RECONNAISSANCE SURVEY (G-4 STAGE) PROPOSAL FOR COPPER ORE AND ASSOCIATED MINERALISATION IN BODAL BLOCK (IN 50.35 SQ.KM AREA), MOHLA MANPUR AMBAGARH CHOWKI DISTRICT, CHHATTISGARH

COMMODITY:

COPPER AND ASSOCIATED MINERALS

BY

M/s. HINDUSTAN COPPER LIMITED (HCL)

CORPORATE OFFICE, KOLKATA

Place: Kolkata

DATE: 28.10.2025

SUMMARY OF THE BLOCK FOR RECONNAISSANCE SURVEY (G4 STAGE)
GENERAL INFORMATION ABOUT THE BLOCK

	Features	Details
	Block ID	Bodal Block
	Exploration Agency	Hindustan Copper Limited HCL is a Notified Exploration Agency (NEA) under section 4 (1) of the Mines and Mineral (D&R) Act, 1957. This proposal is being submitted incompliance to ATR for review meeting under the chairmanship of Secretary, GoI, and Ministry of Mines. Upon approval of the project, exploration shall be taken up by HCL / other NEA/ NPEAs.
	Commodity	Copper and associated minerals
	Mineral Belt	Chhattisgarh Basin, Kotri Lineament
	Completion period with entire Time schedule to complete the project	10 months
	Objectives	Based on the evaluation of geological data available, the present exploration program has been formulated to fulfil the following objectives. a) To carry out Large Scale Mapping (LSM) on 1:12,500 scale for demarcation of mineral bearing formations (host rock) with the structural features to identify the surface manifestations and lateral disposition of the mineralized zones. b) To carry out surface geophysical survey (I.P cum-resistivity, S.P., Magnetic) to demarcate concealed copper ore bodies. c) To collect surface (Bedrock/soil/stream sediment) samples & analyse for copper and associated minerals to decide future Exploration program. d) To carry out pitting to expose concealed copper body under soil & lateritic cover. e) In case, surface samples give positive results, supported by Geophysical surveys for mineral targeting and giving sub-surface positive indications of extension of a concealed ore body, then 5 Nos. scout boreholes shall be drilled which in turn will decide the future course of Exploration program at the G-3/G-2 category of UNFC. f) To estimate reconnaissance Copper resources along with accessory elements in the block as per UNFC norms and Minerals (Evidence of Mineral Content) Rules-2015 at G-4 level.
	Whether the work will be carried out by the proposed agency or through outsourcing and details thereof. Components to be outsourced and name of the outsource agency	Exploration shall be undertaken by HCL/ other NEA/ NPEA, as per the decision of the HCL
	Name/Number of Geoscientists	Two nos. Geoscientist (1 Field + 1 HQ)
	Expected Field days (Geology, Geophysics, surveyor)	Geologist Party days: 120 days

1.	Location	
	Latitude	20°38' to 20°42'
	Longitude	80°42' to 80°47'
	Villages	Bodal, Koremara, Hitkasa, Motipur et, Hiddar, Kuwardalli, Pendakoda etc

	Tehsil/Taluk	Mohala
	District	Mohla Manpur Ambagarh Chowki
	State	Chhattisgarh
2.	**Area (hectares/ square kilometres)**	
	Block Area	50.35 Sq.Km
	Forest Area	18.67 Sq. Km
	Government Land Area	3.235 Sq.Km
	Private Land Area	28.445 Sq.Km
3.	**Accessibility**	
	Nearest Rail Head	Rajnandgaon
	Road	The area, is at a distance of about 67 km. from Rajnandgaon and is situated on Rajnandgaon-Mohala-Manpur fair weather road
	Airport	Raipur
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Local Nala
	Rivers/ Streams	Kharkhara nala
5.	**Climate**	
	Mean Annual Rainfall	The average rainfall is 1252 mm.
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	The maximum temperature (in summer) reaches to 46°C and the minimum (in winter) to about 10°C. The rainy Season commences in July and continues up to September.
6.	**Topography**	
	Toposheet Number	64D/14 & 64D/10
	Morphology of the Area	The southern part of the area is a plain and the rest of the areas is hilly. The highest point of the area is 597m, about 2 km. SE of Angora (20°32'30"; 80°59'; 64D/14) in the eastern part of the area. The lowest part of the area is less than 340m, above MSL in the Southern and northern part of the area.
7.	**Availability of baseline geoscience data**	
	Geological Map (1:50K/25K)	Regional Geological Map - GSI (1:50000 scale)
	Geochemical Map	NGCM data available and Soil Geochemical data available from partial area covered by M/s.Mira Exploration Private Limited
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Available (GSI carried out studies in regional scale for Bastar Craton.)
8.	**Justification for taking up Reconnaissance Survey/ Regional Exploration**	i. There are different known occurrences of mineralization in Neo-Archean- Paleoproterozoic age in extensional rift system around all over world. Magmatism and extensional faults are fundamental elements in controlling the genesis and evolution of continental rift-basins, as well as mineralization in these environments. ii. Proposed area i.e. Bodal is a part of Kotri lineament of Dongagarh-Kotri Rift Zone (DKRZ) or Dongagarh- Kotri Belt (DKB) of Bastar craton and formed in an extensional riftogenic environment. This rift has been filled up by volcano-classics with variation of dips from steep towards west and moderate towards east representing original deposition over an asymmetrically subsiding basin (Ghosh and Pillai,1992).

		iii. This proposed Bodal area, is Neo-Archean-Palaeoproterozic in age and within a typical granite-green stone belt with imprints of repetitive volcanic, plutonic and tectonic episode finally incorporating volcano- sedimentary assemblage (Krishnamurthy et al 1988, D.K,Sinha et al 2014). Thus, it is highly chance to get different types of mineralization around Bodal area as economic mineralized deposit occurred in other riftogenic environment around world. iv. Presence of low-grade moderate tonnage uranium mineralization in Bodal area with pyrite/pyrrhotite (Krishnamurthy et al 1988) and Paleoproterozoic Rhyolite hosted Zn-Pb-Cu rich metamorphosed volcanogenic massive sulphide deposit in paleo continental rift setting of Bhuyari prospect, Betul, central India (M. N. Praveen et al.2021), are also justifying the probable presence of economic mineralization in Bodal area as Bodal has similar geological history. v. Arsenic (As) is one of the main pathfinder elements for evaluate large areas for Uranium, VMS deposit (Cu, Pb, Zn, Ag and Au), Cu-Ni-PGE deposits by eliminating likely barren areas from the areas under consideration (V Balaram et al. 2022). Presence of geogenic arsenic (As) is reported in part of Dongagarh -Kotri Rift Belt of Mohla Manpur Ambagarh Chowki district. Arsenic contaminated villages are located within areas exposing felsic volcanics or located close to shear zones (Subhrangsun K acharyya et al 2007). Thus, presence of arsenic may be indication of presence of Cu, Pb, Zn, Ag, Ni-PGE in this area. vi. As per the geochemical study of M/s Mira Exploration Private Limited using MMI technology (Mobile Metal Ion – soil geochemistry), Bodal Block, part of the 100 sq. km area identified as potential area for polymetallic deposit, seems to be a prospective block for copper ore. vii. The Bodal project area shows significant anomalous responses for Cu, Pb, Zn, Au and Ag, where sampling was done at 100m spacing. It is reported that a large Cu anomaly some 500m wide on the SW boundary of the sample grid has been very high Cu responses (greater than 2000ppb) and remains open to the south. Also as reported a multi element Au, As, Ag and Ce anomaly lies in a central eastern position of the study area. The report concluded that the area with anomalies of multi-element associations of Cu, Pb, Au and Ag, as very prospective for further exploration.

		viii. A rock chip sample collected by M/s. Mira Exploration Private Limited resulted encouraging results (Cu- 1616ppm, Pb – 585ppm, Zn – 237 ppm and Ag – 2.3 g/t). ix. If occurrence of the copper ore deposit is proved this will be the first Copper deposit in the State. x. The exploration G-4 will be helpful in estimation of reconnaissance (334) Resources and will help in planning G - 3 stage exploration program which in turn will lead to estimation of indicated (333) category resources.

