PROPOSAL FOR PRELIMINARY EXPLORATION (G-3) FOR LIMESTONE IN KIRANAGI-1 AND 2 BLOCKS OVER AN EXTENT OF 11.41 Sq. Km. AREA, BHIMA BASIN,

DISTRICT: GULBARGA, KARNATAKA

UNDER NMET PROGRAM.

COMMODITY: LIMESTONE

BY

MINERAL EXPLORATION AND CONSULTANCY LIMITED

DR. BABASAHAB AMBEDKAR BHAWAN

SEMINARY HILLS

PLACE: NAGPUR **DATE: JANUARY, 2023**

Summary of the Proposed Kiranagi-1 and 2 Blocks (G-3) for Limestone

Features	Details
Block ID :	Kiranagi-1 and 2 Blocks (G-3)
Current Exploration Agency	**Mineral Exploration and Consultancy Ltd. (MECL)** (Formerly Mineral Exploration Corporation Ltd.)
Previous Exploration Agency	**Geological Survey of India (GSI)**
Geological Report (Previous stage Geological Report)	Previously no work has been carried out in the proposed Kiranagi-1 and 2 blocks. However, the entire Bhima basin was mapped by GSI and exploration at different stages was carried out at various places in scattered manner.
Commodity	Limestone
Mineral Belt :	Bhima Basin
Budget &Time Schedule to complete the project	Rs. 152.84 Lakhs, 10 month time period
Objectives:	Objectives of the proposed exploration in Kiranagi-1 and 2 Blocks are as follows: i) To carry out detailed Topographical Survey and Geological mapping on 1:4000 scale over an extent of 11.41 sq. km. area for proposed Kiranagi-1and 2 Block. ii) To delineate the strike and depth continuity of the limestone by drilling vertical boreholes of 10 numbers (5 in each Kiranagi-1 and Kiranagi-2 Blocks). The average depth of boreholes will be 50.00 m. iii) One borehole will be drilled upto the basement to check the thickness and continuity of limestone horizon at depth. iii) To carry out exploration as per Minerals (Evidence of Mineral Contents) Rule-2015 & Mineral (Auction) Rules-2015 (Amended upto 2021). v) The proposed exploration programme will be helpful in demarcating zone of various grades of limestone in the block as per UNFC norms and estimation of limestone resources which in turn will facilitate the State Govt. for auctioning of the Block.
Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be	The work will be carried out by Mineral Exploration and Consultancy Ltd. (MECL).

<table>
<tr><td>outsourced and name of the outsource agency:</td><td></td></tr>
<tr><td>Name/ Number of Geoscientists :</td><td>Geologist: 01 HQ (60 days)
Geologist: 01 Field (120 days)</td></tr>
<tr><td>Expected Field days (Geology, Surveyor)</td><td>Geologist: 01 HQ (60 days)
Geologist: 01 Field (120 days)
Surveyor: 01 Field (45 days)</td></tr>
<tr><td>1. Location:</td><td></td></tr>
<tr><td>Location</td><td>The proposed Kiranagi-1 and Kiranagi-2 Block is located in Gulbarga Taluk of Gulbarga district having a total block area of 11.41 Sq. Km. The Block falls in the Survey of India Toposheet No. 56C/16.</td></tr>
<tr><td>Block boundary Coordinate</td><td>
<table>
<tr><th rowspan="2">Sl. No.</th><th rowspan="2">Point Name</th><th rowspan="2">Block Name</th><th colspan="2">UTM Co-ordinates (Zone-43)</th><th colspan="2">DMS Co-ordinates (GCS WGS-1984)</th></tr>
<tr><th>Northing (m)</th><th>Easting (m)</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>1</td><td>KW-1</td><td rowspan="5">Kiranagi-1</td><td>1895914.446</td><td>699798.331</td><td>17° 8' 20.585" N</td><td>76° 52' 41.194" E</td></tr>
<tr><td>2</td><td>KW-2</td><td>1898552.811</td><td>700359.382</td><td>17° 9' 46.636" N</td><td>76° 53' 0.859" E</td></tr>
<tr><td>3</td><td>KW-3</td><td>1898551.241</td><td>697872.620</td><td>17° 9' 47.411" N</td><td>76° 51' 37.342" E</td></tr>
<tr><td>4</td><td>KW-4</td><td>1897005.389</td><td>697963.857</td><td>17° 8' 57.560" N</td><td>76° 51' 39.531" E</td></tr>
<tr><td>5</td><td>KW-5</td><td>1895914.446</td><td>698056.043</td><td>17° 9' 48.188" N</td><td>76° 51' 37.082" E</td></tr>
<tr><td>1</td><td>KE-1</td><td rowspan="4">Kiranagi-2</td><td>1895914.446</td><td>699798.331</td><td>17° 8' 20.585" N</td><td>76° 52' 41.194" E</td></tr>
<tr><td>2</td><td>KE-2</td><td>1898552.811</td><td>700359.382</td><td>17° 9' 46.636" N</td><td>76° 53' 0.859" E</td></tr>
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</table>
</td></tr>
<tr><td>Villages :</td><td>Kiranagii, Tosanhalli, Taranhalli, Telgul</td></tr>
<tr><td>Tehsil/ Taluk :</td><td>Gulbarga</td></tr>
<tr><td>District :</td><td>Gulbarga (Kalaburagi)</td></tr>
<tr><td>State :</td><td>Karnataka</td></tr>
<tr><td>2. Area (hectares/ square kilometres)</td><td></td></tr>
<tr><td>Block Area :</td><td>11.41 sq. km.</td></tr>
<tr><td>Forest Area :</td><td>No forest area.</td></tr>
<tr><td>Government Land Area</td><td>Data not available</td></tr>
<tr><td>Private Land Area</td><td>The block area mostly comprises of private land</td></tr>
</table>

3. Accessibility	
Nearest Rail Head :	There nearest railhead is Shahabad Railway Station at a distance of 4 kms towards the south east of the block.
Road :	The National highway No. 50 passes at a distance of 8 km to the west of the bock, which connects Gulbarga taluk headquarters and proposed Kiranagi Block. The state highway No. 125 passes at a distance of 4 km from the south eastern part of the block. No roads passes through the block.
Airport :	The nearest airport is Gulbarga Airport at 30 km from the block towards north east.
4. Hydrography	
Rivers/ Streams	The drainage of the area is mainly controlled by tributaries of Bhima River. The small nalas flowing from northeast to southwest drain into perennial Bhima river which is about 9 km east of the block. Small nalas flow towards the east to join Nandana Halla River
5. Climate	
Mean Annual Rainfall :	The average annual rainfall is 770 - 880 mm and the relative humidity varies from 26% in summer to 62% in winter. **Rainfall: Max. 70 mm in 24 hours**
Temperatures	**Summer: Max. 45°C in May- June** **Winter: Min. 10 °C in December**
6. Topography	
Toposheet Number	Survey of India Toposheet No. 56C/16
	The topography around the Kiranagi Block is almost flat to gently sloping. In general the area is sloping towards southwest and towards east The maximum elevation is approximately 450 m and the minimum elevation is 420 m. The north and central part of the block has the highest elevation.
7. Availability of baseline geology data	
Geological Map	1. Geological Map of the Bhima Basin (cale-1:25,000), GSI Mimore-129, GSI
Geochemical Map and Geophysical Map	Geochemical Map and Geophysical Map is not available for the proposed block.
8. Justification for taking up G4 stage mineral exploration	1. The area where exploration of Limestone is being proposed is not explored in the past. Though the area is already established of Limestone occurrences, conversion of Geological resource to mineable reserves is a necessity. Exploration increases the level of confidence on quantity and quality of reserve/resource which will attract the investors. 2. Most of the limestone deposits in India vary in grade. Silica and

