated capacity in all the years. The production of Galvanised sheet was also less than the rated capacity in all the years (except 1979-80 and 1989-90) and ranged between 55.6% (1986-87) and 96.9% (1990-91). The production in Electrolytic tinning lines units was very low and ranged between 10.7% (1990-91) and 50.7% (1988-89) of the rated capacity (Annexure-X). The Management attributed the lower production to shortage of material, power, mechanical, electrical and operational problems, and constraints in availability of equipment for Galvanised sheets.

The Ministry attributed (November 1995) the lower production to wide fluctuations in demand owing to availability of other substitutes.

3.06.10 ***SILICON STEEL MILL (SSM)***

To minimise the import of CRGO (Cold Rolled Grain Oriented) and CRNO (Cold Rolled Non-Oriented) steel to save foreign exchange, CRNO and CRGO units were commissioned with capacity of 36,000 and 37,500 tonnes per annum respectively. The total cost of both the project was Rs.178.18 crores as on 31 March 1994.

i) ***CRGO (COLD ROLLED GRAIN ORIENTED).***

The CRGO Plant was commissioned in April,1989 at a cost of Rs.87.48 crores with a rated capacity of 37500 tonnes of CRGO steel. However, the production of CRGO steel was discontinued from December,1989 as during the trial run several problems cropped up such as decarb line, carlite line etc. As per Management CRGO unit was yet to stabilise and within a short period they would be able to overcome the trouble.

The fact remains that CRGO unit (costing Rs.87.48 crores) remained idle from the date of commissioning (i.e. April, 1989) onwards. As per the Ministry (November 1995) commissioning and stabilisation of CRGO unit had taken considerably longer time due to steep learning curve because of the highly technical know-how involved. The CRGO Unit did not remain idle as the actual production during 1991-92 and 1992-93 was 3040 & 400 tonnes respectively. However, during 1993-94, the actual production was 370 tonnes only though the Plant planned to produce 5000 tonnes.

(ii) ***CRNO (COLD ROLLED NON ORIENTED)***

The CRNO unit was commissioned in October 1984 at a cost of Rs.90.70 crores. It started production from October, 1984. The actual production of non-oriented steel was less than the rated capacity of 36000 tonnes of CRNO steel in all the years (except 1992-93) and ranged between 18.4% (1985-86) and 92.0% (1993-94) (Annexure XI). The Management attributed low production to non availability of power, problems in secondary steel making affecting steady input materials and logistic problems in pit head.

According to the Ministry (November 1995) marketability problems due to recessionary trends in Electric Motor Industry had affected the market demand resulting in stock piling of CRNO and consequent backlash on production.

CHAPTER 4

4. *FERTILIZER PLANT*

i) The plant was commissioned in November 1962 with a designed capacity to produce 5.60 lakh tonnes of Calcium Ammonium Nitrate `CAN' (with 20.5% Nitrogen) to gainfully make use of hydrogen from coke oven gas and surplus nitrogen from Oxygen Plant. In 1969,after seven years of commissioning it started producing enriched fertilizer having 25% nitrogen. Keeping this in view, its rated capacity was fixed at 4.60 lakh tonnes per annum. As the actual supply of coke oven gas was insufficient, a Naptha Reforming Plant-I (NRP-I) was installed in 1968 to produce synthetic gas so as to meet 40% of the requirement of hydrogen gas. Since the available coke oven gas and utilisation of Fertilizer Plant was still poor (ranging from 40 to 43%) Naptha Reforming Plant-II(NRP-II) was commissioned in November 1980 at a total cost of Rs.17.75 crores to supplement the supply of synthetic gas.

(A) It was observed that before commissioning of NRP-II the production of CAN from NRP-I ranged between 28.32 percent (1980-81) and 33.83 percent (1978-79) whereas it ranged between 15.9 percent (1982-83) and 48.3 percent (1984-85) after its commissioning.

The Management attributed lower production to power shortage and repeated power interruptions during the period from 1980-81 to 1986-87.

ii) Inspite of modification of Ammonia Synthesis Loops (March,1982) at a cost of Rs.3.44 crores and installation of NRP- II (November,1980), at a cost of Rs.17.75 crores, the production of Fertilizer Plant did not improve and ranged between 19.1% (1982-83) and 71.7% (1993-94) of the rated capacity (Annexure XII). The actual working hours were also less than the standard hours fixed by the Designers and accepted by the Management.

Due to low production the cost per tonne of CAN was more than the net sales realisation in all the years from 1979-80 to 1993-94, the loss ranging between Rs.37 (1979-80) and Rs.2,791 (1982-83) per tonne.

The Management attributed the shortfall to a) inadequate supply of coke oven gas from Coke Oven Batteries b) Inadequate supply of Nitrogen, c) Power failure/restrictions, d) Shortage of Naptha and e) Synchronisation problem between Nitrogen availability and other inputs.

It was, however, noticed that during the period in question, 901032 tonnes nitrogen were also bled out (refer - para 6.04).

According to the Ministry (November 1995) the assumptions on which the viability of the Fertilizer Plant was based, have obviously not been realised i.e. availability of coke oven gas in sufficient quantities and uninterrupted power for processing. The economic viability of Plant was further affected due to changes in Government policy vis-a-vis retention prices for CAN. Recently, RSP had submitted a proposal to Government to derate the capacity.

iii) The actual consumption of Ammonia and Nitric Acid per tonne of CAN (25%) was more than norm during 1978-79 to 1993-94 as per details given in Annexure - XIII. The excess consumption amounted to Rs.23.87 crores upto 1993-94.

The Management attributed the excess consumption to low load operation and frequent system disturbances. However, with the commissioning of Captive Power Plant-II, (CPP-II) the overall position of power supply has improved.

iv) The value of excess consumption of Coke Oven gas during 1978-79 to 1986-87 as compared with the norm fixed by the Designer and that accepted by the Management was Rs.7.61 crores and Rs.1.39 crores respectively. There was no supply of Coke Oven gas during 1987-88 to 1993-94. The value of excess consumption of Crude Naptha was Rs.28.67 crores during 1978-79 to 1993-94.

The Management/Ministry attributed (November 1995) higher consumption of Gas, Naptha and Power to low load operation, frequent power interruption, poor availability of Coke Oven gas, very low percentage of Hydrogen in Coke Oven gas, low supply pressure of Screw compressor, compressing Coke Oven gas to Fertilizer Plant and inadequate supply of and impurities in Nitrogen obtained from Tonnage Oxygen Plant.

v) The Fertilizer Plant earned profits, during 1978-79 to 1980-81 and thereafter it has continuously been incurring losses except in 1993-94 when it earned a net profit of Rs.158.40 lakhs. The accumulated loss as on 31st March 1994 amounted to Rs.169.59 crores.

According to the Ministry (November 1995) the loss was because CAN was taken out of price control from 1980-81 to 1983-84 and again in 1990-91 and 1991-92, which affected the profitability.

CHAPTER - 5

5. *SOURCES OF RAW MATERIAL*

The RSP obtains iron ore and limestone from its captive mines.

5.01 IRON ORE

The requirement of iron ore is mainly met from the mines of Barsua (fully mechanised) and Kalta (manually operated). The total requirement of iron ore received from captive mines and the procurement made from outside sources over the years is given below:-

Table 17

(Figures in tonne)

Year	Annual planned production		Actual Receipt from Captive Mines		Purchased
	Lump	Fines	Lump	Fines	Lump
1.	2.	3.	4.	5.	6.
1980-81	1987000	-	854386	561510	721410
1986-87	1425000	561600	1048427	672186	357459
1987-88	1253500	712000	932040	719520	371980
1988-89	1363000	798500	1010569	748472	320132
1989-90	1234000	897000	1003609	897339	231878
1990-91	1201000	1184000	898772	1138390	167988
1991-92	1388000	1051000	899194	1031098	140167
1992-93	1275000	1050000	896606	1011100	228900
1993-94	1315000	1050000	783500	963700	194200

Due to low production of lump, the Plant procured iron ore lumps from outside sources during 1978-79 to 1993-94 which resulted in an extra expenditure of Rs.711.36 lakhs.

The Ministry stated (November 1995) that purchase of high grade iron ore lumps from outside sources was necessitated due to inability of Barsua Iron Ore Mines to produce high grade Iron Ore (as per DPR norms) and poor off-take of fine ore therefrom.

5.01.01 *BARSUA MECHANISED MINE (BIM)*

The rated capacity (revised) of BIM (fully mechanised) is 20.16 lakh tonnes per annum. The actual production of iron ore lumps & fines was less than the rated capacity in all the years from 1978-79 to 1993-94.The actual production as compared to Budgeted production has come down especially in 1992-93 and 1993-94 (Annexure XIV).

The Management attributed lower production of lump to inferior quality of lump at BIM and inadequate maintenance of mining machines, delayed/non-supply of spares and constant power failure.

Due to low production of iron ore, the cost of production of lump ore and fines had increased as compared to standard cost except in 1984-85, 1990-91 and 1991-92.

The actual cost of ore produced from captive mines varied between 93.2% (1984-85) and 143.6% (1982-83) in the case of lump ore and 95.55% (1990-91) to 148.1% (1982-83) in the case of fines when compared with the standard cost.

The Ministry stated (November 1995) that with the lower production, the fixed cost per tonne increased resulting in increased in the total cost of production.

5.01.02 *BENEFICIATION PLANT*

A Beneficiation Plant was installed (1970) at Barsua at a cost of Rs.4.09 crores to improve the quality of iron ore by increasing the Fe content in lump ore by 1 to 1.5 percent and in fines by 3 to 4.5 percent. The table below indicates the quantity of iron ore washed in the plant:-

Table 18

Year	Quantity washed (in lakh tonnes)	
	Lump	Fines
1978-79	2.02	2.40
1979-80	2.07	2.24
1980-81	1.87	1.81
1981-82	1.31	1.32
1982-83	2.19	1.79
1983-84	2.80	2.31
1984-85	1.57	1.56
1985-86	1.38	1.40
1986-87	2.43	2.39
1987-88	2.56	2.87
1988-89	2.48	3.32
1989-90	2.39	2.90
1990-91	1.30	1.60
1991-92	1.81	2.19
1992-93	1.56	3.91
1993-94	2.41	3.41

The actual quantity of washed lump during 1978-79 to 1993-94 ranged between 1.30 lakh tonnes (1990-91) and 2.80 lakh tonnes (1983-84) and fines between 1.32 lakh tonnes (1981-82) and 3.91 lakh tonnes (1992-93) as compared to rated capacity of 4.22 lakh tonnes and 4.85 lakh tonnes respectively. Thus the rated capacity of Beneficiation Plant was under-utilised and RSP could not derive the full return from the investment of Rs.4.09 crores.

