

**PROPOSAL FOR RECONNAISSANCE(G-4) SURVEY FOR  
LIMESTONE IN DIKURUMETRON AREA OF UPPER DEOPANI  
AREA, DIST: KARBI ANGLONG, ASSAM  
(THROUGH NMET FUND)**

**GOVERNMENT OF ASSAM**



**DIRECTORATE OF GEOLOGY & MINING, ASSAM**

**RECONNAISSANCE SURVEY FOR LIMESTONE IN DIKURUMETRON AREA , UPPER DEOPANI OF KARBI ANGLONG DISTRICT- (ASSAM) EXPLORATION G-4**

**Details enclosed with map**

i.	Name of Mineral	Limestone
ii.	Name of Block	Upper Deopani
iii.	Location	Latitude: 26°13'40.00"N to 26°15' 20.00"N Longitude: 93°45' 0.00"E to 93°47' 35.00"E
iv.	Toposheet No.	83 F/15 and 83 F/16
v.	Name of villages	<b>Dikurumetron</b> , Deopani
vi.	Sub-division	Bokajan
Vii.	District	Karbi Anglong
Viii.	Area	20 km <sup>2</sup> (approximately)
ix.	Type of Land	
x.	Status of Exploration	Partly explored by DGM
xi.	Detailed mapping	Approx 20 sq. km. in 1:12500 Scale
xii.	Present Category of UNFC	334
xiii.	Total Meterage to be drilled	500 mtrs (approx.)
xiv.	Number of borehole to be drilled	10 nos. (approx.)
xv.	Spacing of boreholes	More than 800 Mtr. (borehole to borehole)
xvi.	Depth of borehole	50 Mtr. (approx.)
xvii.	Category of exploration as per UNFC	334
xviii.	Logging	All the borehole cores (Approx. 500 Mtr.)
xix.	Sampling	300 Nos. (Approx.)
xx.	Analysis	DGM Lab.
xxi.	Report Writing	Will be done by Exploration agency

## **Reconnaissance survey (G-4 level) for Limestone Exploration at Dikurumetron area of Upper Deopani in 20 sq. km. area District Karbi Anglong(Assam)**

### **1. Introduction:**

Assam is the state where Cement is in short supply from the local production. Limestone is perhaps, the most exploited minerals since limestone constitute the basic raw materials for these industries. But today bulk of the cement comes to Assam outside of the state as the local plant is hardly able to meet the growing demand. In view of the above, the central and state government have been evincing keen interest in promoting cement plants, mini or major, within the state of Assam. In this background, the state Directorate of Geology and Mining was entrusted with the task of undertaking raw materials investigation forcement and lime manufacture within the State.

### **2. Location of the Block:**

The area under investigation lies in the Upper Deopani area in Karbi Anglong district, Bokajan subdivision under Deopani Police Station of Karbi Anglong, Assam.