	MgO in limestone play an important role towards chemical parameters of raw feed for cement manufacturing. In sedimentary limestones, the said radicals along with CaO vary consistently in lateral and vertical direction, in a small area. Estimation of quantity and quality based on the interpretation from nearby data is not possible especially for important factors like silica, MgO and others, which have a key role in the quality of the limestone to be used by cement and other industries. Limestone having high silica and MgO cannot be utilized for cement manufacturing process without blending with high grade limestone and the same may not be suitable for clinker manufacturing process. Exploration will locate and quantify the different grade of limestone based on the requirement for the different industries. 3. The proposed Kiranagi Block lies 11 km northwest of Kannur Limestone Block explored by GSI which had been already successfully auctioned. GSI had carried out General Exploration (G-2) in 550 Ha of block area. A total estimated reserve of limestone was 376.51 MMT with Portland Cement Grade: 309.14 MMT, at average 48.40% CaO, 9.04% SiO2, 0.98 %Al2O3 and Beneficiable Cement Grade of 67.37 MMTat average grade 44.99% CaO, 13.03%SiO2, 0.98% Al2O3. Thus it can be assumed that the Zone-1 would be well-developed in Kiranagi Blocks. 4. Based on the recent exploration in the adjoining area (Diggaon and Udagi Blocks), it has been observed that there are two zones in Shahabad limestone, namely Zone-1 and Zone-2 separated by shaly limestone. The thickness and quality of the limestone increases towards the north i.e. the dip direction. The maximum thickness of Zone-1 is 48.00 m, and the maximum grade is 47.42% CaO, average 1.00% MgO and average 11.59% SiO2 in Diggaon Block. The proposed Kiranagi-1 and 2 Blocks falls 30 kms to the northwest of the previously explored MECL blocks, thus it can be assumed that the Zone-1 would be of well-developed in Kiranagi Blocks. 5. Due to the high demand of limestone, Bommanalli Limestone Block, Chittapur South Limestone Block, Chitapura SW Limestone Block, Sulahalli Limestone Block, Ravur Limestone Block, Diggaon Limestone Block, have been successfully auctioned. Further, the Udagi Limestone Block explored by MECL is also in auction platform. 6. Augmentation of limestone resource which is the base of the infrastructure development and makes these blocks auctionable in accordance with the existing Rules & Regulations. 7. Demand for cement in construction industry will increase in coming years that will further increase the demand for limestone. The infrastructural projects like rail, water, transport, electricity, telecom, etc. will have increased investments and that also arise the need of limestone. In the union budget 2021 it was announced for “Housing for all” and “Smart Cities” which is steadily increasing

	the demand for cement and subsequently limestone. 8. Metro rail projects in Bangalore and the development of civil structure such as hospitals and schools throughout the state are influencing the cement industries growth in the state. 9. The neighboring states of Karnataka those do not have cement industries procure cement from the cement plants located in the state.

1.0 INTRODUCTION

1.1 On enactment of MMDR Amendment Act 2015, Minerals (Evidence of Mineral Contents) Rules 2015 and Mineral Auction Rules 2015, Govt. of India directed State Governments to speed up exploration work for different Mineral Commodities in the respective states and put them for auction. Recently, some rules in the MMDR ACT have been amended which facilitates the state Govt. to auction the blocks with lower confidence level of exploration and put more and more blocks on auction. Accordingly, State Government of Karnataka provided location of 17 prospective Limestone blocks in Gulbarga district to MECL and directed to verify the same for feasibility of exploration along with field work. MECL studied the area based on the available exploration data around the target area along with field visit. Field inspection report, modified location & extent of the blocks feasible for exploration where no exploration work was carried out in the past submitted to DMG, Karnataka. After assessment of the blocks, the feasibility of exploration had been discussed and finalized in the State Technical Committee meetings held on 03.06.2021 & 07.06.2021. The same was also discussed in the State Technical Committee meeting held on 19.07.2021 and recently concluded 56th SGPB held on 29.09.2022, where it was directed to submit proposals for the limestone exploration under NMET funding.

1.2 In the 61st meeting of Central Geological Programming Board (CGPB) held on 24th March 2022, New Delhi, Director Technical., MoM added that the proposal for exploration of Limestone can be submitted to NMET through MECL due to crunch of raw material faced by the cement industries which was adressed by FIMI. (Para 61.04.12 of Minutes of the 61st Meeting of the Central Geological Programming Board dated 24.03.2022)

1.3 In view of the above, MECL has prepared the exploration proposal involving G-3 level exploration in proposed Kiranagi-1 and 2 Blocks for Limestone.

1.4 At present MECL intends to carry out exploration for limestone in the proposed Kiranagi-1 and 2 Blocks. Consent from Department of Mines & Geology, Govt. of Karnataka has been accorded to carry out exploration in the proposed Kiranagi-1 and 2 Blocks vide letter No. DMG/Plan/53695/VOL-III/2022-23 dated 17/11/2022. Before giving consent DMG, Karnataka had taken GSI, state unit Karnataka and Goa views. GSI state unit have confirmed that there is no overlapping of proposed block area with previous/ presently ongoing exploration block.

2.0 LOCATION AND COMMUNICATION

2.1 The Kiranagi-1 and 2 Blocks is located in Gulbarga Taluk of Gulbarga district having a total block area of 11.41 Sq. Km. The location of the Block is shown in **PLATE No-I**. The National Highway No. 50 passes at a distance of 8 km to the west of the bock,

which connects Gulbarga taluk headquarters and proposed Kiranagi-1 Block. The Blocks fall in the Survey of India Toposheet No. 56C/16 and is bounded by the co-ordinates as listed in the **Table-2.1**

Table-2.1

Co-ordinates of corner points of proposed Kiranagi-1 and 2 Blocks (G-3) for Limestone, District: Gulbargat, State: Karnataka.

Sl. No.	Point Name	Block Name	UTM Co-ordinates (Zone-43)		DMS Co-ordinates (GCS WGS-1984)	
			Northing (m)	Easting (m)	Latitude	Longitude
1	KW-1	Kiranagi-1	1895914.446	699798.331	17° 8' 20.585" N	76° 52' 41.194" E
2	KW-2		1898552.811	700359.382	17° 9' 46.636" N	76° 53' 0.859" E
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2.2 The National Highway No. 50 passes at a distance of 8 km to the west of the bock, which connects Gulbarga taluk headquarters and proposed Kiranagi-1 and 2 Blocks. The state highway No. 125 passes at a distance of 4 km from the south eastern part of the block. No roads passes through the block.

2.3 The block area is surrounded by cement manufacturing industries and some of them are as follows:

- Orient Cement Plant, Itgi, Chittapur
- Ultratech Cement Plant, Malkhed
- Vasavadatta Cement plant, Sedam
- Jaypee Cement Corporation Ltd. Plant, Shahabad
- ACC, Cement, Wadi
- Shree Cement, Gulbarga

3.0 PHYSIOGRAPHY AND DRAINAGE

3.1 The topography around the Kiranagi-1 and 2 Blocks is almost flat to gently sloping. In general the area is sloping towards southwest. The maximum elevation is approximately 450 m and the minimum elevation is 420 m. The north and central part of the block has the highest elevation.

3.2 The drainage of the area is mainly controlled by tributaries of Bhima River. The small nalas flowing from northeast to southwest drain into perennial Bhima river which is about 9 km east of the block. Small nalas flow towards the east to join Nandana Halla River

4.0 CLIMATE

4.1 The climate of the area has semi-arid type climate. Dry climate prevails for most part of the year. December is the coldest month with mean daily maximum and minimum temperatures being 29.5^0 C and 10^0 C respectively. During peak summer, temperature rises upto 45^0 C. The climatic information of the area is as given below:

Temperature	**Max.**	**45 ^{o}C in May- June**
	Min.	**10 ^{o}C in December**

The average annual rainfall is 770 - 880 mm and the relative humidity varies from 26% in summer to 62% in winter.