The Management attributed the under utilisation of the plant to lower availability of power, low off-take, quality of ore, continuous teething problems at classifier and launder circuits due to design deficiencies and lack of co-ordination.

5.01.03 *KALTA IRON ORE MINES*

The Kalta Iron Ore Mines (manually operated) had a reserve of 102.68 million tonnes of mineable Iron Ore. The actual raising of Iron Ore in mines was less than the budgeted production during 1978-79 to 1983-84, 1986-87 and 1987-88 (Annexure XV).

The Management attributed the fall in production to i) transfer of 146 PRWs (Piece Rated Workers) from the mines to Plant and ii) Industrial relation problems for 9 months during 1982-83 and strike for one month (December'87 to January'88).

The budgeted production seems to have been fixed on the lower side as even after achieving the target continuously from 1989-90, the Plant had to procure Iron ore (63.93 lakh tonnes) from outside sources in all the years under review.

5.02 *LIME STONE*

Lime stone required for the production of hot metal is obtained from captive mines at Purnapani. The actual production of low grade lime stone at Purnapani Limestone and Dolomite Quarry (PLDQ) required for use in Blast Furnace was less than the rated capacity during all the years from 1978-79 to 1993-94 (Annexure XVI). However, the actual production declined gradually from 5.85 lakh tonnes in 1988-89 to 3.33 lakh tonnes in 1993-94.

The Ministry stated (November 1995) that the mines have consistently supplied limestone as per the requirement of the plant except for few years when massive development work was undertaken for improving quality.

CHAPTER - 6

6. *SERVICES AND FUEL*

6.01 In addition to raw materials and refractories, different units of the steel plant require various types of services and fuel for the production of iron and steel. Some of the important services required are steam, electricity, oxygen, compressed air, water and air blast. The fuel requirements comprise gases like coke oven gas and blast furnace gas and liquid fuel such as coal tar fuel (pitch creosote mixture) benzene, naptha and furnace oil. For the production of some of these services & fuel, separate units have been set up in RSP, while other items are produced as concomitants of the regular operation of certain other units of the Steel Plant. The production and consumption of important services and fuel are discussed in the succeeding paragraphs.

6.02 *STEAM*

High pressure steam is required for the captive power plant and for the turbo blowers which supply air to the blast furnaces. The requirement is met from six steam boilers of 125 tonnes (nominal continuous rating) capacity per hour of steam.

The steam boilers were designed to use blast furnace gas, coke oven gas and small size coke/coal as fuel. However in actual practice these fuels were seldom used and instead, costly fuel like furnace oil was used. The consumption of costly fuels resulted in extra expenditure to the extent of Rs.84.86 crores from 1978-79 to 1993-94.

According to the Management, as the supply of blast furnace gas and mixed gas was much below the requirement, usage of costly fuel like furnace oil was inevitable.

The Ministry added (November 1995) that with judicious energy management even with low gas availability, furnace oil consumption had been brought down in 1992-93

6.03 *ELECTRICITY*

The peak requirement of electricity for steel Plant (including Fertilizer Plant and the Township) was estimated at 156 MW. A maximum of 55 MW was to be supplied by the Hirakud grid of Orissa State Electricity Board and balance 101 MW to be met from the

Captive Power Plant, having a capacity of 128 MW, installed at a cost of Rs.10.55 crores. The Captive Power Plant-I has 5 generators of the capacity of 25 MW each, out of which four are expected to work at a time and the fifth is to serve as a standby. In addition there was a Back Pressure (BP) set of 3000 KW and two emergency diesel sets of 500 KW each. Besides these, two medium pressure boilers were also commissioned, one in April 1978 and the other in July 1978 to improve the generation of electricity by 15 MW.

Considering the load requirements including expected further requirement of additional units such as Silicon Project, Slag Granulation Plant, additional Coke Oven Batteries, Naptha Reforming Plant-II, and the modernisation of the existing facilities, another Captive Power Plant-II having two units of 60 MW each was installed at a cost of Rs.185.81 crores (March, 1989).

The generation of CPP-I during 1978-79 to 1991-92 did not improve even after the commissioning of medium pressure boilers (April,1978). On the contrary, it decreased steadily from 64.192 MW (1978-79) to 20.550 MW (1993-94) (Annexure XVII). Further, the actual consumption of steam per MWH of electricity generated during 1979-80 to 1993-94 was more than the projected norm which resulted in extra expenditure of Rs.25.15 crores.

The Ministry attributed (November 1995) the excess consumption of steam to aged power plant and the quality of fuels available and added that the generation of CPP-I had to be curtailed to make available steam for running the Turbo Blowers for operation of Blast Furnaces. Medium Pressure boilers were installed for meeting the requirement of factory steam.

However, the Medium Pressure boilers were installed with the main objective of increasing the generation by 15 MW.

6.04 *OXYGEN & NITROGEN*

The actual production of oxygen and nitrogen from the Oxygen Plant was below the rated capacity as per details given in Annexure XVIII (i & ii). The actual consumption was even less than the production and as a result substantial quantities of oxygen valuing

Rs.19.59 crores and nitrogen valuing Rs.29.73 crores (taking variable cost) were bled out during the period from 1978-79 to 1993-94.

As per Management, bleeding of oxygen as a percentage of production had been progressively coming down. Further, keeping in view the requirement of oxygen and generation facilities, it was not possible and was not considered logistically expedient to reduce the generation of oxygen. As regards nitrogen, it is only an arising in the process of oxygen recovery from air and to the extent not required by the plant, it has to be necessarily bled.

According to the Ministry (November 1995) poor power situation during the period under review upto 1986-87 and repetitive power interruption caused an imbalance between production and supply.

It was however, noticed that even after improvement of power situation from 1987-88, there was no marked reduction in the bleeding of oxygen and nitrogen.

6.05 FUEL

All the units of the steel plant which consume fuels for operation, use gas as principal fuel. Gas is a by-product of coke oven and blast furnaces.

The production of coke oven gas and blast furnace gas used in all the units of the plant, was less than that envisaged in the Project Report during all the years from 1978-79 to 1993-94.

The shortfall in production of coke oven gas was attributed by the Management to lower volatile matter in the incoming coal and bad oven condition. The oven condition was to some extent improved in 1987-88 after rebuilding and repairs. The actual production of blast furnace gas was less due to improvement in the operation of blast furnaces resulting in lower coke rate.

The reply of the Management is not tenable since inspite of rebuilding and repairs, the production of coke oven gas was less than project report norms during 1990-91 to 1993-94 also. The plant incurred an expenditure of Rs.33.81 crores towards repair of coke oven batteries during the period 1978-79 to 1993-94. Besides this, one additional half

battery was also commissioned on 27th December, 1983 as a standby to take care of production during repair. Still the production of coke oven gas did not improve.

According to the Ministry (November 1995) production of coke was also limited to its requirement by B.Fs due to reduction of coke rate.

Lower requirement of coke in B.Fs was due to lower capacity utilisation in blast furnaces.

The calorific value of coke oven gas and blast furnace gas was also less than the DPR norms. The value of shortfall in production of coke oven gas in terms of heat energy during 1978-79 to 1993-94 works out to Rs.227.11 crores and Rs.40.81 crores with references to project norms and norms fixed by the Norms Committee (1979) respectively. In respect of blast furnace gas, the shortfall works out to Rs.694.58 crores with reference to project norms.

According to the Management, calorific value of coke oven gas is controlled by inert component i.e. Nitrogen. Due to bad oven condition in Battery-2B, 3, 5A & 4, oven sealing was not proper resulting in air-filteration in ovens which brought down the calorific value of coke oven gas. After oven conditions improved, there was significant improvement in calorific value. In 1987-88 coke oven gas yield against the norms fixed by Norms Committee, (275 NM^3/tonne of dry charge) was more or less equivalent to norms for 1978-79 (272), 1979-80 (274), 1980-81 (274), 1985-86 (271) 1986-87 (271) and 1988-89 (273). With the ageing of the batteries and the quality of coal it was not technologically possible to maintain project report norms.

However, overall energy consumption (Gega Calories) per tonne of Crude Steel has been decreasing though it increased slightly during 1993-94, as may be seen from the data given below :-

Year	**Consumption of energy per tonne of crude steel (in Gega Calories)**
1989-90	10.23
1990-91	10.05
1991-92	9.99
1992-93	9.83
1993-94	10.17

CHAPTER - 7

7. *BY PRODUCTS & OTHER ARISINGS.*

7.01 To recover valuable chemicals from crude coke oven gas and also to remove harmful and corrosive ingredients, a by-products Plant was installed at a cost of Rs.14.58 crores.

The actual yield of principal by-products viz. Crude Tar, Crude Benzol and Ammonia Sulphate during 1978-79 to 1993-94 (except Crude Tar for 1978-79) was less than the DPR norms as well as norms fixed by the Norms Committee (1979) as per details given in Annexure XIX.

The Management stated that the screw compressors were not in operation due to shortage of coke oven gas for Fertilizer Plant. The benzol recovery unit in MTP was also not in operation for the same reasons.

As per the Ministry (November 1995) the recovery of crude benzol was less due to lower supply of coke oven gas to Fertilizer Plant which was totally stopped from 1986-87. The actual yield of crude benzol was, however, more during 1988-89 to 1993-94 than that in earlier years (1980-81 to 1987-88).

7.02 *NAPTHALENE PLANT*

The actual production of hot pressed and brown napthalene in Napthalene Plant was much less than the rated capacity in all the years from 1978-79 to 1993-94. The Ministry attributed (November 1995) less recovery of napthalene to low availability of coke oven gas.

7.03 *OTHER ARISINGS*

The arisings of steel scrap in the Steel Melting Shop during 1978-79 to 1993-94 ranged between 4.9 percent (1978-79) and 10 percent (1984-85) as against the DPR norms of 2 percent. The stock of iron and steel scrap as on 31st March 1994 was 0.49 lakh tonnes.