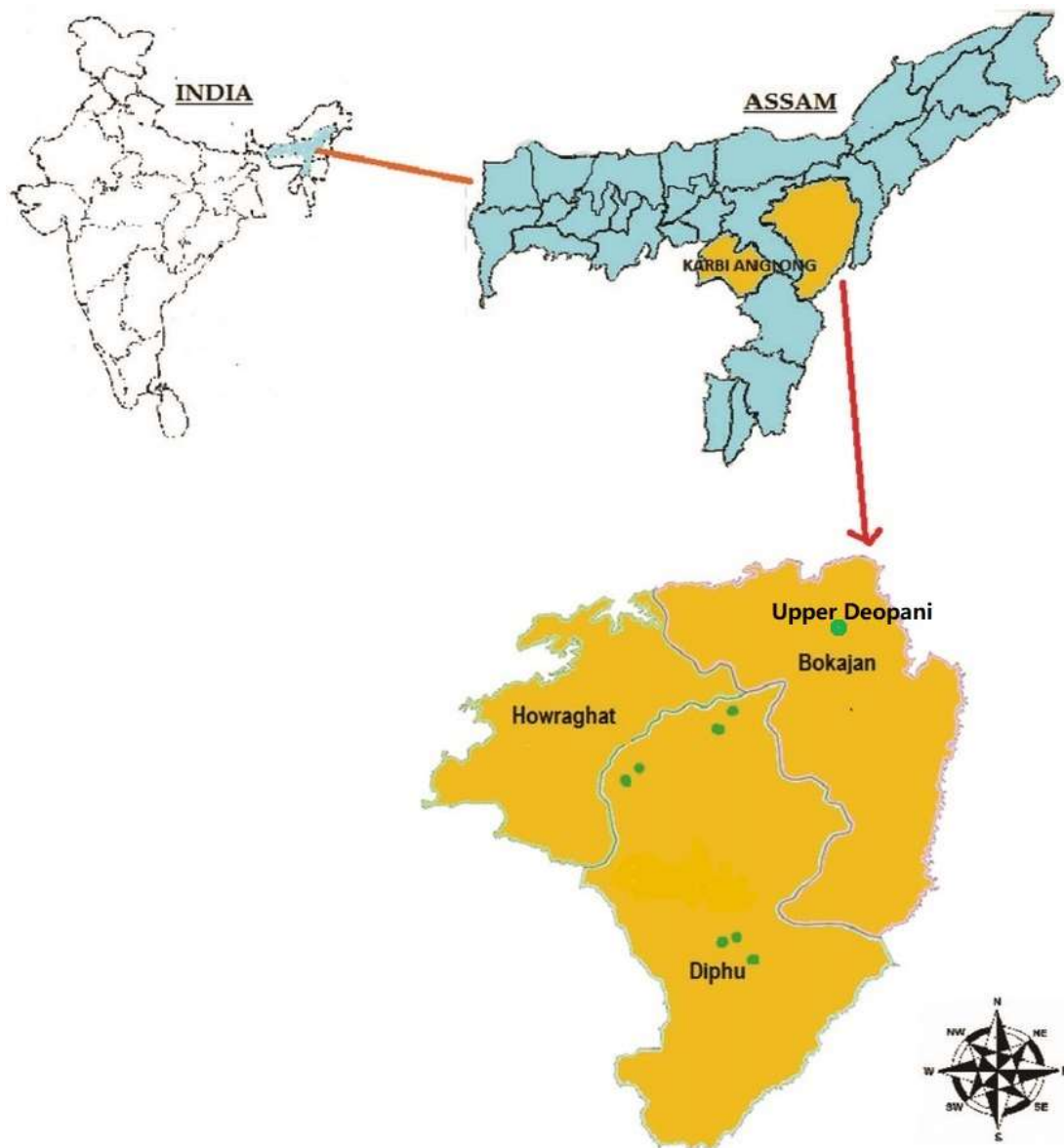
The Limestone Deposits of Upper Deopani is located near the Manja Golaghat road in Karbi Anglong district. It is 55 km from Golaghat on the Manja Golaghat road and 76 km from Diphu. The nearest train station is Barpathar Railway Station which fall the main line of North East Frontier railway which lies at a 220km from Guwahati and large station is Diphu which is around 85 km from Barpathar Railway Station.

The deposit occurs on an area with undulating topography with several Hills and Nalas cutting across the region forming valley like topography. The deposit is bounded by the following boundary points:

Sl No	Boundary Point	Latitude	Longitude
1	A	26° 13' 40.00" N	93° 45' 0.00" E
2	B	26° 14' 0.00" N	93° 47' 35.00" E
3	C	26° 15' 20.00" N	93° 47' 35.00" E
4	D	26° 15' 20.00" N	93° 45' 0.00" E

The block lies near the Manja Golaghat road which is all weather road but the roads leading to the block from the highway are kuccha roads which can be used only during dry season. The block is also filled with thick vegetation which can be cleared during dry season only.

The area under investigation is shown as location as in the figure Map.1 below:



### 3. Physiology and Drainage:

The area of the investigation lies on the Eastern edge of the Mikir hills is made up of undulating hillocks and flat valleys. The drainage system is controlled by the Deopani and Barjan river. Both are highly meandering in nature and trends in North South direction. Several Nalas form tributary and sub tributary of Deopani and Barjan river that contribute to the drainage system of the area.

### 4. Previous Work:

Many geologists of the Geological Survey of India visited Mikir Hills (present day Karbi Anglong district) at different times since the later part of 19<sup>th</sup> century. The Geological Survey of India at the behest of the State Government had taken traverses over a large belt near the Deopani area.

Directorate of Geology and Mining, Assam had carried out investigation of Limestone and Kaolin deposits at Upper Deopani, Karbi Anglong district during the time period 1984-85. Light grey fossiliferous limestone occur in the Deopani river and Borjan nala. The general trend is NW-SW, dipping low (3° to 6°) and dipping towards SE. Most of the limestone are siliceous in nature. Limestone is essentially composed of calcite.