Rainfall	**Max.**	**70 mm in 24 hours**

5.0 FLORA & FAUNA

5.1 No forest, sanctuaries, national park, etc., exist in the vicinity of the Blocks.

6.0 PREVIOUS WORK

6.1. Previously no work has been carried out in the proposed Kiranagi-1 and 2 blocks. However, the entire Bhima basin was mapped by GSI and exploration at different stages was carried out in a scattered manner. The Geological Map of Bhima Basin (Parts of Gulbarga and Bijapur Districts of Karnataka and Ranga Reddy district Andhra Pradesh in Parts of Degree Sheets 56 C, D, G, and H) Scale 1:200000, 2007, Published by GSI is attached as **Plate No. IV**.

6.2 Directorate of Mining & Geology (DMG), Karnataka explored the adjoining area in detail in the year 1976 with the purpose of proving cement grade limestone in the area. The exploration could establish the occurrence of large reserves of cement grade limestone in the area. The results of investigation are given in the report entitled “Limestone Deposits immediately to the East of Chittapur, Gulbarga District of Karnataka.” The said work was targeted for feasibility to setup cement industry.

6.3 GSI carried out preliminary investigation for Flux grade Limestone around Wadi, Gulbarga district Karnataka during the year 1974-75. The area is occupied by Shahabad limestone formation of Bhima Group, chip samples were collected from vertical faces of the quarries existing in the area. Chemical analysis shows that the MgO content is always very low. A few beds of grey to dark grey soft limestone are of blast furnace grade and the rest are of cement grade. Flaggy to slabby variegated limestones are always siliceous in composition with the insoluble around 15%.

6.4 During the field season 1976-77, GSI carried out preliminary investigation for Flux grade limestone near Wadi, Gulbarga district Karnataka. An area of about 16.75 sq. km. on 1:7,910 scale using the village maps as base map was covered by mapping. A total of 150 samples also collected and analysed. The formations met with here are Rabanapalli shale and flaggy limestone, stylolitic limestone and varigated limestone units of Shahabad Limestone Formation. All those formations are remarkably horizontal and undisturbed. Generally, stylolitic limestone contains CaO 48% and above and insoluble around 10%. Hence it is categorized as Blast Furnace Grade. The

other two units can be utilized in cement manufacture if suitably blended with high grade limestone. An inferred reserve of 96 million tonnes of Blast Furnace grade limestone has been estimated over an area of 4.00 sq.km to a depth of 12 m. Drilling can be taken up to explore the depth-wise persistence and lateral extension of the B.F. grade limestone.

6.5 During the F.S. 1977-78, GSI carried out preliminary investigation for Flux grade Cement grade Limestone in Bhima Basin, Gulbarga district, Karnataka. Preliminary investigation for flux grade and cement grade limestone in parts of Bhima Basin, Gulbarga district, Karnataka was taken up an area of 50.5 sq.km area was mapped on 1:10,000 scale using tape and compass and a total of 125 samples were collected, around Wadi and Chitapur. The limestone met with in this area has been classified as fissile limestone stylolitic limestone and variegated limestone. Stylolitic limestone is of Flux grade (Blast Furnace grade) and occupies over an area of 8.5 sq.km. Total inferred reserve of B.F. grade limestone has been calculated as 153 million tonnes for the area under investigation.

6.6 East of Chittapur and North Diggaon village, MECL has carried out exploration during 2018-19 at G3 level and established 530.80 MT with average grade 45.45% CaO, 1.00% MgO , 11.59% SiO2 in Diggaon Block and 385.35 MT with average grade 45.66% CaO, 0.55% MgO , 12.98% SiO2 in Udagi Block of net in-situ resource of Cement grade Limestone.

6.7 GSI had carried out G-2 exploration in Bommanalli Limestone Block and estimated a resource of B.F Grade 244.27 MMT in Avg 49.83% CaO, 9.92% SiO2, 1.16% Al2O3, Portland Cement Grade 18.921 MMT in Avg 47.42% CaO, 14.41% SiO2, 0.91% Al2O3, 154.246 MMT in Avg 41.80% CaO, 23.37% SiO2, 2.12% Al2O3 and 46.488 MMT in Avg 39.12% CaO, 27.17% SiO2, 1.65% Al2O3.

6.8 GSI had carried out G-2 exploration in Chittapur South Limestone Block and estimated a resource of Portland Cement Grade 89.04 MMT in avg 46.39% CaO, 15.65%SiO2, 0.98%Al2O3, beneficiable Cement Grade 228.16 MMT in avg 39.08% CaO, 27.03% SiO2, 1.66% Al2O3.

6.09 GSI had carried out G-4 level exploration in Chitapura SW Block and Sulahalli Limestone Block, estimated a resource of 438.00 MMT of Cement Grade Limestone and 466.00 MMT of Cement Grade Limestone respectively.

6.10 Mining activities are currently ongoing in surrounding areas and limestone being excavated for manufacturing of cement.

7.0 REGIONAL GEOLOGY AND STRUCTURE

7.1. Bhima basin is the smallest of all Proterozoic basins of India. They do not actually come in contact with the Kaladgi group and are believed to be younger. They are in close resemblance to the Kurnool group of the Cuddapah super group. The Bhima basin is covered by latitude N 16°20' to 17°35' and longitude N 76°15' to 77°40'E. The Bhima basin sediments stretch linearly in N -S for about 160 km with varying width and the maximum being 40 km. It extends over an area of 5200 Sq.km. and is situated to the North-west of Cuddapah basin and north east of Kaladgi basin.

7.2 Captain New Bold (1842 – 1845) was first to record the Talikote flaggy limestone and Muddebihal red sandstone. R.Bruce Foote (1876) had divided the Bhima Group (mainly of limestone) into lower clastic represented by sandstone and shale and

upper mainly of limestone and shales. Further, Mahadevan (1947), Janardhana Rao et.al (1973), Mathur (1977), Mudholkar and Kale (1982) and Mishra et.al (1987) classify Bhima Group. However, Vivek S. Kale, V.G. Phansalkar et.al (1991) classify Bhima Group into Rabanapalli (clastic) formation and Shahabad (limestone) formations.

7.3 The Stratigraphic Column of the Bhima Group (after GSI) is furnished in **Table 7.1** below:

Table – 7.1
The Stratigraphic Column of the Bhima Group (after GSI)

Group	Sub-Group	Formation	Member	Thicknes
Bhima Group (upper Proterozoic) (93-273 m.y)		Harwal-Gogi		5-10m
	Andola Sub-group in Pulsating basin environment (31-68 m.y)	Katamdevar-halli	Fossil shale member ortho-quartzite chert + pebble conglomerate	10-40m 16-18m
		Halkal		
	-------Para – unconformity --------			
			Flaggy dark grey and argillaceous	4-6m
			Massive dark grey and bluish grey	8-20m
		Shahabad	Variegated and siliceous/cherty	20-80m
	Sedam Sub-group with quiescent basin regime (62-2.5 m.y)		Blackish, light grey to bluish grey L.st	10-15m
			Slabby and flaggy Lst	4-8m
			Purple shale	2-40m
			Green/yellow shale	5-15m
		Rabanapalli	Siltstone	3-4m
			Quartzite / Intercalated Sand stone	5-15m
			Conglomerate / grit	1-2m

7.4 Recent classification (1991) of revised litho-stratigraphy of the Bhima Group is furnished below in **Table 3.2.**

Table - 7.2
Revised litho stratigraphy of the Bhima Group
(after Vivek S. Kale, V.G. Phansalkar et.al 1991)

Formation	Maximum Thickness	Member	Main Lithological components
Shahabad limestone	< 75m		• Grey, argillaceous micritic limestones. • Dark, bluish grey, massive limestones. • Variegated, siliceous and cherty limestones. • Blue- grey, blacky micritic limestones. • Flaggy (Partly impure argillaceous and cherty) limestones.
---------- Gradational and transitional contact ----------			
Rabanpalli Clastics	< 70m	Ekmai shale member	Ferrugenous shales, with calcareous shales at top.
		Kasturpalli-Glauconitic member	Green, glauconitic bearing fine grained sandstones and siltstones.
		Kundrapalli quartz arenite member	Quatzitic sandstones (medium to fine grained).
		Adki Hill conglomerate member	Polymictic conglomerates and arkosic, gritty sandstones.