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1.0.0 PREAMBLE

1.0.1 In order to sustain the current level of production of copper ores and to meet the future demands, the exploration of copper ore is the need of the hour. In India the copper ore deposits mainly occur as porphyritic, meta-sediments etc associated with Proterozoic deposits of Madhya Pradesh (Balaghat districts), Singhbhum Copper Belt in Jharkhand as well as in Delhi Group of rocks in Rajasthan.

1.0.2 The total resources of copper ore in the country as on 01.04.2020 are estimated at 1660.87 million tonnes with about 12.19 million tonnes of copper metal as per UNFC system (IBM Indian Mineral Year Book-2020). Out of these resources 163.89 million tonnes (9.86%) fall under reserve category containing 2.16 million tonnes of copper metal and the balance 1496.97 million tonnes (90.13%) are remaining resources containing 10.03 million tonnes of copper metal.

1.0.3 Rajasthan is credited with 867.85 million tonnes ore (52.25%) containing 4.64 million tonnes copper, Madhya Pradesh 386.66 million tonnes ore (23.28%), containing 3.67 million tonnes copper, Jharkhand 251.46 million tonnes ore (15.14%), containing 2.78 million tonnes copper and the rest 9.33% are accounted for by other states namely Andhra Pradesh, Arunachal Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Uttarakhand and West Bengal.

1.0.4 GSI reported Sulphide mineralisation in the Bailadila, Nandgaon and Chhattisgarh groups of rocks in parts of Rajnandgaon, Durg and Bastar Districts, Madhya Pradesh in their reports published as Narang. J.L and Shibesh Chandra (1981), Ghosh, J.G and Pillai, K.R. (1993), Ramchandra, H.M. (1994), Arijit Kundu and K.R. Pillai (1995), and thereafter. Subsequently, the Mineral Resource Department (MRD), Govt. of Chhattisgarh identified five potential blocks for exploration of ploy-metallic mineralization in its various districts. Rajnandgaon, Balod, Kanker, Kondagaon districts were included in one of the identified potential Block at Kotri covering an area of 4960 Sq.km.

1.0.5 M/s Mira Exploration Private Limited, Delhi was awarded Reconnaissance Permit (RP), and carried out Geochemical Survey over 481.25 Sq. Km (of Korti Block) in the year 2004-06 using MMI (Mobile Metal Ion) technology and identified about 100 sq. km area for further prospecting for ore deposits for Copper, Nickel, Lead, PGE and associated minerals, covering sub blocks of Bodal (21.75 sq. km), Dumartola (28.10 sq. km), Hiddar (28.60 sq km) and Bhagwantola (26.90 sq. km). Accordingly, M/s Mira Exploration Private Limited applied for Prospecting License (PL) for the above said four blocks.

1.0.6 Out of which, Bodal area (including Bodal and Hiddar Blocks) was identified with potential for copper ore deposit in the report prepared by MMI (Mobile Metal Ion) technology for M/s Mira Exploration Private Limited in 2006. Accordingly, unified Bodal block (50.35 sq.km) clubbing Bodal (21.75 sq. km) and Hiddar (28.60 sq km) Blocks in Mohla Manpur Ambagarh Chowki district has been demarcated for copper ore and associated mineralisation prospecting study.

1.0.7 In view of the potentiality for copper ore, The Secretary (Mines) during the meeting, recommended to immediately explore the Bodal block (combining earlier Bodal & Hiddar blocks) through NMET fund. Pursuant to that, proposals are prepared for undertaking exploration of Bodal Block for copper and associated minerals under NMET. Once the NMET funding is approved, the exploration shall be undertaken by HCL /NPEAs as per the decision of the Board of HCL.

1.0.8 Although M/s. Mira Exploration Private Limited had carried our considerable amount of exploration across their Reconnaissance Permit of 100 Sq.kms, the G4 exploration requirements such as Geological mapping in 1:12,500 scale, surface geochemical sampling (bed rock, Stream sediment and Soil), Geophysical survey, Trenching and scout drilling were not fulfilled.

1.0.9 In view of the above, Hindustan Copper Limited has prepared this proposal for reconnaissance exploration (G-4) in Bodal block (50.35 sq.km), in Mohla Manpur Ambagarh Chowki district of Chhattisgarh and submitted to TCC, NMET for technical assessment.

2.0.0 BLOCK SUMMARY

2.1.0 BLOCK DESCRIPTION

2.1.1 The Bodal Block area falls in Survey of India Toposheet No. 64D/10 & 64D/14 and covers an area of 50.35 sq.km in and around villages Bodal, Koremara, Hitkasa, Motipur, Hiddar, Kuwardalli, Pendakoda villages of Mohala & Ambagarh Tehsil of Mohla Manpur Ambagarh Chowki District, State Chhattisgarh. The block location in toposheet is given in **PLATE-I.** The Co-ordinates of the corner points of the block area are given in the **Table-III-A** below:

Table – III-A. Block coordinates

Sl No.	Co-ordinate			Area Covered.	District & Topo-sheet No.
	Corner Points	Latitude	Longitude		
1	B-1	20°41'00"	80°42'00"	~50.35 Sq. Km.	Mohla Manpur Ambagarh Chowki & Toposheet No. 64 D/10 & 64D/14
2	B-2	20°41'00"	80°45'00"		
3	B-3	20°42'00"	80°45'00"		
4	B-4	20°42'00"	80°46'00"		
5	B-5	20°41'00"	80°46'00"		
6	B-6	20°41'00"	80°47'00"		
7	B-7	20°38'00"	80°47'00"		
8	B-8	20°38'00"	80°42'00"		

2.2.0 LOCATION AND ACCESSIBILITY

2.2.1 The Bodal area is located in the central part of Mohla Manpur Ambagarh Chowki District. Mohala is one of the Tehsil headquarters of Mohla Manpur Ambagarh Chowki District, located at a distance of about 67 km from Rajnandgaon town, towards south west direction. The area is well connected by fair weather roads with Rajnandgaon, Raipur, Durg and Jagdalpur. The interior parts of the area are approachable by fair weather roads and cart tracks which are generally in a state of disrepair. The nearest railhead to the area is Rajnandgaon on the South Eastern Railway.

2.3.0 PHYSIOGRAPHY & DRAINAGE

2.3.1 The area is characterized by gently undulating or rolling topography with low mounds and hills and intervening flat valleys. Sporadic flat-topped hills, and ridges occur in the western, northwestern and eastern parts of the area, which are aligned in general N-S direction, central part is more or less flat. The highest elevation is 490m above the msl on the hill north of Kolatola.

2.3.2 Kotri River and its tributaries form the main drainage in the area forming part of the Indravati major basin (of Godavari master basin). The drainage is mostly southerly with sub dendritic to sub-parallel and rectangular drainage pattern. Most of the streams of the area of ephemeral type which get dried up during the summer.

2.3.3 The general slope of the district is towards east. All the rivers of the district flow in eastern direction. Seonath is the most important river. The important tributaries of the river are Amner, Jonk, Ghumriya, Pairi Zura and Hanf. Nearly 71.8 percent area of the district falls under Mahanadi River basin. The river Seonath which is a tributary of Mahanadi, originates near village Kotgul, Garh-Chiroli district (Maharashtra) on the border of Chowki block and is the principal river of this district and is a fifth order river. The drainage density is very high on the western part of the area and is low on the eastern part. The high drainage density indicates higher run off and less infiltration.

