Proposal for Exploration of Copper Bearing Minerals around Musabani, Dumriya, Maheshpur areas in West Singhbhum District of Jharkhand for Reconnaissance Survey (G4 Stage) under NMET

(Copper Bearing Minerals)

By

Natural Resources Division, Tata Steel Limited

Place: Jamshedpur, Jharkhand
Date: 19-07-2024

Summary of the Block for Reconnaissance Survey (G4 Stage)

GENERAL INFORMATION ABOUT THE BLOCK

	Features	**Details**
	Block ID	Musabani-Dumriya-Maheshpur
	Exploration Agency	Natural Resources Division, Tata Steel Limited
	Commodity	Copper Bearing Minerals
	Mineral Belt	Singhbhum Share Zone
	Completion Period with entire time schedule to complete the project	24 Months
	Objectives	1. Carryout mapping, soil, and bed rock sampling to identify potential zones of copper mineralization. 2. Perform geophysical survey in most potential areas to delineate zone of mineralization and propose next phase of exploration to quantify resource and grades.
	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	Field geological activities including collection of samples, database preparation, review, interpretations, report writing etc shall be conducted by Natural Resources Division, Tata Steel Limited. Some of the job such as chemical analysis, geophysical survey shall be conducted thorough outsourced agencies.
	Name/ Number of Geoscientists	4 to 6 geoscientists shall be deployed in the project
	Expected Field days (Geology) Geological Party Days	Geology = 325 man-days (approx.) Geological Party = 470 man-days (approx.)
1.	**Location**	
	Latitude	22.35^0 to 22.55^0
	Longitude	86.42^0 to 86.57^0
	Villages	Musabani, Dumriya, Maheshpur
	Tehsil/ Taluk	Musabani, Dumaria
	District	West Singhbhum
	State	Jharkhand
2.	**Area (hectares/ square kilometers)**	
	Block Area	166.296 Sq. Km.
	Forest Area	-
	Government Land Area	-
	Private Land Area	-
3.	**Accessibility**	
	Nearest Rail Head	Ghatshila Railway Station
	Road	NH-18
	Airport	Sonari, Ranchi, Kolkata
4.	**Hydrography**	-
	Local Surface Drainage Pattern (Channels)	Trellis drainage pattern
	Rivers/ Streams	Sankh Nadi and its' tributaries are flowing through the block and meeting Subarnarekha River flowing parallel to the block at about 3.0 to 4.0 Km way from the eastern boundary.
5.	**Climate**	
	Mean Annual Rainfall	44.58 mm (1.76in)

