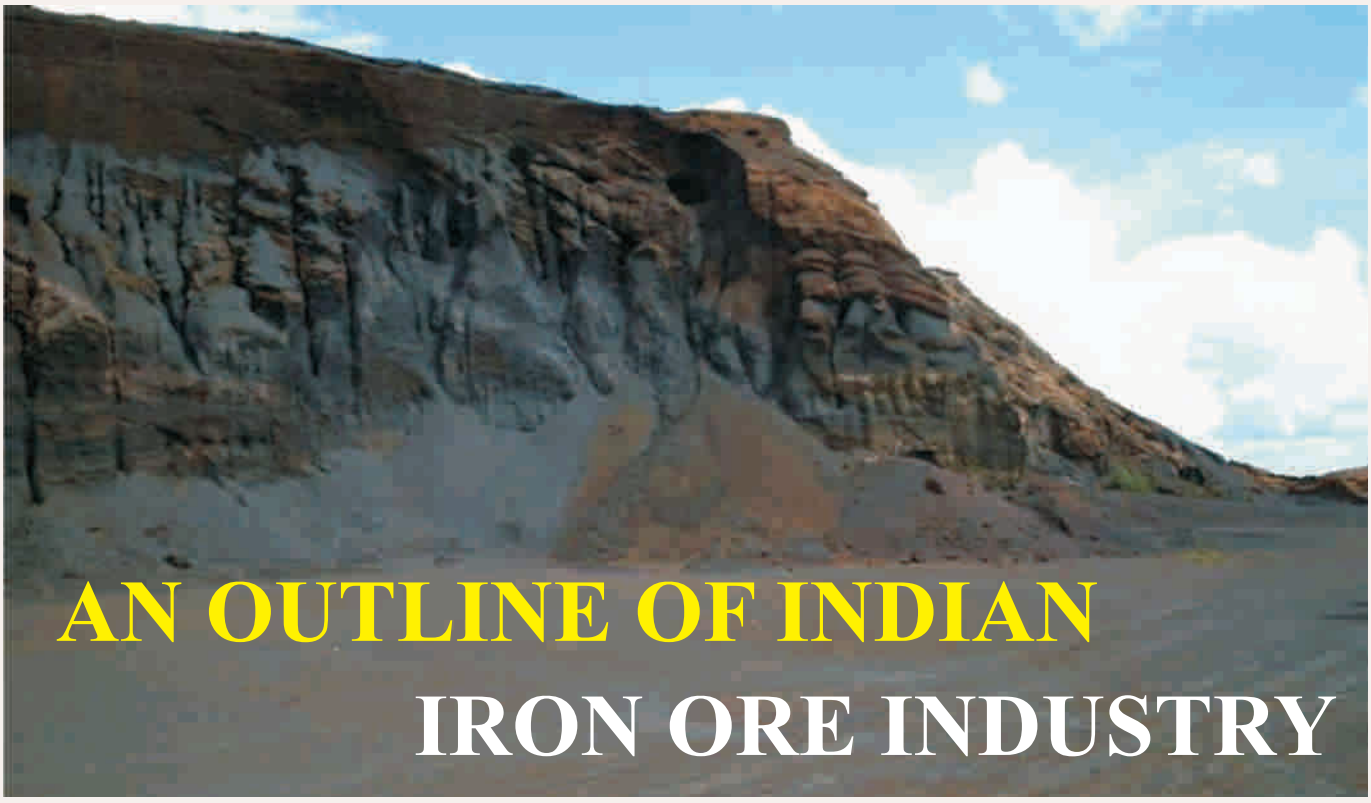

AN OUTLINE OF INDIAN IRON ORE INDUSTRY

- Sanjay Sen Gupta

Introduction

Iron ore is the main input for the BF - BoF route of hot metal production. Globally, about 65 per cent of crude steel at present is produced through this route. Other than the BF – BoF process, many new technologies have been developed over the years which uses iron ore pellets, DRI, fines and concentrates in EAFs, IFs and smelting reduction process.