2.4.0 CLIMATE

2.4.1 The area experiences warm dry climate with hot summer and moderate winter. The maximum temperature raises upto 46°C during the month of May and the lowest temperature is around 10°C in the month of December-January. The rainfall generally confined to the period between mid-June to mid-September due to the southwest monsoon. The annual rainfall is around 1200 mm.

2.5.0 FLORA AND FAUNA

2.5.1 The vegetation in the forest is extremely dwindled though major part of the area excepting the cultivated tracts around the village settlements comes under Protected Forest. In the forest Sal (Shorea robusta), Sarai (Cobrasus torulera), Tendu (Diospyros melanoxylon), Amla (Emblica officivalia), Bahera (Terminalia baheria), Mahua (Madhuca latifolia), and Ber (Zizyphus jujuba) are the main varieties of trees. Mango (Manoifera indica) Neem (Margosa indica) and Peepal (Ficus religiosa) are commonly found near the village settlements. The wild animals are rare in this area. The fauna mainly includes deer, jackal, hispid hare, monkeys, wild boar, and occasional bear. A variety of birds including peacock, snakes and insects thrive in the area.

3.0.0 REGIONAL GEOLOGY

3.0.1 The N-S trending Dongargarh-Kotri Belt (DKB) or Dongagarh-Kotri Rift Zone (DKRZ) is about 250 km long tapering towards south and widening in the north. It is about 25 km wide in the mapped area. The belt extends from the northwestern part of Bastar District up to the northern part of Mohla Manpur Ambagarh Chowki District in Madhya Pradesh. The northern extension of this belt appears to be abutting against the ENE-WSW trending Sausar belt and also covered by the Deccan Trap.

3.0.2 A metasedimentary association of the Bengpal Group shows the typical characters of Archaean high grade gneissic complex. This occurs on the western and eastern sides in the southern part of the Kotri volcanic belt. In the northern part of the volcanic belt gneissic rocks as enclaves within the younger granitoids (Dongargarh granitoid). The lower Proterozoic Bailadila Group comprising Banded Iron Formation (BIF) including Banded Haematite Quartzite/chert/jasper and ferruginous shale, tuffite and metabasalt overlies the Bengpal Group and is characterized by multiphase deformation and low-grade metamorphism ranging from green schist to lower amphibolite Facies.

The regional stratigraphy is given below.

Table I-A. Regional Stratigraphic sequence of Litho units

<table>
<tr><td rowspan="8">PRECAMBRIAN</td><td></td><td colspan="3">RAJNANDGAON</td></tr>
<tr><td>Upper Proterozoic</td><td colspan="3">Chhattisgarh Supergroup</td></tr>
<tr><td></td><td colspan="3">----------Unconformity? ---------</td></tr>
<tr><td>Lower to Middle Proterozoic (?)</td><td rowspan="4">D O N G A R G A R H SUPER GROUP</td><td colspan="2">Khairagarh Group
(c.1534 Ma)</td></tr>
<tr><td colspan="2">Dongargarh granitoids
(c.2200 Ma)</td></tr>
<tr><td rowspan="2">Nandgaon Group</td><td>Pitepani volcanics</td></tr>
<tr><td>Bijli rhyolite
(c.2200 Ma)</td></tr>
<tr><td></td><td colspan="3">----------Unconformity? ---------</td></tr>
<tr><td>Lower Proterozoic (?)</td><td colspan="3">Bailadila Group (Lameta Group)</td></tr>
<tr><td>Archaean</td><td colspan="3">Bengpal Group (Hanker Complex)</td></tr>
</table>

3.0.1 The litho-units (BIF) of the Bailadila Group are intruded by sub volcanic igneous suites, and overlain by the volcano-sedimentary sequences of the Kotri Supergroup in Bastar District, and of the Dongargarh Supergroup in Mohla Manpur Ambagarh Chowki District. The Kotri Supergroup comprises basal volcano-sedimentary sequences of the Kotri Supergroup in Bastar District, and of the Dongargarh Supergroup in Mohla Manpur Ambagarh Chowki District. The Kotri Supergroup comprises basal volcano-sedimentary association represented by the Ainhur Group (= Nandgaon Group), which is invaded later by the epizonal, multiphase intrusive granitoid known as Bande granite in the Bastar area and Dongargarh granite in the Rajnandgaon area. The younger cover sequences of the Abujhmar and Khairagarh Groups were deposited in intra cratonic basins, and are represented by alternate sequences of clastic sedimentary rocks and basic volcanic.

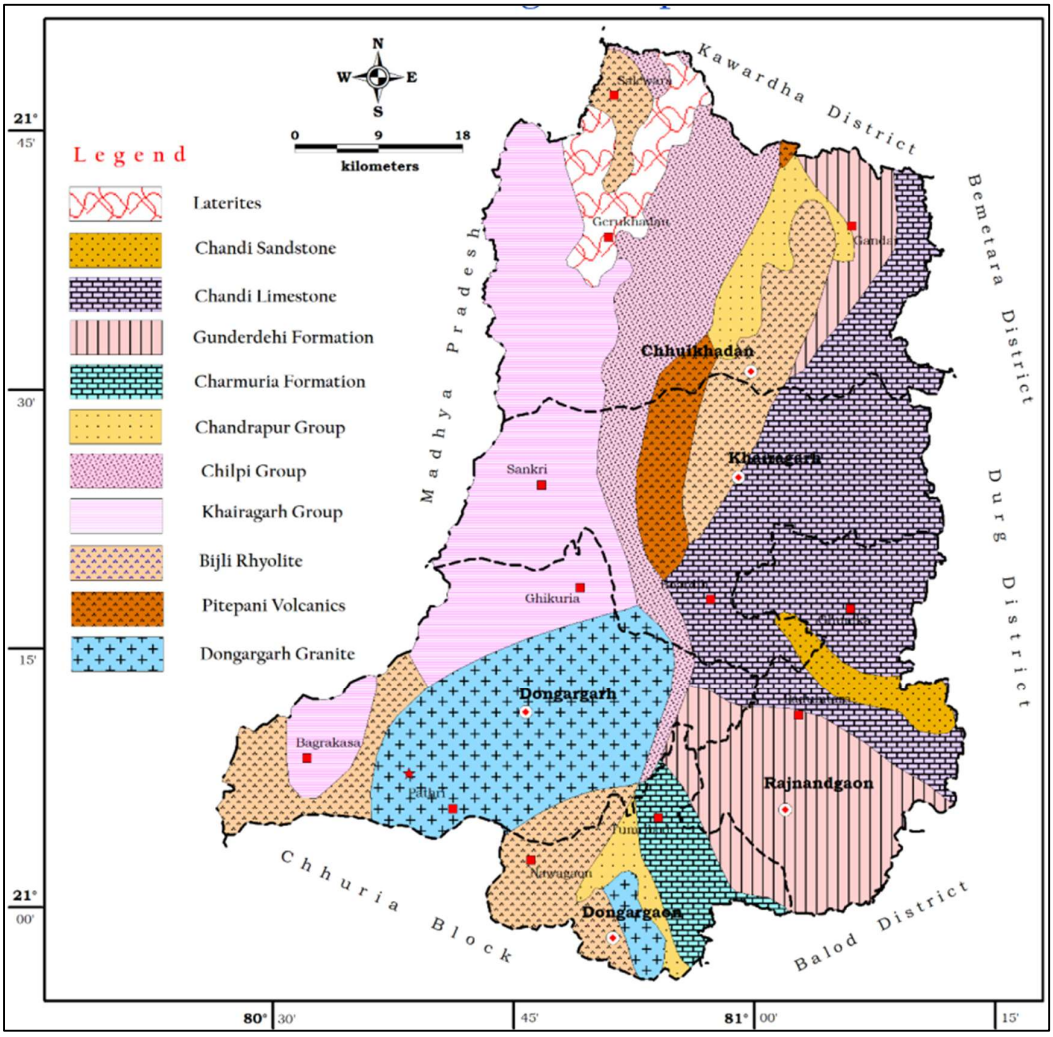

Figure 1. Regional Geological map of the area

3.0.2 The Kotri linear (volcanic) belt occupied by the bimodal rhyolite-basalt association and volcanoclastic-epiclastic sequences has been interpreted as an early Proterozoic androgenic intra-continental rift zone on the basis of the lithological association. The volcano-sedimentary sequences were laid down in alternating sub-aerial and subaqueous conditions in a continental rift generated basin.

