NEED FOR A REVIEW OF INDIA'S IRON ORE EXPORT POLICY

India's domestic annual production of steel is about 38 4 Mt in the year 2004-2005 Government of Orissa, till September 2005, signed about 37 Memoranda of Understanding (MoUs) with various parties to establish steel plants in the state Similarly several plants are planned in Chattisgarh, Jharkhand and Karnataka Some parties expressed their desire to establish steel plants with a capacity to the tune of 10 Mt per annum For example companies like POSCO, ESSAR, LNMITTAL, JINDAL and TATA STEEL are aiming in a big way to enhance their steel production Taking account of these figures, it is estimated that the order of steel production may be around 50-60 Mt by 2010-12 and 100 Mt by 2018-2020 Taking even a conservative consumption figure of 1 6 tonnes of iron ore per one tonne of steel, requirement of iron ore for producing 100 million tones of steel is around 160 million tonnes of ore

In many reports and books it is stated that India has huge reserves of iron ore of high quality Infact this statement needs to be reviewed from various angles The sector-wise hematite ores (Tripathi, 1997) are listed in Table 1

After hematite, magnetite is the principal iron ore and these resources are given in Table 2

Though India has Banded Magnetite Quartzites of the order of 3000 million tonnes, in view of the existence of stringent environmental laws, much of the same cannot the mined Of all the states, Karnataka state is bestowed with maximum quantity of iron ores of magnetite quartzite variety Leaving small deposits, magnetite quartzites of Aroli range, Gangrikal and Nalli Beedu of Kudremukh area, Bababudangiri deposits of Chikmagalur district, and Kodachadri deposit of Shimoga district are considerably big deposits On environmental considerations, the Supreme Court of India ordered the complete closure of Kudremukh Iron ore mines w e f 31-12-05 stating that Kudremukh is an environmentally fragile area The position is that about 450 Mt of primary magnetite quartzite, though available, cannot be mined in Kudremukh because of the above order Whereas, Bababudangiri and Kodachadri are also equally environmentally fragile areas and as such applying the same yardstick of Supreme Court, one may not expect to get permission to mine these areas With the result, about 2000 tonnes of magnetite quartzite, though shown in

Table 1 Sector wise grade wise recoverable reserves of hematite iron ores in India as on 1 4 1990 (*after* Tripathi 1997)

(Reserves in million tonnes)

Sector/ Belt	High Grade[1]	Medium Grade[2]	Low Grade[3]	Unclassified	Others[4] / Not known	Blue dust	Total
Jharkhand Orissa	348	3080	1655	491		59	5633
Bailadila	511	38	213	218		66	1046
Dalli Rajhara Rowghat	48	445	303	184	14	5	999
Chandrapur Gadchiroli	0 5	31	0 5	109			141
Goa-Redi	14	157	480	98	37	12	798
Bellary -Hospet	221	438	72	195	1 5	1	928 5
Others	6 5	6	38 5	5	0 5		56 5
Total India	1149	4195	2762	1300	53	143	9602

High grade[1] (Lumps & Fines) – Fe > 65% Medium grade[2] (Lumps & Fines) – Fe 62% to 65%
Lowgrade[3] (Lumps & Fines) – Fe < 62% Others[4] Not classified

Table 2. Magnetite iron ores in India (in million tonnes)

S No	State	+38% Fe grade	Unclassified	Total
1	Andhra Pradesh	37 9	380 0	417 9
2	Goa	98 3	66 2	164 5
3	Karnataka	1298	1219	2517
4	Kerala	35 4		35 4
5	Tamil Nadu	1 1		1 1
	Total India	1470 7	1665 2	3135 9

the reserves is not available for mining. The magnetite quartzite reserves in Tamil Nadu are very modest of about 1.1 Mt and they can be utilized. Banded magnetite quartzites (BMQ) of Andhra Pradesh occur as small deposits and in detached hills in Ongole district and Siddhipet area in Medak district. Probably these deposits are a part of unclassified reserves of say about 200 Mt which could be economically mined. It is to be seen as to whether the ores of Goa can be utilized for internal purposes.

STATUS OF HEMATITE DEPOSITS

All integrated steel plants in India consume hematite iron ores. In view of their requirement, it is to be examined whether these deposits are extensive are not?

Dalli-Rajhara-Rowgaht Sector

Dalli-Rajhara-Rowgaht deposits are earmarked as captive sources for Bhilai Steel Plant. The possibility of their tying up for international export is ruled out as it goes against the interests of domestic steel industry.

