

# NUVOCO Cement - Rajasthan

NUVOCO

Presented By -  
Team - Chittor Cement Plant (Chittorgarh)

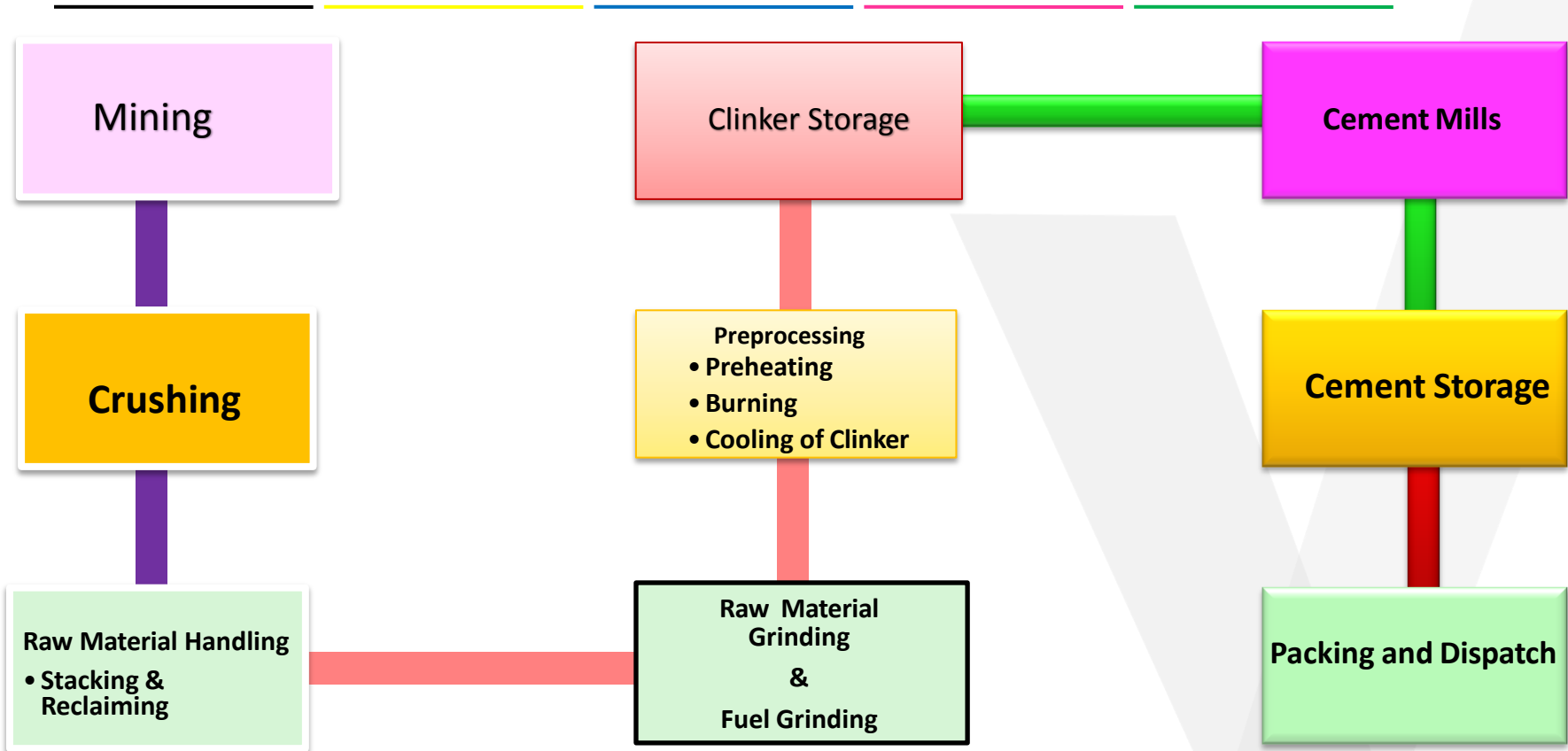


# Arniya Joshi Limestone Mine

Location	SiO <sub>2</sub> (%)	Al <sub>2</sub> O <sub>3</sub> (%)	Fe <sub>2</sub> O <sub>3</sub> (%)	CaO (%)	LSF	SM
SRK Mines	15.88	2.58	1.24	43.08	89.2	4.2
SRK Mines	16.76	2.72	1.42	42.48	83.2	4.0
SRK Mines	16.66	2.82	1.53	42.55	83.5	3.8
SRK Mines .	15.92	2.67	1.49	42.76	87.8	3.8
<b>BLAST NO:- 426 SRK MINES</b>	<b>16.3</b>	<b>2.7</b>	<b>1.4</b>	<b>42.7</b>	<b>85.8</b>	<b>4.0</b>