Iron Ore Reserves in India

India's Iron Ore reserves as on 1-4-2000 was 23.59 billion tonnes. Out of this, Hematite Ore reserves was 12.91 billion tonnes and Magnetite ore reserve was 10.68 billion tonnes. The details of Hematite ore reserves are furnished in Table – 1

Table-1 Hematite ore reserves in India as on 1-4-2000

Grade	Total Resources ('000 tonnes)	% to total Hematite
A. Lumps		
High grade	915,276	7
Medium grade	2,822,917	22
Low grade	1,131,915	9
Unspecified grade	533,225	4
Sub Total – A	**5,403,333**	**42**
B. Fines		
High grade	139,221	1
Medium grade	2,506,868	20
Low grade	1325515	10
Unspecified grade	354187	3
Sub Total – B	**4325791**	**34**
C. Lumps & Fines		
High grade	409,095	3
Medium grade	421225	3
Low grade	331,754	3
Unspecified grade	116,650	3
Sub Total – C	**1,278,724**	**10**
D. Prospective Resources	1480005	11
E. Others	417,940	3
Total Hematite (A+B+C+D+E)	12,905,793	100
Magnetite Ore (Total)	10,682,207	
Grand Total	**23,588,000**	

** IBM Year Book, 2005*

As may be observed from the above table that India is having a reserve of 23.59 billion tonnes of iron ore which is about 6.3 per cent of world reserve.

Production Capacities

The production capacity of some major producers of iron ore in India is furnished in Table – 2. The capacities were in place in 2004-05.

Table 2 – Companywise capacities of some major iron ore producers in India in 2004-05 .

Company	Capacity (Mtpy)
A. SAIL	
i) Kiriburu, Jharkand	4.25
ii) Meghatubur, Jharkhand	4.30
iii) Gua, Jharkhand	2.40
iv) Chiria, Jharkhand	0.50
v) Rajhara group, Chattisgarh	3.50
vi) Dalli Group, Chattisgarh	4.77
vii) Bolani, Orissa	3.00
viii) Barsua, Orissa	2.01
ix) Kalta, Orissa	0.77
Total SAIL	**25.50**
B. NMDC	
i) Bailadila Group, Chattisgarh	13.00
ii) Donimalai, Karnataka	4.00
Total NMDC	**17.00**
C. KIOCL	
Magnetite Concentrate & Pellets	7.00
D. Tata Steel	
Noamundi and Ioda	7.00
E Goa Sector	16.00
Grand Total	**72.50**

There are other producers like Essar, Jindals etc. whose production capacities when added to the above would make India's total production capacity of iron ore to about 130-140 mtpy in 2004-2005
(Source : Article by Mrinmoy Roy, E D-in-charge, RMD, SAIL)

Production & Exports of Iron Ore by India

The production and export figures by India between 1992-93 and 2006-07 with y-o-y growth and other details are furnished in Table-3 (as seen on page 40).

It is evident from the above table that the average yearly growth in production of iron ore in India in the last five years up to 2006-07 was 20.14 percent.

India was exporting 40-50 percent of its domestic production upto 2002-03. But afterwards after 2006-07, India has exported over 50 percent of its production.

According to industry sources, indias share in global production of iron ore was 11.73 percent and its share in global trade of Iron Ore was12.1 percent in 2006-07.

Quality of Indian Iron Ore

The Indian iron ore characterised by high alumina and silica ratio. The alumina content in Indian iron ore lies between 2-4 percent in lumps and 4-6 per cent in fines. Sinter produced from such fines contains much higher percentage of alumina compared to other major iron ore producing countries where it seldom exceeds 2-2.5 percent.

It has been found that ore per cent increase in alumina content of the iron ore leads to 2.25 per cent increase in coke rate, a drop of 4 per cent in B. F. productivity and an increase in flux consumption by 30 kg per tonne of hot metal produced. Indian producers are talking various modern measures to bring down the alumina content in the ore.

Production of Indian ore by Grades

Gradewise production of Indian Iron Ore is shown in Table 4 (as on page 40). It may be observed from the above table that the percentage share of lumps in total production of iron ore in India has remained almost in the same level but the share of fines has consistently increased during the above period.

Gradewise Exports of Indian Iron Ore

The gradewise exports of iron ore from India are grown in Table- 5 for the period between 2002-03 and 2005-06.