As per the Ministry (November 1995) the arisings of scrap at SMS had come down over the years from about 8% in 1980 to around 5% in 1990

CHAPTER - 8

FINANCIAL PERFORMANCE

The financial performance of the Plant during the last six years ended 31 March 1994 is given below :-

Table - 19

(Rs.in crores)

	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94
Net Sales	1156.69	1222.58	1289.10	1430.75	1592.43	1723.92
Cost of Sales	1057.75	1167.53	1246.39	1416.37	1548.14	1720.51
Percentage of cost of Sales to Net Sales	91. 4	95. 5	96.7	99.0	97.2	99.8
Net Profit	98.93	55.05	42.70	14.37	44.29	3.41
Percentage of Net profit to Net Sales	8.55	4.50	3.31	1.00	2.78	0.20

The net sales of the Plant have increased steadily from Rs.1156.69 crores in 1988-89 to Rs.1723.92 crores in 1993-94. Though the Plant has been earning marginal profit, its net profit ratio to net sales is under pressure and has been declining from 1988-89 onwards. The net profit of the Plant which was Rs.98.93 crores in 1988-89 decreased gradually to Rs.14.37 crores in 1991-92. Though in 1992-93 the net profit increased to Rs.44.29 crores but in 1993-94 it again decreased drastically to Rs.3.41 crores mainly due to decrease in income by Rs.29.44 crores and increase in expenditure on account of Employees' remuneration & benefits (Rs.24.06 crores) and Interest charges (Rs.22.50 crores).

CHAPTER - 9

9. *MANPOWER ANALYSIS*

9.01 The profit of Plant has been arrived at after providing for the expenditure on excess manpower. As per project report, the 'Works' manpower required for achieving production of 1.8 MTPA was assessed at 10,600 employees, but number of employees in 'Works' was more than double i.e. 26,236 as on 31st March 1984 and 22,312 as on 31st March, 1994. The Management attributed the requirement of excess manpower to creation of new departments which had come up with the growth of the organisation to augment facilities for improving the productivity and quality, diversification of products like SW pipes and Silicon Steel Sheets and also for providing essential inputs like Power and maintenance requirements. The Management further added that they have taken measures to control manpower by introducing an attractive Voluntary Retirement Scheme, restricting fresh recruitment and gainfully redeploying surplus manpower after training.

The Ministry stated (November 1995) that by the time the Phase-II of modernisation was completed manpower would be brought down to the level of 19,500.

9.02 *LABOUR PRODUCTIVITY AND COST*

It was observed (June 1966) by the Mehtab Committee (constituted to study/fix norms on manpower and productivity in steel plants) that it should be possible to increase the productivity of works personnel from the then existing level of 55 to 77 ingot tonnes per man year to about 125 Ingot tonnes per man year and above in each Steel Plant. However, the Plant fixed the norms of 95 ingot tonnes per man year. The actual productivity ranged between 42 (1983-84) to 54 ingot tonnes (1993-94) per man year from 1978-79 to 1993-94.

As per the Ministry (November 1995) additional manpower meant for product diversification as well as for providing balancing facilities could not have any increase in production. Therefore, the productivity at Rourkela Steel Plant remained low compared to DPR norms.

9.03 *SALARIES, WAGES & OTHER BENEFITS PER EMPLOYEE*

The incidence of salaries and wages including bonus and other benefits per employee increased from Rs.12814 in 1978-79 to Rs.79012 in 1993-94. This resulted in higher cost of production.

CHAPTER - 10

10 *INVENTORY CONTROL*

10.01 The inventory of the Plant comprises (a) raw materials (b) stores and spares and (c) finished and semi finished products.

The stock of stores and spares in terms of months' consumption was abnormally high upto 1983-84 and ranged between 18.46 months' consumption (1978-79) and 23.59 months' consumption (1982-83). It was brought down to 10.82 months' consumption during 1993-94. However, stores and spares valuing Rs.22.10 crores have been lying unmoved for more than five years. The age-wise analysis of unmoved stores for five years and above as on 31st March,1994 is given below :-

Table - 20

(Rs. in crores)

Agewise analysis	Closing stock of Stores & Spares	Insurance items	Obsolete items
1.	2.	3.	4.
5 to 9 years	7.91	0.66	0.86
10 to 19 years	5.27	3.04	1.93
20 years above	0.19	0.73	0.36
Unclassified	0.39	0.52	0.24
	13.76	4.95	3.39

The value of stores and spares declared surplus/obsolete awaiting disposal as on 31 March 1994 was Rs.4.14 crores.

10.02 *PHYSICAL VERIFICATION*

The results of physical verification of stores, raw materials and semi/finished products during the last six years are given below:-

Table - 21

(Rs in lakhs)

Year	Stores & Spares		Raw materials			Semi/Finished	
	Excess	Shortage	Excess	Shortage		Excess	Shortage
				Normal	Excess		
1988-89	4.74	0.60	161.91	967.77	227.94	972.35	962.95
1989-90	4.31	4.67	145.78	787.83	3.09	657.50	1023.17
1990-91	7.62	1.01	27.54	1074.77	460.83	2443.47	608.13
1991-92	3.78	0.06	12.68	808.29	278.55	2942.83	731.14
1992-93	1.28	-.-	36.20	1002.74	133.10	1688.23	631.52
1993-94	26.13	0.35	182.84	1149.05	294.89	1888.48	221.09

It would be seen that there was shortage of raw materials in excess of normal loss from 1988-89 to 1993-94 (except 1989-90). The value of excess shortage of raw materials in all the years works out to Rs.1398.40 lakhs.

CHAPTER - 11

INTERNAL AUDIT

The Ministry of Finance (BPE), while accepting recommendation of the Committee on Public Undertakings (COPU) in their Fifteenth report (4th Lok Sabha) that functions of Internal Audit should include a critical review of the system procedure and operations as a whole, directed the public sector enterprises to introduce the same. However, the Internal Audit has not conducted any such appraisal of the performance of the Steel Plant so far. The Ministry stated (November 1995) that with the augmentation of Internal Audit Wing, the system of conducting technical audit had been introduced w.e.f. 1992-93.

CHAPTER - 12

POLLUTION CONTROL & ENVIRONMENTAL MANAGEMENT

In December 1989, a scheme was approved for augmentation of pollution control measures in Captive Power Plant-I (CPP-I) at an estimated outlay of Rs.19.66 crores so as to achieve the norms laid down by Orissa State Prevention and Control of Pollution Board(OSPCPB). The scheme scheduled to be completed by April 1993 was still under execution (November 1995).

As per the recommendations of the Consultant (BHPE, Kinhill of Australia), an Environment Laboratory incorporating sophisticated instruments of monitoring air, water, noise and land pollution in and around RSP was installed in September 1990 at an approximate cost of Rs.1.00 crore. However, the analysis conducted by the OSPCPB on different occasions revealed that RSP failed to meet the standard fixed by the Board.

According to the Ministry (November 1995) all the effluents from RSP were being discharged through Guradih Nallah and to a lagoon. The SPCP regularly analysed the effluents from RSP. The analysis report showed that total dissolved solids, suspended solids, ammonical nitrogen, hexavalent chromium etc. remain within the standard prescribed by the Board. Further, report of analysis done in RSP laboratory mentioned that concentration of phenol and cyanide at the discharge points of river Brahmani remained within the standard.

Although the OSPCPB has certified the satisfactory position in many of the areas, they have also specified inadequacy in some other areas where the Management is yet to fulfil the requirement.

CHAPTER -13

OTHER POINTS OF INTEREST

13.01 To achieve the rated output of Calcium Ammonium Nitrate (CAN), it was anticipated that higher capacity gas compressors would be able to increase the supply of gas to Fertilizer Plant. However, the supply of coke oven gas to Fertilizer Plant continued to be inadequate and became negligible during 1986-87 onwards even after installation of gas compressors at a cost of Rs.7.75 crores in May, 1984 and December, 1985. According to Management, the compressors could not be operated due to adverse power and gas availability. The replacement of compressors was made when coke oven gas was used for production of fertilizer in the Plant. From April 1989 the use of Coke Oven gas for production of fertilizers was abandoned due to increase in power cost and reduced availability of coke oven gas. Thus the investment of Rs.7.75 crores on the gas compressors became infructuous.

13.02 There were handling shortages of coal in excess of normal loss of 5% during the years from 1978-79 to 1993-94 (except 1987-88 and 1989-90). The total value of abnormal handling shortages of coal during 1978-79 to 1993-94 amounted to Rs.23.78 crores. The Management attributed the excess shortages to (a)Extensive pilferages enroute. (b)Under loading (c) Loading of high moisture coal at washeries and collieries. The Ministry stated (November 1995) that the overall shortage in respect of coking coal was mainly due to transit loss which was beyond Company's control.

13.03 BHEL was awarded (August 1982) the work of supply, erection and commissioning of Captive Power Plant - II. They imported equipments required for the plant which were received at Calcutta/Rourkela in March 1986. The materials stored under covered shed by BHEL at plant site till 5 February 1987, got damaged due to seepage of water. BHEL lodged a claim with insurer in March 1987 and also placed an order in August 1987 on foreign supplier for replacement of damaged items costing Rs.83.16 lakhs which were received in February 1988. Since BHEL failed to place the order for replacement of damaged items immediately after detection of damage to the equipment, the supply too got delayed. In March 1987 the rules regarding concessional customs duty were amended and the concession was withdrawn. As a result when the replacements

arrived in February 1988 BHEL had to pay customs duty of Rs.153 lakhs on the replaced equipments.

The Ministry stated (November, 1995) that the concessional rate of customs duty was not applicable at the time of second import i.e. in February 1988. Hence, RSP had no choice but to reimburse the customs duty.

The fact, however, remains that had BHEL placed the order sufficiently in advance so as to receive the materials before March 1987, it could not have lost the benefit of concessional customs duty. As a result, RSP had to bear the customs duty.

13.04 Imported coal transported during May,1987 to February,1988 from Vizag, Paradeep and Haldia Ports to the plant through railway wagons weighed short by 28,311 tonnes resulting in excess freight of Rs.50.28 lakhs paid to Railways. The Ministry stated (November 1995) that the ports did not have any weighment facilities and since the bulk density of imported coal is 5% less than that of indigenous coal,the wagon cannot carry the same amount of imported or indigenous coal. The matter was also taken up with the Railways but could not be sorted out.