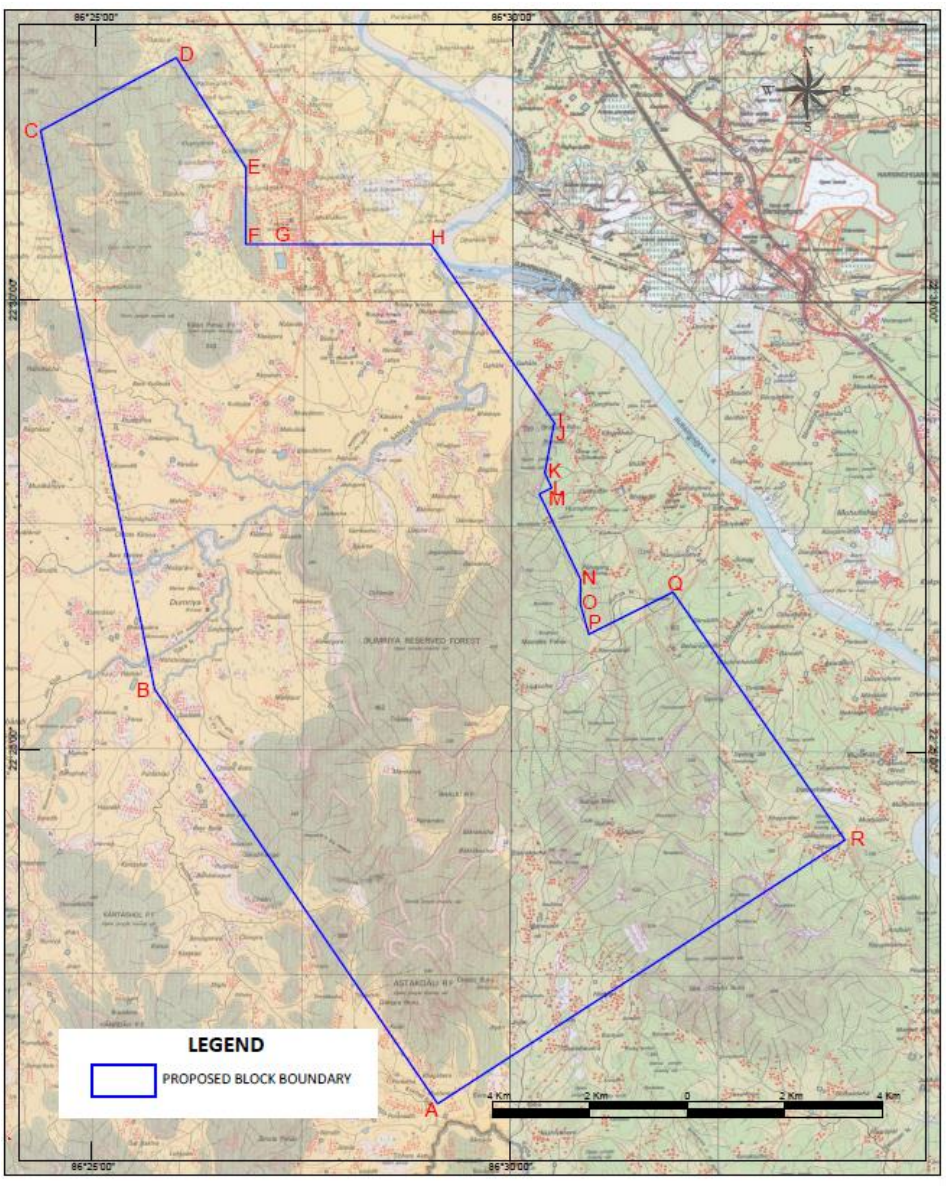
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	11^0C 44^0C
6.	Topography	45% area is flat with few mounts. 55% area is very rugged where hill ridges are about 300m to 400m from the surrounding flat land.
	Toposheet Number	73J/6, 73J/7, and 73J/11
	Morphology of the Area	Northern part is mostly flat with small mounts while southern part is having hills with steep slopes, scarps, and intermittent valleys.
	Availability of baseline geoscience data	Yes (in NGDR and Bhukosh)
	Geological Map (1:50K/ 25K) Geochemical Map	Available (1:50000 Scale)
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Available (Regional Scale)
	Justification for taking up Reconnaissance Survey / Regional Exploration	The area is falling close to the well-known Singhbhum Share Zone which host a variety of mineralization with most known are the copper and uranium deposits of India. Prominent deposits of the belt are Chapri, Rakha, Surda, Kendadih, Pathargora and Dhobani. The Surda mine which is under operation of Hindustan Copper Limited is located just at the northern boundary of the proposed block for investigation. A number of G3/G2 exploration projects for investigation of copper were undertaken in past by GSI and MECL just outside the eastern boundary of the proposed block where it could be observed that copper mineralization is mainly hosted in Quartz-Chlorite-Schist, shared quartzites and in some areas at the contact of soda granite and epidiorite and also within epidiorite. Few field traverses undertaken in the proposed block by Natural Resources Division, Tata Steel Limited, could see existence of bands of quartz-chlorite-schist and shared quartzite at places. Analysis of 5 BRS samples collected from the area had concentration of copper between 106ppm to 346ppm, Ti between 2878ppm to 5053ppm, V between 190ppm to 305ppm, Ni between 135ppm to 214ppm, Cr between 183ppm to 472ppm. The above analysis of randomly collected few BRS samples indicate that the rocks have elevated metal content and there is possibility of higher concentration of metal at suitable litho-structural domain in the area.