Bailadila Sector

As far as Bailadila deposits are cornered, the requirement of Rashtriya Ispat Nigam Ltd (RINL), Vizag, some sponge iron plants like LANCO are met from the Bailadila sector and the remaining ore is being exported. Moreover National Mineral Development Corporation Ltd. (NMDC) is supposed to supply iron ore fines for its beneficiation plant at Bailadila, which would be used for production of 8 million tonnes of pellets by the two plants of Hy-Grade Pellets Limited (HGPL) of ESSAR STEEL, located, at Visakhapatnam. Besides, a sponge iron plant in joint venture with RINL Visakhapatnam at Dantewara/Baster districts (Chattisgarh), NMDC is proposing to develop a steel plant near Jagdalpur. Both ESSAR and TATAS are interested in setting up steel plants of 3-4 Mt/year capacity. The Chattisgarh state is contemplating to sanction iron ore leases of 100-200 Mt in favour of ESSAR and TISCO. Of the 1000 Mt of iron ore reserves in the Bailadila sector, about 200 million tonnes are already mined by NMDC. With the sanction of 150 million tonnes each in favour of ESSAR and TISCO, what remains is about 500 million tonnes of reserves in Bailadila sector for NMDC. This ore will be sufficient to meet the requirement of domestic steel plants and sponge iron plants apart from the supplies to HGPL, ESSAR. That means over a period, no surplus would be left for export from Bailadila mines.

Chandrapur-Gadchiroli Belt

The reserves are too small in this belt. Whether for export or steel making, these will not last long.

Goa Sector

The iron ores of Goa sector are of low grade. The ore is not suitable for producing DRI nor is it suitable for producing high grade pellets. Most of the ores are of low grade laterite variety. Mining activity is going on in Goa sector since a long time and a substantial quantity of ore is already mined out Therefore this can support export activity for some more time.

Bellary-Hospet Range

This range is supposed to contain hematite reserves of about 900 million tonnes. Out of these, only three blocks — namely Ramandurg, Kumaraswamy and Donimalai are of big size. Rest of the deposits are small with hundreds of small mining leases. Donimalai deposits in reality contain nine ore bodies namely — A, 1A, 2E, 2W, 3E, 3W, ore bodies B, C and D. with a geological reserves of about 140 Mt and mineable reserves of 100 Mt. About 70 Mt of ore is already mined and hardly 30 Mt of ore is left out. Even assuming that the reserves of ore bodies would be increased by further exploration, the life of the mine could be maximum for a period of 20 years. Ramandurg deposit contains a reserve of 200 Mt and half of that reserve is earmarked for JINDAL'S and the remaining half to Kudremukh to meet the ore requirement of pellet plant, located in Mangalore. Kumaraswamy, another big block has five ore bodies — namely A, B, C, D and E. Of these ore bodies, A and E are very small. Ore body D may contain about 20 million tonnes, for which many have filed mining lease applications. Ore body B (about 52 Mt) and Ore body C (127Mt) are earmarked for NMDC. Leaving them, the other ore bodies are too small to produce any substantial quantity of ore. The present day exports are met out of private mines and partly from NMDC mines. It is learnt that Karnataka has approved 54 steel projects. Therefore, the production from the Bellary-Hospet sector would be just sufficient to meet the domestic demands including the new steel projects. In future there would be hardly any surplus left for exports.

Jharkhand-Orissa Sector

Of the total hematite reserves of about 9,600 million tonnes, about 5600 million tonnes are located in Jharkhand-Orissa sates. About 37 and 12 MoUs have been signed by the Governments of Orissa and Jharkhand receptively for the establishment of steel plants.. If these plants are

established, India's steel producing capacity may be of the order of 60 Mt by 2011-2012 and 100 Mt by 2018-2020 Out of which the capacities of the steel plants of Orissa and Jharkhand are expected to be 47 Mt/year and 30Mt/year respectively As far as Jharkhand is concerned, Chiria deposit with about 2000 Mt of reserves is a deposit worth mentioning Even one block each for SAIL, LNMITTAL, TATA STEEL and ESSAR are considered, the reserves of this deposit may be sufficient for 30-40 years? The Noamundi, Barsua, Bolani, Kiriburu-Meghahatuburu are the captive mines for the existing steel plants There is no surplus ore left for export from these mines As far as Orissa is concerned, Malangtoli and Gandhamardhan are available But more than 200 parties have filed application for sanction of mining leases Malangtoli has many blocks in it Even some of the major entrepreneur gets one block, the reserve would be just sufficient to meet 20–30 years of the requirement of the steel plant Over a period, there will not be any surplus ore to export to other countries

EXPORT POLICY

India is committed to export iron ore to Japan, China and Korea Some of the export commitments would be up to 2006, which are renewable and some are up to 2008 and even 2011

