ANNEXURE - X

FEASIBILITY STUDY REPORT IN RESPECT OF KCP LIMESTONE DEPOSIT-II, OVER AN EXTENT 20.046 HA IN SY.NO.656/11-B8 OF POLEPALLI VILLAGE DURGI MANDAL, GUNTUR DISTRICT, A.P.

1.0 Introduction: M/s KCP Industries has set up a cement plant at Macherla with a capacity of 2000 TPD. KCP is a 75 year old diversified business group with a turnover over 200 million USD with interests in Cement, Heavy Engineering, Sugar, Power and IT. It has 9 manufacturing locations over various geographies in India and Vietnam. The plant is in operation since 1958. Presently raw material requirement to the cement plant is being met from the existing four mining leases of the company: The four Mining leases are as below:

- Mandadi Limestone Mine over an area of 50.41 ha in Mandadi Village, Veldurthy Mandal, Guntur District, Andhra Pradesh.
- Terala Limestone Mines over an area of 49.18 ha in Terala Village, Durgi Mandal Guntur District, Andhra Pradesh.
- KCP Limestone Deposit-I Mine over an area of 4.274 ha in Mandadi Village, Veldurthy Mandal, Guntur District, Andhra Pradesh.
- **KCP Limestone Deposit-II Mine over an area of 20.046 ha in Polepalli Village, Durgi Mandal, Guntur District, Andhra Pradesh.**

It is mandatory to carry out a feasibility study and document the results as report and annex to the Mining Plans/Review of Mining Plan. Accordingly the present study report is prepared as per the guide lines provided in the Circular no M-110011/1/NMI/2009 CCOM dated 19th March 2010. Reserves in the subject mining lease have higher level of confidence in terms of its quantity and quality with adequate detailed exploration inputs meeting the parameters of UNFC. The reserve so arrived is amenable for a detailed mine planning addressing all environmental issues related to the lease area. The ROM quality meets the end product

manufacturing parameters and also the winning of the deposit meets the economic viability and ultimately the final product has the market acceptability. Further, the lessee has complied with all statutory conditions and free from legal and statutory litigations. In the forthcoming paras, the above said items have been discussed.

2.0 General Mine Descriptions. KCP Limestone Deposit-II is the captive mine for limestone raw material to the M/s The KCP Ltd's Cement plant located at Macherla at a distance of 7 km from mine. KCP Limestone Deposit-II is over an extent of 20.046 ha and is located Reserve forest area in Polepalli Village, Durgi Mandal, Guntur District of A.P. The Mining lease is valid upto 17.06.2066. The lease area is well connected with rail and road network. The ML area is due South located at a distance of about 6 km from Macherla town and is connected by a metal road running parallel to the ropeway. Hyderabad is 175 km from Macherla via. Nagarjuna Sagar connected by a State Highway. Macherla is the nearest Railway station about 5 km from the area, situated on Macherla - Guntur Loop line of SCR. The area is 125 km away from Guntur, the district headquarters. Key Plan of the area is given as **Plate – I** on 1:50000 Scale.

The ML area falls in Survey of India Topo Sheet No 56 P/7 (1:50,000 Scale) between 16°25'22.7"N - 16°25'37.9"N and 79°25'56.0"E - 79°26'15.2"E latitude and Longitude respectively with an altitude ranging from 159 to 166 m above MSL. The relief within the ML area is about 8m. There is a gentle slope towards East. The total lease area falls within the Mandadi RF.

The lease hold is of an irregular panel shape, extending over a length of about 530 m in a general W - E direction, for a width of 400m (max) and occupying an area of 20.046 ha. The lease has a comparatively straight boundary on the southern side against the jagged northern boundary with several re-entrant edges.

The formations occurring in the ML area are near horizontal with gentle dips of 2^{o} to 5^{o} towards SSE or South. The incidence/ mode of occurrence of Limestone is akin to Stratiform, Strata bound and Tabular

Deposits of Regular order of United Nations Framework Classification for Regular/irregular Habit vide the Mineral Conservation and Development (Second Amendment) Rules, 2003, dated 17.04.2003 issued by the Ministry of Mines, Government of India. Therefore, the type of deposit has been categorised as Category-I of MEMC Rule 2015.'