New Delhi
The

(B.P. MATHUR)
Deputy Comptroller and Auditor General-
cum-Chairman, Audit Board

Countersigned

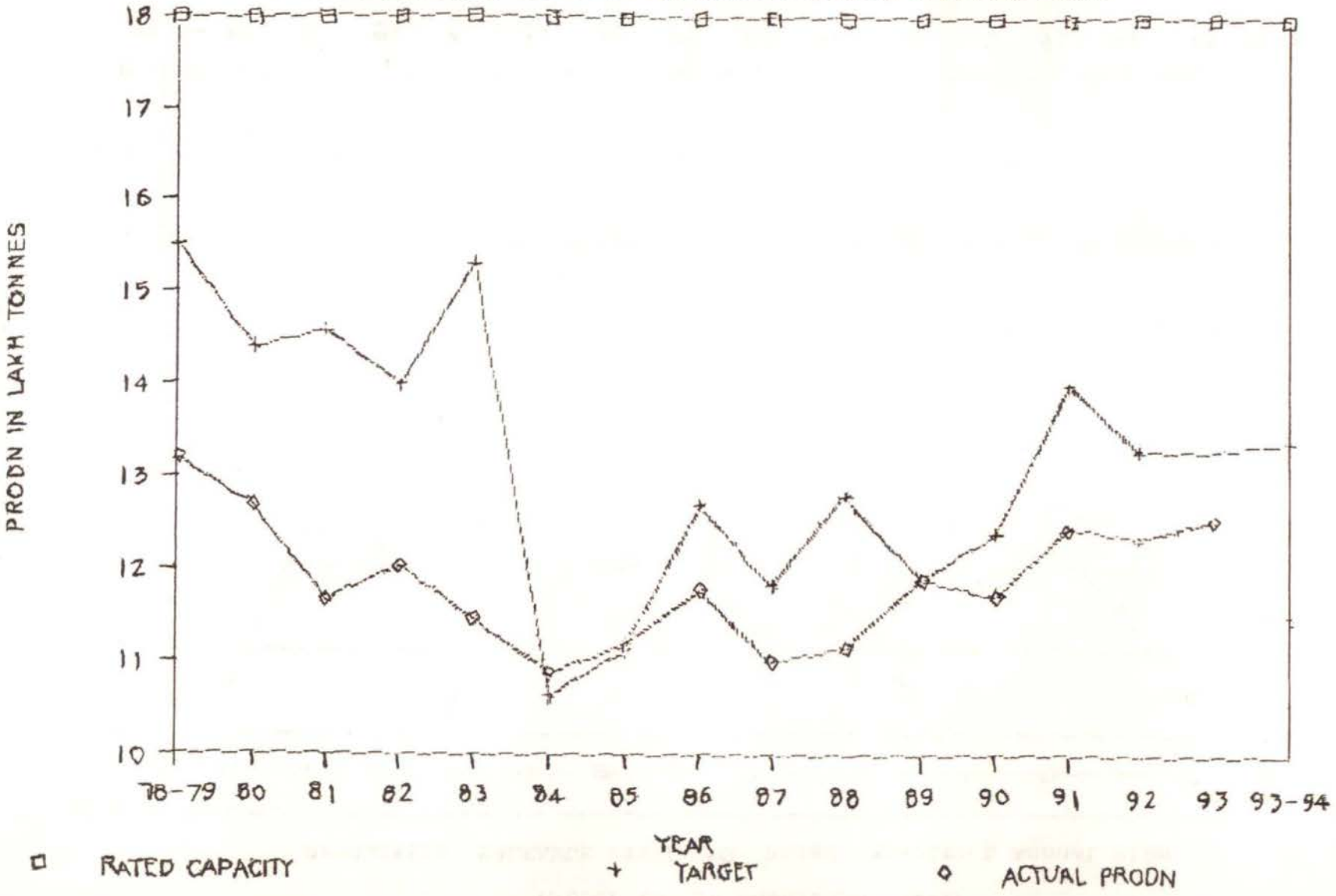
New Delhi
The

(C.G. SOMIAH)
Comptroller and Auditor General of India

ANNEXURE-I (i)

(Refer to in paragraph 3.01)

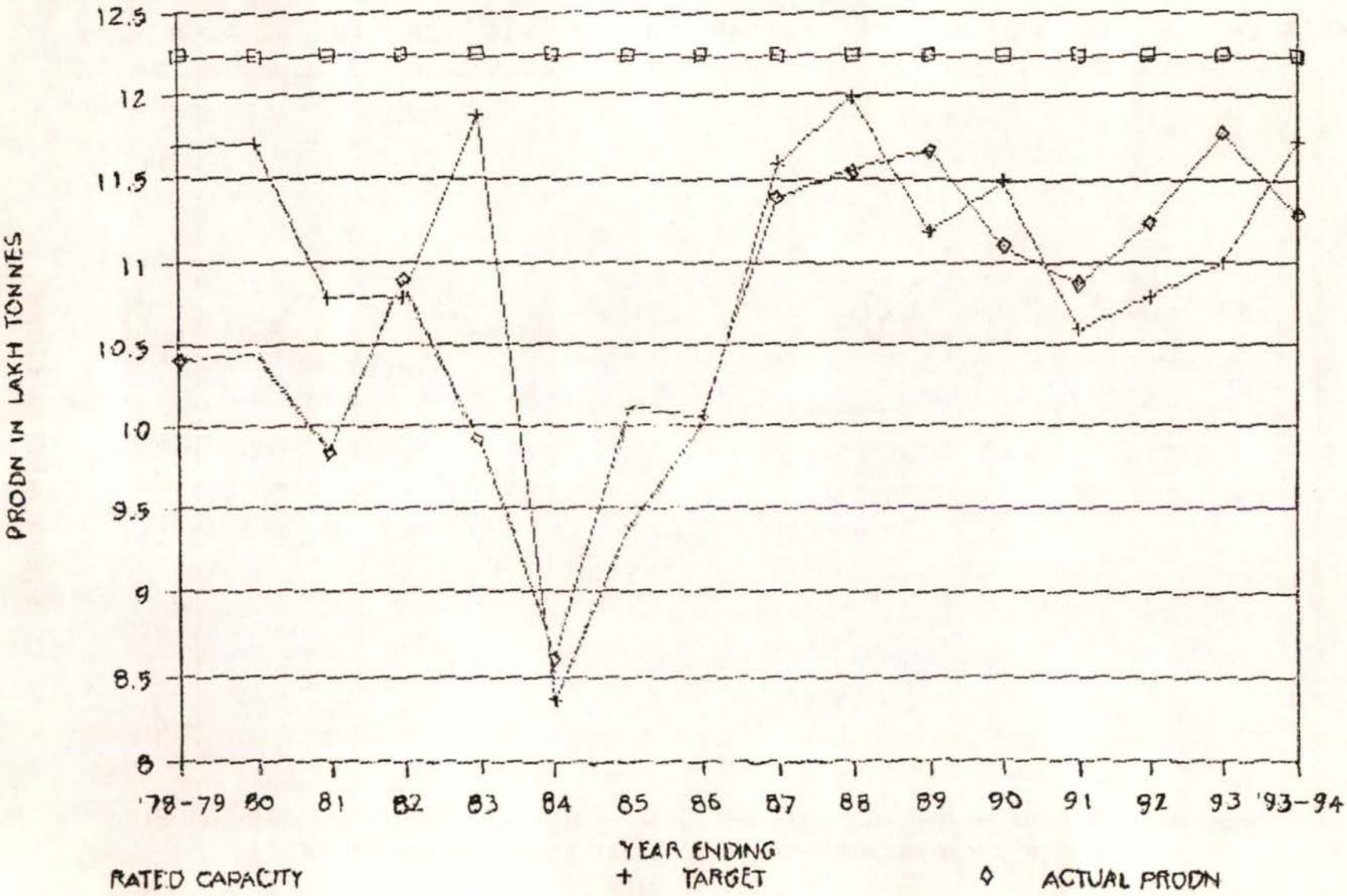
Production of INGOT STEEL VS Rated capacity & Annual Plan



ANNEXURE I (ii)

(Refer to in paragraph 3.01)

Production SALEABLE STEEL V/S Rated capacity & Annual Plan



ANNEXURE - II

(Refer to in paragraph 3.02)

Statement showing the rated capacity, budgetted production and actual production of coke.

Rated capacity- 17.36 lakh tonnes (Figure in lakh tonnes)

Year	Budgetted production	Actual input of coal	Actual output				Total	Percentage of production to	
			B.F. Grade	Nut coke	Pearl coke	Breeze coke		Rated Capacity	Budgeted production
1978-79	15.86	19.41	12.14	0.78	0.43	0.96	14.31	82.43	90.23
			(62.5)	(4.0)	(2.2)	(4.9)	(73.6)		
1979-80	16.66	19.16	12.19	0.80	0.45	0.89	14.33	82.55	86.01
			(63.6)	(4.2)	(2.3)	(4.6)	(74.7)		
1980-81	16.47	18.54	11.58	0.73	0.55	0.81	13.67	107.55	113.36
			(62.4)	(3.9)	(2.9)	(4.4)	(73.6)		
1981-82	15.34	19.29	11.69	0.74	0.46	0.76	13.65	78.63	88.98
			(60.6)	(3.8)	(2.4)	(3.9)	(70.7)		
1982-83	16.10	17.46	10.32	0.67	0.33	0.86	12.18	70.16	75.65
			(59.1)	(3.8)	(1.9)	(4.9)	(69.7)		
1983-84	12.92	16.88	10.03	0.62	0.43	1.13	12.21	70.33	94.50
			(59.4)	(3.7)	(2.5)	(6.7)	(72.3)		
1984-85	13.97	18.32	11.40	0.74	0.60	1.08	13.82	79.61	98.93
			(62.3)	(4.0)	(3.3)	(7.7)	(77.3)		
1985-86	15.56	18.75	11.99	0.71	0.33	1.07	14.10	81.22	90.62
			(63.9)	(3.8)	(1.8)	(5.7)	(75.22)		
1986-87	12.59	16.41	10.08	0.80	0.29	0.88	12.05	69.41	95.71
			(61.4)	(4.9)	(1.8)	(5.4)	(73.5)		
1987-88	13.48	17.13	10.86	0.75	1.50	0.00	13.11	75.52	97.25
			(63.4)	(4.4)	(8.8)	(0.0)	(76.6)		
1988-89	13.26	17.44	10.99	0.82	1.39	-	13.20	76.04	99.55
			(63.0)	(4.7)	(8)	-	(75.7)		
1989-90	13.43	17.36	10.98	0.79	1.41	-	13.18	75.92	98.14
			(63.2)	(4.5)	(8.1)	-	(75.8)		
1990-91	13.42	16.08	10.15	0.68	1.36	-	12.19	70.22	90.83
			(63.1)	(4.2)	(8.4)	-	(75.7)		
1991-92	13.05	15.41	9.76	0.47	1.49	-	11.72	67.51	89.80
			(63.3)	(3.0)	(9.7)	-	(76.0)		
1992-93	12.87	16.68	10.65	0.48	1.66	-	12.79	73.67	99.38
			(63.8)	(2.9)	(9.9)	-	(76.6)		
1993-94	12.84	17.25	11.05	0.26	1.96	-	13.27	76.44	103.35
			(64.0)	(1.5)	(11.4)	-	(76.9)		

Figures in brackets indicate percentage of Coke produced to coal charged.