# Cement Manufacturing Process



# PRODUCT SPECIFICATION

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COMPRESSIVE STRENGTH (Mpa)	OPC 53 IS 269:2015		PPC IS 1489 : 2015	
	BIS NORMS	INTERNAL NORMS	BIS NORMS	INTERNAL NORMS
<b>3 DAYS</b>	27	36	16	21
<b>7 DAYS</b>	37	ND	22	N D
<b>28 DAYS</b>	53	58	33	47
<b>SETTING TIME (Minutes)</b>				
<b>INITIAL</b>	30 (Min)	130-160	30 (Min)	160-190
<b>FINAL</b>	600 ( Max)	190-240	600 ( Max)	220-250
<b>FINENESS (M2/KG)</b>	225 (Min)	300 $\pm$ 10	300 (Min)	340 $\pm$ 10
<b>SOUNDNESS</b>				
<b>LE CHATELIER (mm)</b>	10	0.5-1.0	10	0.5-1.0
<b>AUTOCLAVE %</b>	0.8	0.02-0.05	0.8	0.02-0.05

To achieving the cement quality we considered the clinker phases value as per below table:

CLINKER Phase	
Phases	Typical Value (%)
C3S	48-50
C2S	25-28
C3A	6-7
C4AF	12-14
fCaO	<1.5

**For Achieving these phases value we are maintaining oxide values**

CLINKER OXIDES	
Oxides	Typical Value (%)
SiO2	21.5-22.2
Al2O3	4.8-5.2
Fe2O3	4.0-4.3
CaO	64-65
MgO	1.0-1.2
SO3	1.6 - 1.8

### Cement Additives Quality

Material	Quality Parameter
Gypsum	Anhydrite Gypsum (Purity >90%) Gypsum Marine Raw ( Purity = > 80%, Cl = < 3.0 %)
Fly ash	LOI <5%, S+A+F >70%, LR >5.0 MPa

# Clinker Consist of

**RAW MIX DESIGN**

**CLINKER**

**FUELMIX**

**Rawmix = Limestone + Red Ochre + LIRO+ SWT**

Oxides	Rawmix	Limestone	Red Ochre	LIRO	Sweetner
SiO <sub>2</sub>	14.3-14.8	14.0-15.0	15-20	30-36	3-5
Al <sub>2</sub> O <sub>3</sub>	2.9-3.1	2.0-2.2	11-15	30-37	0.5-0.7
Fe <sub>2</sub> O <sub>3</sub>	2.7-2.9	0.9-1.2	45-55	8-15	0.1-0.3
CaO	42.8-43.2	43.0-45.0	1-2	2-5	49-51
MgO	0.5-0.8	0.4-0.5	<1.0	<1.0	1-3
K <sub>2</sub> O	0.3-0.4	0.3-0.4	<0.5	<0.5	<0.3
LSF	92-94	100 -106	-	-	-
SM	2.3-2.5	3.0- 4.8	-	-	-
AM	1.1-1.3	1.9-2.6	-	-	-