The litho units exposed in the lease hold and the surroundings belong to **Narji formation** of the Kurnool Group (Late Proterozoic). The local geological succession and the general characteristics' of the litho units are as below (Also refer Geological Plan vide **Plate – IV**)

SUCCESSION OF LITHOUNITS, KCP LIMESTONE MINE

S.No	Litho units	Geological Correlation & Age	General Range of Thickness (m)	CaO%	SiO_2%
1.	Soil & Calcareous Shale (S&C)/ Grey Lst	Recent	0.1 -4.0	35-40	12-18
2.	Grey Lst. & Kankar Zone (G&KZ)	Proterozoic	2-4	42-45	+13
3.	Dark Grey L.St. (DGL)	-do-	5-11	46-49	8-12
4.	Light Grey L.St. (LGL)	-do-	3-10		
5.	Green L.St. (GL)	-do-	2-6		
6.	Pink L.St (PL) (Floor Rock)	-do-	11-13	40-42	13-15

The above information about the characteristics of the Limestone is based on actual observations in the field as exposed and intercepts of boreholes.

The general strike of the formation is ENE-WSW with very low (2° to 6°) dip due south.

The upper most units in limestone unit are intensely altered to brown, buff, red and white calcareous clay and occur as overburden. It also occurs as thin layers within limestone unit and as creep down the sub-vertical joints down to variable depths. They show series of strike and dip joints, which dip at 60° to vertical.

3.0 Exploration: Topographic survey was carried out on 1:2000 scale. A temporary bench mark was established at the BP -7 (158.478m RL). Surface Plan (**Plate – III**) has been updated at regular intervals on quarterly basis. The last survey was carried out, for the current modification is on 28.08.2020.

Exploration in the lease area was carried out during the year 2015-16 by drilling 7 core bore holes with an aggregate meterage of 230 m on 100 m x 100 m grid. The maximum and minimum depths reached by the boreholes were 41.0 m and 13.0 m respectively. The logs in Form - K with analysis of meter wise samples of these boreholes are given as **Annexure – XI B**.

Further additional four DTH holes were drilled from the floor of a bench to decipher depth continuity of Cement grade Limestone. Thus a total of 26 boreholes were drilled involving 484.04m with depth range of 8.0m to 40m. The details of these boreholes are given as **Annexure – XI C**.

During exploration, meter wise half cut(longitudinal split) were drawn from the core boreholes. All meter wise core samples were analyzed for total carbonates. The data generated was used for reassessment of reserves while submitting the current Mining Plan. Locations of these bore holes are shown on Geological Plan (**Plate – IV**).

4.0 Reserves Assessment: Reserves estimation for the Cement grade Limestone was attempted based on the basis of exploration inputs and also on the basis regularly updating the Geological Cross Sections and related Surface and Geological maps from time to time. Cross sectional method of reserve estimation was adopted to estimate the reserves.

On the basis of threshold values, reserves have been estimated as per SiO_2 less than 18% and CaO greater than 35%. The tonnage factor considered is 2.5 for reserves assessment. After taking into consideration of present mine position and the drilling data of core bore holes the reassessment has been made. The geological cross sections have been redrawn and re estimation is done.

Basis for reserves Estimation

On the basis of above classification guidelines, to estimate the reserves/ resources the following criteria has been adopted.

