

**Proposal for General Exploration (G2) in Mundadevta-Darkhuli-
South Jharia Copper Block in Baharagora Copper Prospect,
Singbhum Copper Belt, District: East Singbhum, Jharkhand, under
NMET.**

Copper and Associated Minerals

By

**Mineral Exploration Corporation Limited
(A Government of India Enterprise)
A Mini Ratna Company
Seminary Hills, Nagpur-440 006 Maharashtra**

**Place: Nagpur
FEB-2021**

**Summary of the Block for G-2 Stage Exploration for Copper Ore in
Mundadevta-Darkhuli-South Jharia Block,
Baharagora Copper Prospect**

Features	Details															
Block ID :	Mundadevta-Darkhuli-South Jharia Copper Block															
Current Exploration Agency	MECL															
Previous Exploration Agency	GSI															
Geological Report (Previous stage Geological Report)	Geological Report for the Field Season 1970-71 & 1971-72 28 BHs of BJ series involving total Drilling of 4805.76 m in Mundadevta-Darkhuli Block. Geological Report for the Field Season 1975-76 & 1977-78, 3 BHs drilled in Mundadevta Extn Block involving meterage of 755.05 m and Drilling of 1798.25 m in 11 BHs in South Jharia Block.															
Commodity	Copper(Cu) and associated minerals (Ni, Co, Mo)															
Mineral Belt :	Singbhum Copper Belt															
Budget &Time Schedule to complete the project	-Rs. 967.70 Lakhs & 18 months															
Objectives:	To assess and estimate the ore potential up to vertical depth of 200 m & more and to intersect HW lodes in eastern limb of the Synformal flexure.															
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:	The work will be carried out by the proposing agency.															
Name/ Number of Geoscientists :	Geologist: 01 HQ (120 days) Geologist:02 Field (420 days)															
Expected Field days (Geology, Surveyor)	Geologist: 01 HQ (120 days) Geologist:02 Field (420 days) Surveyor :90 days															
I. Location:																
Location	Mundadevta-Darkhuli-South Jharia block is situated 4km NNW of Baharagora town in Jharkhand. Near the junction of NH-49 (Kharagpur to Bilaspur) and NH-18 (Dhanbad-Balasore), Baharagora is a small town in East Singhbhum district and situated on the south-east corner of Jharkhand, India. It is 60 km from Kharagpur, 90 km from Jamshedpur, 50 km from Ghatshila, 50 km from Baripada and 200 km from Kolkata. Chakulia and Dhalbhumgarh are the nearest railway stations. The nearest airport is Netaji Subhas Chandra Bose International Airport, Kolkata which is 200 km. away from the study area.															
Block boundary coordinate	<table><thead><tr><th>Point name</th><th>Long</th><th>Lat</th></tr></thead><tbody><tr><td>A</td><td>86° 41' 20.5205" E</td><td>22° 18' 10.6292" N</td></tr><tr><td>B</td><td>86° 42' 14.8297" E</td><td>22° 18' 10.8608" N</td></tr><tr><td>C</td><td>86° 42' 14.9235" E</td><td>22° 17' 26.3130" N</td></tr><tr><td>D</td><td>86° 41' 20.6190" E</td><td>22° 17' 26.0814" N</td></tr></tbody></table>	Point name	Long	Lat	A	86° 41' 20.5205" E	22° 18' 10.6292" N	B	86° 42' 14.8297" E	22° 18' 10.8608" N	C	86° 42' 14.9235" E	22° 17' 26.3130" N	D	86° 41' 20.6190" E	22° 17' 26.0814" N
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Villages :	Mundadevta, Darkhuli, Jharia															
Tehsil/ Taluk :	Baharagora															
District :	East Singhbhum															
State :	Jharkhand															

2. Area (hectares/ square kilometres)	
Block Area :	2.13 Sq Km
Forest Area :	-
Government Land Area	-
Private Land Area	-
3. Accessibility	
Nearest Rail Head :	The nearest railhead is Chakulia and Dhalbhumgarh, which are at a distance of 25 km and 31 km respectively in the Howrah-Mumbai line of the South-Eastern Railway.
Road :	NH 49 (old NH 6) running from Kharagpur in West Bengal to Bilaspur in Chhattishgarh and NH-18 (Old NH 33) running from Govindpur in Jharkhand to Balasore in Odisha made a junction at Baharagora Town.
Airport :	Netaji Subhas Chandra Bose International Airport, Kolkata is at 200 km towards East and Birsamunda Airport, Ranchi is at 220 km from the area towards NW.
4. Hydrography	
	The major part of the Baharagora area is covered by alluvium and soil upto 3m. thickness. The area is constituted of rolling plains with occasional low ridges and is about 80 to 100 m above mean sea level. The area is drained by the Subarnarekha River in the West and South-west.
Rivers/ Streams	Part of tributaries/water shed area of River Subarnarekha
5. Climate	
Mean Annual Rainfall :	The average annual rainfall in the East Singhbhum District is reported about 1200-1300 mm, mainly during June to August.
Temperatures	(May-June) (Maximum) 40°C (Minimum) 27°C (November- December) (Maximum) 26°C (Minimum) 16°C
6. Topography	
Toposheet Number	73J/11
	The major part of the area is covered by alluvium and soil is 80 to 100 m above mean sea level. The general slope of the ground is North-easterly.
7	Availability of baseline geoscience data
Geological Map	Surface Geological Map of Baharagora Copper Prospect is on scale 1:16000 (Field season:1970-71,71-72)
Geochemical Map and Geophysical Map	Surface plan showing data of Geochemical and Geophysical Traverses on scale: 1:16000 (Field season:1970-71,71-72)
8. Justification for taking up G2 stage mineral exploration	GSI bore holes have intersected considerable copper mineralisation in various bore holes. Reserves/Resources (indicated and inferred combined) at cut-off grade of 1.0% Cu is amount to 2.12 m. tonnes (1.42 m. tonnes of 1.23% Cu, and 0.70 m. tonnes of 0.87% Cu plus 0.21% Ni), at 0.7% Cu is 3.876 m. tonnes (2.650 m. tonnes of 0.92% Cu and 1.226 m. tonnes of 0.74% Cu plus 0.16% Ni), at 0.5% Cu is 6.86 m. tonnes (4.77 m. tonnes of 0.79% Cu and 2.09 m. tonnes of 0.59% Cu plus 0.12% Ni) and at cut-off grade 0.5% Cu+Mo 0.1232 m. tonnes of 0.5% Cu plus 0.08% Mo, down to 290m vertical depth from the datum line fixed at 100 mRL in Mundadevta-Darkhuli Block. Resource (indicated and inferred combined) at cut-off grade of 1.0% is amount to 0.65 m. tonnes of 1.3% Cu, and at cut-off grade of 0.5% is 0.92 m. tonnes of 1.01 % Cu, down to 200m vertical depth from the datum line fixed at 100 mRL in South Jharia Block as assessed by GSI. The assessment of continuity of the lodes at down dip and density of drilling needs to be improved to test the persistence of the ore body at closure intervals and for a greater confidence in providing resource.

