Regional Exploration Proposal (G-4 level) for Basemetals associated Elements, Gold & REE in Kachola-Amargarh-Jhikri Area (Block ID Raj-05), in 88 sq. km. area District: Bhilwara, (Rajasthan)

1.0.0 **Introduction:**

1.1.1 Copper, Lead and Zinc due to their unique physical, mechanical and electrical properties, has played a vital role in the industrial growth of a nation. In India, around 75% of demand is met through imports. The increasing demand of copper ore has been accorded high priority in the XIIth Plan document.

1.1.2 During the last three decades, no large base metal deposit has been discovered in India. However, the possibility of working of small mineral bodies in proximity to each other, through technological advances and increased operational efficiency, cannot be ruled out. Therefore, it is necessary to locate and explore such small size deposits in clusters.

1.1.3 In view of the MMDR amendments act – 2015, Mineral (Evidence of Mineral Contents) Rule 2015 and Mineral Auction Rule – 2015, Ministry of Mines, GSI identified the block for exploration & MECL decided to take up the block for G-4 level of exploration under NMET funding. MECL requested Ministry of Mines, Government of India to reserve the block to carry regional exploration.

1.1.4 Ministry of Mines, Government of India allotted 30 Regional Mineral Exploration Blocks for G-4 exploration from the 100 Reports handed over by GSI to MoM. The Regional Exploration for Copper & Gold in Mineralisation in Kachola-Amargarh-Jhikri Area (Block ID Raj-05), in 88 sq. km. area District: Bhilwara, (Rajasthan) is one of the block allotted to MECL. Accordingly MECL prepared proposal for regional exploration and being put up for approval of Technical Committee of NMET.

1.2.0 **Location of the Block:**

1.2.1 The district headquarters Bhilwara is 50 km from the block in the West. The nearest township is Mandalgarh due south of the block. The state high way No. 56 passes through Kachola, Amargarh and Jhirki through the middle of the block along longer axis. The block is located in the Survey of India Topo-sheet No. 45O/3. The coordinates of the corner points of the block is given below and covers an area of nearly 88 sq. km.

A) 25^0 22’ 20”N and 74^0 04’ 20”E B) 25^0 20’ 40”N and 75^0 06’ 30”E

C) 25^0 30’ 00”N and 75^0 12’ 00”E D) 25^0 30’ 00”N and 75^0 15’ 00”E

1.3.0 **Physiology and Drainage:**

1.3.1 The block area in general is of undulating terrain. A ridge from Kachola-Amargarh-East of Jhikri representing a high land as isolated hillocks runs NE-SW. The reduced level of 419 m is at the fort in Amargarh and the highest peak of 470 m from mean sea level is at Kachola.

1.3.2 The Banas River flows at the south western end of the block. The drainage pattern is dendritic. The drainage in the southern half is in the south-western & western direction and acts as tributary to Banas River, where as the drainage in the northern half portion is flowing to north and merges to Banas River as tributaries.

2.0.0 **Previous work:**

2.1.1 In 1992 Sharma et.al. have mapped the area on 1:25,000 scales. According to them in the regional aspect the area is occupied by the rocks of Mangalwar Complex, Berach Granite, Hindoli and Jahazpur Groups in the order of younging.

Devpriyan and Sahai (1984) carried out test drilling for Pb & Zn in Jhikri area, surface indication of sulphide mineralization is manifested by gossan within the ferruginous brecciated chert horizon of Gwalior Formation (Hindoli Group), Seven boreholes were drilled (Borehole KBH-2,3,4,5,6,7, & 8). In BH KBH-3, 89.70-90.00 m a zone of 0.44 m massive galena is recorded. In Borehole KBH-7, the Pb mineralization was encountered from 96.25 m to 100.28 m depth in Chlorite-Biotite schist intercalated with thin bands of Dolomitic Limestone. The disseminations of Galena & Sphalerite were also intersected at 150.05 to 150.20 m also. It was concluded that except very few, very thin mineralized zones, significant zones of mineralization were not intersected.

2.1.2 In Gelaji area I.P., S.P. Surveys have been carried out by Singh et. al (1994). Four moderate feeble I.P. anomaly zones I, II, III & IV have been delineated, S.P. anomaly is found to be associated with zone III in dolomite. No significant magnetic response has been observed in this area. Magnetic profiles are featureless in this area.