Table-5 shows Gradewise exports of Indian Iron Ore (mt)

Year	Fines	Lumps	Total
2002-03	35.72	12.30	48.02
	(74.39)	(25.61)	(100.00)
2003-04	49.12	13.45	62.57
	(78.50)	(21.50)	(100.00)
2004-05	64.60	13.54	78.14
	(82.67)	(17.33)	(100.00)
2005-06	77.67	11.61	89.28
(p)	(87.00)	(13.00)	(100.00)

Data Source: Article by R. K. Sharma, Secretary General, FIMI, in JPC Bulletin, June 2006 (p) = Provisional
N. B. 1) Figures in parenthesis ( ) indicate percentage to total exports. 2) Pellets included in lumps and concentrates in fines.

It is observed that there is a marginal variation in the total export figures in 2002-03 and 2003-04. The share of iron ore fines in total export reached 87 per cent in 2005-06. Presently,

Table-3 : Production & Exports of Iron Ore by India (Mt)

Year	Production	Y-o-Y Growth (%)	Export	Y-o-Y Growth (%)	Export as % of production
1992-93	57.5	-	26.8	-	46.61
1993-94	59.6	3.65	29.9	11.57	50.17
1994-95	64.5	8.22	28.3	(-) 5.35	43.88
1995-96	67.4	4.50	28.1	(-) 0.71	41.69
1996-97	68.2	1.19	29.5	4.98	43.26
1997-98	73.2	7.33	31.0	5.08	42.35
1998-99	77.0	5.19	32.4	4.52	42.08
1999-2000	74.9	(-) 2.73	32.9	1.54	42.93
2000-01	80.8	7.88	37.5	13.98	46.41
2001-02	86.2	6.68	41.6	10.93	48.26
2002-03	99.1	14.97	48.5	16.59	48.94
2003-04	120.6	21.70	62.7	29.28	51.99
2004-05	142.7	18.33	78.1	24.56	54.73
2005-06	155.2	8.76	89.3	14.34	57.54
2006-07(p)	176.0	13.40	93.0	4.14	52.84

Data source : Upto 2005-06 :JPC & IBM, Nagpur and 2006-2007 : NMDC. (P) = provisional

Table – 4: Gradewise production of Iron ore in India. ('000 tonnes)

Grade	2000-01	2001-02	2002-03	2003-04	2004-05
Lumps	33,567	34,572	39,581	47,420	57,590
	(41.56)	(40.09)	(39.95)	(39.32)	(40.35)
Fines	41,189	45,224	52,994	67,052	79,976
	(51.00)	(52.45)	(53.49)	(55.60)	(56.04)
Concentrates	6,006	6,430	6,497	6,129	5,145
	(7.44)	(7.46)	(6.56)	(5.08)	(3.61)
Total	**80,762**	**86,226**	**99,072**	**120,601**	**412,711**
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

(Data Source: IBM Nagpur)
N. B. Figures in parenthesis ( ) indicate the contribution of Lumps, Fines and Concentrates in total production.

according to industry sources it is about 89 per cent.

Economical & Elogical Benefits of Optimised Mining and Benefication Systems

Dr. – Ing. Herbert Breuer, M. D., Allmineral GmbH & Co. K. G. Germany, has made valuable observation on economical and ecological benefits of optimized mining systems after studying the Indian Iron Ore mining scenario.

He observed that Iron Ore mining in India has been characterized in the past by methods developed for high grade deposits and relatively small outputs of up to 2 mtpy i.e. selective mining of high grade material and simultaneous dumping of low grades and fines.

The scenario is changing dramatically and demands new approaches :

- Ratio of high grade / low grade in the deposits is

coming down from 80/20 to 50/50.

- The specific value of % Fe in Saleable product increased over the last years by more than 100%
- Fines, disregarded as waste, ore becoming a valuable product considering the upcoming sintering and pelletisation capacities.
- Modern beneficiation process allow for effective and low cost upgrading of lump, fines and ultrafines.

He further opines: The economical and ecological benefits of combined sustainable approaches are obvious like:

- production per volume of deposits increases respectively and the reserves lifetime is prolonged.
- Volume of waste disposal requirement is reduced substantially.
- At same price levels existing deposits become more profitable.
- At rising prices profit increase is disproportionate.

National Steel Policy on Iron Ore

According to the formulations of the National Steel Policy (NSP) announced in November, 2005 in order to support a steel production of 110 Mt. by 2019-20 at 100 per cent capacity utilisation, Indian Steel Industry would need 190 mt of iron ore as against 54 mt in 2004-05.