ANNEXURE - III

(Refer to in paragraph 3.02.02)

Statement showing the actual yield of gross coke, B.F. Coke and gas against DPR Norms Committee Norm (1979) for the year 1978-79 to 1993-94.

Year	Yield as envisaged in the Project Report			Norms fixed by the Norms Committee (1979)			Actuals			
	B.F. Coke as %age of coal input	Other Grade Coke as %age of coal input	Gas (NM^3) per tonne of coal charge	B.F. Coke as %age of coal charge	Other Grade Coke as %age of coal charge	Gas (NM^3) per tonne of coal charge	B.F. Coke as %age of coal charge	Other Grade Coke as %age of coal charge	Total	Gas (NM^3) per tonne of coal charge
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1978-79	62	10.94	325	64.5	11.5	275	62.57	11.10	73.60	272
1979-80	62	10.94	325	64.5	11.5	275	63.62	11.10	74.72	274
1980-81	62	10.94	325	64.5	11.5	275	62.46	11.20	73.66	274
1981-82	62	10.94	325	64.5	11.5	275	60.60	10.10	70.70	253
1982-83	62	10.94	325	64.5	11.5	275	59.11	10.60	69.71	265
1983-84	62	10.94	325	64.5	11.5	275	59.40	12.90	72.30	269
1984-85	62	10.94	325	64.5	11.5	275	62.30	15.00	77.30	266
1985-86	62	10.94	325	64.5	11.5	275	63.90	11.30	75.20	271
1986-87	62	10.94	325	64.5	11.5	275	61.44	12.10	73.54	271
1987-88	62	10.94	325	64.5	11.5	275	63.42	13.20	76.62	267
1988-89	62	10.94	325	64.5	11.5	275	63.00	12.70	75.70	273
1989-90	62	10.94	325	64.5	11.5	275	63.26	12.69	75.95	274
1990-91	62	10.94	325	64.5	11.5	275	63.15	12.66	75.81	286
1991-92	62	10.94	325	64.5	11.5	275	63.35	12.70	76.05	287
1992-93	62	10.94	325	64.5	11.5	275	63.82	12.79	76.61	278
1993-94	62	10.94	325	64.5	11.5	275	64.03	12.84	76.87	274

ANNEXURE-IV(i)

(Refer to in paragraph 3.05.01)

Statement showing the actual number of hours for which O.H. Furnaces worked

Calender Hours= Per year - 35040
Leap year- 35136

Year	Available Hours (excl. down time hrs.)	Hours worked	delay due to						Total hours (delay)
			Blast Furnace	operational	Mechanical	Refractory	Energy Economy	Other	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1978-79	31102	25319	--	923	348	1737	560	2215	5783
1979-80	30904	26393	--	922	384	834	440	1931	4511
1980-81	30087	24545	--	957	522	834	708	2521	5542
1981-82	30415	24240	--	1334	577	753	780	2731	6175
1982-83	30297	23328	105	1748	506	824	1948	1838	6969
1983-84	31178	23859	289	2302	384	763	2279	1302	7319
1984-85	30584	24324	195	1981	362	643	1958	1121	6260
1985-86	30387	23887	287	1783	446	841	1790	1353	6500
1986-87	29088	22185	142	2223	565	844	1812	1317	6903
1987-88	27325	20639	298	3305	636	1076	763	1608	6686
1988-89	25702	19779	330	2678	367	1240	417	891	5923
1989-90	25519	20354	412	1854	297	935	337	1330	5165
1990-91	24662	19272	422	1938	383	639	963	1045	5390
1991-92	25783	20453	119	1865	394	648	843	1461	5330
1992-93	24573	19686	518	1850	471	807	179	1062	4887
1993-94	24858	18690	35	1379	735	634	1786	1599	6168

ANNEXURE-IV(ii)

(Refer to in Para 3.05.01)

Statement showinng the actual number of hours for which L.D. converters worked

Calander Hours =

Per year- 43800

Leap year -43920

Year	Available Hours (excluding Down time hours	Hours worked	Delay due to						Total hours (delay)
			Blast Furnace	operational	Mechanical	Refractory	Crane Maintenance	Other	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1978-79	26834	18382	1369	3133	587	724	360	2279	8452
1979-80	26792	17957	1851	2527	522	105	486	3344	8835
1980-81	26450	17076	2220	3034	995	365	410	2350	9374
1981-82	27395	18864	1190	1998	679	241	811	3612	8531
1982-83	28145	18952	2141	3366	529	236	663	2258	9193
1983-84	26697	17394	3351	2424	553	156	338	2481	9303
1984-85	27491	17154	3580	3371	734	239	305	2108	10337
1985-86	26849	17594	1831	3038	750	327	543	2766	9255
1986-87	26441	19794	613	2505	1009	28	703	1339	6647
1987-88	27415	17957	2554	3236	1090	191	512	1875	9458
1988-89	27931	17642	3066	4234	493	149	354	1993	10289
1989-90	28334	17035	4229	3657	442	131	319	2521	11299
1990-91	28773	18460	3941	3693	420	209	221	1829	10313
1991-92	27851	18091	2976	3474	638	295	262	2115	9760
1992-93	28184	18097	2559	4041	685	548	214	2040	10087
1993-94	30361	16851	381	1891	515	970	324	9429	13510

ANNEXURE - V

(Refer to in paragraph 3.05.03)

ACTUAL HANDLING LOSS OF HOT METALS

Year	Despatches from BF to SMS	Consumption in CH and LD (SMS)	Qnty. lost	percentage to col. 2	Loss 2.5 % as per Norms Committee	Excess loss col.(4-6)	Cost as per Annual cost sheet per tonne of HM(Rs)	Credit given for scrap per tonne (Annual Cost sheet) (Rs)	Net Loss per tonne col.(8-9)	Value of net loss col.(7x10) (Rs.in lakhs) Annual (Rs.)
			LOSS (IN LAKH TONNE)							
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1978-79	12.28	11.74	0.54	4.40	0.31	0.23	644.36	490.00	154.36	35.50
1979-80	11.81	11.18	0.63	5.33	0.30	0.33	872.35	670.00	202.35	66.78
1980-81	11.36	10.50	0.86	7.57	0.28	0.58	837.83	785.00	152.83	88.64
1981-82	12.37	11.47	0.90	7.28	0.31	0.59	1122.58	1000.00	122.58	72.32
1982-83	11.42	10.81	0.61	5.34	0.29	0.32	1559.54	1070.00	489.54	156.65
1983-84	10.84	10.31	0.53	4.89	0.27	0.26	1627.17	1285.00	342.17	88.96
1984-85	10.96	10.37	0.59	5.38	0.27	0.32	1737.31	1360.00	377.31	120.74
1985-86	11.62	10.89	0.73	6.28	0.29	0.44	1859.74	1540.00	319.74	140.69
1986-87	11.06	10.61	0.47	4.24	0.28	0.19	2015.91	1605.00	410.91	78.07
1987-88	11.01	10.43	0.58	5.27	0.28	0.30	2044.89	1665.00	379.89	113.97
1988-89	11.74	11.02	0.72	6.13	0.29	0.43	2318.96	1735.00	583.96	251.10
1989-90	11.78	10.89	0.89	7.58	0.29	0.60	2571.56	1845.00	726.56	435.94
1990-91	12.68	11.59	1.09	8.60	0.32	0.77	2735.85	1630.00	1105.85	851.50
1991-92	12.71	11.62	1.09	8.58	0.32	0.77	3149.53	2100.00	1049.53	808.14
1992-93	12.58	11.80	0.78	6.20	0.31	0.47	3792.20	2200.00	1592.20	748.33
1993-94	11.50	10.81	0.69	6.00	0.29	0.40	4171.00	2820.00	1351.00	540.40
								Gross .Total		4597.73

ANNEXURE - VI

(Refer to in paragraph 3.05.04)

