Exploration Proposal (G-2 level) For Cement Grade Limestone in Naubasta-Kolard Block, Nagod Tehsil, District - Satna, Madhya Pradesh

SYNOPSIS

<table>
<tr><td>Mineral</td><td>Limestone</td></tr>
<tr><td>Location</td><td>Naubasta-Kolard limestone block is located in the Nagod Tehsil, District- Satna, Madhya Pradesh. Nagod, the Tehsil Town is at 15 km from the exploration block. The nearest Railway station is Satna Junction which is about 20 km from the proposed study area. Motorable /Metalled road is available in the area.
The deposit falls within the Survey of India Toposheet No. 63 D/10. The block limits with Latitude and Longitude as under
<table>
<tr><td>A</td><td>80°38' 30.8666''</td><td>24°37’ 48.2316’</td></tr>
<tr><td>B</td><td>80°39' 45.40’’</td><td>24°37’13.3715’’</td></tr>
<tr><td>C</td><td>80°38’ 51.7777''</td><td>24°36’ 31.2152’’</td></tr>
<tr><td>D</td><td>80°40' 35.410''</td><td>24°36’ 36.5995’’</td></tr>
<tr><td>E</td><td>80°41' 25.4661’’</td><td>24°37’ 7.7750’’</td></tr>
<tr><td>F</td><td>80°41' 14.4564’’</td><td>24°35’ 0.7002’’</td></tr>
<tr><td>G</td><td>80°40' 19.7256’’</td><td>24°34’ 34.005’’</td></tr>
</table></td></tr>
<tr><td>Total Area</td><td>15.00 Sq. km.</td></tr>
<tr><td>Background information</td><td>On request of Government of Madhya Pradesh, MECL submitted regional exploration proposal (G3/G2) for Limestone in Naubasta-Kolard Block in Satna District of Madhya Pradesh. The proposal was discussed in Ist meeting of Technical Committee of NMET held on 1st & 2nd April, 2016 at GSI Central Region, Nagpur. The Committee recommended Geological Mapping, surface/outcrop samples and five scout boreholes covering the entire block with an area of 15 Sq.Km to generate analytical data at G4 level. MECL accordingly modified the proposal and put up for approval in the 2nd meeting of Technical Committee held on 5th May 2016 at GSI, TI, Hyderabad. On recommendations of Technical committee the proposal was approved in the 2nd Executive Committee held on 09.05.2016 at Ministry of mines, New Delhi.
It was proposed by the Technical Committee of NMET to review the exploration data after receiving the results of G-4 level exploration, during midterm review meeting. The administrative/ financial sanction for G4 level exploration of limestone in Naubasta-Kolard block at an estimated cost of Rs 59.49 lakhs was received from Ministry of Mines, Govt. of India, National Mineral Exploration Trust ,New Delhi vide F no 6/1/NMET-2015 dated 18.08.2016.

MECL commenced exploration work in Naubasta-Kolard block on 12.08.2016 and completed geological mapping, collection of outcrop samples and 294.00 m drilling in five scout boreholes along with other associated geological and laboratory work in October-2016. The geological report on regional exploration (G-4) for limestone in Naubasta-Kolard block has been submitted in January-2017.</td></tr>
</table>

	As an outcome of regional exploration (G-4) level two Cement grade limestone zones i.e. zone-I with thickness varying from 3.90 m (Min) (MNKS-5) to 6.20 m (Max) (MNKS-2) and Zone-II with thickness varying from 4.11 m (min) (MNKS-5) to 7.80 m (max) (MNKS-2) have been identified at shallow depth in the block and 198.625 million tonnes (Net in situ) reconnaissance category resources (334) with average grade CaO-44.61%, MgO- 2.35%, SiO2- 10.52, Al2O3- 1.64%, Fe2O3- 1.32% and LOI- 37.41% at 42% CaO, 4.00% MgO & 16% SiO_2 cut off have been estimated in 8.01 sq. km area out of total 15.00 sq. km area of the block. Resource has not been estimated for the area on the western part. Encouraged by the findings of the G-4 level régional exploration, MECL formulated proposal for G-3/2 level exploration at 400m x 400m grid interval along with associated geological & laboratory studies in the Naubasta-Kolard Block to bring the resource at higher confidence level (G-3/2) and put up for approval in midterm review meeting of Technical Committee of NMET. Technical Committee of NMET in its midterm review meeting reviewed the proposal of G-3/2 level of exploration prepared based on the data generated in the G-4 level exploration and recommended upgradation at G-3 level as no borehole was drilled in the western part of the block and northern part of the eastern block and approved 7 no of scout boreholes in its 4th meeting held on 21.02.2017. The executive Committee in its 4th meeting held on 21.02.17 has approved the scheme. The administrative/ financial sanction for G3 level Exploration for limestone in Naubasta-Kolard block at an estimated cost of Rs 57.91 lakhs was received from Ministry of Mines, Govt. of India, National Mineral Exploration Trust ,New Delhi vide F no 6/1/NMET-2015/ dated 03.04.2017. MECL commenced the exploration activities in the Naubasta-Kolard block in May-2017 and completed the exploration work in June-2017. The geological report was submitted to DGM, MP in November-2017.Total **131.100 million tonnes of cement grade** limestone of **'inferred category resource' (333)** with average grade CaO-45.26%, MgO-2.04%, SiO_2- 10.05, Al_2O_3- 1.58%, Fe_2O_3- 1.18% and LOI- 38.09 % at 42% CaO, 4.00% MgO & 16% SiO_2 cut off have been estimated in total 15.00 sq. km area of the block. Considering the limestone potentiality of the block, DGM, MP requested MECL vide letter no 651/भौमिकी/न.क्र.31/2016-17 Dated 12/01/2018 to provide geological report of G-2 level of exploration of Naubasta-Kolard block as it can only be auctioned only after doing G-2 level of exploration. In accordance with the request of DGM, MP, MECL formulated proposal for G-2 level exploration at 400m x 400m grid interval along with associated geological & laboratory studies in the Naubasta-Kolard Block to bring the resources at higher confidence level (G-2) and is put up for approval of Technical Committee of NMET/ Executive Body of NMET.

<table>
<tr><td>Regional Geology</td><td>The stratigraphic succession of the area under study is as follows:

<table>
<tr><td>Recent</td><td>-</td><td>Laterite</td></tr>
<tr><td rowspan="3">Upper Vindhyan</td><td rowspan="3">Bhander Series</td><td>Upper Bhander Sandstone, Sirbu Shale</td></tr>
<tr><td>Lower Bhander Sandstone</td></tr>
<tr><td>Bhander (Nagod) Limestone</td></tr>
</table></td></tr>
<tr><td>Objectives</td><td>The following are the objectives of proposed exploration:

i) To demarcate the Limestone occurrence at shallow depth in the eastern and western part of the block by drilling boreholes at 400 m x 400 m grid interval.

ii) To find out the quality & grade of Limestone and grade-wise estimate of limestone resources.

iii) To carry out general exploration (G-2) as per Mineral (Evidence of Mineral Contents) Rule-2015, Mineral Auction Rule-2015 and MMDR Amendment Act-2015 in turn to facilitate the State Govt. (Madhya Pradesh) in Auctioning of the Block.</td></tr>
<tr><td>Time Schedule</td><td>11 Months</td></tr>
<tr><td>Cost Estimate</td><td>Rs. 406.372 Lakhs</td></tr>
<tr><td>Exploration Agency</td><td>MECL</td></tr>
<tr><td>Date of Commencement</td><td>April’ 2018</td></tr>
</table>

EXPLORATION PROPOSAL (G-2) FOR CEMENT GRADE LIMESTONE IN NAUBASTA-KOLARD BLOCK, NAGOD TEHSIL, DISTRICT-SATNA, MADHYA PRADESH

1.0.0. INTRODUCTION

1.1.1 On enactment of MMDR Amendment Act- 2015, Mineral (Evidence of Mineral Contents) Rule- 2015 and Mineral Auction Rule - 2015, Govt. of India directed State Governments to speed up exploration work for different Mineral Commodities especially Notified Minerals i.e. Iron ore, Manganese, Bauxite and Limestone in the respective states.