3.0.3 The initial phases of the episodic volcanism are characterised by dominance of acid volcanics and epiclastics represented by the rhyolite and tuffites. The increased extension is manifested by the preponderance of acid volcanic with minor basic volcanic in the Kurse Korhi Formation, and the basic pyroclastics of the Mendra Formation. The massive gabbro bodies seem to have been emplaced at the culminating stage or end of every major acid volcanic phase.

3.0.4 The shear zones parallel or sub-parallel to the trend of the rift zone represent high strain zones along which repeated vertical movements occurred during active rifting and at the closing phases of the rift. The Madanbera granitoid batholith represents final stage of the cratonization (in Bastar craton).

3.1.0 GEOLOGY OF THE BLOCK

3.1.1 The area is mainly occupied by the rocks of the Archean Hanker Complex (= Bengpal Group), lower Proterozoic Banded Iron Formation of the Latmarka Group (=Bailadila Group), and bimodal volcanic suite belonging to the Ainhur Group and the intrusive Madanbera granitoid of the Kotri Supergroup. The Ainhur Group comprises the Pachangi Formation (mainly tuffites and rhyolite), the Kurse Korhi Formation (porphyritic rhyolite), and the Mendra Formation (basaltic pyroclastics) along with the basic-ultrabasic intrusives. The Madanbera granitoid is coarse grained equigranular to porphyritic grey to pinkish grey granite.

3.1.2 The contacts of the individual litho-units are not well exposed due to extensive and thick (5m to 10m) soil covers, which has created difficulties in establishing the litho-stratigraphic relationships. The litho-stratigraphy in the area has been built up on the basis of physical continuity of the various litho-units units from the previously mapped areas in the southern part of the Kotri volcanic belt, and the lithological similarities with the established Groups.

3.1.3 The rocks of the area are characterised by N-S trend with steep dips and at places with shear fabric with closely spaced fractures cleavages. North-South trending shear zones occupied by quartzose rock (silicified shear zone/quartz vein) showing bifurcation and cross cutting trends along NW-SE are conspicuous in the whole area.

3.1.4 Sulphide mineralization is noted in the NW-SE trending silicified shear zone west of Kattapar, and in the N-S trending shear zone extending from Paurkhera to Koremara. In these, disseminations of pyrite, occasional chalcopyrite, arsenopyrite, sphalerite and galena have been found to occur. At places, sulphide minerals occur within thin veinlets of quartz in the shear zone. On these silicified shear zones, at some places brown coloured ferruginous coatings and vug fillings derived from oxidation of the original sulphide minerals are also noted.

3.1.5 The nomenclature suggested by the earlier workers in the adjacent areas has been adopted in the litho-stratigraphic classification. The litho-stratigraphy of the area is given below:

Table II-A. Block level Stratigraphic sequence of Litho units (After Ghosh and Pillay,2003)

<table>
<tr><td>Quaternary-Recent</td><td colspan="4">Laterite, Alluvium</td></tr>
<tr><td rowspan="6">Lower to Middle Proterozoic</td><td rowspan="6">KOTRI SUPERGROUP</td><td colspan="2">Patkasa Formation</td><td>Conglomerate, Sandstone and Shale</td></tr>
<tr><td colspan="3">---------- Unconformity----------</td></tr>
<tr><td colspan="2">Madanbera Granite</td><td>Coarse grained biotite granite</td></tr>
<tr><td rowspan="3">AINHUR GROUP</td><td>Mendra Formation</td><td>Basalt and basaltic volcanoclastic rocks.</td></tr>
<tr><td>Kurse Korhi Formation</td><td>Porphyritic rhyolite, rhyodacite, ignimbrite, acid tuff, vesicular basalt, sandstone, shale</td></tr>
<tr><td>Pachangi Formation</td><td>Epiclastic sediments and minor acid volcanics, Porphyritic rhyolite</td></tr>
<tr><td>Lower Proterozoic</td><td colspan="2">Latmarka Group</td><td>BIF and associated sediments</td></tr>
<tr><td>Archaean</td><td colspan="2">Hanker Complex</td><td>Granitic gneiss, metasediments and basic dykes.</td></tr>
</table>

3.1.6 The geology of Bodal area typically represented by a package of rocks that includes ferruginous shale, acid pyroclastic, porphyritic rhyolites, granite, quartz porphyry etc amphibolites, gabbro, metagabbro and dolerite dykes. Silicified fault breccias and vein quartz are often mineralized. The geology generally strikes NNW-SSE and has E-W faults, often filled with quartz. Occurrence of uranium mineralization has been reported from the Bodal-Bhandaritola area of Mohla Manpur Ambagarh Chowki district, hosted in the sheared, Meta basalt-meta rhyolite hybrids of Late Archean-Early Proterozoic Nandgaon Group of Dongargargh Supergroup. Bodal area shows formations trending in N40°W - S40°E with steep dips (60°-70°) towards northeast and Transverse faults trending E-W to ENE-WSW. Shear zones parallel to the regional trend host uranium mineralisation. Bhandaritola area shows formations trending in Nl8°E - Sl8°W with steep dips (70° -80°) towards southeast.

3.1.7 The rocks of the area show general N-S trend and steep easterly dip which is characteristic of the volcanic sequence in the Kotri lineament zone. The bimodal volcanic association and the epiclastic suite indicate that the Kotri belt evolved as an aborted continental rift over an Archaean gneissic basement. Bedding is not well preserved in the ferruginous phyllite/shale of the Latmarka Group exposed in this area. At places, compositional banding and colour banding indicate presence of primary depositional structure in the rock, which show N-S to NNW-SSE trend with steep (70° to 80°) dips towards east.

3.1.8 Shear zones traverse all the litho-units in the area, and are defined by zones of strong deformation confined to a narrow width which are invariably occupied by quartz veins (silicified shear zones). These are narrow linear zones characterised by brittle to brittle-ductile mylonite, and brecciated and cataclastic rocks occurring along deep-seated zones of deformation and faults, having vertical to sub-vertical movement direction. These silicified zones show three major trends. (i) N-S to NNE-SSW (ii) NNW-SSE, and (iii) NW-SE.

3.1.9 The N-S trending Manpur shear zone takes a swing in north-westerly direction south of Bhursetola and continues for about 15 km up to Murer. This forms a linear ridge and marks the eastern boundary of the Madanbera granite.

3.1.10 A NW-SE trending silicified shear zone is noted extending from east of Raysingh Salhe to NW of Koremara for a distance of about 4.5 km. Among the NNE-SSW trending shear zones, the most prominent one is seen extending from west of Paurkhera in the south to Koremara in the north for a length of about 15 km. The metabasalts and metarhyolites, comprising both porphyritic and aphyric types, have been subjected to low-grade metamorphism under the greenschist to epidote-amphibolite facies.