The area adjacent to it can be taken up for FS 2024-25 for reconnaissance (G-4) survey of Limestone by geological mapping and drilling in the area.

### 5. Geology and Structure:

#### 5.1. Regional Geology:

Geologically, Assam and NE India compile most astonishing stratigraphy. Starting from oldest Archean gneissic rocks to recent quaternary alluvium found in this part of India. Among all other parts of Assam Karbi-Anglong host most complex geological stratigraphy. These complex stratigraphy, structure, and deformations results in Karbi- Anglong as the most mineralized part of Assam. The Archean basement gneissic complex forms the basement as other parts of NE India. It is followed by quartzites and phyllites metasediments belong to Shillong Group of rocks. But these metasediments are mostly absent in West Karbi- Anglong area. These gneisses and Precambrian metasediments of central part are intruded by younger acidic granitoid intrusive bodies. These granitoid bodies are scattered as Inselberg. These Precambrian rocks are overlain by the younger Tertiary shelf sediments, which are again overlain at places by the Quaternary and Recent deposits.

Gneissic Complex represents the oldest group of rocks. The gneiss, when highly weathered, looks like sandstone. However, on careful examination, the dark toned mafic bands can be identified). The most prominent foliation (Gneissosity/ Schistosity/ Cleavage) strike along NE- SW direction and dip by 60°-70° towards southeast (GSI NER Report 1986-87). Exposure of equigranular, hard, compact homogeneous dark colored granite occurs at many places. The granites are generally grey- white in color with a pink tinge on fresh surface. On weathering it becomes dark grey to black in color with sub rounded spheroidally weathered surface. These Precambrian rocks are overlain by tertiary sedimentary sequences of sandstone, limestone and shale and thin coal beds. These strata are mainly horizontal to sub-horizontal striking NNE-SSW dipping towards SE by an amount of about 15 to 30 degrees.

The general stratigraphic sequence of the area can be summarized as below:

Age	Group	Formation	Lithounits
Recent			Soil and alluvium
Tertiary	Dihing   Jaintia Group  -----	DihingKopili Formation	Boulder bed shale sandstone
		Sylhet Limestone	Limestone (Fossiliferous Limestone)
			Sandstone, clay and thin coal seam
Jurassic	Volcanics	Trap rock	Weathered trap rock
Precambrian	Gneissic Group	Intrusive	Quartz vein, granite, Kaolinized granite, granite gneiss

## **5.2 General Geology**

The Limestone under investigation belongs to the Sylhet Limestone Stage of Jaintia Series of the Eocene system of Assam. Together, these rocks form the detached part of a belt of sedimentaries which fringe the Pre-Cambrian rocks along the southern edge of the Mikir Hills ranges. The geology laid bare by the Deopani river section and most of the Litho units can be observed there.

The depth of overburden varies from place to place. In some places, the Limestone is exposed above the surface while in other places, they are present beneath a layer of overburden. A layer of top band of Nummulitic Limestone is present after which a fine grained brown Sandstone appears as intrabed. Below this layer, the bottom bed of Limestone is present. Both the bands are fossiliferous in nature where Nummulites is the primary fossil for which they are termed as Nummulitic Limestone. The depth of each formation has to be confirmed after drilling in the area.

The various litho units present in the area can be described as follows:

### **Trap Rocks:**

Weathered trap rock is exposed along mainly in Deopani Nadi in form of small lenses. Colour of trap rock varies from red to green. In hand specimen the rock is brownish in colour. Iron and biotite flakes are most common. Vesicular cavities are filled up by felspathoid minerals.

Trap is intrusive to granite gneiss and its relation to the country rock is concordant.

### **Sandstone:**

Exposures of grey to greyish white coloured coarse grained sandstone occur in the Deopani river and Borjan nala. The rock is weathered and friable in nature and composed of angular quartz feldspar grains with ferruginous matrix.

### **Limestone**

Light grey fossiliferous limestone occur in the Deopani river and Borjan nala. The general trend is NW-SW, dipping low ( $3^{\circ}$  to  $6^{\circ}$ ) and dipping towards SE. Most of the limestone are siliceous in nature. Limestone are essentially composed of calcite. Fine to medium grain in nature. Glauconite and hematite occur as minor constituent. Fossil nummulites and foraminifera are common in the rock.