2.1.3 Shekhawat & Sharma (2006) carried out detailed Geological mapping & Geochemical Sampling in Gelaji East & Amargarh blocks. In Gelaji East block (East of Jhikri Block), two prominent zones of ferruginisation – the Western zone and the Eastern zones are identified. The zones are represented by ferruginous Chert, breccias, ferruginous phyllite and dolomitic marble. These zones are also associated with silicification in some portions. A number of old workings are present in the zone of ferruginisation. The western zone in mainly developed in Hindoli phyllite & is intermittently exposed at or near contact of Hindoli phyllite and Jahazpur carbonate unit, however, at a few places ferruginisation is also reported in dolomitic marble. Twelve main ferruginous zones exposures with some minor one are developed in the area.

The Eastern zone of ferruginisation is present well within the phyllite. Four main ferruginised exposures have been indentified besides number of small exposures.

2.1.4 The analytical data of soil samples in Western & Eastern zones have indicated anomalous values of zinc, cobalt & copper. Anomalous values of copper are present over zone of ferruginisation in Amargarh block with malachite stains occurring at the contact of phyllite & quartzite. Anomalous values of copper near Kachola and anomalous REE have been reported by Singh & Jadia (F.S. 1977-78)

3.0.0 **Geology and Structure:**

3.1.0 Regional Geology and Structure of the area.

3.1.1 The Litho units exposed in and around the region of the block belongs to Mangalwar and Hindoli groups intruded by Dolerites & Berach Granite Group of Bhilwara Supergroup belonging to the Archaean age. These lithounits are overlain by Jahazpur group of metasediments belonging to the Bhilwara Supergroup of Lower Proterozoic age. The lithounits show strike of NE-SW. The litho units of Jahazpur & Hindoli groups are the parts of overturned synform in the region with axial trace striking NE-SW. In the NW side a major thrust line brings Jahajpur group of rocks directly to the contact of Mangalwar Complex group of Rocks. The Regional stratigraphic sequence of lithounits (after GSI) is given below.

Regional stratigraphic Sequence of lithounits (after GSI)

Age	Super group	Group	Lithounits
Recent			Soil
Lower	Bhilwara	Jahazpur	Conglomerate, Quartzite, Dolomite, Phyllite, tuff.
Protero-zoic		Berach granite	Granite
Archaean		-	Dolerite
		Hindoli	Phyllite, Metagreywakes.
			Shale, Slate, Phyllite, Quartzite.
		Mangalwar	Biotite schist, Quartzite, Dolomite, Amphibolites.

3.2.0 **Geology and Structure of the block:**

3.2.1 The lithounits exposed in the block are of Hindoli group belonging to Bhilwara Supergroup intruded by Dolerites of Archaean age, these lithounits are over lain by rocks of Jahazpur group of Bhilwara Supergroup belonging to Lower Proterozoic age. The guides to the mineralization available in the block on the surface are ferruginisation, malachite staining in old workings, silicification gossans etc. the stratigraphic sequence of the lithounits exposed in the block (after GSI, District Resource Map) is given below.

The Stratigraphic Sequence of Lithounits of the Block (after GSI)			
Age	**Super group**	**Group**	**Lithounits**
Recent			Soil
Lower Protero-zoic	Bhilwara	Jahazpur	Conglomerate, Quartzite, dolomite, Phyllite, tuff.
			Dolerite
Archaean		Hindoli	Phyllite, Metagreywakes.

			Shale, Slate, Phyllite, Quartzite.

3.2.2 The lithounits of Hindoli and Jahazpur groups have experienced three phases of deformation each and are the part of an overturned synform with axial trace striking NE-SW passing through the middle of the block parallel to the length of the block. According to Sharma et. al (1992) the Hindoli Group of rocks has under zone three phases of deformation. The second generation folds occur on regional scale. Crenulation cleavage related to these folds trend N 55^{O} E & dip steeply towards south east. The interference of first and second generations of folds has resulted in hook pattern, the folds of third generation are of open symmetrical type. According to Kumar & Sharma (2005), the rocks of Jahazpur have suffered three phases of deformation. The first folds (F1) are interfolial folds. The second folds (F2) are generally tight and inclined plunging No 40^{O} W at an angle of 40^{O} to 45^{O} easterly plunging second folds (F2) have also been noted. These folds are best preserved within the Phyllites & Quartzites, besides Dolomite. The first folds (F1) are restricted in their occurrence and confined mainly to phyllites. The third folds (F3) are represented by broad warps and best preserved in banded phyllite and quartzite. These folds plunge at an angle of 30^{o} to 35^{o} towards N 50^{o} W to N 60^{o} W. The third folds (F3) control the local swings in the strike of the beds.