A summary of iron ore production, exports and domestic consumption is shown in Table 3

The following points emerge from a critical analysis of the present situation of the iron ore mining and steel industry in India

- About 1100 Mt of iron ore is mined in India from 1991-2005 Conservatively, it is estimated that at least 500 Mt of iron ore was mined till 1991 Thus the total iron ore mined would be of the order of 1600 Mt Thus, the reaming hematite reserves may be of the order of 8,000 Mt
- Domestic requirement of iron ore for sponge iron and steel plants is projected at 60 Mt and 100 Mt in 2011-2012 and 2018-2020 respectively
- The iron ore requirements of hematite ore for the production of 60 Mt and 100 Mt of steel per annum are 96 Mt and 160 Mt respectively
- New steel industry normally plans for assured supply of iron ore between 40–50 years
- At the iron ore production rate of 160 Mt/year the existing hematite deposits will last for about 50 years
- But if India continues to export 100 Mt per year, then the total production required is 260 Mt/year Then the existing ore would last for about 30 years
- Further exploration may increase the inventory of iron ores but only marginally
- Some float occurs on the flanks of the deposits Majority of such ore is already excavated and the remaining will last for a few years only
- Some of the countries like America conserve their own ores and import from elsewhere
- May be that our economy does not permit us to import the iron ores But at least, we can conserve to some extent
- Of the 1 1 billion tonnes of Magnetite-Quartzite ore, Kudremukh could mine only about 500 Mt of weathered ore and the recent Supreme court order has stopped all further mining By the same logic, the deposits of Gangrikal, Bababudangiri, Kodachadri and Kozikode are located in environmentally fragile zones Hence 2000 Mt of magnetite-quartzite ore, though present, is not available for mining The reserves of Magnetite-Quartzites in Andhra (analyzing Fe>38%) are about 37 8 Mt and unclassified ores are 380 Mt Only a small part of the Magnetite-Quartzites of Andhra Pradesh, could be mined economically as they occur in small detached hills
- There are some existing contracts for the supply of iron ore to various countries like Japan, China and Korea We have to phase out these exports gradually
- When the new steel plants would be commissioned, it is prudent to stop the exports altogether
- At one point of time, India was badly in need of foreign exchange and the domestic steel industry including the sponge iron did not require ore extensively and as

Table 3 Year wise production export and domestic consumption of iron ore (in million tonnes)*

Year	1995 96	1996 97	1997 98	1998 99	99 2000	2000 01	2001 02	2002 03	2003 04	2004 05
Total Production (Mt)	66 58	66 60	75 72	70 68	74 95	79 22	83 00	96 96	120 6	145 0
Export (Mt)	31 34	31 70	35 61	31 27	32 91	37 49	41 64	48 02	57 09	76 0
Domestic consumption	35 24	34 90	41 11	39 41	42 04	41 73	41 36	39 31	63 51	69 0

*The production figures include Lumps fines and concentrates The domestic consumption includes consumption for steel and sponge iron

such there was justification for the export of iron ore. Now that the domestic steel industry has picked up, export of iron ore may have to be phased out gradually and we should not enter into any new contracts
- It is the time for the Government to undertake a comprehensive review of the iron ore export policy.

India does not have vast iron ore resources and hence the need for rethinking about exports. These resources are just sufficient to meet the requirements of domestic steel industry for about 40-50 years. Our country should not lose sight of this important point. The author firmly believes that export of iron ore, on long term basis, is a short sighted policy and it would be detrimental to the interest of the nation, if the same is continued.

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ARCHAEOLOGICAL AND GEOARCHAEOLOGICAL RECORDS OF NATURAL AND HUMAN-INDUCED DISASTERS

A special session entitled "Archaeological and Geoarchaeological Records of Natural and Human Induced Disasters" that will be part of the annual meeting of the Geological Society of America (GSA) held in Philedelphia, PA during October 22-25, 2006.

This session explores catastrophic events and disasters in human history recorded in geologic data, archaeological excavations, and historical sources including earthquakes, volcanic eruptions, soil depletion, epidemics, floods, droughts, climate and environmental change, and crises of cultural origin.

Devastation from hurricane Katrina and 9/11 that has unfolded before our eyes has shown that catastrophes have natural and human causes. This session will explore various types of disaster records and the effects of these events might have had on the course of human history. This topic is timely given widespread media attention on the flu pandemic, global warming, hurricane frequency, rapid environmental changes in coastal wetlands, tsunami damage, earthquakes and other disasters that have recently occurred. Our goal is to explore physical records that can place the modern change into a longer historical and archaeological context. With growing awareness of perceptible change in modern earth systems, we feel that this proposed interdisciplinary session will have wide international appeal.

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