1.1.2. Accordingly, on request of Government of Madhya Pradesh, MECL submitted regional exploration proposal (G3/G2) for Limestone in Naubasta-Kolard Block in Satna District of Madhya Pradesh. The proposal was discussed in Ist meeting of Technical Committee of NMET held on 1st & 2nd April, 2016 at GSI Central Region, Nagpur. The Committee recommended Geological Mapping, surface/outcrop samples and five scout boreholes covering the entire block with an area of 15 Sq.Km to generate analytical data at G4 level. MECL accordingly modified the proposal and put up for approval in the 2nd meeting of Technical Committee held on 5th May 2016 at GSI, TI, Hyderabad. On recommendations of Technical committee the proposal was approved in the 2nd Executive Committee held on 09.05.2016 at Ministry of mines, New Delhi.

It was proposed by the Technical Committee of NMET to review the exploration data after receiving the results of G-4 level exploration, during midterm review meeting. The administrative/ financial sanction for G4 level exploration of limestone in Naubasta-Kolard block at an estimated cost of Rs 59.49 lakhs was received from Ministry of Mines, Govt. of India, National Mineral Exploration Trust ,New Delhi vide F no 6/1/NMET-2015 dated 18.08.2016.

1.1.3 MECL commenced exploration work in Naubasta-Kolard block on 12.08.2016 and completed geological mapping, collection of outcrop samples and 294.00 m drilling in five scout boreholes along with other associated geological and laboratory work in October-2016. The geological report on regional exploration (G-4) for limestone in Naubasta-Kolard block has been submitted in January-2017.

1.1.4 As an outcome of regional exploration (G-4) level two Cement grade limestone zones i.e. zone-I with thickness varying from 3.90 m (Min) (MNKS-5) to 6.20 m (Max) (MNKS-2) and Zone-II with thickness varying from 4.11 m (min) (MNKS-5) to 7.80 m (max) (MNKS-2) have been identified at shallow depth in the block and 198.625 million tonnes (Net in situ) reconnaissance category resources (334) with average grade CaO-44.61%, MgO- 2.35%, SiO2- 10.52, Al2O3- 1.64%, Fe2O3- 1.32% and LOI- 37.41% at 42% CaO, 4.00% MgO & 16% SiO_2 cut off have been estimated in 8.01 sq. km area out

of total 15.00 sq. km area of the block. Resource has not been estimated for the area on the western part.

1.1.5 Encouraged by the findings of the G-4 level régional exploration, MECL formulated proposal for G-3/2 level exploration at 400m x 400m grid interval along with associated geological & laboratory studies in the Naubasta-Kolard Block to bring the resource at higher confidence level (G-3/2) and put up for approval in midterm review meeting of Technical Committee of NMET.

1.1.6 Technical Committee of NMET in its midterm review meeting reviewed the proposal of G-3/2 level of exploration prepared based on the data generated in the G-4 level exploration and recommended upgradation at G-3 level as no borehole was drilled in the western part of the block and northern part of the eastern block and approved 7 no of scout boreholes in its 4th meeting held on 21.02.2017. The executive Committee in its 4th meeting held on 21.02.17 has approved the scheme. The administrative/ financial sanction for G3 level Exploration for limestone in Naubasta-Kolard block at an estimated cost of Rs 57.91 lakhs was received from Ministry of Mines, Govt. of India, National Mineral Exploration Trust ,New Delhi vide F no 6/1/NMET-2015/ dated 03.04.2017.

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1.1.9 In accordance with the request of DGM, MP, MECL formulated proposal for G-2 level exploration at 400m x 400m grid interval along with associated geological & laboratory studies in the Naubasta-Kolard Block to bring the resources at higher confidence level (G-2) and is put up for approval of Technical Committee of NMET/ Executive Body of NMET.

1.2.0 LOCATION AND ACCESSIBILITY

1.2.1 Naubasta-Kolard limestone block is located in the Tehsil - Nagod, District- Satna, Madhya Pradesh. The deposit falls within the Survey of India Toposheet No. 63 D/10. The block limits with Latitude and Longitude as under.

A	80°38' 30.8666ô	24°37ô48.2316ô
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D	80°40' 35.410ô	24°36ô36.5995'ô
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F	80°41' 14.4564ôô	24°35ô0.7002'ô
G	80°40' 19.7256ôô	24°34ô34.005'ô

1.2.2 Most of the Infrastructure (Police Station, Bank facility, workshop facility, Bus Stand etc) are available at Nagod, the Tehsil Town which is at 15 km from the exploration block. The nearest Railway station is Satna Junction which is about 20 km from the proposed study area. Motorable /Metalled road is available in the area. The proposed block covers an area of 15 Sq. km. with the proposed work of G-2 level exploration.

1.3.0. PHYSIOGRAPHY & DRAINAGE

1.3.1 Physiographically, Satna district forms a part of Vindhyachal range. The back slope of Vindhyachal leads to a broad plain with low ridges and valleys and rise gently to Bhander Plateau in the south. The Bhander Plateaus comprises isolated mesas and buttes and is succeeded further south by Kaimur ridge reaching maximum elevation of 704 m. The Satna district is mainly drain by Son and Tons or Tamasa Rivers and their tributaries. The highest elevation in the proposed area is 382 mtrs above MSL. The average rainfall in the area is 800 mm to 1100 mm. Wildlife in the area is scanty.

1.4.0 PREVIOUS WORK

1.4.1 Since the middle of the 19th Century, Vindhyan basin has been studied by the stalwarts like Medlicott (1860), Mellet (1869), Oldhem (1851), Vredonbera (1906) and others. Oldhem suggested a threefold division of Upper Vindhyans into Kaimur, Rewa and Bhander. Mellet (1869) has given a comprehensive geological account of the Vindhyan rocks and its equivalents. He also subdivided the Lower and Upper Vindhyans into various litho units. A comprehensive account of the work carried out on the limestone deposits in Rewa-Satna area is contained in the report on Investigation of Flux Grade Limestone in Rewa- Satna areaô by D.R.S.Mehta and P.K Raman, Geologist of Geological Survey of India. A vivid account of Nagod Limestone (Bhander Limestone) is given by Rao et al.

1.4.2 The Directorate of Geology and Mining, Madhya Pradesh, in the regular programme of survey of various mineral deposits of the state had already undertaken and completed preliminary assessment of high grade limestone blocks of Nagod Limestone in the adjoining area.

1.4.3 Due to depleting deposits of SMS grade limestone in the property of MP state Mining Corporation Ltd. (A Government of Madhya Pradesh Undertaking), the Corporationôs authorities approached DGM to locate area of SMS and higher grade limestone within economic distance of transport from the Satna railway siding of the corporation. Selection of detailed geological work and proving of high grade limestone deposit for the Madhya Pradesh State Mining Corporation was therefore based on the recommendations contained in the work carried out by S.S.Mishra (1974-75)

1.4.4 The geological investigation was taken up around Rampur and Ramasthan, Raghuraj Nagar Tehsil, Dist.-Satna and is included in the Survey of India Toposheet no 63 D/14. The work in the above area commenced in October-1975 and was closed in September-1976. 200 Sq. km of area between Latitude 24°36ôto 24°39ôand Longitude 84°47ôto 84°59ôwas mapped on scale 1:63360. The rock formation belongs to Bhander group of Vindhyan Super Group.

1.4.5 The area is found to contain 8 m to 13.5 m thick dark grey limestone horizon of lower Nagod limestone of average grade corresponding to flux grade. However, if mechanized mining is carried out, the grade may fall to the cement grade. A total of 17.05 million tonnes of flux and cement grade limestone have been proved in the Ramasthan block by DMG, Madhya Pradesh.