4.0.0 **Objective of the proposed exploration programme**

4.1.1 The basic Geoscience data provided by GSI has been studied and evaluated. Based on the evaluation the present exploration programme has been formulated to fulfill the following objectives.

. i) To carry out geological mapping on 1:12,500 scale and demarcate the rock types of Basemetal, Gold, REE & associated Elements, bearing formations with the structural features to identify the surface manifestations and lateral disposition of the mineralised zones (ore body).

ii) To collect surface samples and analyze them for Cu, Pb, Zn, Au, Ag and REE and decide further course of exploration programme.

iii) In case, surface samples give positive results and Remote Sensing Studies shows probable extension of the mineralised zones (Ore body) on surface & structural control, then to drill 5 scout boreholes which in turn will decide the future course of exploration programme at G-3/G-2 category of UNFC.

iv) To estimate reconnaissance basemetals, gold, associated elements, REE resources as per UNFC norms and minerals (evidence of mineral content) Rule-2015 at G-4 level.

5.0.0 **Proposed scheme of Exploration:**

5.0.1 In accordance to the objectives set for the block, the exploration programme is formulated. The exploration shall be carried out as per Minerals (Evidence of Mineral Contents) Rule-2015. Accordingly, the following scheme of exploration is formulated in

order to achieve the objectives. The details of different activities to be carried out are presented in subsequent paragraphs.

5.1.0 **Geological mapping:**

5.1.1 Geological Mapping will be done on 1:12,500 scales. Rock types, their contact, structural features will be mapped. Surface manifestations of the mineralised zones available along with their surface disposition will be marked on map. Samples of various litho-units for Petrological studies from ore bodies will be taken during the course of geological mapping.

5.2.0 **Geochemical Sampling**

5.2.1. Surface Sampling (Bed Rock Sample / Soil Sample)

During the course of Geological mapping the Bed rock and Soil samples shall be collected from the out crops and soil covered area respectively. A total of 100 no's bed rock samples and 100 no's soil samples shall be collected, prepared and analyzed for Cu, Pb, Zn, Ni & Co assay and 15 Nos of samples for Au & Ag by fire assay will be also indentified. 20 Nos samples will be given for REE assay by ICP MS method.

5.2.2 **Stream Sediment Sampling**

The stream sediment samples shall be collected from the entire study area of 88 sq. km. The samples shall be collected depending upon the forest cover and accessibility of the area. A total of 100 stream sediment samples shall be collected from the study area.

5.3.0. Surveying:

5.3.1. The block boundary will be surveyed by DGPS and total station in WGS-84 datum for demarcation of block boundary points. Survey party will be associated with stream sediment sample and bed rock sample collection by taking up the points and plotting its location on map for proper interpretation of the sample data. Survey party will also be associated with Geological Mapping will be observed during Geological mapping and the litho-contacts will be plotted for finalization of Geological map on 1:12,500 scale. During drilling scout borehole fixation and determination of reduced level and co-ordinates of the boreholes will be undertaken. If mineralized zones are identified, contouring of the surrounding areas of ore bodies would be done on 5m contour intervals along with survey of surface features.

5.4.0 Geophysical Survey:

5.4.1 The area of the block is nearly 88 sq. km and to assess the strike continuity of the sub-surface mineralised zones (ore body) need of Geophysical Survey is felt. Based on the results of Geological Mapping and Geochemical sampling Surface Geophysical survey will be carried out. The surface Geophysical survey (magnetic, self potential,

resistivity and induced polarisation) in 20 line km in split profile lines will be carried out.

5.5.0 Exploratory Mining

5.5.1 **Shallow Trenching / Pitting (Excavation)**

Trenching and pitting shall be carried out in the potential zones identified based on the results of Geological Mapping & Geochemical sampling. A provision of shallow trenching of 100 cu. m. is kept. Pitting shall be done for correlation of mineralised zones on surface upto a depth of 1m after removal of soil/ weathered column in the area. Locations of the pits & trenches on ground will be decided by field geologist based on field observations. A provision of 100 number of primary trench / pit samples is kept for analysis of Cu, Pb, Zn, Co & Ni and 20 samples for Au & Ag by Fire assay).