### **Shale**

Light grey coloured well bedded slightly sticky shale exposed in Deopani river, Borjan nala and in other small streams. Shale is the most dominant sedimentary rock type of the area. The general trend is NE-SW and dipping low towards SE ( $1^{\circ}$  to  $10^{\circ}$ ) sometime shale beds are dipping towards NW. Disseminated grains of pyrite occur in shale exposure. Small bands of dark grey coloured carbonaceous shale with coal partings are composed in nalas which are affected by fractures.

Coal occurs as thin lenticular pockets. The top and bottom of the coal seam are shale and fire clay respectively. The trend is NE-SW dipping low towards SE. Sometime coal bands are associated with pyrite grains. The maximum thickness of coal bands are 50 cm.

### **Boulder Bed:**

A gravel horizon occurs below the soil zone. It comprises boulders, cobbles, pebbles and grit. It is loosely cemented by ferruginous cementing materials. The thickness of the zone is variable and it varies from 50 cms to 3 mts.

### **Soil Zone:**

Brownish, light brown colour soil occurs in the area. The soil is sandy and coarse in nature.

### **Chemical analysis of samples:**

The analytical report of Limestone samples collected from the field site is as follows:

Sl No.	Sample No	SiO <sub>2</sub>	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub> (T)	MnO	MgO	CaO	Na <sub>2</sub> O	K <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>
		(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
1	UD-1	12.2	0.15	2.34	1.53	0.14	0.89	44.83	<0.1	0.45	0.04
2	UD-2	8.00	0.13	2.30	1.76	0.13	1.03	47.27	<0.1	0.29	0.05
3	UD-3	9.76	0.15	2.47	1.89	0.14	0.97	45.50	<0.1	0.39	0.05
4	UD-4	7.45	0.13	2.49	1.81	0.13	1.05	47.54	<0.1	0.28	0.05
5	UD-5	7.50	0.12	2.19	1.74	0.13	0.97	47.25	<0.1	0.26	0.05

Analysis is done in the GSI, NER Lab.



### 5.3 Structures

The general trend of the sedimentaries is NE-SW and dipping at low angle towards SE (amount of dip varies from  $1^{\circ}$  to  $10^{\circ}$ . Sometime minor variation is seen in dip direction. Due to change of dip direction towards NE minor synclinal fold form in the nala section.

The general trend of the foliation of gneissic complex is NE-SW direction with variation from N-S, NW-SE to NE-SW to NE-SW and dipping at very high angle towards east. Precambrian rocks are affected by pronounce jointing.

## **6. Objective of the proposed exploration program:**

The following are the objectives of proposed exploration:

- i) To demarcate the Limestone occurrence in the study area by Geological Mapping on 1: 12500 Scale for G-4 level of exploration.
- ii) To collect surface out crop samples and get analysed for six radical to find out the quality & grade of Limestone.
- iii) In case the results of the proposed exploration are encouraging then future exploration can be planned.
- iv) To carry out the exploration as per Mineral (Evidence of Mineral Contents) Rule- 2015, Mineral Auction Rule-2015 and MMDR ACT, 1957 Amended, 2015 in turn to facilitate the State Govt. (Assam) in Auctioning of Blocks.

## **7. Methodology of Exploration:**

### **7.1. Topographic Survey & Geological Mapping:**

Triangulation network will be laid down in the proposed study area of 25.00 Sq.Km. Detailed Geological Mapping will be done in the proposed block on 1:12500 scale. Borehole will be fixed on the ground. RL's and co-ordinates of survey and exploration points will be determined. All the geological features will be recorded. This map will be used as base map for future work.

### **7.2. Surface Sampling:**

Surface / outcrop samples will be collected during Geological Mapping from outcrops / exposures of Limestone formations on a systematic 400m x 400m grid interval in an area of 25 sq.km (Approx). In case outcrops are not available on systematic grid then random samples will be collected from the available outcrops / exposures. On systematic 400m x 400m grid interval approximately 300 number samples will be generated/ collected. Then the Limestone samples will be tested for 6 radicals/ major oxides i.e. CaO, MgO, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Fe<sub>2</sub>O<sub>3</sub> and LOI.

### **7.3. Core Drilling:**

- a) After the analysis of surface samples, number of continuous or detached mineralized zones may come up on map.
- b) Drill Core Logging: The drill core will be logged for rock types, structural features, textures, intersection of ore zones and type of mineralization an occurrence of various core minerals.
- c) Drill Core Sampling: During the geological logging of drill core, mineralized zones will be marked based on concentration and Lithological variation. All core samples (primary) will be analyzed.