7.5 Regional Structure:

7.5.1 The general trend of all formations is North - South. The rectilinear East - West (EW) to North West (NW) - South East (SE) trending boundaries are faulted while the N-S and NNE-SSW linear trends show unconformable relation with the underlying gneisses.

7.5.2 Sediments of Bhima Group are structurally least disturbed and preserve their horizontal bedded character originally impressed at the time of deposition. Deformation is observed only in the vicinity of faults. The faults encountered have

continued into the basement that has exercised control upon the basin configuration.

7.5.3 The basin is well known for its huge reserves of limestone and the newly discovered Uranium occurrence near Gogi. Regional Geological map of proposed Kiranagi-1 and 2 Blocks is shown as **Plate-II.**

8.0 GEOLOGY OF THE BLOCKS

8.1 The rocks exposed in the blocks belong to the Shahabad formation of Sedam sub group of Bhima Group. MECL had explored Diggaon Block at a distance of 30 kms east of proposed Kiranagi-1 and 2 Blocks the general stratigraphic succession of the Diggaon Block based on field observations and available data/literature from nearby mine/areas is given below in **Table No. 8.1**. A representative Geological Cross Section of Diggaon Block is attached as **Plate No. V.**

Table No-8.1

General Stratigraphic Sequence of Bhima Group of Lithounits in Diggaon Block

Age	Sub Group	Formation	Litho Units	Thickness
Quaternary	-	Recent	Top soil	
Upper proterozoic	Sedam	Shahabad	Siliceous/flaggy limestone Massive grey limestone Shaly limestone	68.00 m to 145.00 m
		Rabanpalli Clastics	**Ekmai shale member:** Ferrugenous shales	29.00 m to 40.00 m
			Kasturpalli- Glauconitic member: Glauconitic Siltstone, Siltstone	4.00 m to 13.00 m
			Kudrapalli Arenite Member: Yellowish Quartzitic Sandstone	Max 8.00 m
			Adki Hill conglomerate member: Polymictic Conglomerate	1.20 m to 8.20 m
Archean			**Granite Basement**	Max 7.00 m

8.2 Description of Rock Types: Almost entire area of the blocks are concealed under quaternary sediments i.e. soil cover. Scanty scattered limestone outcrops are seen at places. The beds are horizontally disposed as noticed in nearby areas. Since most of the area is concealed under soil cover the strike and dip of the limestone beds is not observed in the blocks. Mining activities are currently ongoing in surrounding areas and limestone being excavated for manufacturing of cement. The lithological description of litho units from top to bottom as obtained from available data from nearby mines is given below.

8.2.1 **Top Soil**: The overburden top soil is black in colour, fine to silty, friable when dry and sticky when wet. The Over burden soil covers almost the entire Block area. The thickness of the soil varies from 0.10 m to about 19.00 m at places.

8.2.2 **Flaggy/Siliceous Limestone:** This unit overlying massive grey limestone and is grey in color, fine grain, hard and flaggy/flaky in nature. The thickness of this formation varies from 2.00 m to 65.00 m regionally.

8.2.3 **Massive Grey Limestone:** Massive grey Limestone formation is dark grey in color, micritic, fine grained and compact. At places color varies from dark grey to light grey. Stylolite structures are often noticed in this unit. The thickness of this litho unit varies from 7.00 m to 78.00 m regionally. Massive grey limestone is cement grade to high grade and being excavated for manufacturing of cement in nearby areas.

8.2.4 **Shaly Limestone:** Shaly limestone is underlying formation of Massive grey limestone and is fine grained, thinly bedded and associated with thin shale bands/partings. Massive limestone to Shaly limestone transition zone is marked with frequency of shale partings. The frequency of shale parting/bands increases with depth. This litho unit forms the bottom most horizon and extends more than 70m depth from ground surface based on available data from nearby areas.

8.2.5 **Ekmai shales**: These are ferruginous shales with calcareous at top.

8.2.6 **Kasturapalli Glauconitic Member:** It is green glauconite bearing fine grained sandstone and Thickness of this formation varies from 4.00m to 13.00m.

8.2.7 **Kundrapalli arenite Member:** It is yellowish quartzitic sandstone.

8.2.8 **Adiki Hill Conglomerate:** This is a thin zone of conglomerate and arkosic gritty sandstone.

8.2.9 **Archean (Granite):** It's a dark grey, coarse grained rock rich in quartz, feldspars and biotites as major minerals and some sulphides minerals are also associated with it.

8.3 Block Structure: The rock formations within the Blocks are horizontally disposed and mostly concealed under top soil. At places, limestone beds dip 10 to 20^0 due North. The area is geologically undisturbed.

9.0 OBJECTIVE:

9.1 Objectives of the proposed exploration in Kiranagi-1 and 2 Blocks are as follows:

i) To carry out detailed Topographical Survey and Geological mapping on 1:4000 scale over an extent of 11.41 sq. km. area for proposed Kiranagi-1and 2 Block.

ii) To delineate the strike and depth continuity of the limestone by drilling vertical boreholes of 10 numbers (5 in each Kiranagi-1 and Kiranagi-2 Blocks). The average depth of boreholes will be 50.00 m.

iii) One borehole will be drilled upto the basement to check the thickness and continuity of limestone horizon at depth.

iii) To carry out exploration as per Minerals (Evidence of Mineral Contents) Rule-2015 & Mineral (Auction) Rules-2015 (Amended upto 2021).

v) The proposed exploration programme will be helpful in demarcating zone of various grades of limestone in the block as per UNFC norms and estimation of limestone resources which in turn will facilitate the State Govt. for auctioning of the Block.

10.0 METHODOLOGY OF EXPLORATION

In present exploration scheme for proposed Kiranagi block, geological mapping, topographical survey and exploratory drilling (G-3) is planned. The proposed activities are described below.

10.1 DGPS Boundary Corner Pillars Survey & Geological Mapping.

10.1.1 The Blocks boundary shall be surveyed by DGPS in WGS-84 datum for demarcation of block boundary/corner points. Triangulation network will be laid down in the proposed study area of 11.41 Sq.Km (1141 Ha). 10 Boreholes will be fixed on the ground whose RL's and co-ordinates of survey and exploration points will be determined. Detailed Geological Mapping will be done in the proposed block and all the geological features will be recorded and litho-contacts will be plotted for finalization of Geological map. This map will be used as base map for future work.

10.2 Surface Drilling

10.2.1 The present exploration scheme is prepared by proposing total core drilling of 450.00 m in 09 boreholes of NQ size with a vertical depth of 50.00 m each and 01 borehole of 150 m vertical depth. The borehole location map is enclosed as **PLATE No.III** and the details of proposed boreholes at G-3 level are listed as in **Table-5.1.**

Table No.-10.1

Details of Proposed Boreholes in proposed Malkhed Limestone Block

Sl. No.	Block Name	Borehole No.	Inclination (°)	Total Depth (m)
1	Kiranagi-1	PBH-01	90	50
2		PBH-02	90	50
3		PBH-03	90	150
4		PBH-04	90	50
5		PBH-05	90	50
6	Kiranagi-2	PBH-06	90	50
7		PBH-07	90	50
8		PBH-08	90	50
9		PBH-09	90	50
10		PBH-10	90	50

10.3 Drill Core Logging and Sampling

10.3.1 Detailed drill core logging will be done with consideration of weathering, grain size, fossil contents, and color of various formations, intercalation / parting of shale, stylolite, and structure. On the basis of these parameters, grade of limestone can be broadly presented and it will also be helpful in sampling.