1.4.6 During the course of regional exploration (G-4 and G-3) the following quantum of work was carried out by MECL. Table ï 1.1 & 1.2

Table No. - 1.1

QUANTUM OF WORK (G-4) CARRIED OUT BY MECL IN NAUBASTA-KOLARD BLOCK, DISTRICT-SATNA, MADHYA PRADESH

Sl. No.	Item of Work	Unit	Quantum of work proposed	Achievement
1	Geological Mapping (on 1:10000 scale).	Sq. Km.	15.00 sq. km	15.00 sq. km
2	Surface / Out crop sampling	Nos.	20 nos in an area of 15.00 Sq. Km	13 nos
3	Drilling	m.	250m (5 Scout BHs)	294.00 (5 vertical BHs)
4	Laboratory Studies			
	i) Chemical Analysis;(core samples) Primary + Check for 6 radicals i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI	Nos.	120 Primary + 10 Check = 130	Primary -106 + Check-05 Total - 111
	ii)Chemical Analysis;(Surface samples) Primary for 6 radicals i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI		20	13
	iii) External Check sample for analysis of 6 radicals i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI	Nos.	5	-
	iv) Composite Samples a) For 12 radicals (CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5 , LOI, MnO_2, K_2O, Na_2O and Cl.)	Nos.	15	08
5	Physical Studies			
	a) Spectroscopic Studies (10 elements)	Nos.	10	06
	b) XRD studies	Nos	10	06
6	Petrological Studies (Petrographic Studies)	Nos	10	10
7	Specific Gravity Determinations	Nos	20	20
8	Report Preparation (Digital format)	Nos.	1 No.	1 No.

Table No. - 1.2

QUANTUM OF WORK (G-3) CARRIED OUT BY MECL IN NAUBASTA-KOLARD BLOCK, DISTRICT-SATNA, MADHYA PRADESH

Sl. No.	Item of Work	Unit	Quantum of work proposed	Achievement
1	Geological Mapping (on 1:10000 scale).	Sq. Km.	15.00 sq. km	15.00 sq. km
2	Drilling	m.	280m (7 Scout BHs)	305.00 (7 Vertical BHs)
3	Laboratory Studies			
	i) Chemical Analysis;(core samples) Primary + Check for 6 radicals i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI	Nos.	100 Primary + 10 Check = 110	Primary -106 + Check-10 Total - 116
	ii)Chemical Analysis;(Core samples) Primary for 2 radicals i.e. SO_3, P_2O_5		05	05
	iii) External Check sample for analysis of 6 radicals i.e. CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI	Nos.	05	05
	iv) Composite Samples For 12 radicals (CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5 , LOI, MnO_2, K_2O, Na_2O and Cl.)	Nos.	20	08
	Physical Studies			
	c) Spectroscopic Studies (10 elements)	Nos.	10	08
	d) XRD studies	Nos	10	07
5	Petrological Studies (Petrographic Studies)	Nos	10	09
6	Specific Gravity Determinations	Nos	10	10
7	Report Preparation (Digital format)	Nos.	1 No.	1 No.

1.4.7 Based on the outcome of five scout boreholes, a total of 198.625 million tonnes of cement grade (44.61% CaO, 2.35% MgO, 10.52% SiO_2, 1.64% Al_2O_3, 1.32% Fe_2O_3 and 37.41% LOI) net in situ resource of reconnaissance (334) category have been estimated at 42% CaO, 4.00% MgO & 16% SiO_2 cut off in 8.01 sq. km. area out of total 15.00 sq.km. area of the block during G-4 level exploration.

1.4.8 Since the western block and northern part of the eastern block could not be covered during G-4 level exploration by drilling just five boreholes, the Technical Committee of NMET suggested to drill a few more boreholes to cover entire block and approved seven boreholes for G-3 level exploration. Thus seven boreholes have been drilled in the block during G-3 level exploration and geological report has been submitted in

November-2017. As an outcome of G-3 level exploration, a total 131.100 million tonnes of net in situ resource of inferred category (333) of cement grade (45.26%CaO, 2.04% MgO, 10.05% SiO_2, 1.58% Al_2O_3, 1.18% Fe_2O_3 and 38.09% LOI) have been estimated at 42% CaO, 4.00% MgO & 16% SiO_2 cut off in 9.35 sq.km. area out of 15.00 sq.km. area of the block

2.0.0 GEOLOGY OF THE AREA

2.1.0 Regional Geology of the area

The rock types of the region, District- Satna range in age from Archaeans to Cainozoic. The Archaeans rocks comprised of granites & gneisses are exposed only in northern part of the district. The rocks of Vindhyan Super group comprise Semri, Kaimur, Rewa & Bhander groups. The Semri Group of rocks is represented by an alternating sequence of Sandstone and shale alongwith porcellanite and limestone. The Semri Group of rocks mainly exposed in the southern and northern part of the district. The Rohtas Limestone is light to grey in colour, fine grained compact and well bedded. The Kaimur Group comprising mainly sandstone which is fine grained; massive and thickly bedded is exposed in the northern and southern part. The Rewa Group of rocks comprises mainly of sandstone, shale and conglomerate. The Bhander Group of rocks exposed as a broad band and comprises mainly shale, Nagod limestone and upper Bhander sandstone and Nagod limestone is fine grained, hard, compact thinly bedded to massive with some stromatolitic bands. The upper Bhander Sandstone forms the cliffs of the Bhander plateau is composed of purple to reddish brown, fine to medium grained, flaggy to massive and well sorted sandstone interbedded and splintery shale and siltstone. Lameta Formation comprising sandstone and shale range in thickness from 15-80m and occurs in the form as clusters on the hillocks of upper Rewa Sandstone. Laterite occurs as capping on the Bhander Group of rocks and on the upper Rewa Sandstone. It has a maximum thickness of 60m.

2.2.0 Geology of the area

2.2.1 The rock formation occurring in the area comprises sandstone, shale and limestone, all belonging to the Bhander series of Upper Vindhyan. These rock formations are almost sub-horizontal having southerly dips varying from 5° to 10°.

The general stratigraphic sequence is as below:

Recent	-	Laterite
Upper Vindhyan	Bhander Series	Upper Bhander Sandstone Sirbu Shale
		Lower Bhander Sandstone
		Bhander (Nagod) Limestone

3.0.0 DESCRIPTION OF DIFFERENT FORMATIONS

3.1.0 BHANDER (NAGOD) LIMESTONE

Outcrops of this limestone in the area are far and few between, occurring in patches along the general trend which is almost E-W. The limestone deposits are sub horizontally bedded with dips varying from 5° to 10° towards south. At places where limestone deposits are not seen they are concealed below the soil and alluvium cover, varying in thickness from a fraction of a meter to as much as 3 to 5 meters. In many localities the workable limestone does not have any overburden but in few instances the overburden which comprises of soil and alluvium are highly siliceous limestone tending to be calcareous sandstone which is used only as building stone. The nature of the occurrence of this rock formation is such that in all probability is a key horizon in the stratigraphic occupies a set-up of this limestone area.

The Bhander limestone deposits in the region show fairly frequent variations in quality and thickness both laterally and vertically.

Furthermore, these Bhander limestone show considerable variations in quality, both laterally as well as vertically. Again, in several localities the rich quality limestone beds are overlain and also interlayered with limestone which are of interior grade. Another feature which is quite widespread in the stratigraphic sequence of this tract is the capping and interbedding of the rich quality of limestone strata with shales and arenaceous as well as argillaceous limestone.

The limestone are well bedded, fine to medium grained and grey to dark grey in colour. They are traversed by two sets of joints which are parallel to their strike and dip directions.

3.2.0 LOWER BHANDER SANDSTONE ï (Impure Siliceous Limestone)

The rock occurs almost as a persistent capping rock over the Bhander Limestone deposits in the area east and also west of Satna, right up to Nagod in the West, with occasional breaks. The rock varies in colour from greyish white to pale greyish and pale brownish, often cherty in nature and well bedded with thin argillaceous intercalations. The rock is hard, compact, and comes out in slabs.

This rock has perhaps been responsible for the preservation of a large tract of limestone strata underneath, protecting it from sub aerial erosion.

3.3.0. SIRBU SHALES.

Very prominent exposures of Sirbu Shales are seen around Nagod town, along the road cuttings and nala & river courses between Nagod and Satna. The shales are thinly bedded and vary in colour from light grey to pale grey and purple to purplish brown. These shales at places directly overlie the limestone horizon.

3.4.0. UPPER BHANDER SANDSTONE

These sandstones makes the distinct hillocks, situated away from the limestone area were not examined in the investigation and accordingly not described.

3.5.0. LATERITE

At places between Nagod and village Sitapura and also in patches around Satna, particularly on higher grounds laterite is seen strewn over the surface.