3.1.11 Latmarka Group, represented mainly by ferruginous phyllite/shale and banded Haematite quartzite (BHQ) show effects of low-grade metamorphism including recrystallisation of chert and development of sericite. In the BIF associated amphibolitic rock, the following mineral assemblages are noted.

i. Hornblende-muscovite-epidote-quartz-garnet
ii. Hornblende- plagioclase (andesine)- tremolite-quartz-spinel, indicating low to medium grade metamorphism of green schist to lower amphibolite facies.

3.1.12 The Ainhur Group comprises volcano-sedimentary sequences and basic plutonic intrusives, show little metamorphic effects. There is almost no recrystallisation in the acid volcanic and tuffaceous rocks. The porphyritic texture is well preserved in the rhyolites. In the vicinity of the shear zones, effects of brittle and brittle-ductile deformation are exhibited by the fracture cleavage, micro fracturing of grains and twin lamellae, and by the undulose extinction. Increase in the grain size is seen in the quartzo-feldspathic groundmass due to recrystallisation. Near the contact with the intrusive granitoid, the rhyolitic rocks show increase in the grain size indication contact metamorphic effect.

3.2.0 MINERALIZATION (SURFACE MANIFESTATION)

3.2.1 With reference to the GSI report, titled "Geology of Mohala-Pendakado area, Rajnandgaon District (parts of toposheet 64D/10 & 64 D/14) by Arijit Kundu, Geologist (Jr) and K.R.Pillai, Geologist (Jr), published in January,1995, Mohala-Pendakodo area in the Kotri lineament zone is occupied by lower Proterozoic Banded Iron Formation of the Latmarka Group (Bailadila Group), and bimodal volcanic suite belonging to the Ainhur Group and the intrusive Madanbera granitoid of the Kotri Supergroup. The Ainhur Group comprises the Pachangi Formation (mainly tuffites and rhyolite), the Kurse Korhi Formation (porphyritic rhyolite), and the Mendra Formation (basaltic Pyroclastics) along with the basic-ultrabasic intrusives. The Madanbera granitoid coarse grained equigranular to porphyritic grey to pinkish grey granite. Rocks exposed in the Bodal area includes ferruginous shale, acid pyroclastic, porphyritic rhyolites, granite, quartz porphyry etc amphibolites, gabbro, metagabbro and dolerite dykes.

3.2.2 Shear zones are occupied by quartzose rock (silicified shear zone/quartz vein) in which, disseminations of pyrite, occasional chalcopyrite, arsenopyrite, sphalerite and galena have been found to occur. In the Bodal area silicified fault breccias and vein quartz are often mineralized. Occurrence of uranium mineralization along with sulphides, with evidence of silicification, chloritisation, sericitisation, calcitisation and the development of widespread biotite and fluorite are reported from Bodal area (Krishnamurhty, P et al.1988).

3.3.0 MINERAL POTENTIALITY BASED ON GEOLOGY, GEOPHYSICS, GROUND GEOCHEMISTRY ETC.

3.3.1 Mira Exploration (P) Ltd and Barfansai Enterprises Ltd (2006) had submitted a report of MMI technology "Mobile Metal Ion, Soil Geochemistry Program, Hiddar Project, The Rajnandgaon District, India" indicates that the Bodal project area was initially identified through stream sediment surveys and rock chip sampling. Subsequently the geochemical program has successfully defined a coincident, multi-element geochemical trend within the Bodal prospect area.

3.3.2 This suggest that geochemical survey has confirmed that the Hiddar & Bodal Block, part of the 100 sq km area identified as potential area for polymetallic deposit, seems to be a prospective block for copper ore. The Bodal project area shows significant anomalous responses for Cu, Pb, Zn, Au and Ag, where sampling was done at 100m spacing. It is reported that a large Cu anomaly some 500m wide on the SW boundary of the sample grid has been very high Cu responses (greater than 2000ppb) and remains open to the south.

3.3.3 Also as reported a multi element Au, As, Ag and Ce anomaly lies in a central eastern position of the study area. The report concluded that the area with anomalies of multi-element associations of Cu, Pb, Au and Ag, as very prospective for further exploration.

3.4.0 SCOPE OF PROPOSED EXPLORATION

3.4.1 The Reconnaissance survey at G-4 stage exploration program proposed based on previous preliminary exploration carried out by M/s. Mira Exploration Private Limited. The current proposal comprises, Geological mapping (1:12,500 scale), Surface sampling (Bedrock, soil, stream sediment), pitting, Geophysical survey, drilling of 5 Nos of scout boreholes involving about 500m drilling with associated survey, chemical analysis, physical analysis and Report preparation.

3.5.0 OBSERVATION AND RECOMMENDATIONS OF PREVIOUS WORK

3.5.1 Mira Exploration (P) Ltd and Barfansai Enterprises Ltd, Canada had worked briefly in this area (2006), has proved the potentially large Cu anomaly some 500m wide on the SW boundary of the sample grid has been very high Cu responses (greater than 2000ppb) and remains open to the south. They also reported a multi element Au, As, Ag and Ce anomaly lies in a central eastern position of the study area. They have concluded that the area with anomalies of multi-element associations of Cu, Pb, Au and Ag, as very prospective for further exploration.

4.0.0 PREVIOUS WORK

4.0.1 The pioneering work in the area was done by B.C. Gupta, who mapped the iron ore belt of Dalli Rajhara during 1935-1936. D.K. Chatterjee (1950-1951) and R.K. Sharma and G.C. Satyanarayana (1964-1965) mapped a large part of the area to the southeast of the present area and delineated the Dharwarian rocks including the BIF, and the volcanics and epiclastics. Systematic geological mapping of the area was done by J.L. Narang et al. (1982) and S. Chandra et al. (1983), who correlated the BIF with Bailadila Group and the volcano-sedimentary rocks of the area with the Nandgaon Group.

4.0.2 B.S. Acharya and S.K. Tiwari of the Directorate of Geology and Mining, Govt. of Madhya Pradesh carried out regional geochemical survey in parts of the Kotri volcanic belt. G.G. Deshpande (1990) based on petrological data considered the Dongargarh belt in the northern extension of the present area as a bimodal greenstone belt. P. Krishnamurthy et al. (1988) on the basis of their work in Bodal Area, north of the present area, concluded that the Nandgaon Group comprising basalt-rhyolite association developed at the margins of proto-continent in partly orogenic and partly anorogenic continental rift set-up. According to D.B. Yedekar et al. (1990), the volcanic rocks of the/ Nandgaon Group forms an island arc set-up. V.P. Mishra et al. (1990) opined that the Kotri lineament zone represents a proto-ophiolite complex which represents a suture zone between two Proterozoic crustal provinces.

4.0.3 GSI reported Sulphide mineralisation in the Bailadila, Nandgaon and Chhattisgarh groups of rocks in parts of Rajnandgaon, Durg and Bastar. Districts, Madhya Pradesh in their reports published in 1981, 1983, 1995 and thereafter.

4.0.4 In the geological report titled “Geology of Mohala-Pendakado area, Rajnandgaon District (parts of toposheet 64D/10 & 64 D/14) by Arijit Kundu,Geologist (Jr) and K.R.Pillai, Geologist (Jr), published in January,1995, indicated that during the study geological mapping was carried out in Mohala-Pendakodo area (including Bodal and Hiddar areas) , Rajnandgaon District, Madhya Pradesh bounded latitudes 20°30’ and 20°45’N and longitudes 80°38’ and 80°50’E, falling in parts of Toposheet Nos. 64D/10 & 64D/14, on 1:25,000 scale.

4.0.5 Twenty-one bed rock sample of this quartz vein were analysed. Seven of the samples show Pb values ranging from 0.15% to 1.5%, Ag values from 4 ppm to 24 ppm and Au values from 0.1 ppm to 0.5 ppm.