Primary samples will be drawn at 1m interval subject to change in lithology and core recovery. The following parameters shall be considered while sampling the drill cores.

1) Colour, grain size.
2) Fossil variation.
3) Thin intercalations of shale/siltstone.
4) Partially weathered zone.

For preparation of samples the borehole core will be longitudinally split into two equal halves by using core splitter. One half will be powdered to -100 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gm of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-100 mesh size) will be kept as duplicate half for future reference.

Total number of primary samples shall likely to generate about 400 for Limestone, check samples (5% of primary samples) of 20 Nos. and 67 composite samples,. In addition10% of primary samples i.e.40 Nos. will be prepared as External Check samples and will be sent to NABL accredited Labs for analysis of 9 radicals.

Composite samples will be prepared borehole wise based on primary sample data at every 6-m interval (6 m bench height). Composite samples will be prepared entire limestone zone demarcated at 42% CaO cut off. This will generate 67 nos. of composite samples. Composite samples will be prepared entire limestone zone demarcated at 35% CaO cut off (min.) and Mgo 5% (max.) as per the notification issued by IBM vide No.C-284/ 3/CMG/2017 dated 25thApril. This will generate 67 nos. of composite samples.

Total 527 nos. of samples would be prepared including primary samples, internal check sample, external check samples and composite samples.

10.3 Laboratory Studies

10.3.1 **Chemical Analysis:** Primary samples (400 Nos.) will be analyzed for 9 radicals, CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, K_2O and LOI by XRF method. 5% of primary samples around 20 nos. will be analyzed as internal check for 9 radicals CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, K_2O and LOI. 10% of primary samples i.e. 40 Nos. will be sent to NABL external labs as external check samples for analysis of 9 radicals CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, K_2O and LOI.

10.3.2 **Composite Samples:** 67 Nos. of composite samples generated from borehole cores shall be subjected to analysis of 12 radicals, CaO, MgO, Fe_2O_3, SiO_2, Al_2O_3, SO_3,P_2O_5, K_2O, MnO_2, Na_2O, Cl &LOI.

10.3.3 **Petrological Studies**: Petrological studies will be done on 10 nos. of drill core and surface specimen.

10.3.4 **Bulk Density Determination:** Bulk Density will be determined on 10 nos. drill core samples.

11.0 THE QUANTUM OF WORK PROPOSED

11.1 The Quantum of work proposed is given in **Table No.11.1**

Table No.11.1
Quantum of Work for Proposed Kiranagi 1 and 2 Blocks

Sl.No.	Description and Nature of Work	Unit	Target Kiranagi Blocks
A	**GEOLOGICAL WORK AND SURVEYING**		
1	Geological Mapping (1:4000 scale)	Sq. km	11.41
2	Survey Work		
	i) Topographical Survey (1:4000 scale)	Sq. km	11.41
	ii) Bore Hole Fixation	Nos	10
	iii) RL & Coordinate Determination by DGPS	Nos	7
B	**EXPLORATORY DRILLING**		
1	Drilling up to 300m (Soft Rock)	m	600
2	Drill Core Preservation	Per m	550
C	**LABORATORY STUDIES**		
1	**Chemical Analysis**		
	i) Primary Sampling (8 radicals CaO, MgO, Al2O3, SiO2, Fe2O3, SO3, P2O5, K2O and LOI.) by XRF	Nos	400
	ii) Check Sampling Internal 5% (8 radicals CaO, MgO, Al2O3, SiO2, Fe2O3, SO3, P2O5 and LOI.) by XRF	Nos	20
	iii) Check Sampling External 10% (8 radicals CaO, MgO, Al2O3, SiO2, Fe2O3, SO3, P2O5 and LOI.)	Nos	40
	iv) Composite Samples (12 radicals, CaO, MgO, Fe2O3, SiO2, Al2O3, SO3, P2O5, K2O, MnO2, Na2O, Cl &LOI.)	Nos	67
2	**Petrological samples (Surface & BH Core Samples)**		
	i) Preparation of thin section	Nos	10
	ii) Study of Thin Section	Nos	10
3	**Bulk Density Determination**		
	i) Bulk Density Determination	Nos	10
D	**Report Preparation (5 Hard copies with a soft copy)**	Nos	2
E	**Preparation of Exploration Proposal (5 Hard copies with a soft copy)**	Nos	1

12.0 COST ESTIMATE

12.1 The cost has been estimated based on actual schedule of rates mandated in the circular OM No. 61/1/2018/NMET dated 31st March 2020 for NMET funded projects which is **Rs. 152.84 Lakhs.** The detailed cost sheet for G-3 exploration for Limestone in proposed Kiranagi-1 and 2 Blocks are given in **Table No. 1** of Excel Workbook.

Table 12.1

Summary of Cost Estimates of Proposed Kiranagi-1 and 2 Block, Bhima Basin, Gulbarga (Kalaburagi) District, Karnataka

SL. NO.	ITEM	ESTIMATED COST (Rs.)
1	Drilling	59,72,180
2	Geology & Survey	32,57,520
3	Laboratory	23,17,450
	Sub Total (1 to 3)	**1,15,47,150**
4	Exploration Report	11,54,715
5	Proposal Prepration	2,30,943
6	Peer Review Charges	20,000
	Grand Total	**1,29,52,808**
	GST 18%	23,31,505
	Total:	**1,52,84,313**
	Say Rs. in Lakhs	**152.84**

13.0 TIME SCHEDULE

13.1 The proposed exploration programme envisages geological mapping, topographic survey, exploratory drilling, laboratory studies and geological report preparation which will be completed within 10 months. Therefore, all activities have been planned with overlapping and tentative timeline has been worked out for total 10 months for the proposed project completion.

Table No. 13.1

Time Schedule /Action plan for G-3 exploration for Limestone in proposed Kiranagi-1 nad 2 blocks, Bhima Basin, Gulbarga (Kalaburagi) District, Karnataka.

Sl. No.	Activities	Unit	MONTHS									
			1	2	3	4	5	6	7	8	9	10
1	Camp Setting	Month										
2	Surface Drilling (1 rig)	m.										
3	Survey Party days (1 Party)	day										
4	Geologist Party days in field (1 Party)	day										
5	Sampling Party days, Core Sampling (1 party)	day										
6	Laboratory Studies	Nos.										
7	Camp Winding	Month										
8	Geologist Party days in HQ (1 Party)	day										
9	Geological Report Writing with Peer Review	Month										

Note: 1. Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearances.

2. Time loss on account of monsoon/agricultural activity/forest clearance/local law & order problem may be additional to above time line.

14.0 JUSTIFICATION FOR TAKING UP EXPLORATION FOR LIMESTONE IN PROPOSED KIRANAGI-1 AND 2 BLOCKS, BHIMA BASIN, DISTRICT GULBARGA.

14.1 The area where exploration of Limestone is being proposed is not explored in the past. Though the area is already established of Limestone occurrences, conversion of Geological resource to mineable reserves is a necessity. Exploration increases the level of confidence on quantity and quality of reserve/resource which will attract the investors.