**Fuel Quality**

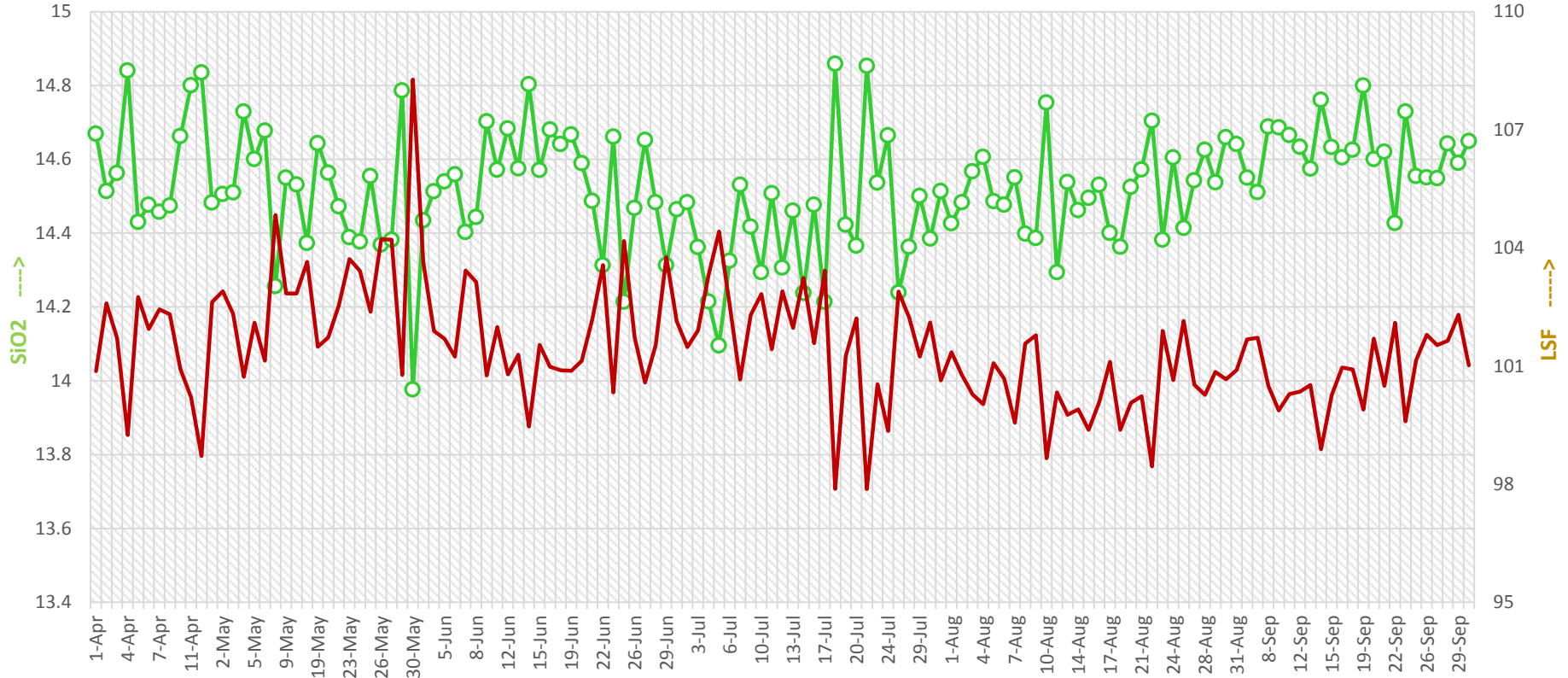
	Petcoke	Carbon Black	TDI TAR
<b>Moisture (%)</b>	6.0-8.0	2.0-3.0	1.0-2.0
<b>IM (%)</b>	0.5-0.8	0.7-0.9	0.4-0.5
<b>VM (%)</b>	9.0-11.0	6-10	48-50
<b>ASH (%)</b>	<1.5	15-25	0.8-1.0
<b>Sulphur (%)</b>	5-7%	2-3%	< 1.0
<b>GCV (Kcal/Kg)</b>	8200-8350	6000-6400	6100-6300