However, according to industry exports if all the announced green field and brownfield expansions materialises by 2019-20. Indian production of steel may reach at level of 180 mt. Recently, however the government has revised the production, figure to 175 mt. in 2019-20.

The NSP says that at present (2004-05), the in-situ reserves of relatively, rich iron ore in India was 11.43 billion tonnes of hematite and 10.68 billion tonnes of magnetite ores. The NSP also states that in order to ensure the availability of 190 mt of iron ore for domestic production of steel by 2019-20, the Government would encourage investments in creation of additional modern mining and beneficiation capacity of 200 mt. The size of these investments will be around Rs. 20,000 crore.

The current policy of captive mining leases for the private sector would continue, but it is necessary that investment plans be put in place for idle mining leases only against credible mining investment plans in a specified period. The government would lay down priorities and guidelines for the state governments to recommend fresh mining leases, having regard to the entrepreneur's mining investment plans, and technical / financial capabilities. Of the 600 mining leases only 245 were operated in 2003-04. All these estimates need to be revised in view of much higher demand for iron ore to produce 175 mt by 2019-20. Environtal and forest clearances, would be granted within a pre-specified time frame. Though local value addition would be given priority, the Government would encourage trading in order to make this essential raw material available to the iron and steel industry, throughout the country. The government would encourage investments in adding value to the iron ore mines. Scientific mining and economics of scale would be encouraged through CONSORTIA of small users and by prescribing a minimum economic size for mines.

Captive and Non-Captive Mines

The increase in India's iron ore production in recent years has mainly been export driven and mostly from non-captive mines.

Iron ore production in India between 2002-03 and 2004-05 by sector and separately for captive and non-captive mines are presented in Table-6 (given below) in million tonnes.

It may be observed from the obove table that more that 75 per cent of India's iron ore production came from non-captive mines in 2004-05. Experts like R. K. Sharma, Secretary General, FIMI has pointed out that cheap iron ore to some steel makers through captive mining, as a special dispensation, is not justifiable.

He maintains that since all iron ore can be used for steel making, the steelmakers should buy iron ore from the open

Table 6 : Iron Ore Production in India by Sectors : Captive & Non-captive

Sector	2002-2003			2003-2004			2004-2005 (p)		
	Captive	Non-captive	Total	Captive	Non-captive	Total	Captive	Non-captive	Total
Public	20.45	29.24	49.69	23.43	34.11	57.54	22.30	34.87	57.17
	(41.16)	(58.84)	(100.00)	(40.72)	(59.28)	(100.00)	(39.01)	(60.99)	(100.00)
Private	9.53	39.85	49.38	10.06	55.24	65.30	12.74	72.80	85.54
	(19.30)	(80.70)	(100.00)	(15.41)	(84.59)	(100.00)	(14.89)	(85.11)	(100.00)
Total	29.98	69.09	99.07	33.49	89.35	122.84	35.04	107.67	142.71
	(30.26)	(69.74)	(100.00)	(27.26)	(72.74)	(100.00)	(24.55)	(75.45)	(100.00)

Source : IBM, Nagpur (P) = provisional
N. B. Figures in Parenthesis ( ) indicate percentage contribution of captive & non-captive mines by public and private sectors producers respectively in total production.

market at the prevailing market price.

Mr. Sharma also stated in an article that since the domestic capacity of iron ore production is more than the domestic requirements, the new plants should source iron ore from non-captive mines. The captive mines tend to be developed to produce highest quality ore at the lowest cost. The focus is always on Manufacturing and not mining which is considered as a secondary job. Selective mining is often resorted, to for minimising cost. The average minable grade leading to reduction of the life of the mine.

However, the National Steel Policy has formulated that the present policy of captive mining leases for the private would continue subject to certain conditions. Major Steel producers like SAIL, Tata Steel etc. who have their own captive mines may not agree to purchase from the market at market price. Instead, they may like to adopt State-of-the-art technologies to develop their captive mines and increase the capacities and production efficiency at a lower cost and use fines through pelletisation.

Use of Higher Capacity Equipment

In India, iron ore production is achieved through the combination of large mechanized mines, semi-mechanized mines and small mines. Up to the mid nineties of the last century, the iron ore producers were using dumpers from 25-30 tonnes capacity with excavators between 1.9-5.5 cum and single pass drills with diameters from 150 to 300 mm.