The trench & pit walls will be mapped on 1:200 scale.

Thus a total of 100 cu m of shallow trenching & pitting work along with associated geological & laboratory studies has to be carried out.

5.6.0 Core Drilling:

5.6.1 The Hindoli group of rocks at the contact of Jahazpur group of lithounits shows the development of manifestations of mineralization in mainly phyllites or at the contact of Jahazpur Carbonate units. It has been reported that sometimes ferruginisation have taken place in dolomitic marble. The contact of Hindoli group of lithounits is with Jahazpur group of rocks. The contact line has 20 km strike length and at one side is 40 km for western & eastern side combined in the overturned syncline. After the analysis of surface samples and Remote sensing studies number of continuous or detached mineralised zones may come up on map. Hence 5 Nos of scout boreholes involving 600 m shall be drilled for upper level of intersection mineralised zones.

5.7.0 Drill Core Logging:

5.7.1 The drill core will be logged for rock types, structural features, textures, intersection of ore zones, type of mineralization and occurrence of various ore minerals. The logging for determining the Rock Quality Designation will also be carried out

5.8.0 Drill Core Sampling:

During the geological logging of drill core, mineralized zones will be marked based on concentration and Lithological variation. 200 Nos of samples (primary) will be analyzed for Cu Pb and Zn assay, 10% primary samples will be given for check. 15 No's composite samples will be analyzed for 7 Radicals namely Cu, Pb, Zn, Ni, Mo, Se & Co and also for Ag, Au by fire assay.

5.9.0 Whole Rock Analysis

5.9.1 10 N0s of samples shall be subjected to whole Rock analysis for SiO_2, Al_2O_3, Fe_2O_3, TiO_2, MnO, CaO, Na_2O, K_2O+H_2O, MgO, P_2O_5, CO_2, & S radicals to check the rock types, their variation in chemical composition.

5.10.0 XRD Studies

5.10.1 From the composite samples, 10 samples shall be subjected for XRD studies.

5.11.0 Spectroscopic (Trace Element Study by LA MC-ICPMS Method) studies:

5.11.0. 15 N0.samples for the study of trace elements (48 Radicals) by La MC- ICP-MS Method spectroscopic studies.

5.12.0 Petrological & Mineralogical Studies:

5.12.1 During the course of core logging & mapping 30 samples from various lithounits intersected will be studied for petrography and 20 samples from mineralized zones will be studied for the ore mineral assemblages and their distribution, alteration, enrichment etc. in polished sections.

5.13.0 **Specific gravity Determination:**

5.13.1 Specific gravity will be determined on 20 samples from the mineralized zones intersected in the boreholes.

5.14.0 Quantum of Work Proposed

5.14.1. The details of Quantum of proposed work is given below:-

TABLE: 5.1 PROPOSED QUANTUM OF WORK IN Kachola-Amargarh-Jhikri Area (Block ID Raj-05), In an area of 88 sq. km. District: Bhilwara, Rajasthan

Sl. No.	Item of work	Unit (m)	Proposed Quantum of Work
1	**Geological Mapping** (on 1:12,500 Scale)	Sq. Km	88 sq.km
	Topographical Survey (on 1:12,500 Scale)	Sq. Km	88 sq.km
	Bore Hole Fixation (Scout Boreholes)	Nos	5 Nos
	RL & Coordinate Determination	Nos	5 N0s
2	**Geochemical Sampling**		
	a) Bed Rock Sampling	Nos	135 Nos
	b) Soil Sampling	Nos	100 Nos
	c) Stream Sediment Sampling	N0s.	100 N0s
3	**Geophysical Survey**		
	a) Gravity Survey & Magnetic Survey	No of Stations	1020 N0s
	b) Self Potential	No of St.	1020 N0s
	c) Resistivity	Line Km	20 Line Km
	d) Induced Polarisation Survey (at station interval of 25 m)	Line Km	20 Line Km
4	**Exploratory Mining**		
	Excavation (Trenching /Pitting)	**Cu. m.**	**100 Cu m**