4.0.6 One was made across the shear zone west of Kattapar to know the nature of the shear zone and variation in the mineralization. Trench samples were collected at 2m interval and analysed for base metal and Ag. The Pb values range from 40 ppm to 400 ppm, Cu from 10 ppm to 150 ppm, Zn from 10 ppm to 200 ppm and Ag value in one sample is 0.3 ppm.

4.0.7 Maringpiring Bhursa quartz vein occurs 100m west of Maringpiring Bhursa and trends N60°E-S60°W. The quartz vein is fracture filling type and extends for 20m with and exposed width of about 2m. Disseminations of pyrite and chalcopyrite occur within this. Three samples from this quartz vein were analysed. Two samples have shown Cu values, 100 ppm and 350 ppm.

4.0.8 Pandherwanitola quartz vein roughly east-west trending exposed north of a pond east of Pandherwanitola. This is over 100m in length and the exposed width varies from 0.5m to 2m. The rock is generally greyish white, but smoky grey patches are also found which contain abundant disseminations of pyrite and chalcopyrite. Four samples analysed from this quartz vein have shown Cu values ranging from 20 ppm to 100 ppm.

4.0.9 M/s Mira Exploration Private Limited, Delhi was awarded Reconnaissance Permit (RP) in the year 2002 and carried out Geochemical Survey over 481.25 Sq. Km (of Korti Block) in the year 2004-06 using MMI (Mobile Metal Ion) technology and identified about 100 sq. km area covering Bodal Block (21.75 sq. km), Dumartola (28.10 sq. km), Hiddar (28.60 sq km) and Bhagwantola (26.90 sq. km) for further prospecting for ore deposits for Copper, Nickel, Lead, PGE and associated minerals. Bodal and Hiddar Blocks were identified with potential for copper ore deposit in the report prepared by MMI (Mobile Metal Ion) technology for M/s Mira Exploration Private Limited in 2006. Accordingly, Bodal (21.75 sq. km) and Hiddar (28.60 sq km) Blocks in Rajnandgaon has been demarcated for copper ore prospecting study.

4.0.10 For reconnaissance work from both the areas (Bodal Block and Hiddar Block) sub-surface sample has been collected forming a grid of 100m x100m. The total number of sampling points within Bodal and Hidder block are 74 and 169 respectively. The analysis of sample has been done as per MMI Technology. The follow up soil programme collected 85 soil samples using a grid of 100 mts. line spacing and sample collection at each 100 meters.

4.0.11 In this report of MMI technology "Mobile Metal Ion, Soil Geochemistry Program, Hiddar Project, The Rajnandgaon District, India" prepared for Mira Exploration (P) Ltd and Barfansai Enterprises Ltd indicate that The Bodal project area was initially identified through stream sediment surveys and rock chip sampling. Subsequently the geochemical program has successfully defined a coincident, multi-element geochemical trend within the Bodal prospect area.

4.0.12 The Bodal project area shows significant anomalous responses for Cu, Pb, Zn, Au and Ag, where sampling was done at 100m spacing. It is reported that a large Cu anomaly some 500m wide on the SW boundary of the sample grid has been very high Cu responses (greater than 2000ppb) and remains open to the south. Also as reported a multi element Au, As, Ag and Ce anomaly lies in a central eastern position of the study area. The report concluded that the area with anomalies of multi-element associations of Cu, Pb, Au and Ag, as very prospective for further exploration.

5.0.0 PLANNED METHODOLOGY

5.0.1 In accordance to the objective set for the block, the exploration programme is proposed. The Exploration shall be carried out as per Minerals (Evidence of Mineral Content) 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 (LSM) will be done in the entire 50.35 sq.km area on 1:12,500 scale. Rock types, their contact, structural features will be mapped. Surface manifestations of the ore bodies available along with their surface disposition will be marked on map.

5.2.0 GEOCHEMICAL SAMPLING

5.2.1 SURFACE SAMPLING (BED ROCK/SOIL SAMPLE):

5.2.2 During the course of Geological Mapping (LSM), the Bed rock samples shall be collected from the outcrops along with soil and stream sediment samples. A total 200 Nos of Surface Samples (Bed Rock, Soil and Stream Sediments) samples which will be analysed for assay of 34 element ICP-MS and 25 Nos for sampling of Au & PGE (By ICP-MS, Fire Assay Method).

5.3.0 GEOPHYSICAL SURVEY:

5.3.1 The area of the block is 50.35 sq.km and in general is plain land with some undulations and majority of the area is covered by local shrubs except some chain of hillocks and isolated hills/reefs at places. In view of presence of vegetation and soil cover the need of the ground Geophysical survey is felt. On interpretation of data of geological mapping, geochemical sampling (Bedrock, Soil sampling and stream sediment sampling) if required surface geophysical survey will be carried out to assess the continuity of surface manifestations of mineralized zones in strike and dip direction. The Geophysical survey programme has been clubbed in the exploration programme. In the surface Geophysical survey, Induced Polarisation cum Resistivity Survey, Self-potential, Magnetic, shall be carried out.

5.4.0 EXPLORATORY MINING (TRENCHING/PITTING)

5.4.1 Shallow pitting (Excavation) shall be carried out in the potential zones identified based on the results of Geological mapping and geochemical sampling. A provision of shallow pitting of 200 cubic meter (100 pits) is kept. Pitting shall be done for correlation of mineralized zones (if any) on surface up to a depth of 2m after removal of soil/weathered column in the area. Locations of pits/trenches on ground will be decided by field geologist based on field observations. A provision of 100 Nos of primary pit samples is kept for analysis of 34 elemental pack by ICP-MS.

5.5.0 CORE DRILLING:

5.5.1 Based on Geological mapping (LSM) with Geochemical sampling and Ground Geophysical survey, the extension of the mineralized zones (ore bodies) will be marked. To find out the potentiality of mineralized zones in strike & dip, 5 Nos scout boreholes involving 500m of drilling will be carried out for upper level of intersection of mineralized zones.

5.6.0 DRILL CORE LOGGING:

5.6.1 The drill core will be logged for rock types, structural features, textures, intersection of ore zones, types of mineralization and occurrence of various ore minerals. The logging for determination of Rock quality determination (RQD) will also be undertaken.

5.7.0 DRILL CORE SAMPLING:

5.7.1 During geological logging of drill core, mineralized zone will be marked on basis of concentration and lithology. Total 100 Nos of primary and check (5% Internal Check+ 10% External Check) samples will be analysed for 34 elemental pack by ICP-MS .

5.8.0 WHOLE ROCK ANALYSIS:

5.8.1 Whole Rock analysis for Major oxides and trace elements using XRF Technique will be carried out on 10 Nos samples to check the rock types, their variation in chemical composition.

5.9.0 PETROLOGICAL & MINERALOGICAL STUDIES:

5.10.0 During the course of Geological mapping and core logging 30 samples from various litho units from surface and intersected in boreholes will be studied for petrography and ore mineral assemblages and their distribution, alteration, enrichment etc.

5.11.0 SPECIFIC GRAVITY DETERMINATION:

5.11.1 For the specific gravity determination 05 samples from the mineralized zones intersected in the boreholes will be sent to lab.

