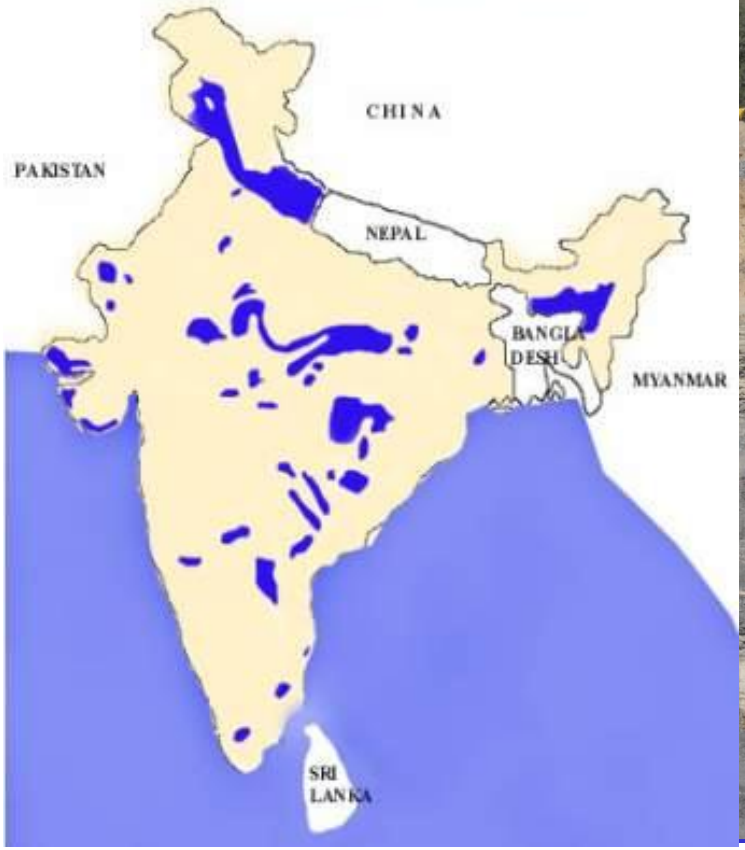
Limestone Threshold Value Requirement for Cement Industry

Kymore Cement Works, ACC Limited

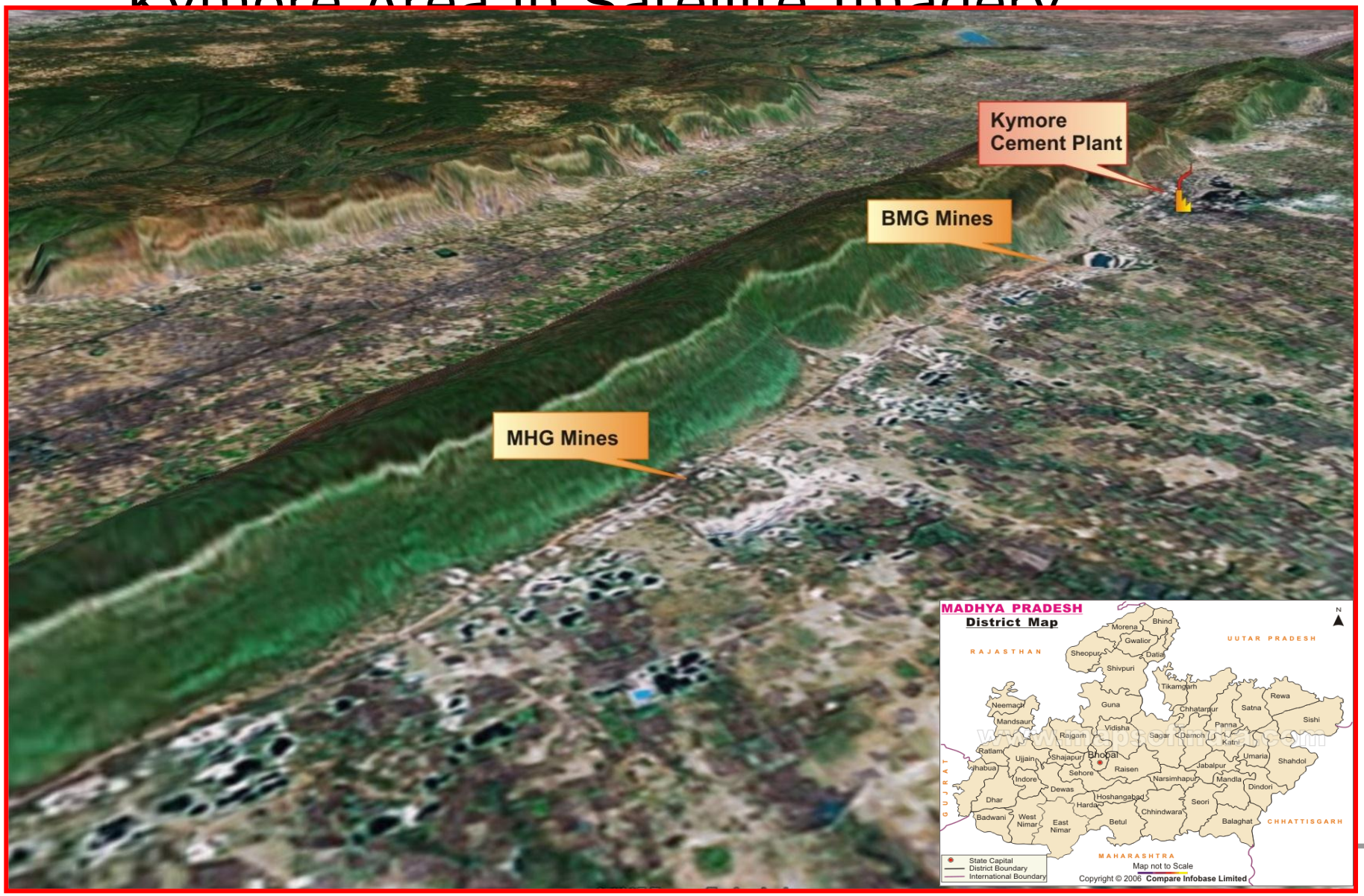
Major Limestone Deposits



Presentation on

Revision of Threshold Value of Minerals(Limestone)

