Workshop on Threshold value of minerals

By

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Satna Cement Works

BACKGROUND

The threshold value can be taken as a component to mineral conservation as it decides the lower limit of subgrade in a mineral deposit and upper limit of mining waste in the ore zone. Last threshold value was revised by IBM on 16th October 2009 vide Notification No. T-45031/CGBM/2007(PF) based on beneficiability /marketibility of limestone deposit as follows:

States	Threshold Values
Chattisgarh, Gujarat, Himachal Pradesh, **Madhya Pradesh,** Maharastra, Rajasthan, Uttarakhnad & Uttar pradesh	CaO- 34%(min) Mgo- 4%(max)
Andhra Pradesh, Jharkhand, Karnataka, Tamilnadu, Kerela, Orissa	Cao- 35%(min) Mgo- 4%(max) Sio2- 18%(max)

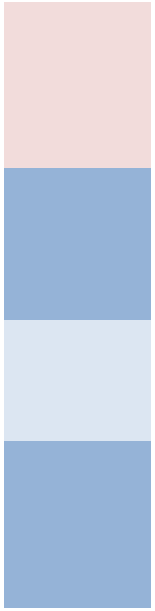
BACKGROUND

National Council for Cement and Building Materials (NCCBM) norms for prospecting limestone suggest limiting value of CaO% to be minimum 40%.

Oxide component(%)	**Acceptable range for manufacture of OPC(%)**	**Limiting values taking into consideration other type of cement, scope of beneficiation and blending (%)**
CaO	44- 52	40(Min)
Mgo	3.5(Max)	5.0 (Max)
Sio2, Al2O3 & Fe2O3	To satisfy Lime Saturation Factor(LSF). Silica Modulus and Alumina Modulus	
Na2O + K2O	< 0.60	<1.0

LOCAL GEOLOGY OF THE AREA(SATNA AND ADJOINING)

The area consists of Bhander group of formations belonging to the Vindhyan Super Group. The sequence of rock formations that constitute the Bhander Group is presented below.

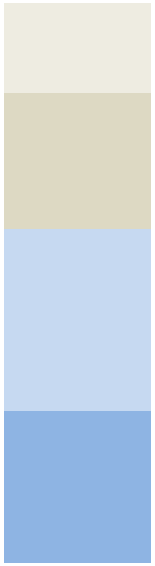


- Maihar (Upper Bhander) Sandstone formation with interbeds of Shale/Siltstone
- Sibru Shale formation with interbeds of argillaceous limestone/limestone/calcareous sandstone/ quartz arenite and siltstone
- Nagod Limestone formation with lower and upper units of limestone separated by Sagma Shale member
- Simrawal (Ganurgarh) Shale formation with interbeds of calcareous sandstone/ argillaceous limestone

Bhander group formation

LITHOLOGY OF SATNA AREA

The lithology of the area around Satna area is as follows:



- Sandy soil (0.5m to 3.0m)
- High Silica/ magnesia Limestone (1.0m to 6.0m)
- Limestone up to 12m
- Shale contd..

This leads to shallow pits , lateral expansion of mining pits and huge generation of waste material.

PRESENT CONDITIONS OF THE DEPOSITS AND ITS IMPLICATIONS

- High Silica and low to sub grade CaO:- Limestone deposits that which are likely to come up for auction have high silica and low to sub grade CaO content. Such deposits will not be able to sustain the process requirement for manufacture of clinker.

- High MgO content:- Limestone deposits with high MgO content are common(particularly in Rajasthan) and MgO content more than than the desirable limits poses much problems in the clinker manufacturing process.

- Deposits with high silica and high MgO content will require blending it with high grade(sweetener grade) limestone whose availability is very limited.

PRESENT CUT OFF LIMIT OF LIMESTONE AND THE ROLE OF FUEL

- Fuels used mainly in cement industry are :- Pet Coke, Imported coal and Indian Coal. Each fuel has important role in the clinker manufacturing process.
- Pet coke:- Most preferred, low ash, high calorific value(~8000 Kcal/ Kg). Problems associated are its non- availability on regular basis, high sulphur content of pet coke poses problems with the limestone deposits having inherent SO3. Even with pet coke, it is difficult to blend limestone with below 40% CaO.
- Imported coal:- It has ash ~16% & calorific value 5500- 6000 Kcal/ Kg. With Imported coal, the limestone cut off limit is 42% CaO.
- Indian Coal:- It has high ash content (~38% to 45%) and low calorific value (~3500 to 4000 Kcal/ Kg). With this quality of coal CaO value in limestone needs to be ~43.0-44.5%.
- Therefore, cement industry uses Indian coal with Imported coal/ Pet coke so that the average CaO in the run off mine is maintained at 43-45% CaO.

PRESENT THRESHOLD VALUE AND ITS IMPLICATION

In present scenario, we need limestone with 42.5% to 44% CaO for making of Cement.

- Since ,we have deposits of marginal grade Limestone more in quantity, all non usable Limestone above the threshold limits and below the blendable grade for making cement(as per NCBM) is required to be stacked separately within the mining lease , hence it blocks substantial area.

- Back-filling can't be done in mined out area; where limestone above the cut-off grade for making cement and below the threshold limit limestone exist. In such cases dumping of over burden becomes a major issue.

- Mining cost increases considerably due to above mentioned situations.

SUGGESTION FOR REVISION OF PRESENT THRESHOLD VALUE OF LIMESTONE

- If we use the available pet coke and screen the run off mine , even then the cut off limit of CaO is around 40% as against threshold value of 34%-35% for different regions.

- By using better process control, the limiting value of MgO usage can be enhanced from the present 4% to 5% (Max)

- We do not see much technological development in beneficiation techniques for upgrading limestone quality that will bring down CaO usage at threshold value.

- Limestone deposits should be considered upto a cut off of 38% CaO, 5% MgO, considering the scope of beneficiation.

MP BIRLA GROUP