Discussion on change of threshold value of Iron Ore

IBM has invited imputes from the stake holders for revision of the threshold value of minerals vide notice dated 24.03.2017 on the following aspects:

1. **Inclusion or deletion of any major mineral from the list of minerals for which threshold value was notified in 2009,**

2. **Changes in the threshold value of the major minerals values of which were notified in 2009, with justifications,**

3. **Suggested threshold value for the new major minerals proposed to be included in the list with justification.**

Threshold Value and provisions for revision

"Threshold Value of minerals" means limit prescribed by the Indian Bureau of Mines from time to time based on the beneficiability and or marketability of a mineral for a given region and a given time, below which a mineral obtained after mining can he discarded as waste.“

"Rule 12(7)-Indian Bureau of Mines shall review the threshold values of minerals periodically in consultation with the stake holders."

Notification of Threshold Value by IBM

In 1990:

Iron ore:

A)Goan Iron Ores:

(i) Siliceous ore - 40% Fe

(ii) Hematitic ore - 55% Fe (Both Lumpy and Powdery ore)

B) Bellary Hospet region - 58% Fe (Provisional)

October 2009:

Iron ore

(i) Hematitic iron ore: 45% Fe(min)

(ii) Hematitic siliceous ore (for ore of Goan origin): 35% Fe(min)

TECHNICAL CONSTRAINTS

- Liberation size of iron ore
- Fines beneficiation constraints
- End use of beneficiated concentrate.
- Transportation issue of beneficiated fines
- Limitation of tailing disposal at fines size

LIBERATION SIZE OF EASTERN SECTOR IRON ORE

- **Studies by various testing agencies have found that iron ore of this sector has a liberation of 75-90% at 150 micron size**
- **At -1mm+0.15mm liberation is about 60-80%**
- **Achieving 45% cut off will require liberation above 90% which is available at 75 micron size.**
- **Without complete liberation, higher grade fe also reports in tails which increases the tails fe%.**
- **Grinding to complete liberation size i.e 75-100 micron is not possible now as all these fines needs to be converted to pellets which is costly as well as its use in steel plants is not feasible beyond a certain % of blast furnace feed.**

Transportation of fines and tailings disposal issues

- ✓ 45 % Fe cut off for tails will require complete beneficiation which will require conversion to pellets or transportation of fines to a place where it can be converted to pellets
- ✓ Transportation of fines can be done by slurry pipelines which is difficult considering terrain and reserve forest status of mining area. transportation by railway for micron fines (-150 micron) is also very difficult.
- ✓ Complete beneficiation will generate higher quantity of tails which whose disposal is also a very big issue.
- ✓ Non availability of sufficient space for tailing disposal is also restricting installation of complete beneficiation plant.

Limitation & Discussion

Marketability of Iron ore primarily depends upon its suitability for use in Iron making.

In addition to Fe content of Iron Ore, Al & Si % is also a factor.

High Iron content in Iron ore increases productivity and decreases energy consumption.

High SiO_2 increases the slag volume while high Al_2O_3 generate viscous slag. To maintain the flowability of slag the Al:Si ratio should be between 1.0 to 1.5. The high Al_2O_3 content increases the energy consumption and decreases the productivity in a blast furnace

[1% increase in Al_2O_3 content increases coke rate by 2.2% decreases productivity by 4% and increases flux consumption by 30kg/t of hot metal production].

In India at 2.5% & more the alumina content of Iron ore used in Blast furnace is among the highest in the world.

Low grade Iron ore are found to be less amenable to the available beneficiation techniques generating a very low yield of ore of desired quality.

However non availability of suitable beneficiation technique to economically upgrade these resources to the grade where industry can use them has generated a huge quantity of so called ore which is of no use at present or in distant future.

At present and in near future considering the cost and technology available, industry is not in position to use haematitic Iron ore below 55% Fe.

Available Beneficiation technique are not amenable for up gradation of all type of haematitic Iron ore to the desired quality & yield.

Can Fe_2O_3 be defined without considering gangue element i.e. Al_2O_3 and SiO_2 as Alumina & Silica have become equally important constituents of Iron are in deciding its usable grade

Alumina and Silica ratio in Hematite Ore of this region is an important factor in deciding the usable grade and hence an important factor for deciding the threshold value

Issue of Space for separate storage of 45% to 55% Fe – IBM manual for preparation of Mining Plan and Supreme Court judgment in Goa Foundation case

Increase in resources and enhanced exploration due to lowering of threshold value however not usable in near future

Coke Consumption and availability of Coking Coal vis –a- vis import of coking Coal

Any research based on which Threshold value decided

It is proposed that the threshold value of Iron Ore (Hematite) may be kept 50-55% Fe enabling Iron & Steel Industry to take up beneficiation projects meeting end requirements.

Thank You