- 5 Geological cross sections designated as AA' to EE' are drawn based on the information from 7 core bore holes and four DTH holes drilled in the year 2016 and 2020 respectively.
- Areas where core drilling has been carried and the lateral distance between the two sections is less than 200m those reserves have been considered as proved reserves. The details of boreholes considered are given as **Annexure – XI A to XI C.**
- Depth wise estimation is restricted to the depth of drilling and to the extent of mineral has been established.
- Reserves for the entire pay zone which includes grey and partly pink limestone.
- Reserves locked up in the 7.5 m barrier zone and bench slopes along section lines were estimated and placed under 211 category. Refer **Annexure – XIII B.**
- Lateral extension for extreme bore holes are not considered for reserves.
- On the basis of threshold values reserves have been estimated as per SiO_2 less than18%
- An in-situ bulk density of 2.5 for limestone has been considered based on the field test carried out.
- Quality of Limestone is based on Analysis of meter wise samples but not on Lithology basis.
- Since the area is rock and bereft any soil cover. Soil quantities are not estimated. However inter locked soil quantities in the bedding planes and fractures up to the first bench between the section lines have been only assessed.
- Ultimate Pit Limit (UPL) is the final projection of the bench workings considered UPL up to safety barriers in the section lines and the Economic depth of the mine is 134m RL.

Assigning UNFC Codes for the lease:

1) **UNFC CODE 111:** Quantities estimated with G1 level of exploration, F1 level feasibility study and E1 level economic consideration.
2) **UNFC CODE 211:** Limited extent along section lines only in the northern part in AA', BB', CC', DD' & EE' section lines.

Total Mineral Reserves & Resources in the Mining Lease

(Re-estimated Reserves /Resources as on 30.09.2020)

UNFC CLASSIFICATION OF RESERVE AND RESOURCE ESTIMATION

	UNFC code	**Qty. in million tonnes**	**Grade/Wt. Avg. Grade**
A. Total Mineral Reserves			
Proved Mineral Reserves	111	**3.65**	The weighted average grade of deposit (cement and sub grade) is assessed as **%CaO : 47.39** **%SiO_2: :10.61**
Probable Mineral Reserves	121 & 122	-	
B. Total Remaining Resources			
Feasibility Mineral Resource	211	**0.75**	
Prefeasibility Mineral Resource	221 & 222	-	
Measured Mineral Resource	331	-	
Indicated Mineral Resource	332	-	
Inferred Mineral Resource	333	-	
Reconnaissance Mineral Resource	334	-	
	Total B	**0.75**	
Total Reserves + Resource **(A+B)**		**4.40**	

Thus the re assessment includes only Mineral Reserves under 111 category (Proved Mineral Reserves) and Remaining Resources includes Feasibility Mineral Resources (211). Thus the re-estimated total Mineral Reserves for the lease are 6.633 million tonnes.

4.1 Quality of Limestone: Meter-wise samples from the drill cores were drawn and analyzed by the Plant laboratory. Selective samples (10% samples) from these core samples have been drawn as check samples and

analyzed at M/s Natural Resources Development Co-operative Society Ltd Hyderabad, which is a NABL accredited laboratory. Copies of these Analytical reports are given as **Annexure – XI A to XI C.**

Based on the analytical results of the meter-wise samples from the boreholes the quality of limestone has been assessed which is as under Quality of Limestone

BH No.	Grade %					
	TCO_3	CaO	MgO	SiO_2	Fe_2O_3	Al_2O_3
CBH-1	80.37	45.01	0.46	13.58	1.20	2.22
CBH-2	83.20	46.59	0.41	11.17	0.99	2.04
CBH-3	82.46	46.18	0.43	12.04	0.88	1.97
CBH-4	81.38	45.57	0.44	12.77	1.11	2.12
CBH-5	73.54	41.18	0.58	18.61	1.91	3.10
CBH-6	81.66	45.73	0.44	12.56	1.04	2.10
CBH-7	83.05	46.51	0.41	11.51	0.94	1.94

It is seen from the above data that, the limestone reserve is of Cement grade and it is consumable with the limestone from the other mines.

ROM to the plant is from the four mining leases i.e. Terala Limestone Mine, Mandadi Limestone mines, KCP Limestone Deposit-I & KCP Limestone Deposit-II mine which meet the desired raw material by the plant.

5.0 Production Schedule: The mine capacity as per Environment clearance is 6,00,000 tonnes, vide letter No SEIAA/AP/GNT-110/2014 Dt. 21.09.2015. Refer **Annexure – XIV.**

The present operating capacity of the plant at Macherla by M/s The KCP Ltd is 2000 TPD of clinker. The mine is in operation since 2016. The current proposal is for the period 2021-22 to 2025-26. Lease area is one of the integral parts of raw material source apart from the other three mining leases which the company is holding.