Short recovery of steel

Year	Total Matal-lic input	Rollable ingot steel prodn.	% of yield	Short fall in prodn. as compared to DPR	Value of short prodn. as compared to DPR	Excess scrap arising as compared to DPR	Value of excess scrap	Net short recovery as compared to DPR	Value of short recovery
	(T)	Qty (T)		Qty lakh tonnes	Rs./ lakhs	Qty lakh tonnes	Rs./ lakhs	Lakh/ tonnes	(6-8) Rs. in lakhs
1	2	3	4	5	6	7	8	9	10
a) L.D. Converter									
As per DPR	1757400	1550000	88.20						
AS per Norm			84.00						
1978-79	1253469	1022232	81.55	0.82	907.74	0.22	119.90	0.51	787.84
1979-80	1184672	966671	81.60	0.77	1118.04	0.42	312.90	0.25	805.14
1980-81	1097027	897160	81.78	0.70	1129.80	0.37	323.75	0.22	806.05
1981-82	1178068	955074	81.07	0.84	1616.16	0.48	532.80	0.26	1083.36
1982-83	1141564	923147	80.87	0.83	2109.86	0.57	678.30	0.16	1431.56
1983-84	1076541	873786	81.17	0.77	2108.26	0.46	657.80	0.19	1450.46
1984-85	1074272	876103	81.55	0.70	2023.00	0.50	755.00	0.08	1268.00
1985-86	1140766	935221	81.98	0.71	2285.49	0.51	872.10	0.10	1413.39
1986-87	1096212	901782	82.26	0.66	2230.80	0.49	943.25	0.06	1287.55
1987-88	1091122	913406	83.71	0.48	1664.16	0.45	900.00	NA	764.16
1988-89	1155515	971122	84.04	0.48	1956.48	0.54	1125.90	NA	830.58
1989-90	1126018	931804	82.75	0.61	2673.63	0.68	1506.20	NA	1167.43
1990-91	1225932	1022571	83.41	0.58	2886.08	0.35	857.50	0.02	2028.58
1991-92	1200000	1007000	83.92	0.51	2698.76	0.24	605.56	0.19	2093.20
1992-93	1245039	1038728	83.43	0.59	3921.73	0.39	1014.00	0.11	2907.73
1993-94	1161996	968354	83.34	0.56	4301.92	0.56	1892.80	0.06	2409.12
								2.21	22534.15

b) O.H. Furnace

As per DPR	274200	250000	91.17
As per Norm			88.00

1978-79	338242	296326	87.61	0.12	144.12	0.06	32.70	0.08	111.42
1979-80	343657	301056	87.60	0.12	181.56	0.08	59.60	0.06	121.96
1980-81	306758	267850	87.32	0.12	216.60	0.09	78.75	0.04	137.85
1981-82	290197	248293	85.56	0.16	365.44	0.12	133.20	0.05	232.24
1982-83	258172	221132	85.65	0.14	416.50	0.12	142.80	0.02	273.70
1983-84	248533	213951	86.09	0.13	432.64	0.11	157.30	0.02	275.34
1984-85	276822	242814	87.71	0.09	301.77	0.09	135.90	0.01	165.87
1985-86	274417	241368	87.96	0.09	312.75	0.06	102.60	0.03	210.15
1986-87	225472	198228	87.91	0.07	276.36	0.05	96.25	0.02	180.11
1987-88	226720	201116	88.71	0.06	259.92	0.03	60.00	0.02	199.92
1988-89	245559	219117	89.23	0.05	235.55	0.03	62.55	0.02	173.00
1989-90	271751	238401	87.73	0.09	459.18	0.02	44.30	0.08	414.88
1990-91	254186	223389	87.88	0.08	475.36	0.05	122.50	0.08	352.86
1991-92	258000	227000	87.98	0.08	512.60	0.03	75.60	0.05	437.00
1992-93	247702	218658	88.27	0.07	544.88	0.04	104.00	0.03	440.88
1993-94	205096	179604	87.57	0.07	612.39	0.03	101.40	0.01	510.99
								---.--	----.--
								0.62	4238.17
								---.--	----.--
						Grand	Total	2.83	26771.32
								---.--	----.--

ANNEXURE - VII(a)

(Refer to in paragraph 3.06.03)

HOT ROLLING MILLS

Blooming and Slabbing Mill

(Figures in lakh tonnes)

Year	Rated capacity	Annual target	Actual production	%age of actual production to	
				Rated capacity	Annual Target
1.	2.	3.	4.	5.	6.
1978-79	15.30	13.18	10.98	71.8	83.3
1979-80	15.30	11.98	10.97	71.7	91.6
1980-81	15.30	12.84	9.82	64.2	76.5
1981-82	15.30	12.75	10.53	68.8	82.6
1982-83	15.30	13.00	9.70	63.4	74.6
1983-84	15.30	9.35	9.23	60.3	98.7
1984-85	15.30	9.72	9.76	63.8	100.4
1985-86	15.30	10.83	9.78	63.9	90.3
1986-87	15.30	10.16	9.39	61.4	92.4
1987-88	15.30	11.16	9.72	63.5	87.1
1988-89	15.30	10.22	10.34	67.6	101.2
1989-90	15.30	10.37	10.27	67.1	99.0
1990-91	15.30	11.60	10.93	71.4	94.2
1991-92	15.30	11.27	10.61	69.3	94.1
1992-93	15.30	11.32	11.35	74.2	100.3
1993-94	15.30	11.73	10.27	67.1	87.6

ANNEXURE - VII(b)

(Refer to in paragraph 3.06.04)

Plate Mill

(Figures in lakh tonnes)

Year	Rated capacity as per Project Report	Annual target	Actual production	%age of actual production to	
				Rated capacity	Annual Target
1.	2.	3.	4.	5.	6.
1978-79	2.80	3.00	2.62	93.6	87.3
1979-80	2.80	3.00	2.63	93.9	87.7
1980-81	2.80	2.80	2.64	94.3	94.3
1981-82	2.80	3.00	2.81	100.4	93.7
1982-83	2.80	3.00	2.67	95.4	89.0
1983-84	2.80	2.20	2.43	86.8	110.5
1984-85	2.80	2.20	2.40	85.8	109.1
1985-86	2.80	2.45	2.47	88.2	100.8
1986-87	2.80	2.73	2.70	96.4	98.9
1987-88	2.80	2.45	2.48	88.6	101.2
1988-89	2.80	2.40	2.54	90.7	105.8
1989-90	2.80	2.40	2.55	91.1	106.3
1990-91	2.80	2.45	2.61	93.2	106.5
1991-92	2.80	2.60	2.80	100.0	107.7
1992-93	2.80	2.40	2.54	90.7	105.8
1993-94	2.80	2.80	2.58	92.1	92.1

ANNEXURE - VII(c)

(Refer to in paragraph 3.06.05)

Hot Strip Mill

(Figures in lakh tonnes)

Year	Rated capacity as per Project Report	Annual target	Actual production	%age of actual production to	
				Rated capacity	Annual Target
1.	2.	3.	4.	5.	6.
1978-79	11.06	9.00	7.78	70.3	86.4
1979-80	11.06	7.65	7.23	65.4	94.5
1980-81	11.06	8.68	6.00	54.2	69.1
1981-82	11.06	8.75	7.22	65.3	82.5
1982-83	11.06	9.36	6.29	56.9	67.2
1983-84	11.06	5.75	5.72	51.7	99.5
1984-85	11.06	6.55	6.35	57.4	96.9
1985-86	11.06	8.07	5.94	53.7	73.6
1986-87	11.06	7.08	6.43	58.1	90.8
1987-88	11.06	8.55	7.04	63.7	82.3
1988-89	11.06	8.09	8.05	72.8	99.5
1989-90	11.06	8.25	7.97	72.1	96.6
1990-91	11.06	8.40	7.94	71.8	94.5
1991-92	11.06	8.14	8.11	73.3	99.6
1992-93	11.06	8.66	9.23	83.5	106.6
1993-94	11.06	8.80	7.90	71.4	89.8

ANNEXURE - VII(d)

(Refer to in paragraph 3.06.06)

Electric Sheet Mill

(Figures in lakh tonnes)

Year	Rated capacity (Tonnes)	Annual Target (Tonnes)	Actual production (Tonnes)	%age of actual production to	
				Annual target	Rated capacity
1.	2.	3.	4.	5.	6.
1978-79	35000	30000	27031	90.0	77.2
1979-80	35000	30000	17576	59.0	50.2
1980-81	35000	27000	19457	72.0	55.6
1981-82	35000	31000	20971	68.0	59.9
1982-83	35000	30000	12073	42.2	34.5
1983-84	35000	17000	17241	101.4	49.3
1984-85	35000	20000	22023	110.0	62.9
1985-86	35000	20000	13003	65.0	37.2
1986-87	35000	15000	16001	106.7	45.7
1987-88	35000	27000	18147	67.2	51.8
1988-89	35000	22000	19662	89.4	56.2
1989-90	35000	18000	16591	92.2	47.4
1990-91	35000	18000	18349	101.9	52.4
1991-92	35000	18000	17237	95.8	49.2
1992-93	35000	19000	19000	100.0	54.3
1993-94	35000	19000	18300	96.3	52.3

ANNEXURE - VIII(a)

(Refer to in paragraph 3.06.07)

Electric Resistance Welding Pipe Plant

(Figures in lakh tonnes)

Year	Rated capacity (Tonnes)	Annual Target (Tonnes)	Actual production (Tonnes)	%age of actual production to	
				Rated capacity	Annual target
1.	2.	3.	4.	5.	6.
1978-79	75000	48000	46000	61.3	95.8
1979-80	75000	75000	51080	68.1	68.1
1980-81	75000	60000	30374	40.5	50.6
1981-82	75000	60000	38663	51.6	64.4
1982-83	75000	46000	45266	60.4	98.4
1983-84	75000	46000	34728	46.3	75.5
1984-85	75000	40000	28066	37.4	70.2
1985-86	75000	40000	34203	45.6	85.5
1986-87	75000	39000	32919	43.9	84.4
1987-88	75000	45000	36047	48.1	80.1
1988-89	75000	40000	38294	51.1	95.7
1989-90	75000	40000	40686	54.2	101.7
1990-91	75000	40000	38177	50.9	95.4
1991-92	75000	40000	43360	57.8	108.4
1992-93	75000	40000	48009	64.0	120.0
1993-94	75000	45000	42199	56.2	93.8

ANNEXURE - VIII(b)
(Refer to in Paragraph 3.06.07)

ERW PIPE PLANT OPERATION DATA

Year	HR Coil input	ERW tube Production	Yield %	Available Hours	Utilisation Hours	Utilisation %	Ouptut %(t/Hr)	Power consmption (Kwh/t)
1978-79	54,133	46,001	85.0	4776	2118	44.3	21	78
1979-80	57,074	51,080	89.5	4896	2232	45.6	23	54
1980-81	34,547	30,374	87.9	4880	1631	33.4	19	92
1981-82	44,274	38,663	87.3	4976	2597	50.2	15	98
1982-83	52,096	45,266	86.9	4885	2058	42.1	22	76
1983-84	39,095	34,728	88.8	4902	1785	36.4	19	75
1984-85	31,688	28,066	88.6	4240	1419	33.5	20	85
1985-86	39,171	34,203	87.3	4916	1700	34.6	20	89
1986-87	37,202	32,919	88.5	4933	2157	43.7	15	82
1987-88	40,449	36,047	89.1	4697	2170	46.2	17	110
1988-89	43,074	38,294	88.9	4496	2435	54.2	16	136
1989-90	46,758	40,686	87.0	4480	2292	51.2	18	138
1990-91	45,059	38,177	84.7	4864	2486	51.1	15	142
1991-92	51,263	43,360	84.6	4606	2593	56.3	17	124
1992-93	55,137	48,009	87.1	4960	2653	53.5	18	112
1993-94	49,735	42,199	84.8	4992	2843	57.0	15	202