5.12.0 XRD STUDIES:

5.12.1 From the composite samples, 05 samples shall be subjected for XRD studies.

6.0.0 NATURE QUANTUM AND TARGET

6.0.1 Details of the particular, Quantum and the targets are tabulated in **Table No.-IV-A.**

Table No-IV-A. Envisaged Quantum of proposed work in Bodal Block

S.No.	Item of Work	Unit	Qty.
1.0	**Survey Work in potential Zone Areas**	**Sq.km**	**50.35**
1.1	a) Bore Hole Fixation* (Scout Boreholes)	Nos	5
2.0	**GEOLOGICAL MAPPING (LSM) (1:12,500), OTHER GEOLOGICAL WORK INCLUDING BR, SS and SOIL SAMPLING**		
2.1	Large scale (LSM) Geological mapping (on 1:12,500 Scale)	**Sq.km**	**50.35**
	a) Geologist man days (1 No) for Geological Mapping (Field)	Days	120
	b) Labour (field) for Geological mapping work (Total 2 workers per one geologist)	Days	240
	c) Surface Sampling -1 Sampler Labour charge not included	Days	60
	d) 4 labours/ party (As per rates pf Central Labour Commissioner)	Days	240
3.0	**GEOPHYSICAL SURVEYS**		
3.1	I.P cum resistivity, S.P., Magnetic (8-10 km)	(8-10 km) line km	02
4.0	**MINERAL INVESTIGATION**		
4.1	Excavation of Pitting)	Cu.m	200
5.0	**DRILLING**	meters	500
6.0	**LABORATORY STUDIES**		
6.1	**Chemical Analysis**		
	I) SURFACE SAMPLING (BED ROCK SAMPLES/SOIL/STREAM SEDIMENT)		
	a) 34 element Package analysis by ICP-MS for surface samples	per sample	400
	b) For PGE and Gold by ICP-MS & Fire Assay	per sample	25
	II) CHECK SAMPLES (BED ROCK/SOIL/STREAM SEDIMENT SAMPLES) - 5% INTERNAL & 10% EXTERNAL		
	a) 34 element Package analysis by ICP-MS for surface samples	per sample	40
	b) For PGE and Gold by ICP-MS & Fire Assay	per sample	02
6.2	XRD Studies for identification of minerals	Per sample	05
6.3	**WHOLE ROCK STUDIES**	per sample	10
6.4	**PETROLOGICAL STUDIES**		
	a) Preparation of thin polished section	per sample	30

S.No.	Item of Work	Unit	Qty.
	b) Study of thin section for petrography	per sample	30
	c) Digital photomicrograph of thin polished section	per sample	30
6.5	Specific Gravity Determination (BH)	per sample	05
6.6	EPMA	Per sample	05
7.00	**GEOLOGICAL REPORT PREPARATION**	5 Hard copies with a soft copy	1

7.0.0 MANPOWER DEPLOYMENT

7.0.1 Manpower deployment List may be provided later.

8.0.0 TIME SCHEDULE

8.0.1 The proposed exploration programme is planned for G-4 Level. The work activities like camp setting, survey and associated geological work, geophysical studies, drilling, laboratory work and Geological report preparation at G-4 level will be completed within 09 months' time. Peer review & final report submission will take another one (01) months' time. Thus, the total duration of the project shall be completed in 10 months from the date of commencement of the project. The bar chart showing activities wise time schedule is placed at **Table-IV-D.**

9.0.0 BREAK-UP OF EXPENDITURE

9.0.1 Cost has been estimated based on actual schedule of rates mandated in the circular OM No. 61/1/2018/NMET dated 31st March 2020 for promotional projects of MOM. The total estimated cost is Rs.252.28 **Lakhs**. The summary of cost estimates for Regional Exploration (G-4 Level) is given in **Table No.- IV-B** and details of cost estimates is given in **Table No-IV-C**. Tentative Time schedule/action plan for proposed Regional Exploration (G-4) for Copper (Cu) and Associated Minerals is given in **Table No. IV-D**.

9.0.1 The field components of exploration cost have been escalated to 1.25 times as recommended in the office memorandum dated 08th July 2024 as Addition of Para 5A, Most Affected Districts by Left Wing Extremism (LWE).

Table No-IV-B. Summary of Cost Estimates for Regional (G-4 Level) Exploration

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Topographical Survey & Geological Mapping (LSM), Other Geological Work	24,77,100
2	Geophysical work	36,21,733
3	Mineral Investigation	9,50,000
4	Drilling & associated works	88,17,250
5	Laboratory Studies	40,14,795
6	Geologist & Geophysicist at HQ	3,15,000
	Sub Total (1 to 6)	2,01,95,878
7	Exploration Report Preparation	7,50,000
	Proposal Preparation	4,03,918
8	Peer review charges	30,000
	Sub Total (1 to 7)	2,13,79,796
9	GST 18%	38,48,363
	Total:	**2,52,28,159**
	Say Rs. In Lakh	**252.28**

10.0.0 JUSTIFICATION

i. There are different known occurrences of mineralization in Neo-Archean-Paleoproterozoic age in extensional rift system around all over world. Magmatism and extensional faults are fundamental elements in controlling the genesis and evolution of continental rift-basins, as well as mineralization in these environments.

ii. Proposed area i.e. Bodal is a part of Kotri lineament of Dongagarh-Kotri Rift Zone (DKRZ) or Dongagarh- Kotri Belt (DKB) of Bastar craton and formed in an extensional riftogenic environment. This rift has been filled up by volcano-classics with variation of dips from steep towards west and moderate towards east representing original deposition over an asymmetrically subsiding basin (Ghosh and Pillai,1992).

iii. This proposed Bodal area, is Neo-Archean- Palaeoproterozic in age and within a typical granite-green stone belt with imprints of repetitive volcanic, plutonic and tectonic episode finally incorporating volcano- sedimentary assemblage (Krishnamurthy et al 1988, D.K,Sinha et al 2014). Thus, it is highly chance to get different types of mineralization around Bodal area as economic mineralized deposit occurred in other riftogenic environment around world.

iv. Presence of low-grade moderate tonnage uranium mineralization in Bodal area with pyrite/pyrrhotite (Krishnamurthy et al 1988) and Paleoproterozoic Rhyolite hosted Zn-Pb-Cu rich metamorphosed volcanogenic massive sulphide deposit in paleo continental rift setting of Bhuyari prospect, Betul, central India (M. N. Praveen et al.2021), are also justifying the probable presence of economic mineralization in Bodal area as Bodal has similar geological history.

v. Arsenic (As) is one of the main pathfinder elements for evaluate large areas for Uranium, VMS deposit (Cu, Pb, Zn, Ag and Au), Cu-Ni-PGE deposits by eliminating likely barren areas from the areas under consideration (V Balaram et al. 2022). Presence of geogenic arsenic (As) is reported in part of Dongagarh-Kotri Rift Belt of Mohla Manpur Ambagarh Chowki district. Arsenic contaminated villages are located within areas exposing felsic volcanics or located close to shear zones (Subhrangsun K acharyya et al 2007). Thus, presence of arsenic may be indication of presence of Cu, Pb, Zn, Ag, Ni-PGE in this area.

vi. As per the geochemical study of M/s Mira Exploration Private Limited using MMI process (Mobile Metal Ion – soil geochemistry), Bodal Block, part of the 100 sq. km area identified as potential area for poly metallic deposit, seems to be a prospective block for copper ore.

vii. The Bodal project area shows significant anomalous responses for Cu, Pb, Zn, Au and Ag, where sampling was done at 100m spacing. It is reported that a large Cu anomaly some 500m wide on the SW boundary of the sample grid has been very high Cu responses (greater than 2000ppb) and remains open to the south. Also as reported a multi element Au, As, Ag and Ce anomaly lies in a central eastern position of the study area. The report concluded that the area with anomalies of multi-element associations of Cu, Pb, Au and Ag, as very prospective for further exploration.

viii. A rock chip sample collected by M/s. Mira Exploration Private Limited resulted encouraging results (Cu- 1616ppm, Pb – 585ppm, Zn – 237 ppm and Ag – 2.3 g/t).

ix. If occurrence of the copper ore deposit is proved this will be the first Copper deposit in the State.

x. The exploration will be helpful in estimation of reconnaissance (334) Resources and will help in planning G - 3 stage exploration program which in turn will lead to estimation of indicated (333) category resources.