# Blast hole Data

## BLAST NO:- 426 SRK MINES

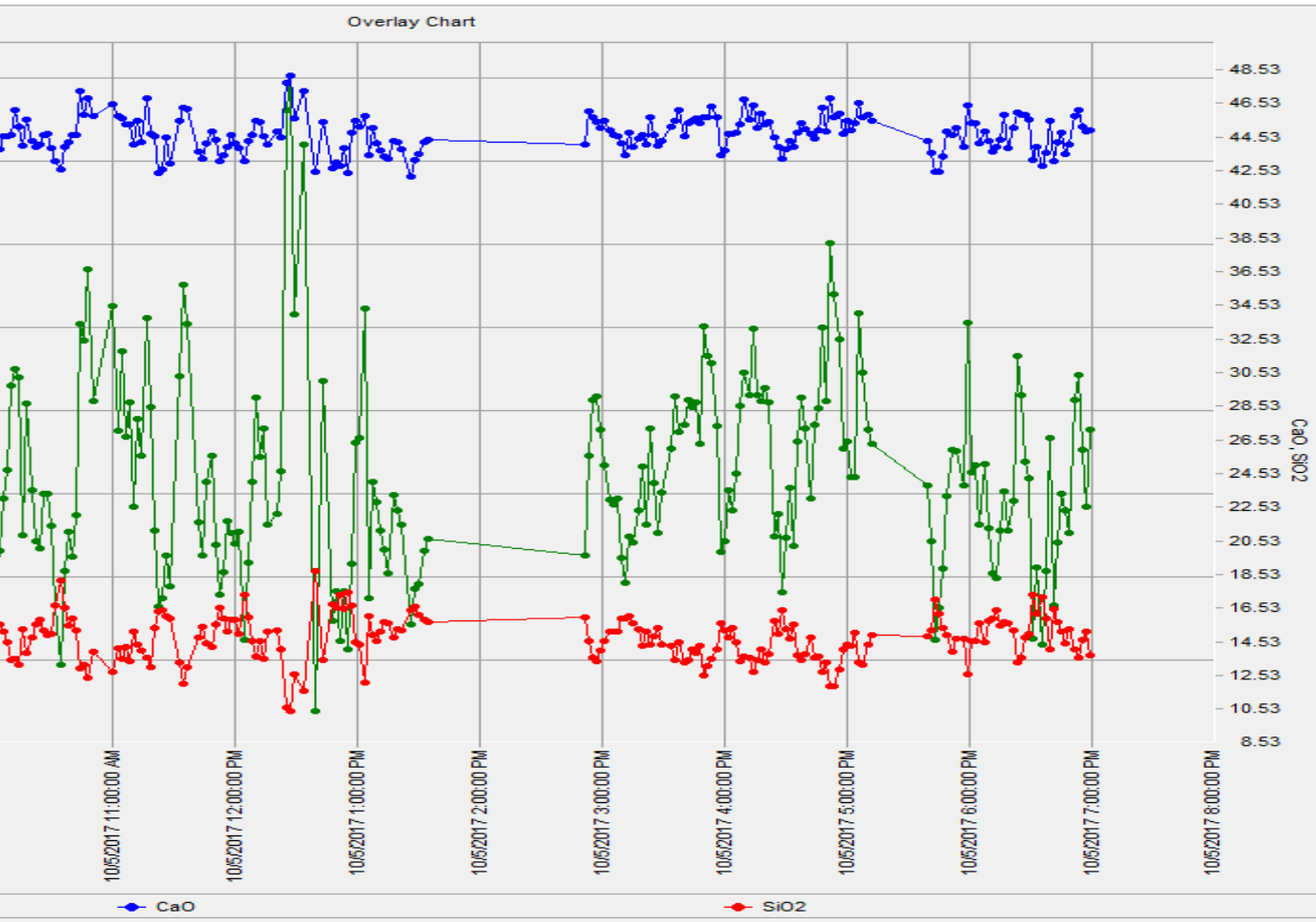
Sl.No	Location	Date	Column	SiO2 (%)	Al2O3 (%)	Fe2O3 (%)	CaO (%)	LSF	SM
1	SRK Mines - Old Pit 2nd Bench East side Depth 10.0 Mtr.	26.04.2017	C1	15.88	2.58	1.24	43.08	89.2	4.2
2	SRK Mines - Old Pit 2nd Bench East side Depth 10.0 Mtr.	26.04.2017	C2	16.76	2.72	1.42	42.48	83.2	4.0
3	SRK Mines - Old Pit 2nd Bench East side Depth 10.0 Mtr.	26.04.2017	C3	16.66	2.82	1.53	42.55	83.5	3.8
4	SRK Mines - Old Pit 2nd Bench East side Depth 10.0 Mtr.	26.04.2017	C4	15.92	2.67	1.49	42.76	87.8	3.8
BLAST NO:- 426 SRK MINES				16.3	2.7	1.4	42.7	85.8	4.0