DETAILED DESCRIPTION ABOUT THE BLOCK

1. Block Summary

1.1 Physiography:

The northern part of the block is situated at about 10 Km. from Ghatshila in the southwest direction and close to Musabani township of Hindustan Copper Limited. It is located the western bank of the Subarnarekha River. The area exhibits both plain land and rugged hills of about equal proportion. Sankh Nadi is the main water body in the area with few tributaries flowing through the central part of the block running west to east and meeting Subarnarekha River, about 3.5 Km way from the eastern block boundary. The minimum elevation of the area is 80 mRL, located around the northeastern boundary of the block, close to Sonagutu village whereas the highest point is 540 mRL in the southwestern part within the hilly area. Accessibility in the northern part of the block is fairly avaliable due to existence of villages while the southern parts of the block do not have much accessibility due to forest cover and rugged topography with extensive scarp sections.



Map-1: Location of the proposed exploration block over toposheet

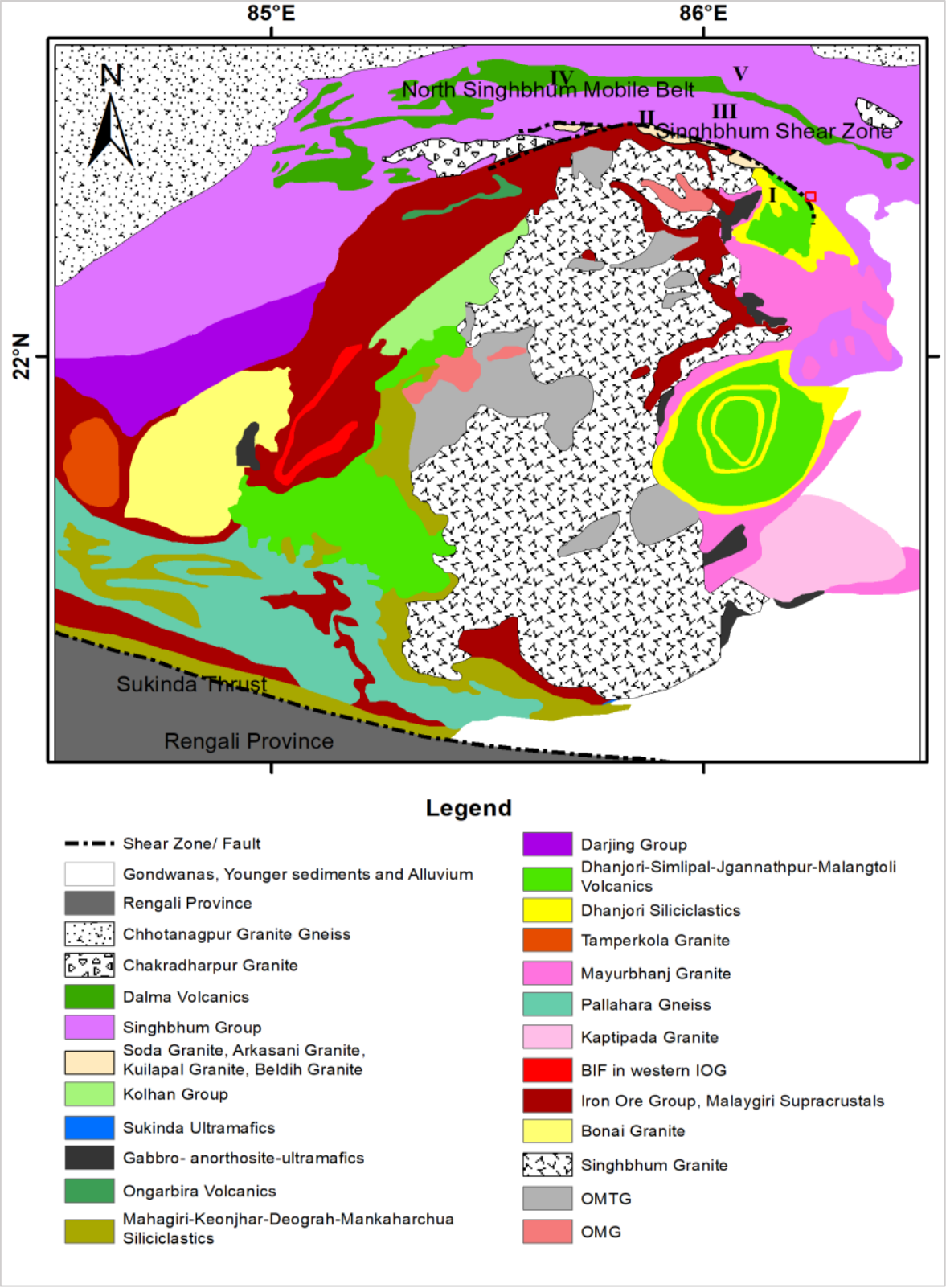
1.2 Background Geology (Regional Geology, Geology of the Block):

