Presentation on Revision of Threshold Value of Minerals (Limestone) by

PRISM CEMENT LIMESTONE MINES

(PRISM CEMENT LIMITED)

Overview

- Prism Cement Limited is one of India's leading integrated Building Materials Company, with a wide range of products from cement, ready-mixed concrete, tiles, bath products to kitchens.
- The company has three Divisions, viz. Prism Cement, H & R Johnson (India), and RMC Readymix (India).

Prism Cement

H &R Johnson

RMC Readymix

Our Presence

- M/s Prism Cement Limited is an IMS (ISO-9001, ISO-14001, OHSAS 18001 & SA 8000) certified industrial establishment. It has successfully set up and commissioned 2.5 MTPA clinker capacity cement Plant at village Mankahari, Tehsil Rampur Baghelan in Satna district of Madhya Pradesh. Another plant of 3.0 MTPA clinker capacity at the same location has also been successfully commissioned in the year 2010 and therefore, the total Clinkerization capacity of Prism Cement Ltd. has become 5.5 MTPA

RegionalGeology

Geologically, this area forms part of the Rewa Plateau belonging to the Upper Vindhyan Super group of rock formations in Indian stratigraphy. The Vindhyan formations are broadly classified into lower calcareous and an upper arenaceous facies.

The upper arenaceous rocks however, have a calcareous horizon - the Bhander Limestone varying in thickness from about 5 to 15 mtrs.

The Limestone deposit of the area belongs to the Bhander series. The general trend of Bhander Limestone is East – North-East to West – South-West having low Southerly dipping of less than 5^0.

Geological succession of the Vindhyan Super group

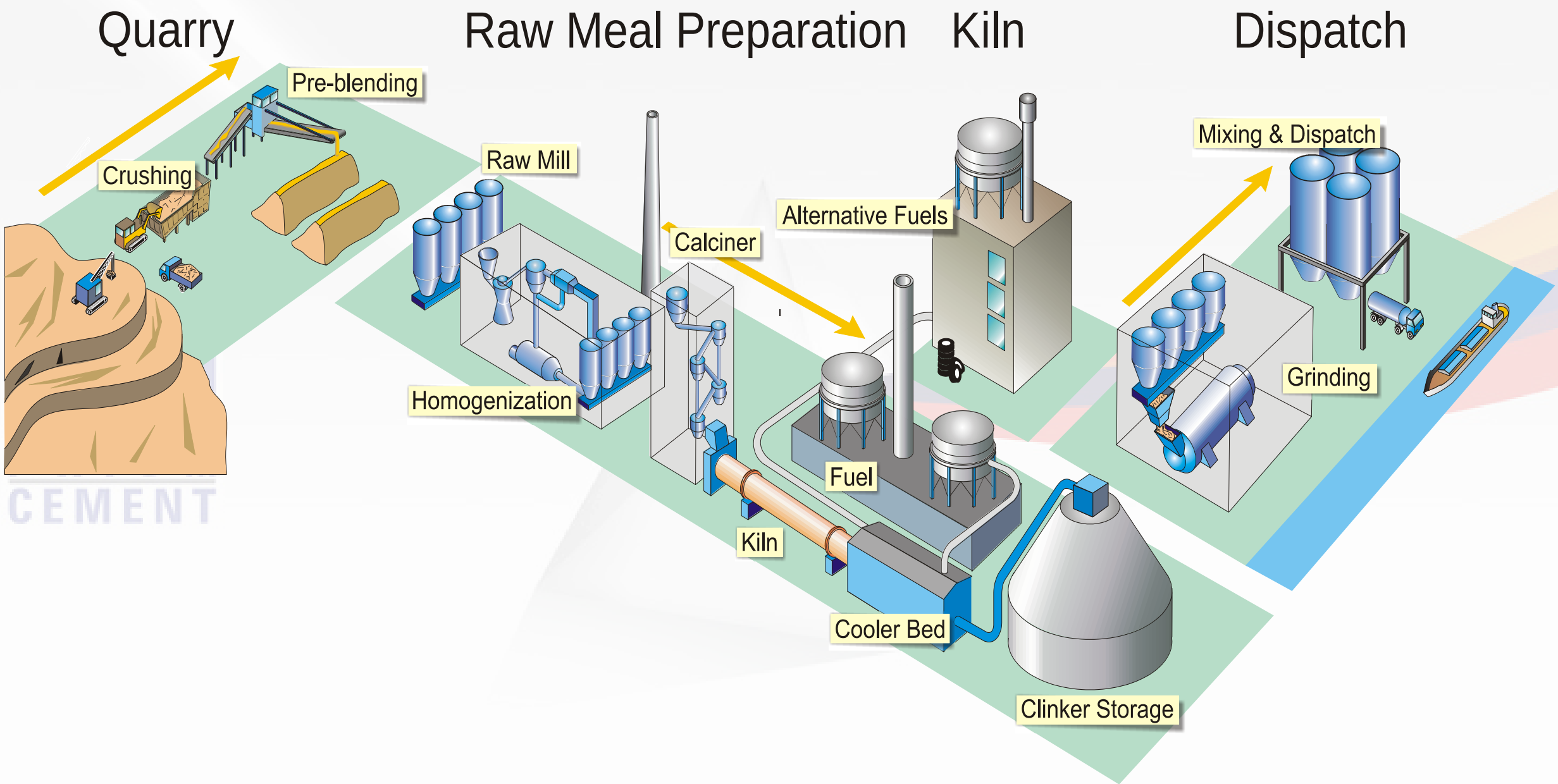
		UPPER BHANDER SANDSTONE
		SIRBU SHALE
	BHANDER	LOWER BHANDER SANDSTONE
	SERIES	**BHANDER LIMESTONE**
		GANUGARH SHALE
UPPER VINDHYANS	**~~~~~~~~~~DIAMOND BEARING CONGLOMERATE~~~~~~~~~~~~**	
		UPPER REWA SANDSTONE
	REWA	JHIRI SHALES
	SERIES	LOWER REWA SANDSTONE
		PANNA SHALES
	~~~~~~~~~~ DIAMOND	**BEARING CONGLOMERATE~~~~~~~~**
	KAIMUR	MAINLY SANDSTONE &
	SERIES	QUARTZITE WITH MINOR SHALE