But at present most of the Indian producers are using 50 to 60 tonnes dumpers, excavators of 6 to 8 cum and single pass drill with diameters ranging from 250 to 400 mm. Crushing equipment of 5000-6000 tph capacity is being installed in bigger mines.

Cost Implications

ROCIS, SAIL, experts have outlined the following measures for improvement of the quality of iron ore:

i) Increase in Fe-content in iron ore burden by one percent will increase productivity of hot metal by 1.5 to 2 per cent and decrease the coke rate by 0.8 to 1.2 per cent,. This will amount to a cost reduction in hot metal by Rs. 60-70 tonne of hot metal.

ii) Lowering of alumina content by one per cent will reduce the cost of hot metal by Rs. 200-250 per tonne of hot metal.

iii) Lowering of Silica content by ore per cent in iron ore burden will reduce the cost of hot metal by Rs. 50-100 per tonne of hot metal.

iv) Reduction in undersize lump ore by one per cent will reduce the cost of hot metal by Rs. 50-60 per tonne of hot metal.

v) Reduction in fluctuations in Fe- chemistry by one per cent will reduce the cost of hot metal by Rs. 40-50 per tonne of hot metal.

vi) Even if a reduction of 0.5 per cent in alumina in the burden to blast as well as a reduction of 5 percent in undersize and improvement in physical and chemical consistency is achieved, it is expected that a saving of Rs.150 crore or more may be possible for a 4 mtpy hot metal production plant.

The above benefits mentioned were placed in a paper presented by M. P. Shrivastave, S. K. Pan and M. Jain of RDCIS, SAIL at the International steel seminar, 2005 held in kolkata based on reports of various research organisations with respect to quality improvement in raw materials. The monetary benefits might have changed now.

Illegal Mining

The widespread illegal mining of iron ore in the Bellary district of Karnataka has been reported in the media about a year ago. The report said that virtual parallel administration, complete with elaborate machinery to counterfeit permits and authorisation has come up to support the illegal mining. This has deprived the Karnataka government of Rs. 3000 crore of revenue in 2004-05 and 2005-06 as per government estimates.

Experts feel that the long – term damage can still be contained in Karnataka because the illegal mining is not more than six years old. Unless the government acts quickly and take remedial measures, Karnataka will suffer in the long run.

Industry experts opine that such illegal mining may also be occurring in Jharkhand and Orissa, though on a smaller scale.

Foreign Companies in Mining

The Central government is considering a proposal to allow foreign mining cos. to pickup stakes in captive mining of steel, power and cement sectors.

Presently, up to 100 per cent FDI installed in iron ore and coal mines. The existing rules are likely to be changed to allow foreign majors and even the foreign financial institutions to pick up stakes in captive projects. In recent times, SAIL and POSCO faced problems to bring in foreign partners due to the lack of clarity in the existing rules. The amended rule may help such producers in future.

Pelletisation

Pelletisation is a process to convert iron ore fines into uniform sized iron ore pellets which can be charged into blast furnaces or for production of sponge iron. Pellets with Fe-content of 63-68 per cent can contribute to faster reduction and high metallisation rate. Pellets with their high mechanical and abrasive strengths can increase the production of sponge iron by 25 to 30 per cent with the same amount of fuel.

About a decade back, pelletisation was not popular with the Indian iron ore producers due to high investment cost of pellet projects. This had compelled them to export the iron ore fines generated at throw away prices, up to 2002-03, India's total

pelletisation installed capacity was 13 mtpy. In addition to Mandoviand Khudremukh, Cowgule & Co. and Tata steel had their pelletisation plants.

However subsequently, the following pelletisation plants have some up or are in the process of planning and constuction :

JSW Steel has installed a 3 mtpy pellet plant a Vijaynagar in Karnataka. Its capacity is being extended by 0.8 mtpy.

Essar Steel has already acquired by Grade Pellet Plant at Vizag with an initial capacity of 3.3 mtpy. The capacity is being expanded to 8 mtpy. Essar is also setting up a pellet plant in Orissa.

Ispat Industries is setting up on 1 mtpy capacity pellet plant in the vicinity of Bailadila ore mines in Chattisgarh which may be operational by 2008.

Tata steel has planned to set up a 6 mtpy capacity pellet plant at Jamshedpur. Pellets will be supplied from this plant to the company's steel plant at Jamshedpur and the proposed 6 – mtpy capacity green field project at Kalinganagor in Orissa.