14.2 Most of the limestone deposits in India vary in grade. Silica and MgO in limestone play an important role towards chemical parameters of raw feed for cement manufacturing. In sedimentary limestones, the said radicals along with CaO vary consistently in lateral and vertical direction, in a small area. Estimation of quantity and quality based on the interpretation from nearby data is not possible especially for important factors like silica, MgO and others, which have a key role in the quality of the limestone to be used by cement and other industries. Limestone having high silica and MgO cannot be utilized for cement manufacturing process without blending with high grade limestone and the same may not be suitable for clinker manufacturing process. Exploration will locate and quantify the different grade of limestone based on the requirement for the different industries.

14.3 The proposed Kiranagi Block lies 11 km northwest of Kannur Limestone Block explored by GSI which had been already successfully auctioned. GSI had carried out General Exploration (G-2) in 550 Ha of block area. A total estimated reserve of limestone was 376.51 MMT with Portland Cement Grade: 309.14 MMT, at average 48.40% CaO, 9.04% SiO_2, 0.98 %Al_2O_3 and Beneficiable Cement Grade of 67.37 MMTat average grade 44.99% CaO, 13.03%SiO_2, 0.98% Al_2O_3. Thus it can be assumed that the Zone-1 would be well-developed in Kiranagi Blocks.

14.4 Based on the recent exploration in the adjoining area (Diggaon and Udagi Blocks), it has been observed that there are two zones in Shahabad limestone, namely Zone-1 and Zone-2 separated by shaly limestone. The thickness and quality of the limestone increases towards the north i.e. the dip direction. The maximum thickness of Zone-1 is 48.00 m, and the maximum grade is 47.42% CaO, average 1.00% MgO and average 11.59% SiO_2 in Diggaon Block. The proposed Kiranagi-1 and 2 Blocks falls 30 kms to the northwest of the previously explored MECL blocks, thus it can be assumed that the Zone-1 would be of well-developed in Kiranagi Blocks.

14.5 Due to the high demand of limestone, Bommanalli Limestone Block, Chittapur South Limestone Block, Chitapura SW Limestone Block, Sulahalli Limestone Block, Ravur Limestone Block, Diggaon Limestone Block, have been successfully auctioned. Further, the Udagi Limestone Block explored by MECL is also in auction platform.

14.6 Augmentation of limestone resource which is the base of the infrastructure development and makes these blocks auctionable in accordance with the existing Rules & Regulations.

14.7 Demand for cement in construction industry will increase in coming years that will further increase the demand for limestone. The infrastructural projects like rail, water, transport, electricity, telecom, etc. will have increased investments and that also arise the need of limestone. In the union budget 2021 it was announced for “Housing for all” and “Smart Cities” which is steadily increasing the demand for cement and subsequently limestone. Metro rail projects in Bangalore and the

development of civil structure such as hospitals and schools throughout the state are influencing the cement industries growth in the state.

14.9 The neighboring states of Karnataka those do not have cement industries procure cement from the cement plants located in the state.

LIST OF PLATES

1. Location Map of Proposed Kiranagi-1 and 2 Blocks, Bhima Basin, Gulbarga District, Karnataka as Plate-I

2. Regional Geology Map of Proposed Kiranagi-1 and 2 Blocks Limestone Block, Bhima Basin, Gulbarga District, Karnataka as Plate-II

3. Geological Map showing the location of Proposed Borehole in Proposed Kiranagi-1 and 2 Limestone blocks as Plate-III

4. The Geological Map of Bhima Basin (Parts of Gulbarga and Bijapur Districts of Karnataka and Ranga Reddy district Andhra Pradesh in Parts of Degree Sheets 56 C, D, G, and H) Scale1:200000, 2007, Published by GSI as Plate-IV

5. Representative Geological Cross Section of Diggaon Block along section line S2-S2', Bhima Basin, Kalaburagi District, Karnataka as Plate-V

REFERENCES

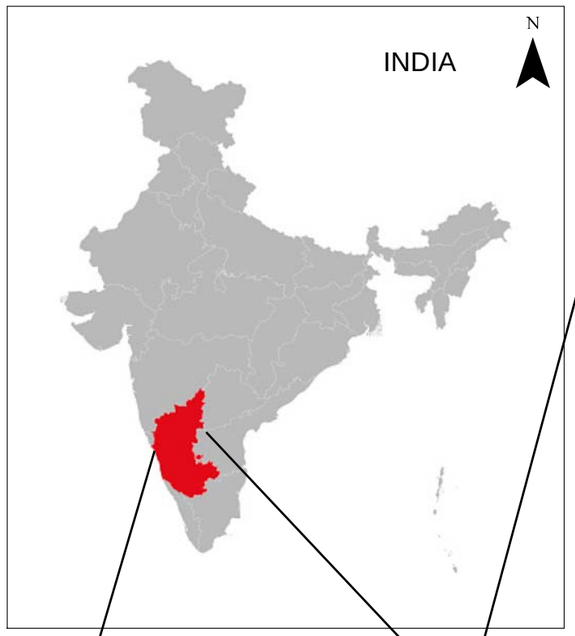
1. A.V. Jayaprakash, F.S.1974-75, Preliminary investigation for Flux Grade and Cement Grade Limestone around Wadi, Gulbarga District, Karnataka. (GSI)

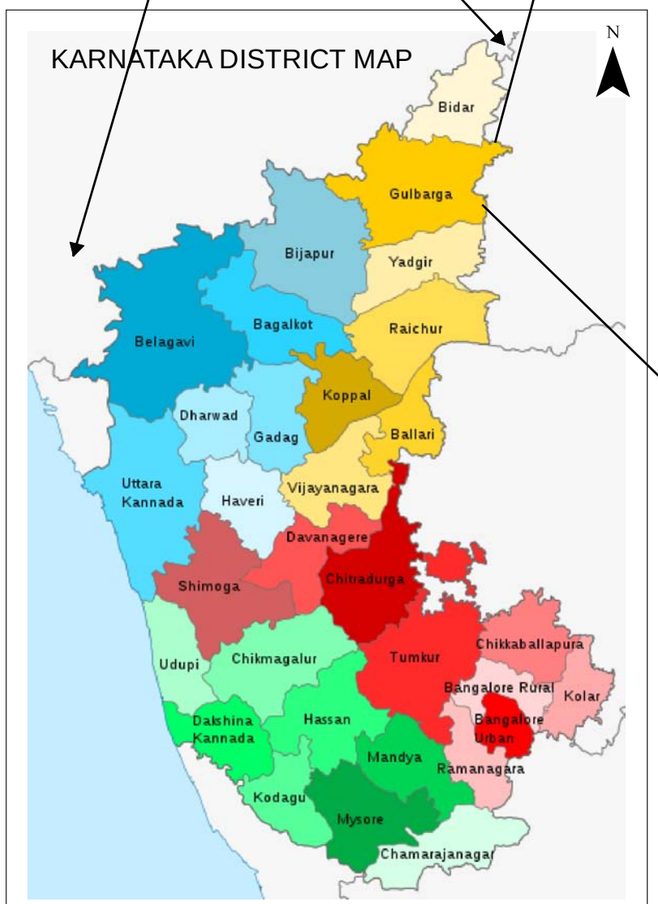
2. A.V. Jayaprakash, F.S.1977-78, Preliminary investigation for Flux Grade and Cement Grade Limestone in Bhima Basin, Gulbarga District, Karnataka. (GSI).