~~~~~~~~~~~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

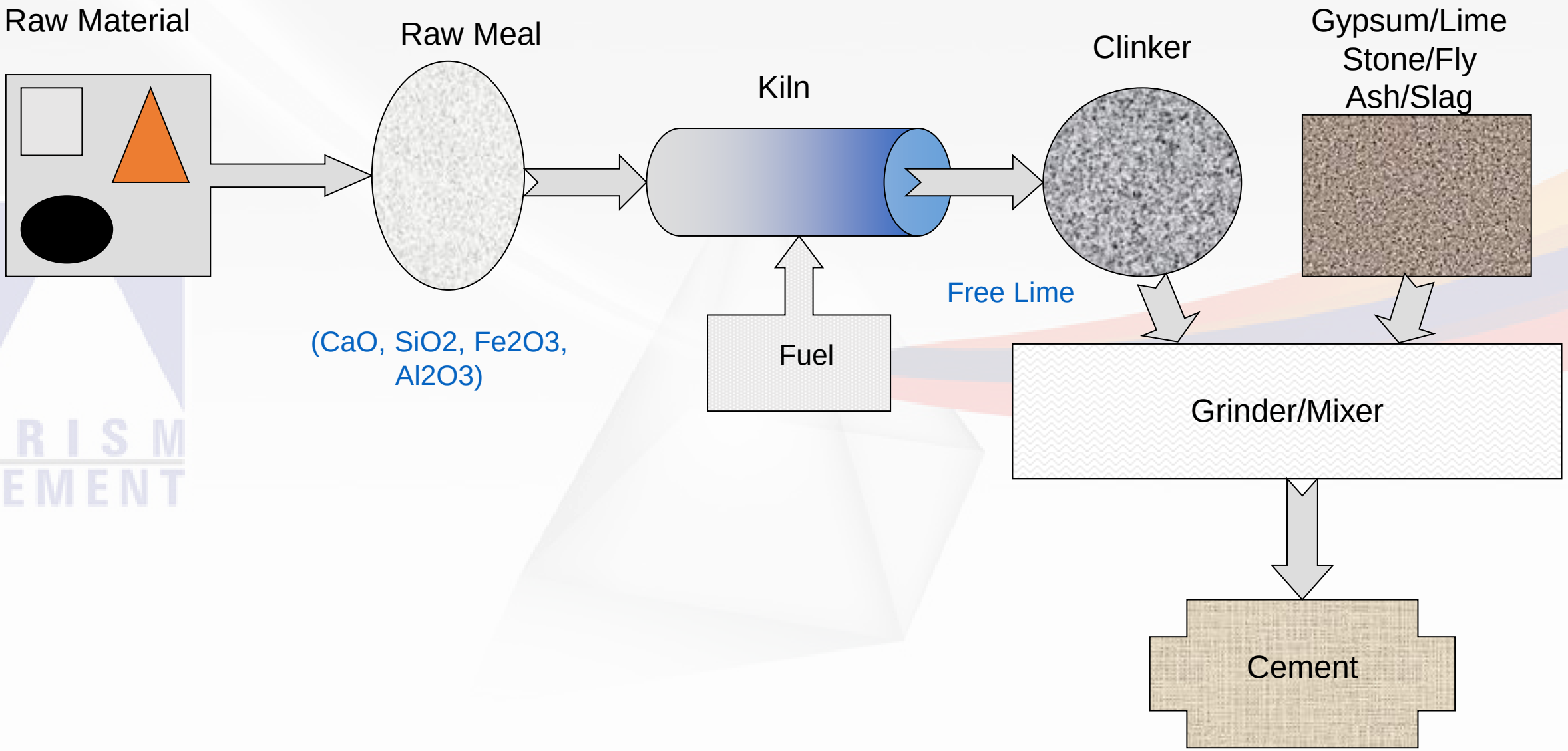
Mining Leasehold areas falling in state of Madhya Pradesh

S. No.	Area (In Ha.)	Location	Mineral	Remarks
1.	253.326	Hinauti & Sijhatta	Limestone	Working mine
2.	66.434	Mankahari	Limestone	Working mine
3.	99.416	Hinauti & Sijhatta	Limestone	Working mine
4.	772.067	Hinauti & Sijhatta	Limestone	Working Mine
5.	117.594	Mendhi	Limestone	Working mine
6.	512.317	Baghai	Limestone	Working mine
7.	40.236	Bandarkha	Limestone	Working mine

Overview Cement Line



Cement Process Control



Specification of Cement grade Limestone as per National Council for Cement and Building Materials (NCCBM)

Oxide Component	Acceptable range for manufacture of OPC	Limiting Values taking into consideration for other types of cement Scope of beneficiation and blending
CaO	44-52	40 (Min)
MgO	3.5 (Max)	5 (Max)
SiO2, Al2O3 and Fe2O3	To satisfy Lime Saturation Factor (LSF), Silica Modulus and Alumina Modulus	
Na2O+k2O	<0.60	<1.0
Total S as SO3	<0.60	<0.80
Cl	<0.015	<0.05

- In case of Vindhyan limestone deposit, Limestone above 38% CaO can only be consumed for Cement manufacturing .

- In practice even to consume Low grade Limestone (Below 34% CaO) we prepare a blending plan of Low grade Limestone and High Grade Limestone with a certain ratio .

- For Mineral conservation we used all the Limestone above the threshold value > 34% declared by IBM.

- Presently we using beneficiation process which is enhance the Limestone grade suitable for Cement manufacturing.