	As recommended in the previous report few boreholes needs to be drilled to test the persistence of the Ni bearing zones in down dip direction at hinge part. To assess the North-East extension of the mineralized zone of the eastern limb. To intersect Mineralised zone 4 which were not tested in the Central sub-block and in the Darkhuli sub block. To test the extended area of south of BJ-43A as recommended in the previous report.
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**Proposal for General Exploration (G2) in Mundadevta-Darkhuli-South Jharia
Copper Block, Baharagora copper Prospect, Singhbhum Copper Belt, District: East
Singbhum, Jharkhand.**

1.0 INTRODUCTION

- 1.1 Copper with its unique physical, mechanical and electrical properties, has played a vital role in the industrial growth of a nation. In India, around 75% of the demand is met through imports. The increasing demand of copper metal in the country could be eased with the exploration of new copper deposits of economic importance.
- 1.2 Singhbhum Shear Zone in the Singhbhum craton is the most important structural element known for its metallogenic importance. A number of workable deposits are located in the South-eastern sector of this shear zone. The Baharagora Copper Prospect is situated near the South-eastern tip of this shear zone.
- 1.3 Airborne Mineral Surveys and Exporation wing of GSI carried airborne Geophysical survey under "Operation Hardrock" in 1967-68. Airborne Geophysical data supplemented with Ground Geophysical Reconnaissance indicated a probable zone of Mineralisation in the Baharagora Area. Subsequently the prospect has been divided into three blocks viz. i) Mundadevta-Darkhuli Block, ii) South Jharia Block, iii) North Jharia Block based on the Geological studies, surface indications and old workings.
- 1.4 A total 28+3=31 Bh drilled in two phase between 1970-1973 by GSI with a cumulative Drilling of 4805.76+755.05=5560.81 m in the Mundadevta-Darkhuli Block and . A Reserve/Resource of (indicated + inferred) at cut off grade of 1.0%, 0.7% and 0.5% Cu down to 290 m vertical depth from datum line (at 100 mRL) amount to 2.12 mt , 3.876 and 6.86 mt respectively and a total 11 Bh drilled by GSI between 1975-1978 with a cumulative drilling of 1798.25 m in the South Jharia Block. A Reserve/Resource of (indicated + inferred) at cut off grade of 1.0%, and 0.5% down to 200 m vertical depth from datum line (at 100 mRL) amount to 0.65 mt and 0.92 mt respectively.
- 1.5 Following the request from the MECL, consent to carry out G-2 level of exploration in the Baharagora Area has been received from DMG, Jharkhand viz. letter no. 507 dated 24.06.2020 (Annexure-I).
 - a. Accordingly two proposal i.e. each in Mundadevta-Darkhuli Block and south Jharia Block have been prepared by the MECL based on the data of previous explorations carried out by the GSI to assess the ore body geometry in more details and estimation of resources under G2 category (UNFC 332).
 - b. In 26th TCC meeting of NMET held on 10th of December, 2020 it was advised to merge the two blocks in a single one and instructed to resubmit the proposal in the next TCC. Accordingly MECL has prepared a proposal combining two blocks previously mentioned into a single one named Mundadevta-Darkhuli-South Jharia Block which is being presented in the 27th TCC on 7th of January, 2021.
 - c. In the meeting of 27th TCC, committee opined that in Mundadevta- Dharkuli Area sufficient boreholes have been drilled by GSI and out of four lodes, lode no. 3 is found to vary in thickness from 1m to 11.83m. Lode no. 3 has been correlated in different boreholes and consistently traced from one limb of the synform to other limb along its closure. The zone width between every two lodes varies from 20m to 60m and only lode no 3 seems to be of fairly good continuity. To compete the activities of G-2 stage exploration, the beneficiation part is left. So, boreholes should

be planned in such way that along every profile/ section there should be one borehole which intersects lode no 3 at -50m RL and boreholes may terminate at 75m to 100m RL. The surface RLs vary between 80m and 90m, there fore the vertical depth of intersection will vary between 150m and 160m.

- d. Further Committee suggested that samples collected from lode no 3 another lodes may be sent for chemical analysis and beneficiation studies may be attempted with samples collected from lode no 3 of Mundadevta-Dharkuli area and lode 1 of South Jharia and with help of analysis results of samples of new boreholes and old boreholes the resource and average grades of lode are to be estimated again.
- e. Accordingly, MECL modified the proposal and 27th TCC recommended the approval of General Exploration (G-2) for Copper in Mundadevta- dharkuli -South Jharia block, Dist- East Singhbhum, Jharkhand with estimated cost of 967.70 Lakh (including GST) in time schedule of 18 months.
- f. The project was approved by 18th EC held on 17th February 2021 and same was intimated to MECL by Ministry of Mines vide letter number F. No. 6/20150NMET/248 dated 24th February, 2021.

2.0 LOCATION AND ACCESSIBILITY

- 2.1 The study area Mundadevta-Darkhuli-South Jharia Copper Block is situated under Mundadevta, Darkhuli and Jharia Village at approx. 4km NW of Baharagora town, East Singhbhum District, Jharkhand. Northing 22° 17' 26" to 22° 18' 10" and Easting 86° 41' 20" to 86° 42' 14" falls in Survey of India Toposheet 73J/11.
- 2.2 Baharagora is a small town near the junction of NH-49 (Kharagpur to Bilaspur) and NH-18 (Dhanbad-Balasore), in East Singhbhum district and situated on the south-east corner of Jharkhand, India. It is 60 km from Kharagpur, 90 km from Jamshedpur, 50 km from Ghatshila, 50 km from Baripada and 200 km from Kolkata. Chakulia and Dhalbhumgarh are the nearest railway stations. The nearest airport is Netaji Subhas Chandra Bose International Airport, Kolkata which is 200 km towards East from the area.

3.0 REGIONAL GEOLOGY AND STRUCTURE

The Precambrian Geology of the Singhbhum Craton was first built up by Dunn (1929,1937), Dunn and Dey (1942) and they divided the craton into four major structural units. Which are I) Singhbhum Geo-anticline comprising highly metamorphosed rocks of Iron Ore Series, II) Dalma Lava Geo-syncline in the north, running parallel to the Geo-anticline, III) a shear-zone, known as Singhbhum Shear Zone, and IV) a second Geo-anticline to the north of the Dalma Lava Geo-syncline with an intervening thrust zone. According to them Singhbhum shear zone extends from Duarpuram, North-East of Chakradharpur, in an approximately East-West direction, turns South-East near Jamshedpur and continues through Jaduguda-Rakhamines, Surda-Mosaboni-Badia mines and eventually ends up at Granites near Baharagora. However later studies revealed that the shear zone extends upto Mayurbhanj districts of Odissa where its trace can be found through some N-S trending shears. However, recent studies by Sarkar and Saha (1959, 1962, 1966) and subsequently Sarkar, Saha and Miller (1969) revised the stratigraphic sequence in Singhbhum and adjoining areas (Table-I). According to these authors, the Singhbhum cratonic area had

undergone three orogenic cycles- The Older Metamorphic Orogeny (3035 m.y.), The Iron Ore Orogeny (2000 m.y.), The Singbhum Orogeny (905-934 m.y.).