### Lime Stone SiO<sub>2</sub> and LSF 6 Months Data (Apr-17 to Sep-17)



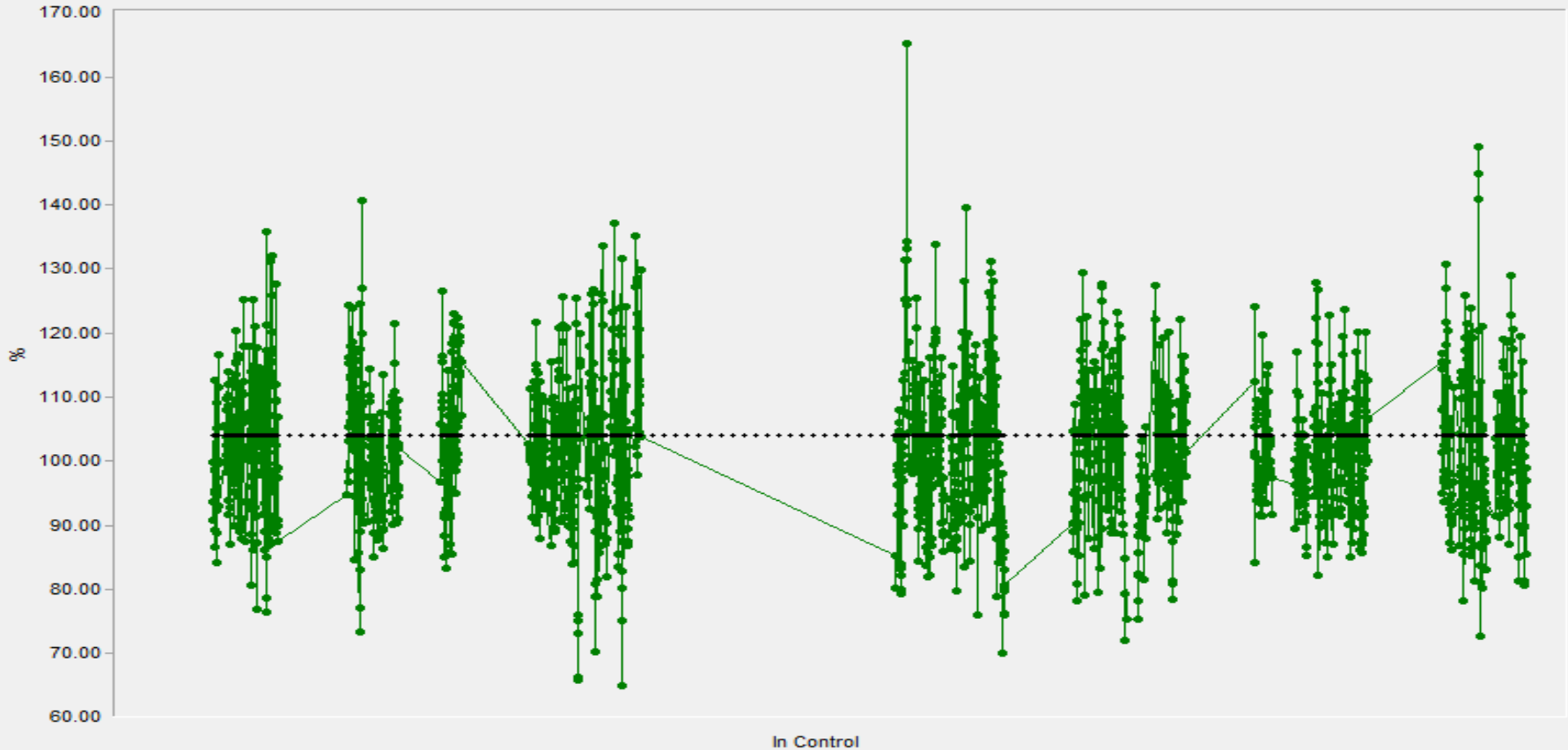


# Limestone Pile LSF Vs Cao Vs Sio<sub>2</sub> from 1<sup>st</sup> Aug – 5<sup>th</sup> Oct'17



# Limestone Pile LSF from 1<sup>st</sup> August to 31<sup>st</sup> September

Test results of samples between 18:47 August 1, 2017 and 18:47 October 5, 2017 - LSFControl Chart  
Average = 100.87 Standard Deviation = 10.87 Target Deviation = 11.09 Out Of Control = 0.0 % Maximum = 165.17 Minimum = 65.01 Count = 2048



## Initiatives for Environment & Mineral Conservation

- *Usage of 100% Petcoke for Kiln firing resulted requirement of low LSF.*
- *Maximum manufacturing of Blended Cement (55-65%).*
- *Focus to enhance the Flyash absorption to reduce the Clinker usage.*
- *Maximum consumption AFR, to minimize Coal consumption.*
- *100% usage of Plant generated waste materials.*
- *100% use of Chemical Gypsum.*

## Role of Fuel in the Cut Off Limit of Limestone

- Fuel being used in the cement industry is Petcoke, Imported Coal and Indian Coal in this order. Each fuel plays an important role in clinker manufacturing process.
- Petcoke 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 41% CaO and use SiO<sub>2</sub> above 15%**. Availability of petcoke on regular basis is an issue. Further, high Sulphur in petcoke put restrictions of its usage in some of the limestone deposits having inherent SO<sub>3</sub>.
- With the imported coal (ash ~16% & calorific value 5500- 6000 Kcal/ Kg) limestone cut off would be 44% CaO and SiO<sub>2</sub> cutoff will reduce drastically say at 13%.
- Indian Coal available to cement industry today is high in ash (~38% to 45%) and low in calorific value (~3500 to 4000 Kcal/ Kg). ???

## Role of Additives in the Cut Off Values of RoM Limestone

- Besides Limestone, cement raw mix requires 08 to 12% additive material like Red Ochre , LIRO, sweetener etc.
- Day by day quality and availability of these additives is deteriorating i.e. increase in silica which demands higher CaO content from run-off-mine limestone



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Thank you !