5	**Drilling (coring)**	**m**	**600m (5 Bhs)**
6	**Geological work** **a**) Geological Core Logging	 m	 600m (5 Bhs.)
7	**Laboratory Studies**		
	I) Surface Sampling (Primary samples)		
	a) Bed Rock samples (Cu, Pb-Zn, Co & Ni) b) Au & Ag by Fire Assay c) REE by ICP- MS	Nos Nos. Nos	100 Nos 15 Nos 20 Nos
	ii)) Soil Samples a)for 5 radicals (Cu, Pb-Zn, C0 & Ni) b) Au & Ag by Fire Assay	 Nos.	 100 Nos.
	iii) Stream Sediment Samples a) for 5 radicals (Cu, Pb-Zn, Co & Ni) b) for Au & Ag by Fire assay	 Nos.	 100 N0s
	iv) Check Samples (Bed Rock / Soil/ Stream sediment) (Cu, Pb-Zn, Co & Ni)	N0s	30 N0s
	v) Trench & Pit samples		
	a) for 5 radicals (Cu, Pb-Zn, C0 & Ni b) for Au & Ag by fire assay	N0s N0s	100 Nos 20 Nos
	v) **Drill Core Primary Samples** a) for 3 radicals (Cu, Pb & Zn) b) for Au & Ag by Fire assay	N0s Nos	220 Nos 15 Nos
	vi) Composite Samples for 7 radicals a) for 7 radicals Cu, Pb , Zn, Co, Mo, Se & Ni b) Au & Ag (By Fire Assay)	 N0s N0s	 15 N0s 15 Nos
8	**Physical Studies** a) XRD – Studies on Composite samples	Nos.	10 Nos
	b) Spectroscopic Studies (12 elements Cd, Sn, W, Sb, Mo, Ce, Nb, Ba, La, Bi, Co & Ni) by ICPMS –Method	Nos.	15 Nos
9	**Petrological Samples (Surface & Bh Core Samples)** a) Preparation of Thin Section b) Study of Thin Section	N0s N0s	30 Nos 30 Nos
10	**Mineragraphic Studies (Surface & Bh Core Samples)** a) Preparation of Polished Section b) Study of Polished Section	N0s N0s	20 Nos 20 Nos
11	**Whole Rock Analysis (SiO_2, Al_2O_3, Fe_2O_3, TiO_2, MnO, CaO, Na_2O, K_2O+H_2O, MgO, P_2O_5, CO_2, & S)**	Nos	10 Nos
12	**Specific gravity Determination**	Nos.	20 Nos
13	**Report Preparation [As per Mineral (Evidence of Mineral Contents) Rule-2015]**	**N0s**	**1**

6.0.0 **Time schedule and cost Estimate:**

6.1.0 **Time schedule**

6.1.1 The proposed block is nearly of 88 sq km, area there are various mineralized zone in the block area. The details of the exploration programme execution are indicated in the bar chart given below.

Time schedule (in months) for Exploration Programme in Kachola-Amargarh-Jhikri Area (Block ID Raj-05), In an area of 88 sq. km. District: Bhilwara, Rajasthan											
Item of Work	1	2	3	4	5	6	7	8	9	10	11
Geological Mapping (2 Party Days)	←	—	→								
Bed Rock Sampling/ Soil Sampling	←	—	→								
Stream Sediment Samplings		←	→								
Surveying (1 Party Days) for Sampling etc	←	—	→								
Sample Preparation Soil/Bed Rock/Stream (2 Party Days)		←	—	→							
Analytical Work			←	—	→						
Geophysical Survey				←	→						
Geophysical Report						↔					
Surveying in Geophysical Survey (2 Party's)				←	→						
Drilling (600 m)						←	→				
Surveying (2 Party) for drilling, contouring and surface features						←	—	→			
Sample Preparation (Drill Core) Party Days (1 Party)							←	→			
Geologist Party days for Drilling and Sampling work & report work (1 Party)					←	—	—	→			
Analytical Work Drill Core Samples							←	—	→		
Camp winding								↔			
Geological Report								←	—	—	→

6.2.0 Cost Estimate:

The Project cost with provisional escalation is estimated at say **Rs. 266.00 Lakhs**. The details of item wise cost estimate with inbuilt actual escalation as on 31.3.2016 and provisional escalated rate for 2016-2017 has been taken and is given below.