The Singbhum Shear Zone is the most important single structural element and has been traced for 200 km in length with a width of few hundred meters to several kilometres. Mainly three types of mineralisation has been localised along this shear zone: Apatite-Magnetite, Sulphide and Uranium mineralisation irrespective of any good relationship of time and space in between. The main sulphide minerals are Chalcopyrite, Pyrite and Pyrrhotite. Other minerals occur in minor to very minor proportions. Sulphide mineralisation is not restricted to any particular lithology. Copper is the metal mainly found with the traces of other metals such as Mo, Ni, Co, Au also reported. A number of workable deposits are there situated in the South-Eastern section of this structural unit, numerous other sulphide occurrences also found in the rest of the belt.

Table-I: Geological Succession of the Precambrian rocks of Singbhum and adjoining areas. After Sarkar, Saha & Miller (1969).					
South of copper Belt-Thrust Zone in Singbhum, N. Mayurbhanj and N. Keonjhar			North of Copper Belt Thrust Zone in Singbhum		Sundargarh District
-----End of Singbhum orogenic cycle (C. 850 m.y.)-----					
NEWER DOLERITES	Biotite Granite-gneiss of SE Singbhum and N Mayurbhanj		Soda-granite, granophyre? Chakradharpur granite-gneiss		
	Graniphyres Gabbro-anorthosite (1470m.y.), Ultramafic intrusions (within and outside Singbhum granite)		Kuilapal granite		
	Kolhan Group (C. 1500-1600 m.y.)		Dalma Lavas		
	Jagannathpur Lavas (1600-1700 m.y.)	Dhanjori formations	Dhalbhum formation, Chaibasa formation	Singbhum group ? (2000-1700 m.y.)	Dhalbhum formation (I.O.S. of Krishnan Gr. Gangpur)
-----Unconformity-----					
-----End of Iron Ore Orogenic cycle (c. 2700 m.y.)---					
	Singbhum Granite				
	Upper shales with sandstone and volcanics Banded hematite Jasper				
Iron Ore Group	Lower shales Basic lavas Sandstone and conglomerate				
	-----Unconformity----- End of Older Metamorphic Orogenic Cycle (C 3200 m.y.)----				
	Granitic activity				
	Basic intrusives				
	Older Metamorphic Group, Calc-Gneiss, Calc-Schist, Hornblende Schist, Quartzite and Quartz Schist.				

4.0 GEOLOGY OF THE AREA

- 4.1 **Lithology:** The area is mostly covered by Tertiary gravels and lateritic soil. Occasional exposure of rocks e.g. Garnetiferous mica schist, Quartzite, basic intrusives, are observed in the NNW part of the Baharagora. Granite, intruded by newer dolerite dykes outcrops at Jharia, Charakmara, Thakurdih.
Quartzite/ Quartz schist are varying in grade from sericite quartzite to kyanite -sericite quartz schist. Mica schists are associated with hornblende schist and garnet-biotite-hornblende schist. Muscovites in greater proportion in the mica schist are produced from earlier biotite through retrograde metamorphism with associated separation of magnetite.
Quartzite/Quartz schist varying to quartz granulite forms low ridges above mica schists.
- 4.2 **Structure:** According to the previous workers, Baharagora is located almost at the south-eastern end of the copper belt thrust/ Singbhum shear Zone but in this area shear zone is ill defined, narrow and gradually disguised into the granite. The dominant linear structures are parallel to the direction of tectonic transport.
As per the previous workers the following structural elements have been observed and are briefly discussed below:
- 4.2.1 **Planar Structure:** The planar structure present in this area are Stratification plane (S1), axial planar foliation (S2), crenulation cleavage (S3). Slickenside and Joints. S1 preserved in very few places and are marked by compositional variations. S2 appears as fine foliation in mica schist and shows brilliant preferred orientation of mica and chlorite in metabasic rocks. These planar structures are interpreted as axial planar schistosity is parallel to the axial planes of the folds on S1. Slickensides are prevalent in quartz schist and quartzite. Joints are very profound in competent rock like quartzite and quartzite schist. 3 sets of joints namely i) Strike Joints, ii) Dip joints, iii) Diagonal joints are well developed.
- 4.2.2 **Linear Structure:** The main linear structures found are puckers, mineral lineation, Bedding-Cleavage intersection, steaking and grooving. Puckers are limited to mica schist and are developed on S2. Pucker axis are sub-parallel to mineral lineation.
Mineral Lineation are defined by preferred orientation of mica and chlorite in pelitic schists; garnets in psammopelitic schists; chlorite, biotite and amphibole in metabasics. Bedding-cleavage intersection seen near to the hinge area of the Mundadevta-Darkhuli Sub-block and has the same plunge as the axis of the synformal flexure.
- 4.2.3 **Faults:** No major faults except small drag faults due to stretching in quartzite/ quartz schist are noticed.
- 4.2.4 **Folds:** Quartzite & Quartz schist in the Baharagora area are thrown into S-shaped, plunging synforms & antiforms, with plunge varying from 35° to 50° towards northeast. In the Mundadevta-Darkhuli block, the synformal flexure is asymmetric with eastern limb dipping more steeply (80-85°) than western limb (60-65°). The plunge of the fold axis is about 40° towards N40°E. Small scale folds including chevrons and mullions are quite common in the area. Axes of these folds are parallel to the down-dip lineation in number of places.
- 4.3 **Metamorphism:** Metamorphism in this area indicated by minerals as Biotite, Garnet, Staurolite and kyanite points towards middle amphibolite facies of Fyfe and Turner (1966). Occurrence of these index minerals during regional metamorphism constitutes a progressive series which is followed by retrogressive metamorphism during later shearing movements resulting developments of Biotite, muscovite and chlorite indicating Middle Greenschist facies.

4.4 Copper mineralisation:

4.1.1 **Mode of occurrences:** In Mundadevta-Darkhuli block, the mineralization occurs along both the limbs as well as in the hinge part of the asymmetric synformal flexure. Four main zones of mineralisation numbered 1,2,3,4 starting from footwall side and a number of minor veins have so far been intersected in the borehole drilled by GSI and in South Jharia Block three main zones of mineralisation numbered 1,2,3 starting from footwall side and a number of minor veins have been intersected in the borehole drilled by GSI. The individual lodes consists of alternatively richer and leaner band. Even in some cases lodes are in the form of sheeted zones separated by poorly mineralised partings. Thus the widths and grades of the lodes depends on the cut-off grade, thickness and strength of the partings. Mineralisation is in the form of fissure veins type associated with closely spaced shear zones, often show branching, sometimes cymoidal and mostly parallel to sub-parallel to the foliation.