4.0.0 OBJECTIVE OF EXPLORATION:-The following are the objectives of proposed General Exploration (G-2):

i) To demarcate the Limestone occurrence at shallow depth in the eastern and western part of the block by drilling boreholes at 400 m x 400 m grid interval.

ii) To find out the quality & grade of Limestone and grade-wise estimate of limestone resources.

iii) To carry out general exploration (G-2) as per Mineral (Evidence of Mineral Contents) Rule-2015, Mineral Auction Rule-2015 and MMDR Amendment Act-2015 in turn to facilitate the State Govt. (Madhya Pradesh) in Auctioning of the Block.

5.0.0. Methodology of Exploration

5.1.0 <u>Topographic Survey & Geological Mapping</u>.

5.1.1 Surveying will be carried out in the block with reference to the already laid down triangulation network. Contouring will be done on 1:5000 scale at 5m contour intervals. Borehole will be fixed on the ground. RLs and co-ordinates of survey and exploration points will be determined. The block boundary will be surveyed by DGPS & Total Station in WGS-84 Datum.

5.1.2 The geological mapping on 1:10000 scale was carried out in 15.00 sq. km. area by taking traverses with the help of hand held GPS during the G-4 level regional exploration. The scanty exposures of Bhander/Nagod limestone in the east-central part of the block were mapped and surveyed where ever available and plotted on the geological map. Western, northern and southern part of the block is completely covered with soil/alluvium. All the geological features wherever possible have been recorded, plotted and furnished in the Borehole Location Plan/Geological Map (Plate - I). The geological mapping had been further taken up in details during preliminary exploration (G-3) and geological map have been updated. This map will be used as base map for future work. Locations of boreholes proposed for G-2 level regional exploration on 400 m x400 m grid interval are depicted in the borehole location plan of the block (Plate I). The final geological map will be prepared at 1:4000 scale.

5.2.0 Surface Drilling

5.2.1 As results of G-4 and G-3 level exploration i.e. drilling of five and seven scout boreholes respectively, geological mapping and drill core sampling, 131.100 million tonnes of net in situ inferred (333) resource have been established in the block. Encouraged by this finding of G-3 level exploration, 58 nos boreholes on 400m x 400m grid interval has been proposed in the block (eastern & western block) . Thus total 58 nos vertical boreholes to be drilled up to the varying depth or up to intersection of lower ungraded limestone zone/Nagod shale, whichever is shallower, covering the entire area of the block is proposed. Thus the total meterage in present G-2 level exploration drilling will be 2355 m approximately along with associated geological, & laboratory studies. The details of proposed boreholes are given below:-

Table-Details of Proposed Vertical Boreholes for Limestone Exploration in Naubasta-Kolard Block (G-2 Level), Tehsil-Nagod, District-Satna, Madhya Pradesh

Sl. No.	Proposed Borehole No.	Proposed Depth (m)	Remarks
1	PBH 1	20	
2	PBH 2	20	
3	PBH 3	20	
4	PBH 4	25	
5	PBH 5	25	
6	PBH 6	25	
7	PBH 7	25	
8	PBH 8	25	
9	PBH 9	25	
10	PBH 10	30	
11	PBH 11	35	
12	PBH 12	35	
13	PBH 13	35	
14	PBH 14	35	
15	PBH 15	35	
16	PBH 16	35	
17	PBH 17	40	
18	PBH 18	40	
19	PBH 19	55	
20	PBH 20	55	
21	PBH 21	55	
22	PBH 22	50	
23	PBH 23	50	
24	PBH 24	45	
25	PBH 25	45	

Sl. No.	Proposed Borehole No.	Proposed Depth (m)	Remarks
26	PBH 26	45	
27	PBH 27	65	
28	PBH 28	65	
29	PBH 29	70	
30	PBH 30	65	
31	PBH 31	60	
32	PBH 32	55	
33	PBH 33	55	
34	PBH 34	70	
35	PBH 35	70	
36	PBH 36	70	
37	PBH 37	75	
38	PBH 38	70	
39	PBH 39	70	
40	PBH 40	65	
41	PBH 41	75	
42	PBH 42	75	
43	PBH 43	30	
44	PBH 44	30	
45	PBH 45	25	
46	PBH 46	25	
47	PBH 47	25	
48	PBH 48	25	
49	PBH 49	25	
50	PBH 50	20	
51	PBH 51	20	
52	PBH 52	20	
53	PBH 53	20	
54	PBH 54	20	
55	PBH 55	20	
56	PBH 56	15	
57	PBH 57	15	
58	PBH 58	15	
	Total	**2355**	
NOTE	Proposed borehole nos PBH-53 to PBH-58 in the north western part of the block will be taken up for drilling only after positive intersection of limestone in the proposed borehole nos PBH-47 to PBH-52		

5.3.0 Drill Core Logging and Sampling

5.3.1 Detailed drill core logging will be done with consideration for weathering, grain size, fossil contents, colour of various formations, intercalation / parting of shale, stylolite, structure and presence of sulphides. 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 should 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 splitted 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 gram 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. This will generate about 2200 Nos primary samples and 220 Nos internal Check samples (10% of Primary samples). In addition 5% of primary samples, 110 Nos Check samples will be prepared as External Check samples and will be sent to NABL Labs for analysis of 6 radicals. Around 110 Nos of primary samples will be prepared for analysis of two radicals i.e. SO_3 & P_2O_5.

5.3.2 Composite samples will be prepared borehole wise based on primary sample data at every 6m interval (6m bench height).Composite samples shall be prepared from the entire borehole in which limestone bands will be intersected. This will generate about 350 nos of composite samples. These samples will be analysed for 12 radicals.

5.4.0. Laboratory Studies

5.4.1 <u>Chemical Analysis</u>:

a) Primary Samples- All the primary (2200 Nos) and check samples i.e. 220 Nos (around 10% of primary samples) will be analyzed for 6 radicals. CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3 and LOI. Around 220 samples will be analyzed for 2 additional radicals- SO_3 & P_2O_5. 5% of primary samples (110 Nos) will be sent to NABL external labs as check samples for analysis of 6 radicals CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3 and LOI.

b) Composite samples- Around 350 nos composite samples will be analyzed for 12 radicals-CaO, MgO, SiO_2, Al_2O_3, Fe_2O_3, SO_3, P_2O_5, Mn_2O_3, TiO_2, K_2O, Na_2O and LOI. Trace element studies will be done on 35 Nos of composite samples by ICP-MS method to know the presence of trace elements and XRD studies will be carried on 35 Nos of composite samples for mineral phase studies respectively.

5.4.2. **Petrological Studies**: Petrological studies will be done on around 35 nos of drill core specimen.

5.4.3 **Specific Gravity Determination:** Specific Gravity will be determined on 35 nos drill core specimen.

5.4.4 **Beneficiation Studies:** One Limestone sample weighing 200-250kgs prepared by mixing the splitted half core samples (4-5 inches) of Limestone zones intersected in all the boreholes will be sent to Ore Dressing Laboratory, IBM, Nagpur for carrying out beneficiation studies.

5.5.0 **Environmental Studies:** Baseline environmental data i.e. Ambient air quality, noise level, land use/land cover, soil, biota, water regime, socio-economics employment, industries, places of religious/historical & archaeological importance and tourist places etc. in the area within 10 km radius from the centre of the block will be collected and studied. The study of the environmental data will be separately presented in the environmental report.

5.5.0 The Quantum of work proposed is given in Table No.5.

Proposed Quantum of Work(G-2) in Naubasta-Kolard Block, Tehsil-Nagod, District- Satna, Madhya Pradesh			
Sl. No.	**Item of Work**	**Unit**	**Proposed Quantum of work**
1	Topographic Survey (on 1:4000 Scale).	Sq. Km.	15
2	Geological Mapping (on 1:4000 Scale).	Sq. Km.	15
2	Core Drilling (on 400m x 400m grid) 58 BHs	m.	2355.00
3	Laboratory Studies		
A.	Primary samples		
	i) Chemical Analysis: Primary for 6 radicals i.e. CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI	Nos.	2200
	ii) Chemical Analysis: Primary for 2 radicals i.e., SO_3 & P_2O_5	Nos	220
	iii) Internal Check samples (10% of Primary samples) for analysis of 6 radicals i.e. CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI	Nos.	220
	iv) External Check sample (5 %of Primary samples) for analysis of 6 radicals i.e. CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI	Nos.	110
B.	Composite Samples		
	i) Composite samples will be analyzed for 14 radicals i.e. CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 ,LOI, SO_3 , P_2O_5 ,MnO_2 , K_2O, Na_2O, Cl	Nos.	350
4	Physical Studies		
	a) Trace Element Studies by ICP-MS (14 elements)	Nos.	35
	b) XRD studies	Nos	35
5	Petrographic Studies	Nos	35
6	Specific Gravity Determinations	Nos	35
7	Beneficiation Study	Nos.	1
8	Environmental Studies	Nos.	1
9	Report Preparation (Digital format)	Nos.	1

5.6.0 **<u>Exploration Report:</u>** Data generated from proposed G-2 exploration and the data of G-3 & G-4 level regional exploration carried out by MECL along with earlier data if any will be utilized in Report preparation.