SAIL – Steel Authority of India Ltd. has set a target to meet about 15 per cent of its total requirement of iron ore through the use of pellets by 2011-12.

Pellets are made of microfines iron ore which is usually generated as a waste product during the separation of alumina and silica from iron ore. SAIL is exploring the possibility of selling up ¾ pellet plants across its iron ore mines in Jharkhand, Orissa and Chattisgarh. A 2 – mtpy capacity plant will be initially set up in Orissa. SAIL intents to build pellet plants with a combined capacity of 5/6 mtpy at an investment of Rs.2500-3000 crore.

Expansion programmes of NMDC and SAIL

National Mineral Development Corporation (NMDC) and SAIL are the two major producers of iron ore in India. In 2006-07, they have together produced about 51.2 mt of iron ore which was over 29 per cent of the country's total production of iron ore. The expansion programmes of these two leading producers are mentioned below:

NMDC : NMDC has planned to increase its production capacity to 31mtpy by 2009-10. The increase will be achieved in the following manner :

i)Kumaraswamy Blocks B & C : This mine will be initially developed for 3 mtpy capacity and in conjunction with the existing Donimalai mines would be augmenting the production capacity of 7 mtpy of ROM. As and when Donimalai is exhausted, 7 mtpy of iron ore would be continuously produced from Kumaraswamy Blocks B & C.

ii)Bailadila : Deposit 11 B. The lease of Bailadila Deposit 11 B is now with NMDC. Its capacity would be expanded to 6 mtpy by the year 2009-10.

iii)Bailadila : Deposit No. 13. As and when the Bailadila Deposit 14 is exhausted, this deposit will be developed. NMDC and the Chattisgarh government have decided to develop this deposit as a modern mine as a joint venture project with Chattisgarh Mineral Development Corporation Ltd. The deposit will be developed with a capacity of 8/10 mtpy by 2008-09.

SAIL : In order to meet the requirements of the expanded capacity of its plants by 2019-20 which will reach 40 mtpy and the corresponding dem and of about 66 mtpy of iron ore, SAIL has undertaken the following projects in its various captive mines:

I) Kiriburu – The present capacity of the mine, which is the principal supplier of iron ore to Bokaro Steel Plant, is 5 mtpy of ROM and 4.25 mtpy of finished productl Mining at present is being done at the North Block of the mine which has a balance reserve of 44 mt and will last 9/10 years. SAIL has planned to shift the mining operation to the virgin South Block, having a probable reserve of 62 mt, to produce 4 mtpy of iron ore annually.

ii) Meghahatuburu – This mine has a capacity of 5 mtpy of ROM and 4.30 mtpy of finished product. At present, mining is being done on a balance reserve of 26 mt and will last for about 5-6 years. SAIL has donned to shift the mining operation to the virgin Central Block having a probable reserve of 79 mt, to produce 4 mtpy of iron ore annually.

iii)Bolani – Bolani is the principle supplier of iron ore annually steel plant. The present capacity of the mine is 3.44 mtpy of ROM and 3 Mtpy of finished product. The mine has a reserve of 154 mt. To meet the future requirement of Durgapur, its capacity is being expanded to mtpy of iron ore.

iv) Barsua – Kolta – Taldih – known as ' Taldih Block', these mines have a reserve of 238 mt. For developing the deposit into a mechanized mine of 4.25mtpy (ROM) capacity, SAIL has signed a MoU with KIOCL for setting up a joint venture company. A pellet plant of 2 mtpy capacity will also be installed.

v) The CHIRIA mines which has reserve of about 2 mtpy of iron ore with Fe – content of 61- 63 per cent is strategically located to cater to the iron ore requirements of the SAIL plants in the eastern sector. After modernisation, the Chiria mine will start producing 7 mtpy of iron ore by 2011-12. Work has already been undertaken for preparation of the Environment Impact Assessment / Environment Management Plan for the development of the mine. The capacity may be subsequently developed to 15 mtpy depending on the requirement of SAIL's eastern sector plants.

vi) Gua – Gua is presently having a reserve of 158 Mt and iron ore production capacity of 2.4 mpty. Gua is primarily linked to IISCO Steel Plant. A railway siding has been planned at the mine.

vii) Rowghat – With the phasing out of Dalhi Rajhara mines in next 7 years, SAIL has planned to develop a new mine at Rowghat to produce 11 mtpy of iron ore to meet the requirements of Bhilai Steel Plant. A rail linkage has been planned by the state government, SAIL & NMDC between Rajhara and Jagdalpur via Rowghat.

viii) Thakurani – An area of about 278 hectors in Thakurani Pahar Block, having an estimated reserve of 75 mt has been reserved for SAIL. SAIL has entered into a MoU with BHP Billion of Australia for developing the Thakurani deposits. Size of the project will be decided after completion of prospecting activities.