Four main modes of occurrence of copper-nickel ore are: i) Dissemination confined to Biotite Quartz rock, ii) Stringers and veinlets along foliation and fractures of schists, iii) Massive sulphide veins in brecciated veined Quartz and iv) minor streaks and replacement patches.

4.4.2 **Hostrocks:** Mineralisation in this area is not confined to any particular stratigraphic horizon nor to any particular litho-unit. However some litho-units are preferred relative to other. Zones are restricted to Quartz-chlorite-biotite Schist, Biotite-quartz rock, Quartz-biotite schist, silicified brecciated rock and Metabasites.

4.4.3 **Structural control:** Mineralisation in this area is broadly controlled by litho-structure i.e. various openings as a result of multi stage deformation. Ore bodies are located along the shear tension surfaces and are more or less parallel to the foliations of the host rock. Different openings thus gave rise to in-filling types of mineralisation such as stringers, veins and veinlets, Breccia filling etc.

Table-II A: Details of lodes intersected in the Mundadevta-Darkhuli Block (After GSI, 1974).			
a. Mundadevta Sub block (Western Limb):			
<u>Lode no.</u>	<u>Range in width (m)</u>	<u>Range in grade(%)</u>	<u>Remarks</u>
1.	0.74 to 7.43	0.42 to 1.20 Cu. 0.03 to 0.30 Ni. 0.02 Co	Tested upto 150 m.
2.	0.50 to 4.29	0.29 to 2.08 Cu. 0.04 to 0.16 Ni.	Erratic in behaviour and irregular in in width and grade
3.	0.70 to 11.89	0.18 to 1.47 Cu. 0.04 to 0.06 Ni. 0.02 to 0.08 Co. 0.02 to 0.08 Mo.	Show variation at width and grade
4.	1.00 to 6.05	0.62 to 1.05 Cu. 0.05 to 0.11 Ni. 0.01 to 0.02 Co	Tested upto 232 m vertical depth

b. Central Sub Block (Hinge):			
<u>Lode no.</u>	<u>Range in width (m)</u>	<u>Range in grade(%)</u>	<u>Remarks</u>
1.	1.10 to 1.90	0.39 to 0.51 Cu. 0.03 to 0.18 Ni. 0.02 Co	Erratic in persistence
2.	0.70 to 1.82	0.15 to 0.98 Cu. 0.07 to 2.95 Ni. 0.02 to 0.28 Co.	Branches into a number of thin ore shoots separated by poorly mineralized zone.
3.	0.79 to 5.29	0.25 to 1.27 Cu. 0.03 to 0.28 Ni.	Has been found oxidised at 25 to 30 m vertical depth.
4.	Not tested		
c. Darkhuli Sub Block (Eastern Limb):			
<u>Lode no.</u>	<u>Range in width (m)</u>	<u>Range in grade (%)</u>	<u>Remarks</u>
1.	1.00 to 2.50	0.59 to 1.43 Cu. 0.03 Ni.	Persists below 200m vertical depth. Richer in middle section.
2.	0.79 to 7.00	0.42 to 1.36 Cu. 0.08 to 0.23 Ni.	Persists along strike and down depth. Branches into 3 veins.
3.	Oxidised		
4.	Not tested		

Table-II B: Details of lodes intersected in the South Jharia Block (After GSI, 1984).			
South Jharia block:			
<u>Zone/Lode no.</u>	<u>Range in width (m)</u>	<u>Range in grade(%)</u>	<u>Remarks</u>
1.	1.0 to 5.90	0.55 to 3.55 Cu. 0.10 to 0.11 Ni. 0.02 to 0.03 Co.	Persists along 600 m strike length. Impoverished in the northern part
2.	1.00 to 1.75	1.0 to 1.09 Cu	
3.	1.60 to 1.80	0.53 to 1.47 Cu.	

5.0 PREVIOUS WORK

Old workings for Copper was first reported by Stoehr in the year of 1870 in the Baharagora area. During mapping of the area Dunn and Dey (1942) also gave a brief description about these old workings. Sinha and party carried out SP-Resistivity and Magnetic survey in the area during field session of 1951-52. Sharma and Sahi carried out detailed Geological Mapping and Geochemical prospecting for copper in the area during the field session of 1969-70.

During the field session 1968-69 P Mukherjee after reconnaissance of the aero-EM intercept BBI-20-601.1 near Baharagora and recommended detailed geological, geochemical and ground geophysical survey.

In the following year detailed integrated geological, geochemical and IP-resistivity investigation of the area was taken up. Based on the results of these integrated surveys Drilling was commenced by GSI in the year of 1970.

A total 4805.76 m of diamond core drilling in 28 BHs was completed in Mundadevta Darkhuli Block. Later in the second phase 3 more BHs was drilled with a meterage of 755.05 m in the northern extension of Mundadevta Block to further investigate the extent of the lodes and the occurrence of Mo in the BH no. BJ-28.

A total 11 Borehole drilled by GSI with a cumulative Drilling of 1798.25 m in the South Jharia Block.

Table-III A: Details of Boreholes drilled by GSI in Mundadevta-Darkhuli Block, with depth and level of intersection and grades of lodes.