6.0.0 Time Schedule and Cost Estimates:

6.1.0 **Time Schedule:** The proposed exploration programme work activities like, camp setting, topographic survey, geological mapping, collection of surface samples, and associated geological work, drilling, camp winding and laboratory work will be completed within 8 monthsôtime, report writing including peer review will be completed in a period of 4 months including overlapping of one month of laboratory studies. Thus the total duration of the project for present exploration will 11 months from the date of commencement of the project.

6.2.0 **Cost Estimate**: Cost has been estimated based on actual and provisional escalation as per RBI indices as on 31-03-17 and same has been considered for the subsequent years. The total estimated cost is **Rs. 406.372 Lakhs.** The details of cost estimates are given in Table 6.2 and summary is given below;

Summary of Cost Estimates

Table 6.2

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Drilling	18428785/-
2	Geology	2785980/-
3	Laboratory	9233903/-
4	Preservation of Core Boxes	901000/-
5	Exploration Report (1% of 1+2+3+4)	313497/-
6	Peer Review	10000/-
7	Environmental Study	2385147/-
8	Preparation of Proposal	380000/-
9	Sub Total	34438311/-
10	GST @ 18%	6198896/-
	Total	40637207/-
		Say- Rs. 406.372 Lakhs

7.0.0 Justification

i) MECL carried out regional exploration (G-4) work under NMET funding in Naubasta-Kolard Block on behalf of DMG, Madhya Pradesh Government, in compliance of the MMDR Amendment Act and Mineral Auction Rules - 2015.

ii) As an outcome of regional exploration (G-4 level two Cement grade limestone zones i.e. zone-I with thickness varying from 3.90 m (Min) (MNKS-5) to 6.20 m (Max) (MNKS-2) and Zone-II with thickness varying from 4.11 m (min) (MNKS-5) to 7.80 m (max) (MNKS-2) has been identified at shallow depth in the block and 198.625 million tonnes (Net in situ) reconnaissance category resources (334) with average grade CaO-44.61%, MgO- 2.35%, SiO_2- 10.52, Al_2O_3- 1.64%, Fe_2O_3- 1.32% and LOI- 37.41% at 42% CaO, 4.00% MgO & 16% SiO_2 cut off have been estimated in 8.01 sq. km area out of total 15.00 sq. km area of the block. Resources has not been estimated for the area on the western part.

iii) Encouraged by the findings of the Reconnaissance Survey (G-4), MECL formulated proposal for exploration at 800m x 800m grid interval along with associated geological & laboratory studies in the Naubasta-Kolard Block to bring the resources at higher confidence level (G-3/2). Technical Committee of NMET reviewed the proposal of G-3/2 level of exploration prepared based on the data generated in the G-4 level exploration and recommended upgradation at G-3 level as no borehole was drilled in the western part of the block and northern part of the eastern block and approved 7 no of scout boreholes in its 4th meeting held on 21.02.2017.

iv) Total **131.100 million tonnes of cement grade** limestone of **'inferred category resource' (333)** with average grade CaO-45.26%, MgO- 2.04%, SiO_2- 10.05, Al_2O_3- 1.58%, Fe_2O_3- 1.18% and LOI- 38.09 % at 42% CaO, 4.00% MgO & 16% SiO_2 cut off have been estimated in total 15.00 sq. km area of the block in G-3 level of exploration.

v) Considering the limestone potentiality of the block, DGM, MP requested MECL vide letter no 651/भौ□मक□/न.□ .31/2016-17 Dated 12/01/2018 (Enclosed as Annexure) to provide G-2 level geological report of Naubasta-Kolard block as it can only be auctioned only after doing G-2 level of exploration.

vi) The G-2 level exploration will be helpful in estimation of Limestone resources at higher confidence level, which in turn will facilitate the Madhya Pradesh State Government for Auctioning of Block.

Table:6.2 COST ESTIMATE FOR EXPLORATION (G-2) OF LIMESTONE, NAUBASTA-KOLAD BLOCK; TEHSIL: NAGOD; DISTRICT: SATNA; MADHYA PRADESH