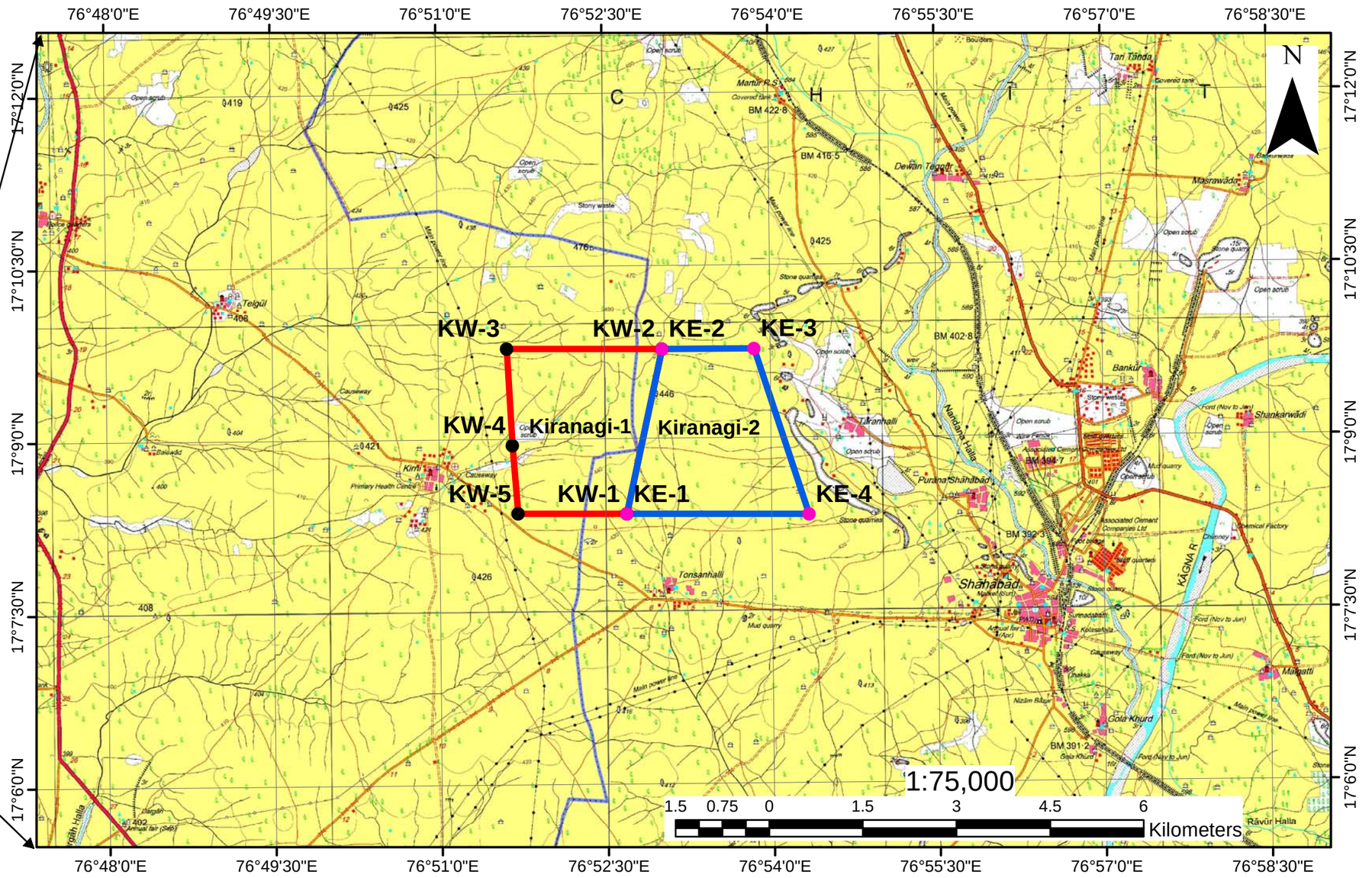
3. N.R. Pattabhiramaiah, D.S. Malkai, 1978, Preliminary Report on the Feasibility of Establishing a Cement Factory in Malkhaid, Sedam Taluk, Gulbarga District.

4. MSTC E commerce Website

Location Map of Proposed Kiranagi-1 and 2 Limestone Blocks, Bhima Basin, Gulbarga District, Karnataka







Survey of India Toposheet No: 56C/16

Block Boundary Corner Points of Proposed Kiranagi-1 and 2 Blocks, Bhima Basin, Gulbarga District, Karnataka

Sl. No.	Point Name	Block Name	UTM Co-ordinates (Zone-43)		DMS Co-ordinates (GCS WGS-1984)	
			Northing (m)	Easting (m)	Latitude	Longitude
1	KW-1	Kiranagi-1	1895914.446	699798.331	17° 8' 20.585" N	76° 52' 41.194" E
2	KW-2		1898552.811	700359.382	17° 9' 46.636" N	76° 53' 0.859" E
3	KW-3		1898551.241	697872.620	17° 9' 47.411" N	76° 51' 37.342" E
4	KW-4		1897005.389	697963.857	17° 8' 57.560" N	76° 51' 39.531" E
5	KW-5		1895914.446	698056.043	17° 9' 48.188" N	76° 51' 37.082" E
1	KE-1	Kiranagi-2	1895914.446	699798.331	17° 8' 20.585" N	76° 52' 41.194" E
2	KE-2		1898552.811	700359.382	17° 9' 46.636" N	76° 53' 0.859" E
3	KE-3		1898563.609	701831.521	17° 9' 46.166" N	76° 53' 51.076" E
4	KE-4		1895914.446	702713.222	17° 8' 19.400" N	76° 54' 20.270" E

Legend

PLATE-I

- Proposed Kiranagi-1 Block Corner Points
- Proposed Kiranagi-2 Block Corner Points
- Proposed Kiranagi-1 Block Boundary (5.62 Sq. Km.)
- Proposed Kiranagi-2 Block Boundary (5.79 Sq. Km.)

MINERAL EXPLORATION AND CONSULTANCY LTD.
(Formerly Mineral Exploration Corporation Ltd.)
Ministry of Mines, Govt of India Enterprise, MINIRATNA-I CPSE
An ISO 9001:2015, 14001:2015 & 45001:2018 Certified Company
MECL

694000.00 699000.00 704000.00 709000.00

1895000.00

N

F F F F F F

20° 20° 25° 15° 10° 50° 40° 20°

KW-3 KW-2 KE-2 KE-3

Proposed Kiranagi-1 Block
Area: 5.62 Sq. Km.

Proposed Kiranagi-2 Block
Area: 5.79 Sq. Km.

KW-4 KW-5 KW-1 KE-1 KE-4

10° 20° 10° 10° 20° 5°

1885000.00

694000.00 699000.00 704000.00 709000.00

Plate No:- II

INDEX

PROPOSED KIRANAGI-1 BLOCK	LIMESTONE	SHALE
KW-1 PROPOSED KIRANAGI-1 BLOCK CORNER POINTS	DECCAN TRAP	GRANITE
PROPOSED KIRANAGI-2 BLOCK	HORIZONTAL BEDDING	STRIKE & DIP
KE-1 PROPOSED KIRANAGI-2 BLOCK CORNER POINTS	FAULT	STRIKE SLIP FAULT

SOURCE: GEOLOGICAL MAP OF BHIMA BASIN FROM GSI, MIMORE-129

MINERAL EXPLORATION CORPORATION LIMITED
(A Government of India Enterprise)

REGIONAL GEOLOGY MAP SHOWING PROPOSED KIRANAGI-1 AND 2 LIMESTONE BLOCKS

DISTRICT : GULBARGA STATE : KARNATAKA

STAGE:- G-3 (Exploration) SCALE:- 1:25,000

694000.00 699000.00 704000.00 709000.00

1895000.00

1885000.00

N

25°

15° 10°

F F F F F F

20°

20°

50° 40°

20°

KW-3 KW-2 KE-2 KE-3

PBH-04 PBH-05 PBH-10

PBH-02 PBH-03 PBH-08 PBH-09

KW-4

PBH-01 PBH-06 PBH-07

KW-5 KW-1 KE-1 KE-4

10°

20°

10°

10° 20°

5°

1885000.00

1895000.00

694000.00 699000.00 704000.00 709000.00

Plate No:- III

GENERAL INDEX

- PROPOSED KIRANAGI-1BLOCK
- PROPOSED KIRANAGI-2BLOCK
- KW-1 PROPOSED KIRANAGI-1 BLOCK CORNER POINTS
- KE-1 PROPOSED KIRANAGI-2 BLOCK CORNER POINTS
- PROPOSED BOREHOLES AT UPTO 50 m DEPTH (09 Nos.)
- PROPOSED BOREHOLES UPTO 150 m DEPTH (01 Nos.)