BH.No	Inclination (from Horizon)	Bearing	RL (m)	Total Depth (m)	Depth of intersection of mineralised zone (m)		Thick- ness (m)	Grade %				Lode Designa- tion
					From	To		Cu	Ni	Co	Mo	
BJ-01	50	290	88.71	88.39	56.97	67.27	1.00	2.08				2
BJ-01					80.73	83.78	3.05	0.74				1
BJ-02	50	270	87.03	91.44	59.91	61.13	1.22	1.10				2
BJ-02					80.74	88.17	7.43	0.85				1
BJ-03	50	290	94.72	156.67	61.05	61.70	0.65	1.00	0.16			2
BJ-04	50	270	86.77	88.51	83.05	86.10	3.05	0.63				1
BJ-05	45	130	94.64	91.44	46.91	53.91	7.00	0.56				2 Sh 'c'
BJ-06	40	270	88.61	196.60	52.77	53.87	1.10	1.08				3
BJ-06					117.26	119.79	2.53	0.72	0.03			1
BJ-06					160.30	162.00	1.70	0.53				1FW/X
BJ-07	35	270	90.25	245.06	156.45	158.45	2.00	0.69	0.07			1
BJ-08	45	130	95.87	91.44	69.56	70.96	1.40	0.73				2 Sh 'c'
BJ-08					78.58	81.63	3.05	0.72				2 Sh 'b'
BJ-08					86.17	89.35	3.18	1.17				2 Sh 'a'
BJ-09	45	130	95.47	89.85	80.25	82.60	2.35	0.73				2 Sh 'a'
BJ-10	45	130	95.51	235.35	58.91	60.24	1.33	0.42	0.08			2 Sh 'b'
BJ-10					68.81	69.60	0.79	1.36	0.23			2 Sh 'a'
BJ-10					158.93	161.23	2.18	1.43				1
BJ-11	50	255	96.50	67.25	50.63	51.64	1.01	0.20	2.95	0.28		2
BJ-12	45	130	96.37	198.00	71.45	74.30	2.85	0.72				2 Sh 'a'
BJ-12					117.07	118.41	1.34	1.36	0.14			1HW/Y
BJ-12					149.44	151.20	1.76	1.11				1
BJ-13	50	270	87.87	156.78	77.10	81.39	4.29	0.60	0.12			2
BJ-13					99.54	100.76	1.22	1.20				1
BJ-15	50	275	88.74	128.50	67.54	68.49	0.95	0.82				2
BJ-15					78.86	79.93	1.07	0.48				1
BJ-17	50	270	88.94	202.20	54.81	66.70	11.89	1.34	0.04	0.02		3
BJ-17					116.25	117.39	1.14	0.60	0.04			2
BJ-17					135.02	135.76	0.74	0.91	0.12	0.02		1
BJ-18	50	270	88.09	203.00	47.65	53.90	6.25	OXIDISED				
BJ-18					114.52	117.17	2.65	0.68	0.03			2
BJ-18					127.21	133.21	6.00	0.84	0.08			1
BJ-18					141.85	142.90	1.05	2.57	0.04			1FW/1A
BJ-19	50	270	89.01	189.68	71.20	72.20	1.00	0.91	0.04			3
BJ-19					145.05	146.07	1.02	0.42	0.30			1
BJ-21	50	255	96.10	164.55	46.79	48.40	1.61	0.74	0.03			3HW
BJ-21					61.60	62.90	1.30	0.71				3B
BJ-21					65.25	67.30	2.05	0.25	0.28			3
BJ-21					70.05	70.84	0.79	1.23				3A
BJ-21					78.01	78.71	0.70	0.98	0.13			2 Sh 'c'
BJ-21					80.01	81.23	1.22	0.96	0.07			2 Sh 'b'
BJ-21					83.81	85.63	1.82	0.51	0.35			2 Sh 'a'
BJ-21					101.42	103.32	1.90	0.39	0.18			1
BJ-22	50	250	95.62	133.25	53.67	58.96	5.29	0.25				3
BJ-22					67.75	68.45	0.70	0.81	0.20			2 Sh 'c'

BH.No	Inclination (from Horizon)	Bearing	RL (m)	Total Depth (m)	Depth of intersection of mineralised zone (m)		Thick- ness (m)	Grade %				Lode Designa- tion
					From	To		Cu	Ni	Co	Mo	
BJ-22					71.54	73.30	1.76	0.37	0.17			2 Sh 'b'
BJ-22					74.17	75.75	1.58	0.15	0.17			2 Sh 'a'
BJ-23	50	202	95.16	130.20	43.30	46.75	3.34	0.50				3
BJ-23					61.15	62.15	1.00	0.86	0.16	0.02		2 Sh 'c'
BJ-23					63.80	65.20	1.40	0.81	0.25	0.03		2 Sh 'b'
BJ-23					118.55	119.65	1.10	0.51	0.03			1
BJ-24	45	170	95.18	150.85	43.10	45.90	2.80	1.27				3
BJ-24					121.20	122.37	1.18	0.46	0.08	0.02		1
BJ-25	45	130	93.95	111.15	59.75	62.25	2.50	0.60	0.03			1
BJ-25					43.00	46.15	3.15	0.52				1HW/Z
BJ-26	45	130	95.31	101.90	80.15	81.95	1.80	0.59	0.03			1
BJ-27	50	270	88.54	206.20	101.00	103.35	2.35	1.00	0.06			3
BJ-27					129.30	131.39	2.09	0.81				2/M
BJ-27					192.80	194.40	1.60	0.49	0.10			1FW/1A
BJ-28	50	270	91.43	258.90	66.65	67.75	1.10	0.62				4
BJ-28					129.45	130.50	1.05	0.57			0.08	3
BJ-28					148.85	149.85	1.00	0.18	0.06	0.02		3FW/3A
BJ-29	50	260	93.96	256.75	97.40	100.85	3.45	0.79	0.05	0.01		4
BJ-29					117.53	119.25	1.72	0.71				3C
BJ-29					121.40	122.95	1.55	0.74				3B
BJ-29					133.80	139.50	5.63	0.78	0.05			3
BJ-29					184.65	186.07	1.42	0.29	0.11			2
BJ-30	45	130	92.21	294.90	126.85	128.98	2.13	0.55				3
BJ-30					169.90	170.62	0.72	0.88				3FW/P
BJ-30					172.17	173.42	1.25	1.00				2 Sh 'c'
BJ-30					181.67	183.07	1.40	0.50				2 Sh 'b'
BJ-30					186.19	187.32	1.13	0.84				2 Sh 'a'
BJ-30					197.27	198.65	1.38	0.59				1HW/N
BJ-30					266.10	267.10	1.00	0.71				1
BJ-31	vertical	45	90.92	422.95	223.25	229.30	6.05	1.05	0.11	0.02		4
BJ-31					317.30	318.00	0.70	0.34	0.04	0.06	0.02	3
BJ-31					336.65	337.75	1.10	0.14	0.17	0.02		2(?)
BJ-39	50	270	93.02	237.85	140.55	141.05	0.50	0.72				2
BJ-39					152.15	153.30	1.15	0.75				1
BJ-39					157.35	163.00	5.95	0.63				1FW
BJ-40	50	270	93.53	280.15	111.90	113.50	1.60	1.47				3
BJ-40					135.80	139.64	3.84	0.65				1
BJ-40					143.00	143.50	0.50	0.60				1FW
BJ-41	50	270	93.92	237.05	143.35	147.35	4.00	0.23				1(?)

Table-III B: Details of Boreholes drilled by GSI, with depth of intersection and grades of lodes.

BH.No.	Inclination (from Horizon)	Bearing	RL (m)	Total Depth (m)	Depth of Intersection of mineralised zone (m)		Thickness	Grade % Lode Designation			Lode Designation
					From	To		Cu	Ni	Co	
BJ-34	50	290	85.66	161	129.00	129.90	0.90	0.38			
BJ-16	45	290	85.27	75	68.43	69.60	1.17	0.54			1
BJ-35	45	290	85.14	102.35	93.25	94.15	0.90	0.54			1
BJ-36	45	290	84.94	182.3	174.75	175.75	1.00	0.28			
BJ-33	45	290	84.51	218.1	94.20	96.00	1.80	1.07			1
BJ-14	45	290	83.18	75.00	67.02	67.55	0.53	1.38			1
BJ-37	45	290	82.20	218.00	127.00	127.80	0.80	0.53			2
					159.17	160.80	1.63	0.79			1A
					159.17	160.10	0.93	1.12	0.12	0.03	1A
					174.05	175.28	1.23	2.05	0.11	0.02	1B
					181.35	182.40	1.05	0.53			1C
					194.25	195.75	1.50	2.37			1D
					194.50	195.50	1.00	3.55			1D
BJ-32	45	290	81.53	226.55	39.60	45.50	5.90	0.55			2
					43.75	45.50	1.75	1.00			2
					102.25	103.71	1.46	0.39			1
BJ-20	45	290	81.27	75.01	62.32	63.07	0.75	0.39	0.17		1
BJ-38	45	290	78.97	255.00	71.85	73.65	1.80	1.00			3
					113.35	114.75	1.40	0.36			2
					198.15	199.40	1.25	1.11			1
BJ-43A	65	260	80.78	244.45	180.91	181.24	0.33	1.22			2 (?)
					184.05	184.50	0.45	1.2			2A (?)
					211.77	214.87	3.10	0.96			1
					211.77	214.37	2.60	1.13	0.10		1