Sl No.	Item	Total Estimated Cost (Rs.)
1	Geological, Survey & Sampling Work	62,30,040/-
2	Geophysical Survey & Report	84,52,880/-
3	Exploratory Mining (Trenching & Pitting)	3,57,290/-
4	Drilling	93,72.826/-
5	Laboratory Studies	19,23,865/-
	Subtotal	**2,63,36,901/-**
6	Report	2,63,369/-
	Total	**2,66,00,270/-**

Or Say Rs. 266.00 Lakhs (Rs. 2.66 Crore)

7.0.0 Justification:

i) In view of MMDR Amendments & Mineral Auction Rule, 2015, GSI has identified this block for exploration MECL decided to take up the work under NMET funding.

ii) In the proposed study area, there are various mineralized zones which are represented by formational contact, ferruginous capping and old workings/pits available as guide for localization of the presence of ore bodies Remote sensing studies will provide structural lineation's & swings even in weathered zones for the targeted bodies.

iii) The exploration will be helpful in estimation reconnaissance resources of base metals, associated accessory elements in the block area.

iv) In case the results of the Regional Exploration are positive it will help in planning of detailed exploration programme which in turn will facilitate the state govt. for auctioning of block.

Cost Estimate for G-4 Level of Exploration for Basemetals associated Elements, Gold & REE in Kachola Amargarh-Jhikri Area (Block ID Raj-05), District: Bhilwara, (Rajasthan)					
Sl. No.	**Item of Work**	**Unit**	**Rates (2016-17)**	**Qty.**	**Amount**
A	**REMOTE SENSING & REPORT (1 BLOCK)**	**Nos**	**2,000,000.00**	**1**	**2000000.00**
B	**GEOLOGICAL WORK**				
1	Survey Party days				
	a) Survey Party days (1party) For Sampling etc	days	6,146.00	90	553140.00
	b) Survey Party days (2 party) For Geophysical Survey etc	days	6,146.00	120	737520.00
	b) Survey Party days (2 party) For Drilling	days	6,146.00	180	1106280.00
2	Geologist Party days				
	a) Geological Party days (2 Party) For Geological Mapping etc	days	8,021.00	180	1443780.00
	b) Geological Party days (1 Party) For Drilling, Core Sampling	days	8,021.00	120	962520.00
3	Sampling Party days				
	a) Sample Preparation for Bed Rock, Soil , Stream samples (2 Partys)	days	2,945.00	180	530100.00
	b) Sample Preparation Drill Cores (1 Party)	days	2,945.00	60	176700.00
4	Transportation (Light Vehicles, 2 nos)	days	1,500.00	480	720000.00
	Sub-Total B				**6230040.00**
C	**GEOPHYSICAL SURVEY & REPORT**				
	Magnetic Stations	Nos.	482.00	1020	491640.00
	Self Potential Stations	Nos.	2,997.00	1020	3056940.00
	Resistivity	L. km	18,710.00	20	374200.00
	Induced Potential	L. km	217,505.00	20	4350100.00
4	Transportation (Light Vehicles, 2 nos)	day	1,500.00	120	180000.00
	Sub-Total C				**8452880.00**
D	**CORE DRILLING (5 BH)**				
1	Surface Drilling (2 rigs)	m	11,601.00	600	6960600.00
2	Transportations (2 Rigs)	Km	34.00	4000	136000.00
3	Accommodation (One time/ Drill)	Nos	728,250.00	2	1456500.00
4	Camp Setting / Winding	Nos	268,723.00	2	537446.00
5	Road Making (Flat Terrain)	Km	20,368.00	10	203680.00
6	GI Core Boxes	Nos	2,000.00	150	300000.00
7	Transportation Charges of Core Boxes	Km	34.00	300	10200.00
	Sub Total D				**9604426.00**
E	**LABORATORY STUDIES**				
1	**Chemical Analysis**				
	i) Surface sampling (Bed Rock Samples)				
	a) Cu, Pb, Zn, Co & Ni	Nos.	2,287.00	100	228700.00
	b) Au & Ag (Fire assay)	Nos	1,460.00	15	21900.00
	c) REE assay by ICP MS	Nos.	4,870.00	20	97400.00
	ii) Soil Samples				
	b) Cu, Pb, Zn, Co & Ni	Nos	2,287.00	100	228700.00
	iii) Stream Sediment Samples				
	c) Cu, Pb, Zn, Co & Ni	Nos	2,287.00	100	228700.00
	d) Check Samples (Bed rock/ soil/ stream) (Cu, Pb, Zn, Co & Ni)	Nos	2,287.00	30	68610.00
	ii) BH Core Sampling, Primary & Check samples				
	a) Cu, Pb & Zn,	Nos.	1,443.00	220	317460.00
	iii) Composite Samples for 7 radicals				
	a) Cu, Pb, Zn, Co & Ni	Nos	2,287.00	15	34305.00
	b) Au & Ag (Fire assay)	Nos	1,460.00	15	21900.00
2	**Physical Analysis**				
	i) Petrographic Studies (BH core + Surface Samples)				
	a) Preparation of thin section	Nos	545.00	40	21800.00
	b) Study of thin section	Nos	1,495.00	40	59800.00
	ii) Mineragraphic Studies (BH core + Surface Samples)				
	a) Preparation of polished section	Nos	583.00	20	11660.00
	b) Study of polished section	Nos	2,118.00	20	42360.00
	iii) Whole rock analysis	Nos	6,386.00	10	63860.00
	iv) Specific Gravity Determination (BH)	Nos	198.00	20	3960.00
	v) XRD & Spectroscopic Studies				
	a) X-RD Studies on composite	Nos	5,900.00	10	59000.00
	b) Spectroscopic studies (12 elements- Cd,Sn,W,Sb,Mo,Ce,Nb,Ba,La,Bi,Co & Ni)	Nos	6,274.00	15	94110.00
	Sub-Total E				**1604225.00**
	Total (A+B+C+D+E)				**27891571.00**
F	**EXPLORATION REPORT - 1% of (A+B+C+D+E)**				**278915.71**
	GRAND TOTAL (A+B+C+D+E+F)				**28170486.71**
					Say Rs. 2.82 crores
Note	**Rates of Goel Committee based on actual escalation as per RBI indices as on 31.3.16 and provisional escalation of @15% points for drilling and 25% points for Geological & Laboratory Studies for subsequent year.**				