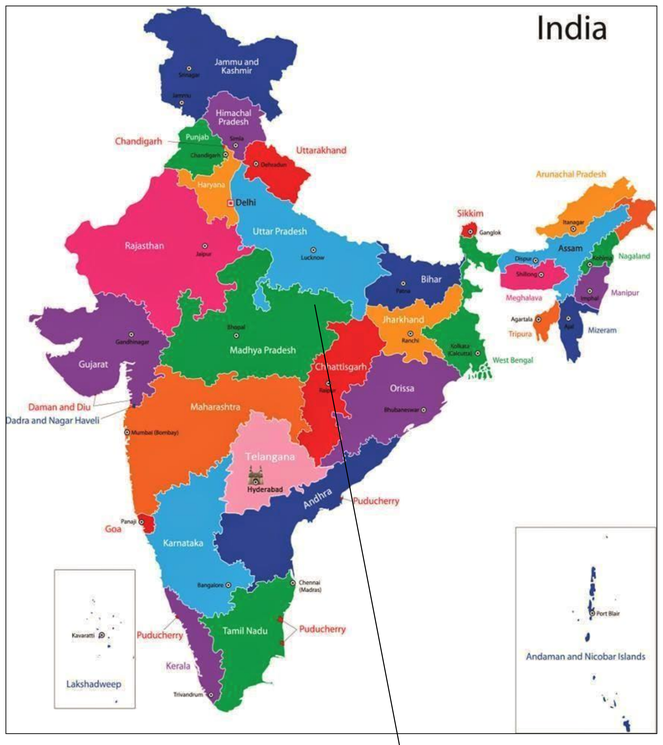
SL. No.	Item of Work	Unit	Base	Financial Year (2017-18)			Financial Year (2018-19)			Total	
			Rate	Esc.Rate	Qty.	Amount	Esc. Rate	Qty.	Amount	Qty	Amount
			1.4.90	(Rs)		(Rs)			(Rs)		(Rs)
A	**DRILLING**										
1	Surface Drilling (2 Rigs)	m.	1714	6780	0	0	6780	2355	15966900	2355	**15966900**
2	Transportation	Km.	8.8	31	0	0	31	2000	62000	2000	**62000**
3	Accomodation	One time / Drill	185925	663715	0	0	663715	2	1327430	2	**1327430**
4	Camp Setting / Winding	Drill/ month	68606	244910	0	0	244910	4	979640	4	**979640**
5	Road Making (Flat Terrain)	Km	7800	18563	0	0	18563	5	92815	5	**92815**
	Sub Total A					**0**			**18428785**		**18428785**
B	**GEOLOGICAL WORK**										
1	Survey Party Days (1 party)	day	1180	5840	0	0	5840	150	876000	150	**876000**
2	Geologist Party days (1 partys)	day	1541	7802	0	0	7802	180	1404360	180	**1404360**
3	Core Sampling Party days(1 party)	day	525	2809	0	0	2809	180	505620	180	**505620**
	Sub-Total B					**0**			**2785980**		**2785980**
C	**LABORATORY STUDIES**										
	a Chemical Analysis										
1	Primary + Check Samples										
	i) for 6 radicals (CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI)	Nos	490 (76x5+110)	2580	0	0	2580	2420	6243600	2420	**6243600**
	ii) for 2 radicals SO_3 & P_2O_5	Nos	186 (76+110)	972	0	0	972	220	213840	220	**213840**
	iii) External Check Samples for 6 radicals(CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI)	Nos	490 (76x5+110)	2580	0	0	2580	110	283800	110	**283800**
2	Composite Samples										
	i) for 12 radicals (CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 ,LOI, SO_3 , P_2O_5 ,MnO_2 , K_2O, Na_2O, Cl	Nos	946 (76x11+110)	4992	0	0	4992	350	1747200	350	**1747200**
	b Physical Analysis										
1	X-RD Studies on composite	Nos	1137	5605	0	0	5605	35	196175	35	**196175**
2	Trace element Studies**** (14 Element) ICP-MS	Nos		4290	0	0	4620	35	161700	35	**161700**
3	Preparation of thin section	Nos	100	538	0	0	538	35	18830	35	**18830**
4	Petrographic Studies	Nos	228	1436	0	0	1436	35	50260	35	**50260**
5	Specific Gravity determination	Nos	32	188.5	0	0	188.5	35	6597.5	35	**6597.5**
6	Transportation of bulk sample to IBM, Nagpur	Km.	8.8	31	0	0	31	1000	31000	1000	**31000**
7	Beneficiation Studies (IBM Lab.)	Nos		280900	0	0	280900	1	280900	1	**280900**
	Sub-Total C					**0**			**9020062.5**		**9233903**
D	**Preservation of Core**										
i)	GI Core boxes	Nos.					1500.00	580	**870000**	**580**	**870000**
ii)	Transportation of Core Boxes	Km	8.8	31.0		0	31.0	1000	**31000**	**1000**	**31000**
	Sub-Total E										**901000**
	Total A+B+C+D					**0**			**30234827.5**		**31349668**
E	**EXPLORATION REPORT - 1% of (A+B+C+D)**				0	**0**		**0**	**0**	1	**313497**
F	**PEER REVIEW OF DGR (Lump Sum)**	Nos		-	0	**0**	**10000**	**1**	**10000**	1	**10000**
G	**Environmental Studies**										
1	**Satelite Imagery Study**	**Scene**	**99697**	**457948.2**	0	**0**	**457948.2**	**1**	**457948.1998**	1	**457948**
2	**Base line Data Collection**	**(10 km radius area)**	**151273**	**694857.4**	0	**0**	**694857.4**	**1**	**694857.3982**	1	**694857**
3	**Chemical Analysis**	**Nos**	**257400****	**1182341**	0	**0**	**1182341.2**	**1**	**1182341.16**	1	**1182341**
4	**Report Writing**	**Nos**	**50000**	**50000**	0	**0**	**50000**	**1**	**50000**	1	**50000**
	Sub Total G					**0**			**2385146.758**		**2385147**
H	*****Preparation of Proposal (Lump Sum)**										**380000**
	GRAND TOTAL A to H					**0**			**32629974**		**34438311**
	GST 18%										**6198896**
	Grand Total : with GST 18%										**40637207**
						Total					**Says 406.372 Lakhs**
Note:											
1	Revised Rates of Promotional Work done by MECL on behalf of Govt. of India Vide letter No. 37(I) /2006-M.I. dated- 02/07/2014 and based on actual escalation as per RBI indices as on 31-03-2017 and the same has been considered for subsequent year.										
2	Phoshphorite rates have been considered as there is no rates for Limestone in Revised Rates of Promotional Work of MoM Schedule of Rates.										
3	**Nityanad Committee Rates with actual escalation as per RBI index as on 31.3.2017 and the same for subsequent year.										
4	*** As approved in the 12th meeting of Technical Committee & th meeting of Executive Committe of NMET.										
5	** Rate has taken from Schedule of Charges of differen activities of GSI as on 2014-15 and 40% escalation on the same has been concidered for FY 2018-19.										

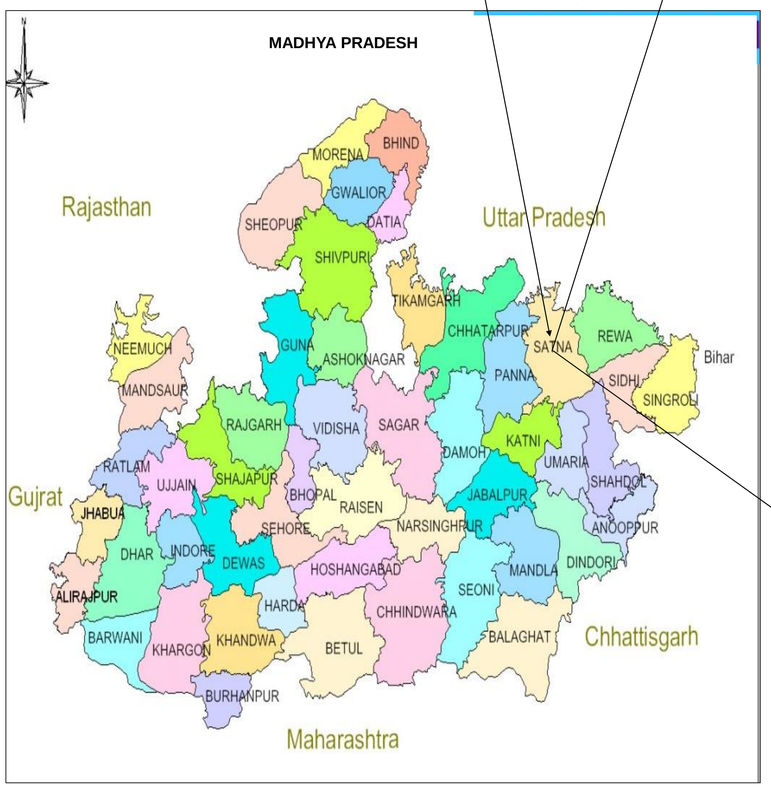
Table:6.2 COST ESTIMATE FOR EXPLORATION OF LIMESTONE IN NAUBASTA-KOLARD BLOCK, (G-2), TEHSIL-NAGOD, DISTRICT- SATANA, MADYA PRADESH

Sl. No.	Activities	Unit	MONTHS											Total
			Financial Year -2018-19											
			1	2	3	4	5	6	7	8	9	10	11	
			Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	
1	Camp Setting	Month	←											1 month
2	Surface Drilling (2 rig)	m.		←	—	—	—	→						2355.00 m (in 58 BHs)
3	Survey Party days (1 Parties)	day		←	—	—	—	→						150
4	Geologist Party days (1 Parties)	day		←	—	—	—	—	→					180
5	Sampling Party days, (1 Parties)	day		←	—	—	—	—	→					180
6	Laboratory Studies	Nos.			←	—	—	—	—	→				3240 No
7	Camp Winding	Month								← →				1 month
8	Report Writing (including peer review)	Month								←	—	—	→	4 months
9	Base line environmental Studies	month			←	—	—	—	—	→				6 months