#### 7.4. Laboratory Studies:

7.4.1 Chemical Analysis: All the surface / outcrop samples approximately 10 Nos will be analysed for 6 radicals/ all major oxides CaO, MgO, Al<sub>2</sub>O<sub>3</sub>, SiO<sub>2</sub>, Fe<sub>2</sub>O<sub>3</sub> and LOI.

7.4.2 Petrological Studies: Petrological studies will be done on around 10 Nos. of drill core specimen.

7.4.3 Specific Gravity Determination: Specific Gravity will be determined on 10 Nos drill core specimen.

### 8. Quantum of Work Time Schedule Proposed:

- 8.1. **Time Schedule:** The proposed exploration programme is planned for activities like, camp setting, topographic survey and geological mapping and surface sample collection winding and laboratory work will be completed within 3 months' time. Report writing will take another 2 months' time including one month overlapping period of one month of laboratory studies. Thus, the total duration of project shall be completed in 6 months from the date of commencement of the project.

<u>Table-1: Time Schedule/ Action Plan, for Exploration Work of Limestone, Upper Deopani, Karbi Anglong district, District - Assam</u>								
SL No.	Activities	Unit	MONTHS					Total
			Financial Year 2024-25					
			1	2	3	4	5	
			08/25	09/25	10/25	11/25	12/25	
1	Camp Setting	Month						1 month
2	Survey – DGPS survey of the area	day						120
3	Geological Party days for Geological Mapping of 25 Sq. Km Area(3 Party)	day						120
4	Sampling	day						90
5	Core drilling	day						150
6	Laboratory Studies	days						60
7	Report Writing	Months						2 months

\* The Schedule is planned for optimal weather condition, as Assam has long rainy season, drilling and surveying activity can be hampered so need to be planned accordingly.

**Table No.2: - Quantum of Work Proposed**

<b>Sl. No.</b>	<b>Item of Work</b>	<b>Unit</b>	<b>Quantum</b>
1	Topographic Survey on 1:12500 scale.	Sq. Km.	25.00
2	Geological Mapping on 1:12500 scale.	Sq. Km.	25.00
3	Surface / Out crop sampling	Nos.	300 numbers in an area of 25 Sq. Km
4	Core drilling (B.H)	Nos	10
5	Laboratory Studies: Surface and Drill core Samples for 6 radicals i.e. CaO, MgO, Al <sub>2</sub> O <sub>3</sub> , SiO <sub>2</sub> , Fe <sub>2</sub> O <sub>3</sub> and LOI	Nos	518
6	Petrological Studies (Petrographic Studies)	Nos	10
7	Specific Gravity Determinations	Nos	5
8	Report Preparation (Digital format)	Nos.	1

## **9. Exploration Report:**

Data generated from proposed exploration along with integration of earlier data of GSI will be utilized in Report preparation.

## **10. Cost Estimate:**

Cost has been estimated based on actual and provisional escalation as per RBI indices as on 31-03-15 and provisional escalation of @ 25% points for Geological and Laboratory Studies for the subsequent years. The total estimated cost is Rs 341.50 Lakhs. The details of cost estimates are given in Table 3 and summary is given below.

**Table 3: Summary of Cost Estimates**

<b>Sl. No.</b>	<b>Item</b>	<b>Total Estimated Cost (Rs.)</b>
1	Geological Work	22,76,760.00/-
2	Pitting and Trenching	6,66,000.00/-
3	Core drilling	47,87,000.00/-
<p>As the area falls in remote and inaccessible terrain of North Eastern States and Hilly terrain, the amount will be 3.35 times higher than the normal SoC.</p> <p>Total amount for field = 3.35 x (2276760+ 666000+ 4787000)</p> <p>=Rs 2,58,94,696.00</p>		

4	Laboratory Studies (Include Quantitative analysis of 6 radicals, Petrological study, Bulk density determination)	18,25,188.00/-
5	Misc. Charges (Includes Report Preparation)	12,21,596.00/-
	Total estimated cost (without GST)	2,89,41,480.00/-
	Provision for GST (18%)	52,09,466.00/-
	Total estimated cost (with GST)	3,41,50,946.00 Or say 341.50 Lakh

## **11. Justification**

- In view of MMDR Act, 1957 and Mineral Auction Rule 2015 DGM, Assam is willing to take up the exploration in this block.
- The exploration work has to be carried out systematically i.e. Geological Mapping, Survey, 800 meters spacing of borehole (G-4 level) initially.
- The exploration will help in planning of future exploration programme.