Cost Estimate for G-4 Level of Exploration for Basemetals associated Elements, Gold & REE in Kachola Amargarh-Jhikri Area (Block ID Raj-05) in an area of 88 sq. Km. , District: Bhilwara, (Rajasthan)						
Sl. No.	**Item of Work**	**Unit**	**Base Rate**	**Rates**	**Qty.**	**Amount**
			01-04-1990	**(2016-17)**		
A	**GEOLOGICAL WORK**					
1	Survey Party days					
	a) Survey Party days (1party) For Sampling etc	days	1180	6,146	90	553140
	b) Survey Party days (2 party) For Geophysical Survey etc	days	1180	6,146	120	737520
	b) Survey Party days (2 party) For Drilling	days	1180	6,146	180	1106280
2	Geologist Party days					
	a) Geological Party days (2 Party) For Geological Mapping on 1: 12500 Scale	days	1541	8,021	180	1443780
	b) Geological Party days (1 Party) For Drilling, Core Sampling	days	1541	8,021	120	962520
3	Sampling Party days					
	a) Sample Preparation for Bed Rock, Soil , Stream	days	525	2,945	180	530100
	b) Sample Preparation Drill Cores (1 Party)	days	525	2,945	60	176700
4	Transportation (Light Vehicles, 2 nos)	days	Lumpsum	1,500	480	720000
	Sub-Total A					**6230040**
B	**GEOPHYSICAL SURVEY & REPORT**					
1	Magnetic Stations	Nos.	107	482	1020	491640
2	Self Potential Stations	Nos.	639	2,997	1020	3056940
3	Resistivity	L. km	4168	18,710	20	374200
4	Induced Polarisation Survey (The Base rate of Rs 7860/- is for Station Interval of 200m, at 100 X 25m interval)	L. km	7860	2,17,505	20	4350100
5	Transportation (Light Vehicles, 2 nos)	day	Lumpsum	1,500	120	180000
	Sub-Total B					**8452880**
C	**Exploratory Mining**					
	Excavation (Pitting & Trenching)	Cu m	345	1853	100	185300
	Trench / Pit Sampling Party days (1 party)	Days	994	5733	30	171990
	Sub-Total C					**357290**
D	**CORE DRILLING (5 BH)**					
1	Surface Drilling (2 rigs)	m	2551	11215	600	6729000
2	Transportations (2 Rigs)	Km	8.8	34	4000	136000
3	Accommodation (One time/ Drill)	Nos	185925	7,28,250	2	1456500
4	Camp Setting / Winding	Nos	68606	2,68,723	2	537446
5	Road Making (Flat Terrain)	Km	5200	20,368	10	203680
6	GI Core Boxes	Nos	Lumpsum	2,000	150	300000
7	Transportation Charges of Core Boxes	Km	8.8	34	300	10200
	Sub Total D					**9372826**
E	**LABORATORY STUDIES**					
1	**Chemical Analysis**					
	i) Surface sampling (Bed Rock Samples)					
	a) Cu, Pb, Zn, Co & Ni (For five Radicals)	Nos.	110 + (76*4)=414	2,287	100	228700
	b) Au & Ag (Fire assay)	Nos	268	1,460	15	21900
	c) REE assay by ICP MS (For ICPMS Studies GSI rate (2014) has been considered)	Nos.	6100	7,381	20	147620
	ii) Soil Samples (Number will be decided based on NGCM data of GSI)					
	b) (For five Radicals) Cu, Pb, Zn, Co & Ni	Nos	110 + (76*4)=414	2,287	100	228700
	iii) Stream Sediment Samples					
	c) For five radicals Cu, Pb, Zn, Co & Ni	Nos	110 + (76*4)=414	2,287	100	228700
	iv) Check Samples (Bed rock/ soil/ stream) (Cu, Pb, Zn, Co & Ni)	Nos	110 + (76*4)=414	2,287	30	68610