GEOLOGICAL INDEX

- LIMESTONE
- DECCAN TRAP
- HORIZONTAL BEDDING
- FAULT
- SHALE
- GRANITE
- STRIKE & DIP
- STRIKE SLIP FAULT

MINERAL EXPLORATION CORPORATION LIMITED

(A Government of India Enterprise)

GEOLOGICAL MAP SHOWING PROPOSED BOREHOLE LOCATION IN PROPOSED KIRANAGI-1 and KIRANAGI-2 LIMESTONE BLOCK

DISTRICT : GULBARGA STATE : KARNATAKA

STAGE:- G-3 (Exploration) SCALE:- 1:25,000

GEOLOGICAL MAP OF BHIMA BASIN

(Parts of Gulbarga & Bijapur districts of Karnataka and Ranga Reddy district of Andhra Pradesh)

(Parts of degree sheets 56 C, D, G & H)

2007

Scale 1:250,000

0 2 4 6 8 10 Km

Published under the direction of the Director General, Geological Survey of India, Kolkata.

Plate - II

Karnataka Part of Memoir 129

N

LEGEND

- Laterite
- Basalts
- Shale
- Limestone
- Shale
- Malkod Limestone
- Gulbal Limestone
- Sedam Limestone
- Yadgir Limestone
- Ratnoor Limestone
- Kolta Shale
- Kurkunpad Sandstone
- Muddebihal Conglomerate
- Unclassified volcanic rocks
- Hanamal Formation
- Kalaburgi/Kamthana Formation
- Hulkal Formation
- Shahabad Formation
- Basic dyke
- Pink Granite
- Schistose rocks
- Migmatic Gneisses
- Ratchakonda Formation
- Archaean Unconformity
- Deccan Trap
- Bhima Group
- Cenozoic
- Upper Cretaceous to Eocene
- Neoproterozoic
- Mangalur schist belt
- Escharaitems of Closepet Granite
- Dharwar Supergroup
- Peninsular Gneissic Complex
- Paleoproterozoic
- Late Archaean to Paleoproterozoic
- Late Archaean
- Middle Archaean

STRUCTURAL INDEX

- Strike and dip of bedding / Horizontal beds
- Trends of minor folds
- Lithocontact, confirmed / inferred
- Strike and dip of foliation / Vertical foliation
- Fault
- Plunging anticline
- Strike-slip Fault

TOPOGRAPHICAL FEATURES

- Railway line
- Town
- Human settlement
- KESAMAVI - Type Locality
- RAMOOR - Type Locality
- Water body
- River/ stream

DATA BASE

Toposheets & Scales

56 D/5, 56 D/9, 56 D/13, 56 D/14	1:50,000	Mapped by T.L.Ramakrishna, C. Srinivasa Rao, L.K.Jena, T.L.Ramakrishna, L.N.Janardhana Rao, B.K.Pangarkar, S. Nomakshi, A.V.Jayaprakash, S.K.Hans, A.V.V. Sagar, R. Ananthanarayana, H.V.Korlahalli, M.H.Achutan, R. Ananthanarayana, H.V.Korlahalli, R.Ananthakrishna Iyer, V.Sivaram, R.N.Sahasrabudhe, H.V.Korlahalli	Field Season	1967-68, 68-69, 1970-71, 1970-72, 1972-73, 1974-77, 1976-79, 1980-81, 1980-86, 1986-87, 1986-87, 1986-87
56 D/5, 56 D/9, 56 D/13, 56 D/14	1:50,000			
56 D/SE	1:25,000			
56 C/SE, D/4,E	1:25,000			
56 D/4	1:50,000			
56 H/NW, G/SW	1:25,000			
56 D/4,D/8 & I/1	1:50,000			
56 D/4, 56 C/16	1:50,000			
56 D/4	1:50,000			
56 D/2 & I/6	1:50,000			
56 D/4, 7&8	1:50,000			
56 C/16, G/13	1:50,000			
56 D/13 & 14	1:50,000			
56 C/12, D/9&13	1:50,000			

PLATE-IV

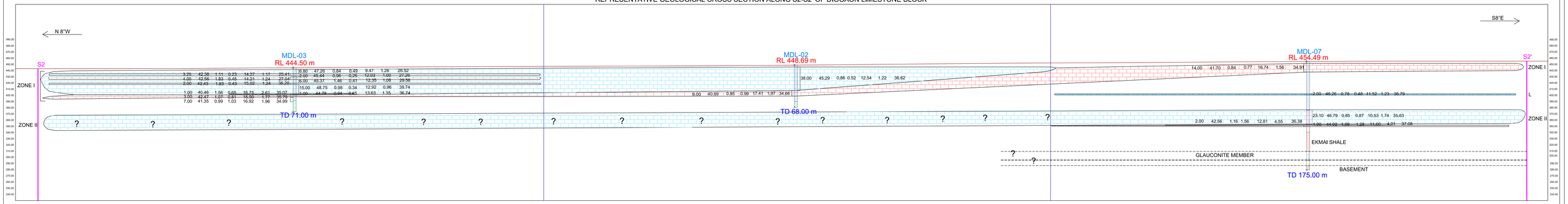
Legend

- Proposed Kiranagi-1 Block Boundary (5.62 Sq. Km.)
- Proposed Kiranagi-1 Block Boundary (5.79 Sq. Km.)
- Proposed Malkhed-1 Block Boundary (8.49 Sq. Km.)
- Proposed Malkhed-2 Block Boundary (9.52 Sq. Km.)

76°0'0"E 76°15'0"E 76°30'0"E 76°45'0"E 77°0'0"E 77°15'0"E 77°30'0"E 77°45'0"E 78°0'0"E

17°30'0"N 17°15'0"N 17°0'0"N 16°45'0"N 16°30'0"N 16°15'0"N

REPRESENTATIVE GEOLOGICAL CROSS SECTION ALONG S2-S2' OF DIGGAON LIMESTONE BLOCK



INDEX

- SOIL
- MASSIVE LIMESTONE
- SILICEOUS LIMESTONE
- SHALY LIMESTONE
- FERRUGINOUS SHALE
- GLAUCONITIC SILTSTONE
- SILTSTONE
- POLYMICTIC CONGLOMERATE
- GRANITE
- CEMENT GRADE LIMESTONE
- BLENDABLE GRADE LIMESTONE

MDL-02
RL 448.69 m
Borehole with total depth and RL in meter
TD 68.00 m

Grade	Th (m)	CaO %	MgO %	Fe_2O_3 %	SiO_2 %	Al_2O_3 %	LOI %
Cement	27.00	44.80	1.11	0.68	12.35	1.29	37.09
Blendable	2.00	40.06	1.31	1.18	16.84	1.93	34.55

S2
Block Boundary
Borehole infiuence

MINERAL EXPLORATION CORPORATION LIMITED

REPRESENTATIVE GEOLOGICAL CROSS SECTION ALONG SECTION LINE S2-S2'

DIGGAON LIMESTONE BLOCK

DISTRICT : KALABURAGI STATE : KARNATAKA

R.F. - 1 : 2000

DECEMBER-2022	PLATE NO. V	5