Schedule of Charges for LIMESTONE IN SHEELVETA AREA, KARBI ANGLONG DISTRICT, ASSAM					
Sl No.	Work Activity	Unit	Charges / Cost in Rs	Qty	Total In Rs
<b>A Geological Mapping and Geological Survey Work</b>					
1	Charges for Geologist (Field)	Days	₹11,000.00	120	₹13,20,000.00
1	Charges for Surveyor	Days	₹8,300.00	30	₹249,000.00
	Labour charges for geological mapping/survey	days	₹437.00	240	₹1,04,880.00
	Charges for Sampler	Days	₹5100.00	60	₹3,06,000.00
2	Labour charges for sample work	Days	₹437.00	240	₹1,04,880.00
3	Borehole fixation and Determination of Coordinate & RL	No.	₹19,200.00	10	₹1,92,000.00
<b>Sub Total A</b>					<b>₹22,76,760.00</b>
<b>B Pitting &amp; Trenching</b>					
1	Pitting and Trenching	per cu m	₹3,330.00	200	₹6,66,000.00
<b>Sub Total B</b>					<b>₹6,66,000.00</b>
<b>C Core Drilling</b>					
1	Drilling – Soft rock	Mtr	₹5242.00	500	₹6,66,000.00
2	Land/Crop compensation in case BH falls in agricultural land	Per BH	₹20000.00	10	₹2,00,000.00
3	Construction of concrete pillar (12" x 12" x 30")	Per BH	₹2000.00	10	₹20,000.00
4	Transportation of Drill rig & truck associated per drill	km	₹36.00	500	₹18,000.00
5	Monthly accommodation charges for drilling camp (upto 2 Rigs)	Month	₹50,000.00	3	₹1,50,000.00
6	Drilling camp setting cost	Nos.	₹2,50,000.00	1	₹2,50,000.00
7	Drilling camp winding up cost	Nos.	₹2,50,000.00	1	₹2,50,000.00
	Road making (Flat terrain)	Km	₹32,200.00	15	₹4,83,000.00
	Drill core preservation	Per m	₹1590.00	500	₹7,95,000.00
<b>Sub Total C</b>					<b>₹47,87,000.00</b>
As the area falls in remote and inaccessible terrain in NE states and Hilly terrain, the amount is 3.35 times higher than the normal SoC, hence the total amount = 3.35x(2276760 + 666000 + 4787000) = <b>Rs 2,58,94,696.00</b>					
<b>D Laboratory Studies</b>					
a) Chemical Analysis					
1	Primary samples (CaO,MgO,Al <sub>2</sub> O <sub>3</sub> ,SiO <sub>2</sub> ,Fe <sub>2</sub> O <sub>3</sub> & LOI)	Per Sample	₹2841.00	450	₹12,78,450.00
2	Check samples (CaO,MgO,Al <sub>2</sub> O <sub>3</sub> ,SiO <sub>2</sub> ,Fe <sub>2</sub> O <sub>3</sub> & LOI)	Per sample	₹2841.00	68	₹1,93,188.00
b) Physical Analysis					
1	Preparation of thin section	No.	₹2,353.00	10	₹23,530.00
2	Bulk density determination	No.	₹3,540.00	5	₹17,700.00
3	Petrographic Studies	No.	₹2353.00	10	₹23,530.00
4	Charges of one Geologist per day at HQ	day	₹9000.00	30	₹2,70,000.00
<b>Sub Total D</b>					<b>₹18,25,188.00</b>
<b>Total of A+B+C+D</b>					<b>₹2,77,19,884.00</b>
<b>E Miscellaneous Charges</b>					
1	Preparation of Exploration proposal	5 Hard Copies and Soft Copies	2% of the Total A+B+C+D	1	₹3,80,000.00
2	Geological Report Preparation	5 Hard Copies and Soft Copies	3% of the Total A+B+C+D or Minimum of 7.5 Lakhs	1	₹8,31,596.00

3	Peer review charges	As per EC decision			₹10,000.00
<b>Total estimated cost without GST</b>					<b>₹2,89,41,480.00</b>
<b>Provision for GST (18%)</b>					<b>₹52,09,466.00</b>
<b>Total estimated Cost (With GST 18%)</b>					<b>₹3,41,50,946.00</b>
<b>Or Say Rs 341.50 Lakh</b>					