Kymore Area in Satellite Imagery



Limestone Threshold Values

- ***Minerals (Evidence of Mineral Contents) Rules, 2015*** defined "Threshold Value of minerals" means limit prescribed by the Indian Bureau of Mines from time to time based on the beneficiality and or marketability of a mineral for a given region and a given time, below which a mineral obtained after mining can be discarded as waste."

- **Threshold Value suggested as per IBM Notification dated 16.10.2009:**

  For North, West & Central Min – (CaO 34%), Max – (MgO 4%)

  For South & Eastern states Min – (CaO 35%), Max – (MgO 4% SiO2 18%, Alkalies 0.5%)

- ***Rule14(1) MCDR 2017-*** **Separate stacking of non-saleable minerals–All the non-saleable or un-usable minerals or ores above the** threshold value of the mineral, as may be notified by Indian Bureau of Mines from time to time, or otherwise shall be stacked separately on the ground earmarked for the purpose

- ***Rule14(2) MCDR 2017-*** The mineral or ore stock above the limit specified in the threshold values of minerals or otherwise, shall be properly maintained indicating the quantity and quality of all such material stacked, and the month-wise inventory of such materials shall be updated.

Limestone Quality Requirement in Cement Industry

- Average quality requirement of limestone for cement manufacture:

  CaO 42% (min), MgO 2.5 to 3% (max) & SiO_2 14% (max)

- No geological deposit is uniform in quality.
- Average 42% CaO of raw mix can be achieved by mixing stones whose CaO can varies from 38% to 44%.
- In any deposit, to use entire reserve of limestone with 34% CaO in cement manufacturing we need minimum 50% CaO limestone of same quantity for blending.
- Often in the deposits of cement grade limestone, mineral with lime value 34% to 38% CaO remain unused.
- As per MCDR 2017 these un-used sub-grade mineral has to be stacked separately.

Example ACC Leases- Quality Variation in Deposits

Kymore Lease- Average Quality				
	CaO	MgO	SiO_2	Remarks
LST	49.1	2.4	5.5	***Usable Sub-grade*** Average ROM limestone requirement of Kymore plant is 43.8% CaO with 11.2% SiO2 and 3.5% MgO. Because of quality of LST & LSTwith black & white shale unit we are able to consume high Mg Sh and LST below 38% CaO
LST with white shale	25.2	1.76	29.5	
LST with Black Shale	30.06	9.5	21.9	
Bottom Shale	28.7	9.5	23.6	
High Magensia Limestone	29.4	16	8.17	

Example ACC Leases- Quality Variation in Deposits

Lakheri Lease- Average Quality				
	CaO	MgO	SiO_2	Remarks
Upper Series	41.7	1.2	16.6	***Un-usable Sub-grade*** Plant's quality requirement 42-43% CaO. Average quality of Lower & Upper Series Limestone is just to meet the quality requirement of plant. Therefore Middle Series Limestone is not used for cement manufacture in Lakheri plant. It is to be stacked separately.
Middle Series	38	1.2	23.9	
Lower Series	42.6	1.3	16.3	

Nandini Khundini Lease- Average Quality				
	CaO	MgO	SiO_2	Remarks
LST_U	44.24	2.18	10.49	***Usable Sub-grade*** Average ROM limestone requirement of Jamul plant is 44.3% CaO with 11.3% SiO2 and 2% MgO. Because of quality of LST_U & LST_L unit we are able to consume Mg Sh LST with 38% CaO
Mg Sh Lst (sub-grade)	38.64	5.31	12.93	
LST_L	46.69	2.39	7.64	

Observation with respect to present threshold value

Space Constraint for Sub-grade Stack

- As per MCDR2017 all sub-grade/mineral reject need to stack separately.
- Mineral rejects can not be backfilled within the pit.
- Outside ultimate pit limit it is often difficult to find place for a separate mineral stack.
- It is even more difficult when entire lease area is mineralized.

Lack of cost effective beneficiation techniques

- As on date no cost effective beneficiation technique is available for limestone.
- Common practice to beneficiate limestone are screening, wobbling & floatation.
- Beneficiation like floatation also creates end products which are difficult to be handled.

Suggestions

- ***Clarification required-*** If one of the 4 parameters of limestone threshold is not met whether that is called a sub-grade or waste?
- Change in threshold limit of limestone from CaO 34-35% to ***CaO 38%.***
- Some ***tax or royalty relaxation*** will enthuse user agency to do beneficiation and use lower quality of limestone - hence conservation of mineral resource
- ***Invention of any cost efficient beneficiation techniques*** by IBM Ore Beneficiation Lab.
- IBM can recommend ***permission for selling un-usable sub-grade*** minerals to State governments. This will solve the problem of stacking & also the un-usable mineral will be used that in turn will reduce the impact of mining on environment.
- ***Alternatively threshold value of limestone for Cement Industry is not required.*** At places 35-38% CaO limestone can be used wherever sweetener grade limestone is available in close vicinity. In the absence of high grade limestone, at places we are not even able to use limestone with CaO content <40%. Quality of overall limestone deposit is required to decide which quality of stone can be used. Threshold value of limestone does not pay much significant role in cement manufacture. Therefore Limestone can be removed from the threshold value list of 12 minerals.