7.0 PRESENT WORK

Objectives of the present level (G2) exploration (as recommended by 27th TCC) are as follows:

1. To know the continuity of the lodes both along the strike and dip.
2. Intersects lode no 3 (Mundadevta area) at -50m RL in every profile/ section there should be one borehole which and boreholes may terminate at 75m to 100m RL.
3. The vertical depth of intersection will vary between 150m and 160m.
4. To estimate **Geological resources of Copper under G-2 category (UNFC-332)**.
5. To ascertain the amenability of the Copper ore through beneficiation study.

8.0 PLANNED METHODOLOGY

8.1 Drilling:

8.1.1 It is proposed to take up the investigation with intersection vertical depth up to 150-160m (-75mRL to -100mRL). A total 23 Nos of BHs within which 14 BHs with 3280.00 m of drilling in Mundadevta-Darkhuli Block and 9 BHs with 1655.00 m of drilling in South Jharia Block has been proposed for the present exploration. Total meterage included 4935 m (Table-IV).

8.1.2 New boreholes has been proposed at interval of 50 m since the structure of the block is complex in nature and persistency of the lode in width and grade is highly variable along strike and dip direction.

Table-IV: The details of proposed Boreholes with proposed inclination, bearing and Proposed depth:

<u>Cross Section</u>	<u>BH.No.</u>	<u>Inclination</u>	<u>Bearing</u>	<u>Proposed Depth (m)</u>	<u>Remarks</u>
MD 3-3'	PBH-04	50	270	270	
MD 4-4'	PBH-07	55	270	200	
MD 7-7'	PBH-13	55	270	230	
	PBH-14	55	270	300	May be drilled to intersect lode 3 at -50 MRL, may extend upto further if lode 1/IFW positively intersected in PBH 13.
MD 9-9'	PBH-17	50	270	215	To intersect target Lode 3FW.
MD 11-11'	PBH-20	50	270	150	
	PBH-21	50	270	220	To intersect target Lode 3 at -50 MRL.
MD 13-13'	PBH-23	50	260	230	To intersect target Lode 3 at -50 MRL.
MD 16-16'	PBH-25	55	202	200	
	PBH-26	65	202	175	To intersect LODE 4 at -50 mRL
MD 19-19'	PBH-28	55	130	250	
MD 21-21'	PBH-32	50	130	280	To intersect target Lode 2 at -100 MRL.
MD 22-22'	PBH-34	55	130	300	To intersect LODE 4 at 00 mRL
MD 23-23'	PBH-36	55	130	260	
SJ 3-3'	PBH-41	50	290	190	
SJ 4-4'	PBH-44	50	290	280	
SJ 5-5'	PBH-46	50	290	185	
SJ 7-7'	PBH-50	50	290	125	
	PBH-52	50	290	250	Conditional if Lode 1 found positive in PBH-50.
SJ 8-8'	PBH-54	50	270	130	
	PBH-55	50	270	190	Conditional if Lode 1 found positive in PBH-54.
SJ 9-9'	PBH-57	50	260	125	
	PBH-58	50	260	180	Conditional if Lode 1 found positive in PBH-57.
		TOTAL		4935	

8.2 Borehole Core Logging

Detailed drill core logging will be done with consideration of lithological details, structural features, e.g. joints, veins foliations, mineralization pattern, visual estimation of copper content and other associated minerals in percentage etc. for entire length of all the holes and determination of Rock Quality Designations (RQD) for entire length of core in each borehole.

8.3 Borehole Geophysical Logging

Borehole Geophysical logging including Induced Polarisation, Resistivity, SP & Spectral Gamma is proposed in all the boreholes in the Block.

8.4 Primary Sample

- 8.4.1 The borehole cores will be spitted into two equal halves by using core splitter. One half will be powdered to -200 mesh size and the other half will be kept for future studies. The powdered material will be mixed thoroughly and about 100 gram of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-200 mesh size) will be kept as duplicate for future reference. This will generate about 700 nos. of samples, which will be sent to MECL Lab. for analysis for Cu, Ni, Mo, Co.
- 8.4.2 Check samples will be prepared and around 35 (5%) samples analysis will be done at internal lab and 70 nos. (10%) sample analysis will be done at external laboratories for Cu, Ni, Mo, Co.
- 8.4.3 A total nos of 115 sample (100 Primary sample + 15 Check sample) will be analysed for Au by Fire Assay.

8.5 Composite Sample

- 8.5.1 Composite samples will be prepared zone wise based on primary sample data. This will generate about 100 nos. of composite samples which will be analysed for radicals such as Cu, Ni, Co, W and Mo. 100 nos. of composite sample will be analysed for Au by Fire Assay.
- 8.5.2 10 nos. of sample will be analysed in ICP-MS (34 element) for multi-elemental analysis and trace element study.

8.6 Petrography, Mineragraphy & Specific Gravity Studies

- 8.6.1 25 no of samples for Petrographic study by thin section 25 no of samples for Mineragraphic studies through polished section shall be proposed to be carried out at MECL Lab.
- 8.6.2 Total 25 nos. samples will be studied for Specific Gravity determinations.

8.7 Geo-Technical Studies

Geo-technical Studies viz., Tensile strength, Compressive strength, Young's modulus, Proto-dyakonov test, density etc., would be conducted on the cores of exploratory borehole cores from the mineralised zone along with foot wall and hanging wall at National Laboratory / NIT as to ascertain rock characteristics.

8.8 Bulk Samples for Beneficiation Test

Two (2) representative bulk sample each from Mundadevta-Darkhuli Part and South Jharla Part would be drawn from the duplicate half core samples of mineralised zones and would be sent for laboratory scale beneficiation studies to IBM Laboratory, Nagpur.