LOCATION MAP OF NAUBASTA – KOLARD BLOCK

TEHSIL – NAGOD, DISTRICT - SATNA, MADHYA PRADESH





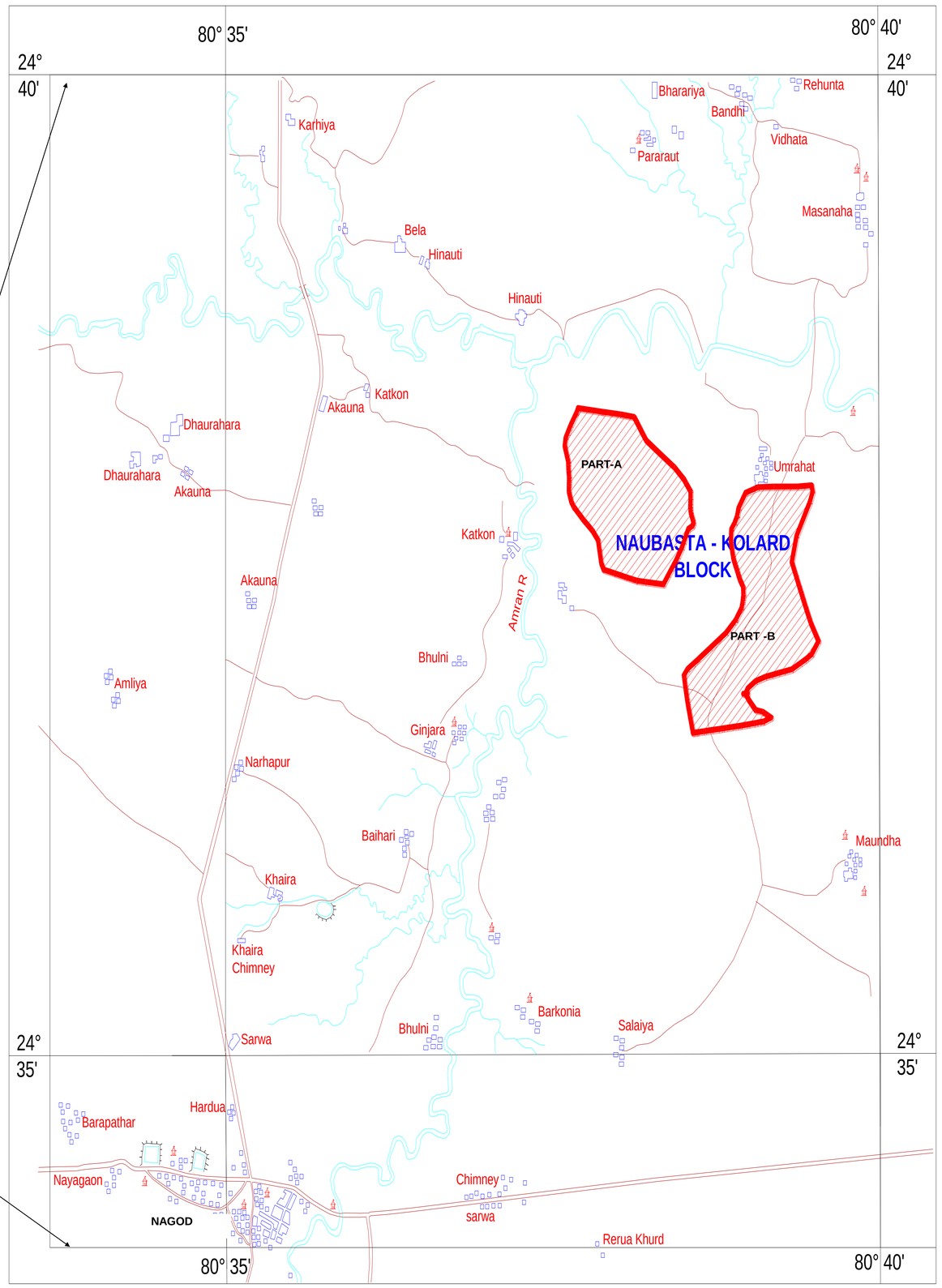
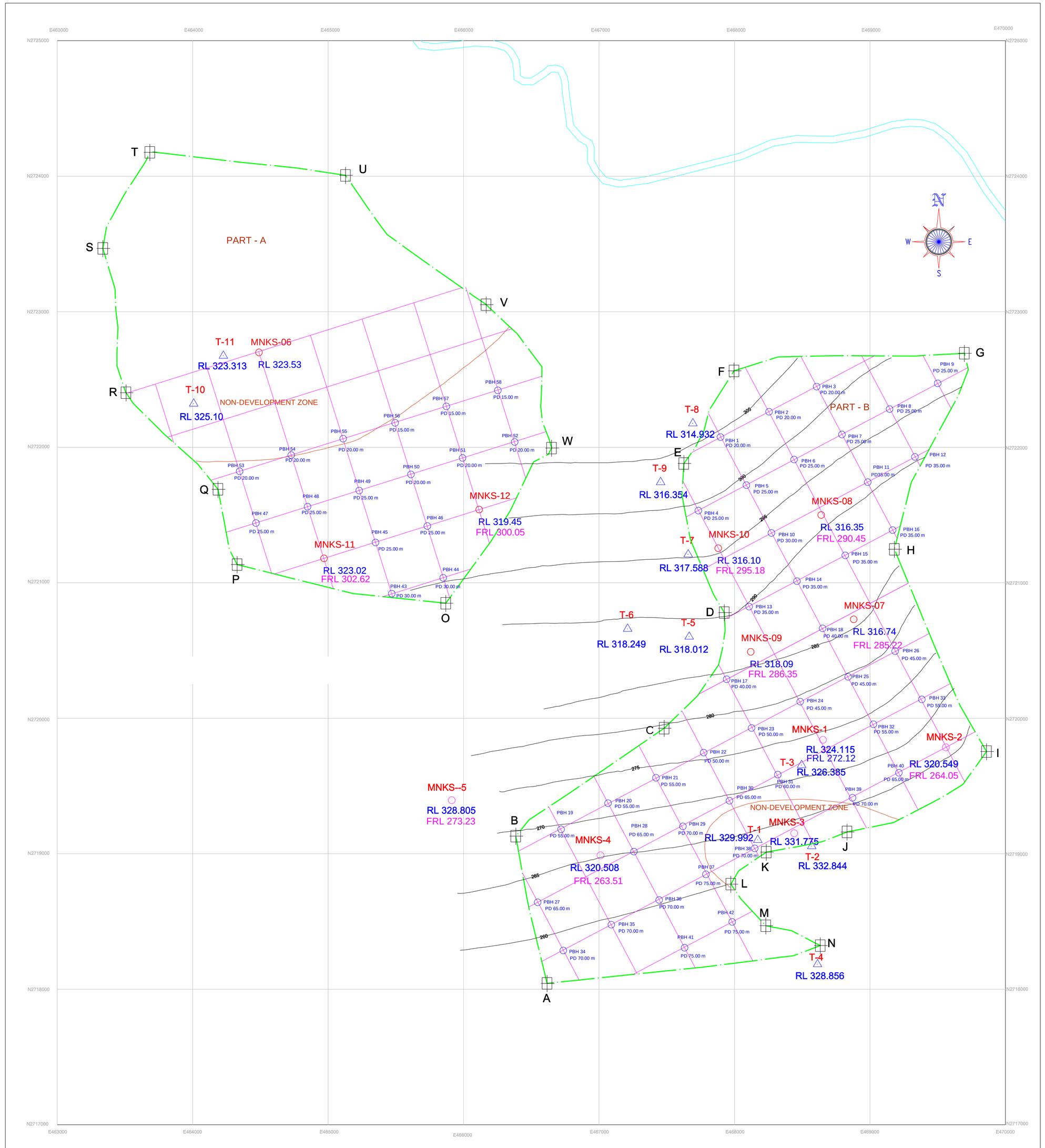


PLATE – I



INDEX

- MNKS-05 / RL 328.805m / FRL 263.508 — Borehole Drilled By MECL With RL (m) in G4/G3 With Floor Contour Value
- T-6 / RL 318.249 — Triangulation station with RL (m)
- PBH 1 / PD 20.00 m — Proposed Borehole with Proposed Depth in m. (PD) (For G2 Level of Exploration)
- River / Nala
- Floor Contour with value (m)
- Block Boundary

MINERAL EXPLORATION CORPORATION LIMITED

PROPOSED BOREHOLE LOCATION PLAN WITH FLOOR CONTOUR OF LIMESTONE FOR ZONE-II

NAUBASTA-KOLARD BLOCK (G2)

DISTRICT : SATNA — STATE : MADHYA PRADESH

R.F. - 1 : 10000

PROCESSED BY : I.T. CENTRE, MECL, NAGPUR

MECL/EXPLORATION / FEBRUARY-2018 — PLATE NO. II — 2

F. No. 6/4/2015-NMET/629
Ministry of Mines
National Mineral Exploration Trust

New Delhi, the 19th April, 2018

OFFICE MEMORANDUM

Subject: Approval of mineral exploration projects in 2 blocks to be executed by MECL.