Table No-IV-C. Estimated cost for Reconnaissance Survey (G-4) for Copper (Cu) in Bodal Block, Mohla Manpur Ambagarh Chowki District, Chhattisgarh

Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal	
		SoC- Item- S. No.	Rates as per SoC	Qty.	Total Amount (Rs)
Survey work in potential Zone Areas	**Sq.km**			**50.35**	
a) Bore Hole Fixation* (Scout Boreholes) by DGPS	Nos	1.6.2	5	19200	96,000
Geological Mapping (LSM), Other Geological Work including BR, SS and SOIL sampling					
Large scale (LSM) Geological mapping (on 1:12,500 Scale)					-
a) Geologist man days (1 No) for Geological Mapping (Field)	days	1.2	11,000	120	13,20,000
b) Labour (field) for Geological mapping work (Total 4 Nos i.e. 2 workers per one geologist)	per worker	5.7	541	240	1,29,840
c) Surface Sampling -1 Sampler Labour charge not included	day	1.5.2	5100	60	3,06,000
d) 4 labours/ party (Rs 522/day/labour) (As per rates of Central Labour Commissioner) Base rate - Rs. 522 x 4 = 2088	day	5.7	541	240	1,29,840
Escalation under Most Affected LWE Districts	1.25 times	5A			1.25
Sub-Total A					***24,77,100***
Geophysical Surveys#					
I.P cum resistivity, S.P.,Magnetic (8-10km)	(8-10 km) line km	3.4 b	14,48,693	2	28,97,386
Esclation under Most Affected LWE Districts	1.25 times	5A			1.25
Sub-Total B					**36,21,733**
Mineral Investigation					
Trenching/Pitting$					
a) Excavation of pits	per cu m	2.1.2	3,800	200	7,60,000
Escalation under Most Affected LWE Districts	1.25 times	5A			1.25
Sub-Total C					**9,50,000**
Drilling					
Drilling up to 300m - 1 Rig (Hard Rock)	per m	2.2.1.4 a	11,500	500	57,50,000
Borehole deviation survey	per m	2.2.6	330	0	0
Borehole pillaring					
a) construction of concrete pillar (12"x12"x30")	per borehole	2.2.7.a	2,000	5	10,000
b) Borehole plugging by cement	per m	2.2.7.b	150	0	0
Transportation of drill rigs & truck associated per drill (To & Fro from HQ)	per km	2.2.8	36	1800	64,800

Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal	
		SoC- Item- S. No.	Rates as per SoC	Qty.	Total Amount (Rs)
Monthly accommodation charges for drilling camp	monthly	2.2.9	50,000	3	1,50,000
a) Drilling camp setting (1 rigs)	per drill	2.2.9a	2,50,000	1	2,50,000
b) Drilling camp winding (1 rigs)	per drill	2.2.9b	2,50,000	1	2,50,000
Approach road making in rugged- hilly terrain (Partly rugged-hilly terrain)	per km	2.2.10b	32,200	5	1,61,000
Drill core preservation	per m	5.3	1590	200	3,18,000
Land/crop compensation	per borehole	5.6	20000	5	1,00,000
a) Geologist man days (1 No) for drilling, logging and sampling	days	1.2	11000	0	0
b) Labour (field) (Total 4 Nos i.e., 2 workers per one geologist) Base rate - Rs. 522 x 2 = 1044	per worker	5.7	1044	0	0
Esclation under Most Affected LWE Districts	1.25 times	5A			1.25
Sub-Total D					***88,17,250***
Laboratory Studies					
Chemical Analysis					
i) Surface sampling (Bed Rock Samples/Soil/Stream Sediment)					
a) 34 element Package analysis by ICP-MS for surface samples	per sample	4.1.14	7,731	400	30,92,400
b) For PGE and Gold by ICP-MS & Fire Assay	per sample	4.1.5d	11,800	20	2,95,000
ii) Check Samples (Bed Rock/Soil/Stream Sediment Samples) - 5% Internal & 10% External					-
a) 34 element Package analysis by ICP-MS for surface samples	per sample	4.1.14	7,731	40	3,09,240
b) For PGE and Gold by ICP-MS & Fire Assay	per sample	4.1.5d	11,800	2	23,600
XRD Studies for identification of minerals on composite sample	per sample	4.5.1	4,000	5	20,000
ix) Whole rock studies	per sample	4.1.15a	4,200	10	42,000
x) Petrological / Mineralographic studies					-
a) Preparation of thin polished section	per sample	4.3.2	1,549	30	46,470
b) Study of thin section for petrography	per sample	4.3.4	4,232	30	1,26,960
c) Digital photomicrograph of thin polished section	per sample	4.3.7	280	30	8,400
Specific Gravity Determination (BH)	Per sample	4.8.1	1605	5	8,025
EPMA	Per hour	4.4.1	8540	5	42,700
Sub-Total E					***40,14,795***

Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal	
		SoC- Item- S. No.	Rates as per SoC	Qty.	Total Amount (Rs)
Geologist man days (1 No.) for Geological map & Report (HQ)	days	1.2	9,000	30	2,70,000
Geophysicist (HQ)	days	3.2	9,000	5	45,000
Sub-Total F					***3,15,000***
Total (Sub-Total A to F)					**2,01,95,878**
Geological Report Preparation	5 Hard copies with a soft copy	5.2	A Minimum of Rs. 7.5 lakhs or 3% of the work which ever is more	1	7,50,000
Preparation of Exploration Proposal	Nos	5.1	500000	1	4,03,918
Report Peer Review Charges	Rs. 30000 lumpsum	As per EC decision	30000	1	30,000
Total Estimated Cost without GST (8+9+10+11)					**2,13,79,795**
Provision for GST (18%)					**38,48,363**
Total Estimated Cost with GST					**2,52,28,158**
				Say, in Lakhs	**252.28**

Note:	
1	Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21
2	In case of delay/non- performance, the appropriate action will be taken by competent authority against delinquent agency as per prevailing govt. of India rules/guidelines on procurement
3	If any part of the project is outsourced, the amount will be reimbursed as per the Paragraph 3 of NMET SOC and Item no. 6 of NMET SOC. In case of execution of the project by NEA on its own, a Certificate regarding non outsourcing of any component/project is required
4	Necessary efforts should be made to minimize any adverse impact on the environment during exploration activities.
5	Any item of work not mentioned above shall be added as per SoC.
6	All the Geological Reports and data are to be uploaded on NGDR as per MERT template by the agency

Table No IV-D

Time schedule / Action plan of Reconnaissance Survey (G4) for Copper (Cu) in Bodal area, Mohla Manpur Ambagarh Chowki District Chhattisgarh

S.No.	Activities	Phase	MONTHS											
			1	2	3	Review-1	4	5	6	Review-2	7	8	9	Review-3	10
1	Camp Setting	Phase - I													
2	Geological mapping & sampling														
3	Sample preparation														
4	Analytiical work														
5	Interim report & Review by TCC														
6	Geophysical survey	Phase - II													
7	Geophysical report prepration														
8	Interim report & Review by TCC														
9	Diamond Drillin 500m	Phase-fII													
10	Sample prepration for Drill Core Samples														
11	Analytical work drill core samples														
12	Camp winding														
13	Geological report Prepration														
14	Peer Review & Final report submission														

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12.0.0 LIST OF PLATES:

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12.0.5 Plate-V-A & V-B : Copper values in ppb from MMI data of Bodal Block, Mohla Manpur Ambagarh Chowki District, Chhattisgarh