During the current Proposal of Plan period 2021-22 to 2025-26. It is proposed to develop the all directions of the lease by advancing the existing faces. Four benches operation for Sur-158, 158-152, 152-146 & 146-140m

will be carried out. An area of 2.498 Ha will be freshly broken up during the period 2021-22 to 2025-26 to raise about 240000 cu.m (600000 tons) of limestone per annum. Haul road and ramp will be formed to carry out the operations. The proposed production for the period 2021-22 to 2025-26 is given in the below table.

Production Schedule:

Year	Pit No. & UNFC Category	Top Soil in m^3	OB/SB /IB in m^3	ROM in T		Mineral rejects in m^3
				Cement Grade Limestone	Mineral Rejects/ Mining Loss	
1	2	4	5	6	7	8
2022-23	do	-	-	250818	-	-
2023-24	do	-	-	600488	-	-
2024-25	do	-	24800	600113	-	-
2025-26	do	-	-	600100		

Working cross sections for the period 2021-22 to 2025-26 is given in **Plate – V A to V E** & Sections in **Plate – V F.**

6.0 Mining Method: The mine is in operation since 2016. Open cast mining would be continued for raising limestone by adopting conventional method of drilling and blasting. The mechanised method will consist of the following operations.

- Cleaning the top surface
- Drilling and blasting
- Excavation and loading by excavator
- Haulage by dumpers up to crusher at a distance of 2.5 km (one way)

The mine is being worked by mechanized opencast benching method. Deep hole drilling of 115 dia holes will be made for blasting to generate well fragmented rock. The muck pile will be excavated by shovels having a bucket capacity of 1.7 cu.m. A maximum bench height of 6 m each with local variations at few locations is maintained. Mined out mineral will be conveyed to the crusher at plant site by 17 tons dumper. A bench width of 3 times to the largest HEMM is maintained for easy movement of machinery

with safety. Haul road with 1:16 gradient will be maintained and will be maintained regularly. During the operation stage a bench slope of 65° and an ultimate slope of 45° will be maintained for the entire operations.

The mining operations are supervised by the Engineers and staff employed by the company. All the required equipment is deployed with good working condition with an availability factor of more than 85%. For up keep and immediate maintenance the facilities and logistics are being established near the mines office which is under the supervision of Mines Manager. However major repairs and maintenance are being carried out at the workshop established in the Plant area. All logistics have been established for the maintenance of HEMM and ancillary equipment. During the current Plan period it is proposed to develop the mine towards northern periphery in the unexploited areas by advancing the existing face along the strike direction During the plan period in the mine will be developed all sides of existing benches, top soil recovery and handling is involved. Fresh area to an extent of 2.498 ha will be broken.

Existing main haulage road with ramps will be utilized and they will further strengthened to develop the mine properly. As mine progresses the ramp positions and the haulage road will be modified as per the requirement. Fuel economy and longevity of transport is taken care while planning the bench developments. Alignment of ramps linking the main haulage road will undergo changes from time to time, depending on the advancement of the benches. The main haul road and the ramp positions are depicted in **Plate – V A to V E** & Sections in **Plate – V F.**

The limestone occurring in the lease area is compact and sub horizontal to dipping at 2 to 6°. As such there are no geotechnical issues are anticipated during bench advancement and production. From the inception, the dark to light gray limestone formed main raw material source from this mine and being high grade material the limestone is being blended as the sweetener with the other mines limestone.

7.0 Beneficiation: The entire excavated mineral is directly usable in the clinkerisation process and does not require any beneficiation except sizing.

8.0 Marketing: The KCP Ltd is producing two types of end product i.e. cement viz Ordinary Portland Cement (OPC) and Portland Pozzalona Cement (PPC). The product range manufacturing is mostly on the demand scenario.

This is an existing mine, which is in operation since 2016. The pit head cost of limestone is Rs. 316 per ton which includes mineral royalty of Rs. 80/ tonne.