ANNEXURE - IX(a)

(Refer to in paragraph 3.06.08)

Spiral Welding Pipe Plant

(Figures in lakh tonnes)

Year	Rated capacity (Tonnes)	Annual Target (Tonnes)	Actual production (Tonnes)	%age of actual production to	
				Rated capacity	Annual target
1.	2.	3.	4.	5.	6.
1978-79	0.55	0.44	0.42	76.4	95.5
1979-80	0.55	0.44	0.43	78.2	97.7
1980-81	0.55	0.54	0.42	76.4	77.8
1981-82	0.55	0.54	0.41	74.5	75.9
1982-83	0.55	0.55	0.41	74.5	74.5
1983-84	0.55	0.25	0.27	49.1	108.0
1984-85	0.55	0.35	0.29	52.7	82.9
1985-86	0.55	0.30	0.31	56.3	103.3
1986-87	0.55	0.35	0.30	54.5	85.7
1987-88	0.55	0.40	0.43	78.2	107.5
1988-89	0.55	0.45	0.48	86.1	106.7
1989-90	0.55	0.45	0.41	74.5	91.1
1990-91	0.55	0.50	0.48	87.3	96.0
1991-92	0.55	0.45	0.45	81.8	100.0
1992-93	0.55	0.45	0.46	83.6	102.2
1993-94	0.55	0.48	0.39	70.9	81.2

ANNEXURE-IX(b)

(Refer to in paragraph 3.06.08)

SW PIPE PLANT PERFORMANCE

Year	HR Coil input MT	SW Pipe prodn. MT	Yield %	Pipe Rejn. %	Available hours	%age of Utilisation	Delay due to Power	Delay due to Material	Power Consumption Kwh/t
1978-79	0.48	0.42	87.5	0.15	14805	71.7	--	--	96
1979-80	0.48	0.44	91.7	0.40	14797	73.6	--	--	--
1980-81	0.45	0.42	93.3	0.66	13836	64.9	0.5	13.5	82
1981-82	0.45	0.42	93.3	1.79	13969	70.8	0.4	7.2	88
1982-83	0.44	0.41	93.2	1.07	13458	72.7	1.6	3.5	88
1983-84	0.31	0.28	90.3	1.60	13736	59.6	0.3	24.6	124
1984-85	0.32	0.30	93.7	1.78	13226	63.5	5.1	15.8	118
1985-86	0.34	0.31	91.2	1.44	13914	61.5	4.6	20.9	108
1986-87	0.32	0.30	93.7	1.50	14475	65.2	0.2	3.7	124
1987-88	0.47	0.44	93.6	1.25	14369	82.5	0.3	0.8	95
1988-89	0.51	0.48	94.1	1.28	13289	88.1	0.5	0.7	130
1989-90	0.43	0.41	95.3	1.33	14835	82.1	0.5	1.8	168
1990-91	0.54	0.50	92.6	1.30	14712	82.7	0.6	0.9	126
1991-92	0.50	0.46	92.0	0.89	14784	83.6	0.3	-	133
1992-93	0.52	0.47	90.4	1.04	14592	81.5	0.1	1.3	129
1993-94	0.44	0.39	88.6	0.67	14715	80.1	0.7	--	221

Annexure - X

(Refer to in paragraph 3.06.09)

Statement showing position of production of different units of the Cold Rolling Mill

(Figures in lakh tonnes)

Year	Rated capa city	Annual target	Actual Prodn.	%age of Actual production to Rated capa city	%age of Actual production to Annual target
1.	2.	3.	4.	5.	6.
1. C.R. Sheets and strips					
1978-79	3.12	2.60	1.64	52.6	63.1
1979-80	3.12	2.23	1.59	51.0	71.3
1980-81	3.12	2.18	1.23	39.4	56.4
1981-82	3.12	2.20	1.29	41.3	58.6
1982-83	3.12	2.25	1.07	34.3	47.6
1983-84	3.12	0.59	0.95	30.4	161.0
1984-85	3.12	1.16	1.19	38.1	102.6
1985-86	3.12	1.55	1.37	43.9	88.4
1986-87	3.12	1.88	1.89	60.6	100.5
1987-88	3.12	2.20	2.01	64.4	91.4
1988-89	3.12	2.00	2.06	66.0	103.0
1989-90	3.12	2.18	2.02	64.7	92.7
1990-91	3.12	2.28	2.00	64.1	87.7
1991-92	3.12	2.00	2.07	66.3	103.5
1992-93	3.12	2.05	2.05	65.7	100.0
1993-94	3.12	2.05	1.79	57.4	87.3
2. Galvanised Sheets					
1978-79	1.60	1.45	1.51	94.4	104.1
1979-80	1.60	1.60	1.60	100.0	100.0
1980-81	1.60	1.50	1.28	80.0	85.3
1981-82	1.60	1.60	1.49	93.1	93.1
1982-83	1.60	1.60	1.38	86.3	86.3
1983-84	1.60	1.36	1.21	75.6	89.0
1984-85	1.60	1.28	1.36	85.0	106.3
1985-86	1.60	1.50	1.19	74.4	79.3
1986-87	1.60	0.90	0.89	55.6	98.9
1987-88	1.60	1.50	1.48	92.5	98.7
1988-89	1.60	1.50	1.55	96.9	103.3
1989-90	1.60	1.57	1.62	101.3	103.2
1990-91	1.60	1.55	1.55	96.9	100.0
1991-92	1.60	1.50	1.51	94.4	100.7
1992-93	1.60	1.55	1.50	93.7	96.8
1993-94	1.60	1.53	1.27	79.4	83.0

3. Electrolytic Tinning Lines

1978-79	1.50	.90	.58	38.7	64.4
1979-80	1.50	1.20	.54	36.0	45.0
1980-81	1.50	.60	.32	21.3	53.3
1981-82	1.50	.66	.39	26.0	59.1
1982-83	1.50	1.10	.34	22.7	30.9
1983-84	1.50	.45	.50	33.3	111.1
1984-85	1.50	.65	.72	48.0	110.8
1985-86	1.50	.70	.73	48.7	104.3
1986-87	1.50	.75	.65	43.3	86.7
1987-88	1.50	.95	.63	42.0	66.3
1988-89	1.50	.76	.76	50.7	100.0
1989-90	1.50	.60	.36	24.0	60.0
1990-91	1.50	.50	.16	10.7	32.0
1991-92	1.50	.60	.27	18.0	45.0
1992-93	1.50	.70	.44	29.3	62.8
1993-94	1.50	.65	.50	33.3	76.9

ANNEXURE - XI

[Refer to in paragraph 3.06.10(ii)]

Statement showing actual production of CRNO unit vis-a-vis rated capacity, annual targets.

Year	Rated capacity	Annual target	Actual Prodn.	%age of Actual production to	
				Rated capacity	Annual target
1985-86	36000	30000	6620	18.4	22.1
1986-87	36000	11000	7352	20.4	66.8
1987-88	36000	28000	18010	50.0	64.3
1988-89	36000	32000	24192	67.2	75.6
1989-90	36000	20000	20139	55.9	100.7
1990-91	36000	35000	23400	65.0	66.9
1991-92	36000	35000	30002	83.3	85.7
1992-93	36000	45000	36090	100.3	80.2
1993-94	36000	48000	33108	92.0	69.0

Annexure - XII

[Refer to in Paragraph 4(ii)]

Statement showing actual Production of CAN (including Intermediate Products)

(Figures in Lakhs Tonnes)

Year	Rated capacity	Actual Production of CAN (25% N) From Coke oven gas	From Naptha reformed gas	Total	% age of actual production to rated capacity
1.	2.	3.	4.	5	6.
1978-79	4.60	1.67	1.56	3.23	70.2
1979-80	4.60	1.05	1.54	2.59	56.3
1980-81	4.60	0.68	1.30	1.98	43.0
1981-82	4.60	0.61	2.08	2.69	58.5
1982-83	4.60	0.18	0.70	0.88	19.1
1983-84	4.60	0.09	1.22	1.31	28.5
1984-85	4.60	0.15	2.25	2.40	52.2
1985-86	4.60	0.06	1.85	1.91	41.5
1986-87	4.60	NA	1.90	1.90	41.3
1987-88	4.60	NA	2.16	2.16	47.0
1988-89	4.60	NA	2.52	2.52	54.8
1989-90	4.60	NA	2.45	2.45	53.3
1990-91	4.60	NA	2.51	2.51	54.6
1991-92	4.60	NA	2.79	2.79	60.7
1992-93	4.60	NA	3.07	3.07	66.7
1993-94	4.60	NA	3.30	3.30	71.7

ANNEXURE - XIII

(Refer to in paragraph 4 (iii)

CONSUMPTION OF RAW MATERIAL PER TONNE OF C.A.N.

Material	Ammonia (Tonne)	Nitric Acid tonnes (53%)	Lime Stone(Tonne)	Power(KWH)
Norms fixed by the designers	0.158	1.100	0.300	NA
Norms fixed by the Management.	0.160	1.100	0.300	41

Material Consumed	80-81	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Ammonia (Tonne)	0.163	0.175	0.169	0.167	0.164	0.164	0.165	0.164	0.166
Nitric Acid(53%) (Tonne)	1.163	1.199	1.151	1.158	1.141	1.121	1.114	1.113	1.118
Lime Stone (Tonne)	0.300	0.304	0.310	0.314	0.315	0.311	0.316	0.313	0.305
Power (KWH)	46	38	38	38	40	41.5	29.6	26.0	16.3

NOTE :The consumption of Lime stone and Power was more or less as per the norms. Hence, no comment is made on the consumption of lime stone and power.

ANNEXURE XIV

(Refer to in paragraph 5.01.01)

Statement showing actual production vis-a-vis rated capacity and budgeted production in Barsua iron Mines.