Mineral Beneficiation Process by screening

Role of Fuel in limiting the cut off grade of limestone

- Fuel being used in the cement industry is Pet coke, Imported Coal and Indian Coal in this order. Each fuel plays an important role in clinker manufacturing process.
- Pet coke is the most preferred fuel due to its low ash and high calorific value (~8000 Kcal/ Kg) and also conserves limestone deposit. Even with this, it is difficult to blend limestone below 40% CaO. Availability of pet coke on regular basis is an issue. Further, high sulphur in pet coke put restrictions of its usage in some of the limestone deposits having inherent SO3.
- With the imported coal (ash ~16% & calorific value 5500- 6000 Kcal/ Kg) limestone cut off would be 42% CaO.
- Indian Coal available to cement industry today is high in ash (~38% to 45%) and low in calorific value (~3500 to 4000 Kcal/ Kg). With this quality of coal, the CaO value in limestone needs to be ~45%.
- Thus, industry uses Indian coal along with imported coal/ pet coke so that average run of mine is maintained at 43-45% CaO.

Role of Additives in the Cut Off Values of RoM Limestone

- Besides Limestone, cement raw mix needs 5 to 6% correcting material namely laterite, bauxite, blue dust and red ochre etc.
- As day by day quality and availability of Limestone as well as these additives is deteriorating which demands higher lime content from run-off-mine and low ash content of fuel being used in cement manufacturing

Cut Off for Correcting Materials

Bauxite

Al_2O_3	>	38%
SiO_2	<	12%
Fe_2O_3	<	20%

Laterite

Fe_2O_3	=	32-48%
Al_2O_3	=	25-35 %
SiO_2	<	12%

Raw Mix Design

Raw Mix

Parameter	Raw Materials			Ash Analysis			Resultant Fuel Ash Analysis	Chemical Analysis		
	Lime stone	LATERITE	Bauxite	Ind. Coal	SA Coal	Pet Coke		Raw Mix	Raw Mix LOI free	Clinker
SiO2	13.58	15.00	6.00	64.29	51.84	41.56	**41.56**	13.56	20.99	**21.02**
Al2O3	2.65	23.00	42.00	24.85	23.54	14.84	**14.84**	3.29	5.10	**5.11**
Fe2O3	1.50	42.00	25.00	4.12	3.38	9.15	**9.15**	2.45	3.79	**3.80**
CaO	41.40	0.50	0.60	0.46	13.95	11.84	**11.84**	40.34	62.42	**62.35**
MgO	2.70	0.50	0.22	1.24	1.80	3.69	**3.69**	2.64	4.09	**4.09**
K2O	0.55	0.56	0.48	0.77	0.22	0.66	**0.66**	0.55	0.85	**0.85**
Na2O	0.12	0.06	0.08	0.21	0.18	0.42	**0.42**	0.12	0.18	**0.18**
Cl-	0.005	0.003	0.007	0.002		0.002	**0.00**	0.005	0.01	**0.01**
SO3	0.10			2.05	1.72	13.61	**13.61**	0.10	0.15	**1.20**
LOI	36.00	16.00	22.00	0.22	0.30	0.26	**0.26**	35.38	0.55	**0.55**
Sum	98.61	97.62	96.39	98.21	96.93	96.03	**96.03**	98.44	98.13	**99.15**
Ratio %	**97.4**	**2.00**	**0.60**	**0**	**0**	**100**	**100**		**0.001**	**1.00**
LSF	**98.3**							**92.8**		**91.3**
S/R	3.27	0.23						2.36		**2.36**
A/F	1.77	0.55						1.34		**1.34**
F-CaO										**0.97**
C3S										**50.29**
C2S										**22.40**
C3A										**7.22**
C4AF										**11.55**
Liq %										**28.75**

Suggestion for Revision of Threshold Value of Limestone

- Even after use of 60% pet coke and 40 % coal of 25% ash available, screening of run-of-mine, the cut off limit of CaO is around 40.8%.
- Due to better process control limiting value of MgO usage can be enhanced from the present 4% to 5% (Max)
- Deposits with high SO3 content restricts usage of pet coke as fuel resulting in consumption of limestone with high CaO only thus limiting the use of low grade limestone.
- Resources should be considered according to fuel mix and raw mix design and to be used for longer period in cost effective way.

THANK YOU

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