The KCP Ltd is well established organization since 1958 and one of the old known cement producers in the State of Andhra Pradesh which was set up to supply cement for the construction of the mighty Nagarjuna sagar Dam, which stands as the testimony to the quality of cement produced by the company. KCP is situated adjacent to the known Nalgonda Cluster, as per cement industry classification, has 21 major & minor cement plants are in operation as on Mach 2014. Though there are few cement plants in the close vicinity, KCP is competing with adjoining plants in the Nalgonda district of Telangana State. KCP has its new plant at Muktyala near Jaggayyapeta. KCP being one of the oldest industries in this region and it is competing all these years for its brand and market share. The product range from this company includes OPC &PPC Cement which has acceptability and good demand in the local market especially by the real-estate industry. The present sale price in the region about 300-310 per bag.

All the statutory provisions of mining, taxation, labour etc. are being complied and returns are being sent regularly to the concerned authorities.

9,0 Infrastructure: The KCP Ltd has established the cement plant where a good infrastructure exists. The present infrastructure is mostly the surface transport systems that too by road. Though the rail head is at 5 km it is preferred to dispatch the end product through trucks by road only. Most of the cement companies adopted this mode only often with owned vehicles. State Highway passes through at Macherla. Hyderabad is 175 km from Macherla via. Nagarjuna Sagar connected by a State Highway.

The company draws the power through State grid located at a Macherla. However to meet any contingency, the company has DG sets as

stand by. Being an established zone / cement industry belt, adequate skilled/ semiskilled man power is available.

10.0 Environmental Requirements.: The KCP Ltd has obtained the environmental clearance for enhanced capacity of clinkerisaion, cement production and related higher level raising of limestone from the mines. Similarly both the mines have approved Mining Plans/ Review of Mining Plan as the case maybe which includes mine closure, reclamation plans as approved by Indian Bureau of Mines plans. These documents illustrates production scheduling on a sustainable basis with due regard to mineral conservation till end of mine life in each case.

11.0 Legal/other Issues: All the issues related to the forest clearance have been obtained Similarly the company has surface rights for the land for mining As such there are no legal factors like tribal lands etc. with any of the lease. All the leases are not part of National Parks, sanctuaries etc.

12.0. Economic Evaluation: The cement plant was established in 1958 with an initial capacity of 500 tpd and gradually increased to today's capacity of 2000 tpd. Present capacity is 0.60 mil tons of clinkerisation and 0.80 mil tons of cement. Since beginning in KCP, the cost component of mines is an integral part of total Cement Division of the company. No separate profit /loss accounting has been made for the mines. Further even within the mining head capital and the recurring expenses are maintained for all the mines as a single expenditure head. Thus it is dealt as a cement division accounting rather a separate mine wise accounting system.

The pit head cost of limestone raising at this Limestone Mine is of the order of Rs. 230.95/- per tonne which includes operating pit cost Rs 118.74/ tonne, royalty of Rs 80/ tonne - others (NMET & DMF) of Rs 25.76/tonne, depreciation and overhead cost of Rs 6.02/tonne, and
Rs 0.43/tonne for Limestone removal. Thus the total per ton of limestone from this mine is Rs 230.95/-. Viability of the project was carried out at the time of capacity enhancement as an integral part with plant and the raising

of 0.60 mtpa was found to be economical with marginal profit from the end product sale. The cost of mining equipment has depreciated over the period of mine operations. Since this being a captive mine there is no profit/ loss for the production of limestone at pit head. The overall profit depends on the cost of end product i.e Cement which has good realisation in the region.

The anticipated inflation component on the cost of production is of the order of 8 to 10%. To meet the anticipated growth of cement demand, the company has made a budgetary provision which includes variable cost, fixed cost and towards Royalty and Cess.

Under the above discussed parameters of geological aspects, reserves, existing infrastructure, marketing scenario present and future, the subject limestone mine will be a profit earning centre with economic viability.

Place:

Date:

M. Pratap Reddy
Qualified Person u/r 15 of MCR, 2016