9.0 Quantum of Proposed Work

Table-VI: Nature and Quantum of proposed exploratory programme:

S.No.	Description and Nature of Work	Unit	Target	Remarks
I	a) Topographic Survey (1:2000 Scale)	Sq.Km.	2.13	
	b) Geological Mapping (1:2000 Scale)	Sq.Km.	Update	
II	Exploratory Drilling	m	4935 (23 BHs.)	
III	Borehole Geophysical Logging	m	4935 (23 BHs.)	
IV	Laboratory Studies			
	a) Primary Samples			
	i. For Cu + Ni + Co + Mo.	Nos.	700	
	ii. For Au by Fire Assay	Nos.	100	
	b) Check Samples			
	i. For Cu + Ni + Co + Mo.	Nos.	105	
	ii. Au by Fire Assay	Nos.	15	
	c) Composite Sample			
	i. For 5 radicals (Cu, Ni, Co, Mo and W)	Nos.	100	
	ii. For Au by Fire Assay	Nos.	100	
	iii. ICP-MS (34 Elements)	Nos.	10	
	d) Petrographic Studies	Nos.	25	
	e) Mineragraphic Studies	Nos.	25	
	f) Specific Gravity determinations	Nos.	25	
V	a) Geo-Technical Studies (on One BH cores)	Nos.	1	
	b) Beneficiation Studies (for Cu)	Nos.	2	
VI	Geological Report preparation (Digital and Hard Copy Format)	Nos.	1	

10.0 COST ESTIMATE

10.0.1 The cost has been estimated based on actual schedule of rates mandated in the circular OM No. 61/1/2018/NMET dated 31st March 2020 for NMET funded projects which is Rs 967.70 Lakhs.

10.0.2 Summary of Cost Estimates

Sl. No.	Item	Total
1	Exploratory Drilling	6,30,35,350.00
2	Geology & Survey	1,00,36,800.00
3	Borehole Geophysical logging	23,98,410.00
4	Laboratory Studies	41,47,644.00
	Sub total	7,96,18,204.00
6	Report	20,00,000.00

7	Peer Review	10,000.00
8	Proposal Preparation	3,80,000.00
	Total	8,20,08,204.00
11	GST (18%)	1,47,61,476.72
	Total cost including 18% GST	9,67,69,680.72
	SAY, in Lakhs	967.70

10.0 TIME SCHEDULE

The proposed exploration programme envisages surveying, updating of geological mapping exploratory drilling, deviation survey, sample preparation and laboratory studies, which will be completed within 14 months by deploying 2 drill rigs, geological report preparation will consume 4 more months. Therefore, a total of 18 months is planned for completion of the entire programme.

11.0 JUSTIFICATION

- 11.1 GSI bore holes have intersected considerable copper mineralisation in various bore holes. Reserves/Resources (indicated and inferred combined) at cut-off grade of 1.0% Cu is amount to 2.12 m. tonnes (1.42 m. tonnes of 1.23% Cu, and 0.70 m. tonnes of 0.87% Cu plus 0.21% Ni), at 0.7% Cu is 3.876 m. tonnes (2.650 m. tonnes of 0.92% Cu and 1.226 m. tonnes of 0.74% Cu plus 0.16% Ni), at 0.5% Cu is 6.86 m. tonnes (4.77 m. tonnes of 0.79% Cu and 2.09 m. tonnes of 0.59% Cu plus 0.12% Ni) and at cut-off grade 0.5% Cu+Mo 0.1232 m. tonnes of 0.5% Cu plus 0.08% Mo, down to 290m vertical depth from the datum line fixed at 100 mRL in Mundadevta-Darkhuli Block. Resource (indicated and inferred combined) at cut-off grade of 1.0% is amount to 0.65 m. tonnes of 1.3% Cu, and at cut-off grade of 0.5% is 0.92 m. tonnes of 1.01 % Cu, down to 200m vertical depth from the datum line fixed at 100 mRL in South Jharia Block as assessed by GSI.
- 11.2 The assessment of continuity of the lodes at down dip and density of drilling needs to be improved to test the persistence of the ore body at closure intervals and for a greater confidence in providing resource.
- 11.3 As recommended in the previous report few boreholes needs to be drilled to test the persistence of the Ni bearing zones in down dip direction at hinge part.
- 11.4 To assess the north-east extension of the mineralized zone of the eastern limb.
- 11.5 To intersect lode no 4 which were not tested in the Hinge portion and in the Eastern limb in the Mundadevta-Darkhuli Block.
- 11.6 To test the extended area of south of BJ-43A in South Jharia Block as recommended in the previous report.

PLATES:

S.No	Description	Plate No.
1	Location map of Mundadevta-Darkhuli-South Jharia Block	1
2	Regional Geological Map of Singbhum Copper Belt.	2
3	Geological Map of Mundadevta-Datrkhuli-South Jharia Copper Block with PBH location.	3
5	Geological Cross Sections MD 1-23 & SJ 1-10	4

ANNEXURE:

S.No.	Description	Annexure No.
1	The consent letter from DGM, Jharkhand	I

References:

1. Report on the Exploration in the Mundadevta-Darkhuli Block, Baharagora Copper Prospect, Singbhum District, Bihar by P Majumder, Geologist (Sr), AMSE Wing, GSI, September, 1974.
2. Exploration for Copper in the South Jharia-Charakmara Blocks and Mundadevta Sub-Block Extension, Baharagora Copper Prospect, Singbhum District, Bihar, FSP: 1975-76 & 1977-78, By P Majumder, Geologist (Sr.), AMSE Wing, GSI, February, 1984.