On the recommendation of Technical-cum-Cost Committee (TCC) of NMET, the Executive Committee in its 7th meeting, held on 12th March, 2018 approved mineral exploration projects in 2 blocks to be executed by MECL at an estimated cost of Rs. 440.03 Lakh. The details of the Blocks are given below:

Sl. No.	Name of the Project/Block	Mineral	Estimated cost (in Lakh)
1.	G-2 level exploration of limestone, Naubasta-Kolad Block; Tehsil: Nagod; District: Satna; Madhya Pradesh. (Area: 15 sq km)	Limestone	365.43
2.	G-2 level Exploration for Bauxite in the Saraipani-Dadar Block, Tehsil-Pandaria, District - Kabirdham, Chhattisgarh. (Area: 0.80 sq km)	Bauxite	74.60
		Total	**440.03**

2. The mineral exploration projects in these 2 blocks will be funded by NMET as per the costing recommended by the TCC and approved by the Executive Committee. MECL shall undertake exploration in these blocks under a Tripartite Agreement between Ministry of Mines (NMET), MECL and the respective State Governments and complete the same as per the approved cost estimates and time schedule, enclosed as **Annexure I & II**.

3. The TCC, NMET shall review the progress of ongoing projects and provide update every six months to the Executive Committee. The Implementing Agencies shall submit progress on six monthly basis to NMET.

19/4/2018

(Pradeep Singh)
Director, NMET

To
The Chairman-cum-Managing Director,
Mineral Exploration Corporation Limited,
Dr. Babasaheb Ambedkar Bhawan,
Seminary Hills, Nagpur- 440 006.

Copy for information to:

1. Sh. D. Mohanraj, ADG, NM-II & Chairman, NMET TCC, Geological Survey of India, Seminary Hills,Nagpur- 440 006.
2. The Member Secretary, NMET TCC, MECL, Dr. Babasaheb Ambedkar Bhawan, Seminary Hills, Nagpur- 440 006.

Annexure-I

COST ESTIMATE FOR EXPLORATION (G-2) OF LIMESTONE, NAUBASTA-KOLAD BLOCK; TEHSIL: NAGOD; DISTRICT: SATNA; MADHYA PRADESH

SL. No.	Item of Work	Unit	Base	Financial Year (2017-18)			Financial Year (2018-19)			Total	
			Rate	Esc.Rate	Qty.	Amount	Esc. Rate	Qty.	Amount	Qty	Amount
			1.4.90	(Rs.)		(Rs.)			(Rs.)		(Rs.)
A	**DRILLING**										
1	Surface Drilling (2 Rigs)	m.	1714	6780	0	0	6780	2140	14509200	2140	**14509200**
2	Transportation	Km.	8.8	31	0	0	31	2000	62000	2000	**62000**
3	Accomodation	One time / Drill	185925	663715	0	0	663715	2	1327430	2	**1327430**
4	Camp Setting / Winding	Drill/ month	68606	244910	0	0	244910	4	979640	4	**979640**
5	Road Making (Flat Terrain)	Km	7800	18563	0	0	18563	5	92815	5	**92815**
	Sub Total A					**0**			**16971085**		**16971085**
B	**GEOLOGICAL WORK**										
1	Survey Party Days (1 party)	day	1180	5840	0	0	5840	120	700800	120	**700800**
2	Geologist Party days (1 partys)	day	1541	7802	0	0	7802	150	1170300	150	**1170300**
3	Core Sampling Party days(1 party)	day	525	2809	0	0	2809	150	421350	150	**421350**
	Sub-Total B					**0**			**2292450**		**2292450**
C	**LABORATORY STUDIES**										
a	**Chemical Analysis**										
1	Primary + Check Samples					-					
	i) for 6 radicals (CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI)	Nos	490 (76x5+110)	2580	0	0	2580	2200	5676000	2200	**5676000**
	ii) for 2 radicals SO_3 & P_2O_5	Nos	186 (76+110)	972	0	0	972	200	194400	200	**194400**
	iii) External Check Samples for 6 radicals(CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 & LOI)	Nos	490 (76x5+110)	2580	0	0	2580	100	258000	100	**258000**
2	Composite Samples										
	i) for 12 radicals (CaO, MgO, SiO_2 , Al_2O_3 , Fe_2O_3 ,LOI, SO_3 , P_2O_5 ,MnO_2 , K_2O, Na_2O, Cl	Nos	946 (76x11+110)	4992	0	0	4992	250	1248000	250	**1248000**
b	**Physical Analysis**										
1	X-RD Studies on composite	Nos	1137	5605	0	0	5605	35	196175	35	**196175**
2	Trace element Studies**** (14 Element) ICP-MS	Nos		4290	0	0	4620	35	161700	35	**161700**
3	Preparation of thin section	Nos	100	538	0	0	538	35	18830	35	**18830**
4	Petrographic Studies	Nos	228	1436	0	0	1436	35	50260	35	**50260**
5	Specific Gravity determination	Nos	32	188.5	0	0	188.5	35	6597.5	35	**6597.5**
6	Transportation of bulk sample to IBM, Nagpur	Km.	8.8	31	0	0	31	1000	31000	1000	**31000**
7	*Beneficiation Studies (IBM Lab.)	Nos		280900	0	0	280900	1	280900	1	**280900**
	Sub-Total C					**0**			**7927462.5**		**8121863**
D	**Preservation of Core**										
i)	GI Core boxes	Nos.					2000	535	1070000	535	**1070000**
ii)	Transportation of Core Boxes	Km	8.8	31.0		0	31	1000	31000	1000	**31000**
	Sub-Total E										**1101000**
	Total A+B+C+D					**0**			**27190997.5**		**28486398**
E	**EXPLORATION REPORT - 1% of (A+B+C+D) or 175000 whichever is more**				0	0		0	0	1	**284864**
F	**PEER REVIEW OF DGR (Lump Sum)**	Nos		-	0	0	10000	1	10000	1	**10000**
G	**Environmental Studies**										
1	**Satelite Imagery Study**	Scene	99697	457948.2	0	0	457948.2	1	457948.2	1	**457948**
2	**Base line Data Collection**	(10 km radius area)	151273	694857.4	0	0	694857.398	1	694857.398	1	**694857**
3	**Chemical Analysis**	Nos	257400**	604478	0	0	604478	1	604478	1	**604478**
4	**Report Writing**	Nos	50000	50000	0	0	50000	1	50000	1	**50000**
	Sub Total G					**0**			**1807283.6**		**1807284**
H	***Preparation of Proposal (Lump Sum)										**380000**
	GRAND TOTAL A to H					**0**			**29008281**		**30968545**
	GST 18%										**5574338**
	Grand Total : with GST 18%										**36542883**
						Total					**Says 365.429 Lakhs**

Note:

1	Revised Rates of Promotional Work done by MECL on behalf of Govt. of India Vide letter No. 37(I) /2006-M.I. dated- 02/07/2014 and based on actual escalation as per RBI indices as on 31-03-2017 and the same has been considered for subsequent year.
2	Phoshphorite rates have been considered as there is no rates for Limestone in Revised Rates of Promotional Work of MoM Schedule of Rates.
3	* IBM rates has been followed for benefication studies
4	**Nityanad Committee Rates with actual escalation as per RBI index as on 31.3.2017 and the same for subsequent year.
5	*** As approved in the 12th meeting of Technical Committee & th meeting of Executive Committe of NMET.
6	**** Rate has taken from Schedule of Charges of differen activities of GSI as on 2014-15 and 40% escalation on the same has been considered for FY 2018-19.

Mineral Exploration and evaluation 18%(SAC Code: 998343)

Table:6.2 TIME SCHEDULE FOR EXPLORATION OF LIMESTONE IN NAUBASTA-KOLARD BLOCK, (G-2), TEHSIL-NAGOD, DISTRICT-SATANA, MADYA PRADESH

Sl. No.	Activities	Unit	MONTHS										Total
			Financial Year -2018-19										
			1	2	3	4	5	6	7	8	9	10	
			Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	
1	Camp Setting	Month	←	→									1 month
2	Surface Drilling (2 rig)	m.		←	———	———	———	→					2140.00 m (in 51 BHs)
3	Survey Party days (1 Parties)	day			←	———	———	———	→				120
4	Geologist Party days (1 Parties)	day			←	———	———	———	———	→			150
5	Sampling Party days, (1 Parties)	day			←	———	———	———	———	→			150
6	Laboratory Studies	Nos.				←	———	———	———	———	→		2890 No
7	Camp Winding	Month							←	———	→		1 month
8	Base line environmental Studies	month		←	———	———	———	———	———	———	———	→	8 months
9	Report Writing (including peer review)	Month							←	———	———	→	4 months

10 months.

B.P. Raturi
member secretary
TCC, NMET