Technology Improvement in SAIL mines

SAIL is working out a strategy to utilise all sub-grade ore upto 52 per cent Fe cut off and upgrade the same by introduction of latest beneficiation technologies like jigging, grinding, magnetic separation etc. The micro-fines generated in this process will be agglomerated as pellets for blast furnace feed. Pellet plants of 2 to 3 mtpy capacity has been planned to be set up at Taldih, Bolani and Rowghat. In addition, SAIL is planning to exchange dumped fines at the Guo mine for pellets in barter system.

SAIL is also planning for beneficiation of the accumulated stime in its tailing ponds to recover iron as well as to reduce the pressure on forest land for their storage / disposal. This will be and altogether new technological approach in mineral conservation follwing NMDC's Romelt plant.

Tata steel installs India's First Jigging Plant

Tata steel has installed India's first automated Jigging and Hydrocyclone Plant, with 1.6 mtpy through put at its Noamundi Iron Mines at a cost of Rs. 2.5 crore.

The Jigging Plant will provide the company with greater competitive advantage through more efficient use of raw materials and enhanced productivity. The Hydro cyclone Plant, on the other hand, will help recover iron values from the slime discharged by the washing plant, as well as reduce the alumina levels.

The potential benefits of the Jigging plant are:

- Efficient use of iron ore fines so as to conserve prime natural resources.
- Reduction in coke consumption.
- Increase in the productivity of blast furnaces.

Export of Iron Ore

The group of ministers (GOM) on the National Mineral Policy 2007, headed by Shivraj Patil has given its green signal to continue with the present policy of exporting iron ore. It further proposes to allow allocation of captive iron ore blocks

to all steel companies. The recommendations of the GOM are in line with those on the report on mineral policy prepared by a committee. Under planning commission member Anwarul Hoda and submitted to the government in June 2006. It said that all quantitative and qualitative restrictions on exports of iron ore should be removed.

As per industry reports, India's iron ore exports have fallen by about 9 per cent y-o-y to 22.03 mt between April to June, 2007 as compared to the exports during the same period of the previous year. India's overall export of iron ore in 2007-08 may drop by about 15-20 per cent over the tonnage exported in the previous year. However according to experts, losses due to lower export sales are likely to be offset in August 2007 or afterwards due to a jump in the international spot iron ore prices for ores with a Fe - content of 63.5 per cent to USD 100 per tonne from USD 52 per tonne.

Conclusions

India's production of iron ore and its exports are now maintaining a healthy grow rate. As per the Central government's recent estimation, India is likely to produce 175 mt of steel by 2019-20. This will mean a requirement of about 280-290 mt of iron ore if all the greenfield projects come up as per schedule and all the brownfield expansions envisaged by the steel producers materialise.

The selective mining in the captive mines should be brought down and the fines generated should be converted to pellets for feeding the blast furnaces and for use in the sponge iron plants. Some steps have already been undertaken by the steel producers in this direction. Tata steel was using 50 per cent of fines for sinter making in 1988-89. Massive technology upgradation should be implemented in the iron ore mines to ensure production in a cost effective and eco friendly manner.

According to the National Steel Policy (NSP), government would encourage investments in creation of additional mining and beneficiation capacity of 200 mt which may louch Rs. 20,000 crore up to 2019-20. Now, with the enhancement of target production from 110 mt to 175 mt, the level of investment would increase substantially.

Infrastructure in iron ore mine is in adequate. The government should ensure smooth and quick movement of ores from mines to steel plants and from mines to the ports.

The iron ore industry, the steel industry and the government should join hands to improve the performance of their on ore mines for the achievement of targeted production of steel by 2019-20, which is essential for the economics development of the country.