Cost Estimate for General Exploration (G2) Proposal for Estimation of Copper, Nickel, Cobalt Ore in Munda Devta - Darkhuli -South Jharlia Copper Block, Singhbhum Copper Belt, East Singhbhum District, Jharkhand State							
Total Area - 2.13 sq km ; Nos. of Borehole - 23 ; Borehole depth range - 125m to 310m ; Completion Time -18 Months							
S.N	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal		Remarks
			SoC-Item -SI No.	Rates as per SoC	Qty.	Total Amount (Rs)	
A	GEOLOGICAL WORK						
1	Borhole logging & sampling & report writing						
a	Charges for one Geologist per day at HQ	day	1.3	9,000	120	10,80,000	
b	Charges for one Geologist per day at field	day	1.3	11,000	420	46,20,000	
c	Labour (2 Nos) Base rate - Rs.420 X 2 = 840	day	5.7	840	420	3,52,800	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
2	Survey (on 1:2000 Scale)						
a	Bore Hole Fixation and determination of co-ordinates & Reduced Level of the boreholes by DGPS	Per Point of observation	1.6.2	19,200	23	4,41,600	
b	Charges of one Surveyor (1 Party)	one surveyor per day	1.6.1a	8,300	90	7,47,000	
c	Labours (4 Nos) Base rate - Rs. 420*4=1680/-	day	5.7	1,680	90	1,51,200	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
d	Charges for one Sampler per day (1 Party)	one sampler per day	1.5.2	5,100	390	19,89,000	
e	Labours (4 Nos) Base rate - Rs. 420 x 4 = 1680/-	day	5.7	1,680	390	6,55,200	Amount will be reimburse as per the notified rates by the Central Labour Commissioner or respective State Govt. whichever is higher
	Sub-Total A					1,00,36,800	
B	Borehole Geophysical Logging/ ORE MODELING						
1	Base log	Per m	3.11a	151	4,935	7,45,185	
2	Induced Polarosation (I.P)	Per m	3.11p	93	4,935	4,58,955	
3	Resistivity	Per m	3.11c	39	4,935	1,92,465	
4	SP	Per m	3.11b	39	4,935	1,92,465	
5	Spectral Gamuna	Per m	3.11o	164	4,935	8,09,340	
	Sub-Total B					23,98,410	
C	DRILLING						
1	Drilling up to 300m (Hard Rock)	m	2.2.1.4a	11,500	4,935	5,67,52,500	
2	Borehole deviation Survey by Multishot Camera	m	2.2.6	330	4,935	16,28,550	
3	Land / Crop Compansation (in case the BH falls in agricultural Land)	per BH	5.6	20,000	23	4,60,000	Amount will be reimburse as per actuals or max. Rs. 20000 per BH with certification from local authorities
4	Construction of concrete Pituit (12% 12% 20%)	per borehole	2.2.7a	2,000	23	46,000	
5	Transportation of Drill Rig & Truck associated per drill (2 rigs)	Km	2.2.8	36	4,000	1,44,000	2000km to & fro from Nagpur/ Rig
6	Monthly Accomodation Charges for drilling Camp (up to 2 Rigs)	month	2.2.9	50,000	14	7,00,000	
7	Drilling Camp Setting Cost	Nos	2.2.9a	2,50,000	2	5,00,000	
8	Drilling Camp Winding up Cost	Nos	2.2.9b	2,50,000	2	5,00,000	
9	Road Making (Flat Terrain)	Km	2.2.10a	22,020	15	3,30,300	Road Making will be considered as per the requirement and Road Making Charges will be reimbursed accordingly.
10	DGPS Survey for Block Boundary	per point	1.6.2	19,200	20	3,84,000	
11	Drill Core Preservation	per m	5.3	1,590	1,000.00	15,90,000	
	Sub Total C					6,30,35,350	
D	LABORATORY STUDIES						
I	Chemical Analysis						
i)	Primary samples						
a.	for Cu, Ni, Mo, Co	Nos	4.1.7a	2,506	700	17,54,200	
b.	Au by Fire Assay	Nos	4.1.5a	2,380	100	2,38,000	1315
ii)	Check samples Internal (5%)						
a.	for Cu, Ni, Mo, Co & W	Nos	4.1.7a	2,506	35	87,710	
b)	For Au (Gold) by Fire Assay	Nos	4.1.5a	2,380	5	11,900	
iii)	Check samples Extrnal (10%)						
a.	for Cu, Ni, Mo, Co & W	Nos	4.1.7a	2,506	70	1,75,420	
b)	For Au (Gold) by Fire Assay	Nos	4.1.5a	2,380	10	23,800	

S.N	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal		Remarks
			SoC-Item -SI No.	Rates as per SoC	Qty.	Total Amount (Rs)	
iii)	Composite Samples						
	a) For 5 Radicals (Cu, Ni, Co, W Mo)	Nos	4.1.7a	2,506	100	2,50,600	
	b) For Au (Gold) by Fire Assay	Nos	4.1.5a	2,380	100	2,38,000	
	c) ICP-MS (34 Elements)	Nos	4.1.14	7,731	10	77,310	
	d) XRD	Nos	4.5.1	4,000	-	-	
	e) Geo-Technical Sample	Nos	N.A	14,663	25	3,66,575	will be reimbursed as per actual
	c) Beneficiation Study *	Nos	4.7.2 as per IBM Rate	2,83,927	2	5,67,854	will be reimbursed as per actual
	Sub-Total -D					37,91,369	
E	Petrological samples (Surface & Bh Core Samples)						
	i) Preparation of thin section	Nos	4.3.1	2,353	25	58,825	
	ii) b) Study of Thin Section	Nos	4.3.4	4,232	25	1,05,800	
	Sub-Total -E					1,64,625	
F	Mineragraphic Studies (Surface & Bh Core Samples)						
	a) Preparation of polished section	Nos	4.3.2	1,549	25	38,725	
	b) Study of Polished Section	Nos	4.3.4	4,232	25	1,05,800	
	c) Digital Photographs	Nos	4.3.7	280	25	7,000	
	Sub-Total -F					1,51,525	
G	Specific Gravity Determination						
	Specific Gravity Determination	No.	4.8.1	1,605	25	40,125	
	Sub-Total - G					40,125	
H	Total A to G					7,96,18,204	
I	Geological Report Preparation	5 Hard copies with a soft copy	5.2	For the projects having cost more than Rs. 300 lakhs - A minimum of Rs. 9 lakhs or 3% of the value of work whichever is more subject to Max. Rs. 20 lakhs		20,00,000	
J	Peer review Charges		As per EC decision			10,000	
K	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	5 Hard copies with a soft copy	5.1	2% of the Cost or Rs. 3.8 Lakhs whichever is lower		3,80,000	EA has to submit the Hard Copies and the soft copy of the final proposal along with Maps and Plan as suggested by the TCC-NMET in its meeting while clearing the proposal.
L	Total Estimated Cost without GST					8,20,08,204	
M	Provision for GST (18% of L)	%				1,47,61,477	GST will be reimburse as per actual and as per notified prescribed rate
N	Total Estimated Cost with GST					9,67,69,681	
or Say Rs. , In Lakhs:						967.70	

**TIME SCHEDULE /ACTION PLAN FOR GENERAL EXPLORATION (G-2) IN MUNDA DEVTA - DARKHULI - SOUTH JHARIA COPPER BLOCK,
SINGHBHUM COPPER BELT, EAST SINGHBHUM DISTRICT, JHARKHAND STATE.**

Sl. No.	Activities	Unit	MONTHS																		Total
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	Camp Setting	Month	1																	1	1 month
2	Core Drilling (2 rigs)	m.		200	500	500	500	500	500	500	500	500	500	390							4935 4935m (in 23 Bhs)
3	Borehole Geophysical Studies	m.		50	500	500	500	500	500	500	500	500	500	500	40						4935 4935m (in 23 Bhs)
4	Survey Party days	day		15	15			15			15			15	15						90 90 days
5	Geologist Party days (2 Party)	day		30	30	30	30	30	30	30	30	30	30	30	30	30	30				420 420 days
6	Sampling Party days, Core Sampling (2 Party)	day			30	30	30	30	30	30	30	30	30	30	30	30	30				390 390 days
7	Camp Winding	Month															1			1	1 month
8	Laboratory Studies	Nos.			50	50	50	100	100	100	100	100	100	100	100	100	132				1182 Nos (Primary/ Check/ Composite/Oths)
9	Geologist Party days (1 Party), HQ	day													15	15	15	15	30	30	120 120 days
10	Report Writing	Month													1	1	1	1	1	1	6 6 month
NOTE																					
1	Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearances.																				
2	Time loss on account of monsoon/agricultural activity/forest clearance/local law & order problem/ lockdown etc will be additional to above time line.																				