	v) Trench & Pit samples					
	a) For five radicals Cu, Pb, Zn, Co & Ni	Nos	110 + (76*4)=414	2,287	100	228700
	b) For Au & Ag (Fire assay)	Nos	268	1,460	20	29200
	vi) BH Core Sampling, Primary & Check samples					
	a) Cu, Pb & Zn,	Nos.	110 + (76*2)=262	1,443	220	317460
	b) For Au & Ag (by Fire assay)	Nos.	268	1,460	15	
	vii) Composite Samples					
	a) For 5 radicals Cu, Pb, Zn, Co & Mo	Nos	110 + (76*4)=414	2,287	15	34305
	b) for 2 radicals Se & Ni	Nos	110 + 76 = 186	1,021	15	15315
	b) Au & Ag (Fire assay)	Nos	268	1,460	15	21900
2	**Physical Analysis**					0
	i) Petrographic Studies (BH core + Surface Samples)					0
	a) Preparation of thin section	Nos	100	545	30	16350
	b) Study of thin section	Nos	228	1,495	30	44850
	ii) Mineragraphic Studies (BH core + Surface Samples)					
	a) Preparation of polished section	Nos	100	583	20	11660
	b) Study of polished section	Nos	364	2,118	20	42360
	iii) Whole rock analysis (SiO2, Al2O3, Fe2O3, TiO2, MnO, CaO, Na2O, K2O+H2O, H2O, P2O5, CO2, & S)	Nos	1316	6,386	10	63860
	iv) Specific Gravity Determination (BH)	Nos	32	198	20	3960
	v) XRD & Spectroscopic Studies					
	a) X-RD Studies on composite	Nos	1137	5,900	10	59000
	b) Spectroscopic(12 elements-Cd,Sn,W,Sb,Mo,Ce,Nb,Ba,La,Bi,Co & Ni)/ LA MC-ICMS Method studies for full spectrum of 64 Elements (GSI rate considered	Nos	6100	7,381	15	110715
	Sub-Total E					**1923865**
	Total (A+B+C+D+E)					**26336901**
F	**EXPLORATION REPORT - 1% of (A+B+C+D+E)**					**263369**
	GRAND TOTAL (A+B+C+D+E+F)					**26600270**
					Say Rs. 266.00 Lakhs	
Note	**Revised rate of promotional work by MECL on behalf of Govt. of India vide letter no. 37(I)/2006-MI dated 02.07.2014 and based on actual escalation as per RBI indices as on 31.3.16 and provisional escalation of @15% points for drilling and 25% points for Geological & Laboratory Studies for subsequent year.**					