Rated capacity 20.16 lakh tonnes (figures in lakh tonnes)

Year	Budgeted Production			Actual Production			%age of actual production to	
	Lump	Fines	Total	Lump	Fines	Total	Rated. capacity	Budgeted Production
1978-79	4.21	9.96	14.17	3.63	6.61	10.24	50.79	72.27
1979-80	5.38	9.65	15.03	4.23	7.88	12.11	60.07	80.57
1980-81	4.20	9.80	14.00	4.34	6.98	11.32	56.15	80.86
1981-82	4.20	9.80	14.00	3.17	5.38	8.55	42.41	61.07
1982-83	6.01	13.13	19.14	4.14	7.41	11.81	58.58	61.70
1983-84	4.20	9.18	13.38	5.44	8.31	13.75	68.20	102.77
1984-85	6.00	9.00	15.00	4.86	8.52	13.38	66.37	89.20
1985-86	5.38	8.00	13.38	4.72	11.12	15.84	78.57	118.39
1986-87	6.00	9.00	15.00	6.26	11.00	17.28	85.71	115.20
1987-88	5.00	10.00	15.00	6.53	9.48	16.01	79.41	106.73
1988-89	6.00	10.70	16.70	6.46	10.65	17.11	84.87	102.46
1989-90	5.50	10.00	15.50	6.17	9.70	15.87	78.72	102.39
1990-91	6.00	10.00	16.00	5.58	10.78	16.36	81.15	102.25
1991-92	6.25	10.50	16.75	6.57	11.12	17.69	87.75	105.61
1992-93	6.25	10.30	16.55	5.15	10.79	15.94	79.07	96.31
1993-94	6.65	10.75	17.40	4.69	11.87	16.56	82.14	95.17

To

ANNEXURE XV

(Refer to in Paragraph 5.01.03)

Statement showing actual production of Iron Ore in Kalta Iron Ore Mines

Year	Budgeted raisings (in lakh tonnes)	Actual raisings (in lakh tonnes)	%age of shortfall in production to budgeted production.
1978-79	3.60	2.71	(-)24.7
1979-80	3.60	2.56	(-)28.9
1980-81	3.60	2.76	(-)23.3
1981-82	3.60	2.05	(-)43.1
1982-83	3.60	2.64	(-)26.7
1983-84	3.60	3.36	(-) 6.7
1984-85	4.00	4.90	(+)22.5
1985-86	3.60	4.34	(+)20.6
1986-87	4.50	4.49	(-) 0.2
1987-88	4.50	3.68	(-)18.2
1988-89	3.80	4.55	(+)19.7
1989-90	4.00	4.79	(+)19.8
1990-91	4.00	4.04	(+) 1.4
1991-92	3.50	4.68	(+)33.7
1992-93	4.50	5.42	(+)20.4
1993-94	4.50	4.87	(+) 8.2

ANNEXURE -XVI

(Refer to in paragraph 5.02)

Statement showing actual production of lime stone at Purnapani Lime Stone Mines.

Rated capacity 6.19 lakh tonnes (figures in lakh tonnes)

Year	Budgeted Production			Actual Production			%age of actual production to	
	Lump	Fines	Total	Lump	Fines	Total	Rated Capacity	Budgeted Capacity
1.	2.	3.	4.	5.	6.	7.	8.	9.
1978-79	5.16	1.68	6.84	4.17	0.58	4.75	77.1	69.4
1979-80	4.56	0.84	5.40	3.74	0.37	4.11	66.4	76.1
1980-81	3.72	1.68	5.40	4.10	0.37	4.47	72.2	82.8
1981-82	3.00	2.40	5.40	4.28	0.36	4.64	75.0	85.9
1982-83	4.44	0.96	5.40	4.80	0.71	5.51	89.0	102.0
1983-84	2.98	2.38	5.36	4.52	1.07	5.59	90.3	104.3
1984-85	2.75	2.85	5.60	4.44	0.81	5.25	84.8	93.8
1985-86	3.74	1.26	5.00	4.95	0.82	5.77	93.2	115.4
1986-87	3.92	0.90	4.82	5.06	0.88	5.94	96.0	123.2
1987-88	3.40	1.20	4.60	4.36	0.59	4.95	80.0	107.6
1988-89	3.20	1.40	4.60	4.95	0.90	5.85	94.5	127.2
1989-90	3.40	1.20	4.60	4.12	1.10	5.22	84.3	113.5
1990-91	3.40	1.20	4.60	4.26	0.76	5.02	81.1	109.13
1991-92	3.00	0.70	3.70	3.62	0.48	4.10	66.2	110.81
1992-93	3.70	-.-	3.70	2.97	0.48	3.45	55.7	93.2
1993-94	3.10	-.-	3.10	2.66	0.67	3.33	53.8	107.4

Annexure- XVII
(Refer to in Paragraph 6.03)

Statement showing generation of electricity in captive power plants

(Unit MW)

Year	Generation			Total Generation	Supply from OSEB	Total
	CPPI	BP Turbine	CPPII			
1.	2	3	4	5	6	7
1978-79	64.192	0.833	-	65.025	61.279	126.304
1979-80	64.144	0.515	-	64.659	53.708	118.367
1980-81	54.242	0.004	-	54.246	56.805	111.051
1981-82	54.505	-	-	54.505	63.914	118.419
1982-83	49.415	-	-	49.415	52.390	101.805
1983-84	42.139	-	-	42.139	58.926	101.065
1984-85	45.476	-	-	45.476	68.217	113.693
1985-86	45.160	-	-	45.160	63.769	108.929
1986-87	34.185	-	-	34.185	75.334	109.519
1987-88	25.086	-	38.857	63.943	58.590	122.533
1988-89	31.445	-	78.124	109.569	27.025	136.594
1989-90	27.543	-	92.184	119.727	16.727	136.454
1990-91	21.940	-	92.440	114.380	23.120	137.50
1991-92	19.870	-	93.310	113.180	25.630	138.810
1992-93	26.120	-	90.960	117.080	23.670	140.750
1993-94	20.550	-	93.450	114.000	28.780	142.780

Annexure - XVIII(i)
(Refered to in Paragraph 6.04)

Statement showing cost of oxygen bled out during the 1978-79 to 1993-94

Rated Capacity - 1,41,912 (10^3MN^3)

Year	Actual production	Actual consumption	Gas bled out	%age of bled out gas to Production	Cost of gas bled out (Rs in lakhs)
1978-79	1,16,135	89391	26744	23.0	45.29
1979-80	1,20,203	85839	34364	28.6	72.52
1980-81	1,20,858	82029	38829	32.1	129.71
1981-82	1,20,879	96780	24099	19.9	84.62
1982-83	1,15,651	96331	19320	16.7	84.89
1983-84	1,19,145	98983	20162	16.9	95.38
1984-85	1,16,327	96728	19599	16.8	111.69
1985-86	1,17,766	95138	22628	19.2	167.46
1986-87	1,20,870	98482	22388	18.5	191.20
1987-88	1,20,535	103334	17201	14.3	167.46
1988-89	1,19,881	103563	16318	13.6	91.95
1989-90	1,19,159	104725	14434	12.1	70.94
1990-91	1,21,192	106094	15078	12.5	89.25
1991-92	1,29,313	101118	22195	17.1	132.69
1992-93	1,33,812	113736	20096	15.0	142.23
1993-94	1,32,397	102140	30227	22.9	281.44
					1958.66

Annexure - XVIII(ii)
(Refer to in paragraph 6.04)

Statement showing cost of Nitrogen bled out during 1978-79 to 1993-94.

($10^3 MN^3$)

Year	Rated Capa-city	Actual produc tion	Actual consum ption	Gas bled out	%age of bled out gas to Prbduc-tion	Cost of gas bled out (Rs in lakhs)
1978-79	2,27,760	2,02,721	1,63,266	39,455	19.5	28.04
1979-80	2,27,760	1,99,430	1,44,000	55,430	27.8	47.23
1980-81	2,27,760	1,81,585	1,26,918	54,667	30.1	77.27
1981-82	2,27,760	1,82,374	1,24,918	57,456	31.5	101.22
1982-83	2,27,760	1,64,458	92,008	72,450	44.1	181.95
1983-84	2,27,760	1,54,484	65,985	88,499	57.3	262.05
1984-85	2,27,760	1,39,886	84,683	55,203	39.5	214.95
1985-86	2,27,760	1,32,729	71,403	61,326	46.2	307.76
1986-87	2,27,760	1,31,351	86,623	44,728	34.1	245.71
1987-88	2,27,760	1,33,209	91,101	42,108	31.6	192.56
1988-89	2,27,760	1,49,252	1,00,253	48,999	32.8	185.04
1989-90	2,27,760	1,50,590	96,945	53,645	35.6	185.35
1990-91	2,27,760	1,47,563	96,867	50,696	34.4	215.15
1991-92	2,27,760	1,47,379	1,01,408	45,971	31.2	199.50
1992-93	2,27,760	1,49,678	98,214	51,464	34.4	282.49
1993-94	2,27,760	1,74,081	95,146	78,935	45.3	246.33
				901032		2972.60

ANNEXURE-XIX

(Referred to in paragraph 7.01)

Statement showing the actual average yield of some principal by-products and the norms indicated in the Projected Report and those fixed by the Norms Committee(1979)

Product	Norms of yield as per Project Report.	Norms of yield as per Norms Committee Report (1979)
Crude Tar(as percentage of dry coal charge)	3.00	3.00
Crude Benzol (as percentage of dry Coal Charge)	0.82	0.51
Ammonia Sulphate(as percentage of dry Coal Charge)	1.01	1.00

Product	Actual Yield								
	1980-81	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94
Crude Tar (as %age of dry coal charge)	2.94	2.93	2.91	2.98	2.97	2.88	2.64	2.86	2.93
Crude Benzol (as %age of dry coal charge)	0.15	0.07	0.08	0.14	0.28	0.26	0.24	0.21	0.24
Ammonia Sulphate (as %age of dry coal charge)	0.64	0.61	0.45	0.73	0.69	0.69	0.68	0.60	0.60

ERRATA

Page No	Chapter No/ Para No/Table	Line No.of the para	For	Read
12	Table-6	heading	(Small furnace) BF1 BF2	(Small furnace) BF1 BF2 BF3
51	Annexure-III	heading 'Total'	73.60	73.67
54	Annexure-V	1980-81-column 8	837.83	937.83
56	Annexure-VI	Grand total	26771.32	26772.32
62	Annexure-VIII(b)	1981-82-utilisation%	50.2	52.2