Regionally the area is falling close to the central part of Singhbhum Share Zone having lithologies of both Dhanjori (older) and the Singhbhum (younger) formations. In the north of the Singhbhum Share Zone (SSZ) at north it is bounded by the arcuate shaped North Singhbhum Mobile Belt (NSMB) and at the south by Singhbhum Granite (SBG) and Iron ore Group (IOG). Many pioneer workers such as Dunn (1929), Dunn and Dey (1942), Sarkar and Saha (1962, 1977, 1983), Gupta and Basu (2000) have dedicated their research to deduce and establish the geology, tectonic evolution and metallogeny of the area.

The North Singhbhum Mobile Belt (NSMB) is about 200 km long and 50 km wide curved orogenic belt. The belt has a general N–S trend in the east, which gradually changes to E–W in the central part and finally to NE–SW in the western part. Based on the difference of geology the NSMB is sub-divided into five longitudinal segments or domains (Sarkar et al, 1992; Gupta and Basu, 2000) (Map-2). From south to north these are: Domain-I, the metasedimentary belt in the south of the Singhbhum Shear Zone (SSZ) and the Dhanjori-Ongarbira-Simlipal volcano-sedimentary basins; Domain-II, the Singhbhum shear zone (SSZ); Domain-III, the area between the Singhbhum shear zone and Dalma belt; Domain-IV, the Dalma volcanic belt; Domain-V, the area between Dalma volcanic belt and CGC. The Upper Dhanjori Formation is a mafic volcanic rock dominated unit. The Dhanjori Group underlies the Chaibasa Formation intervened by the Cu–U bearing chloritic schists and feldspathic schists (Granite) of the Singhbhum Shear Zone (SSZ). The Dhanjori Gp., Chaibasa Fm., Dhalbhum Fm., Dalma Gp., and the sedimentary volcanic sequence between the Dalma and Chhotanagpur Granite Gneiss Complex (CGC) comprise the Singhbhum Supergroup (Sarkar et al., 1992). The rocks lying in NSMB has been clubbed into Singhbhum Group which is further divided into Chaibasa Formation and Dalbhum Formation. The Chaibasa Formation is made up of garnetiferous mica schist (which locally contains staurolite, kyanite and andalusite). The quartzite occurs as thin bands intercalated with mica schist at several stratigraphic levels. The mica schist of the Chaibasa formation is conformably overlain by thinly laminated magnetite-sericite-biotite±chlorite phyllites of Dhalbhum formation. The contact is conformable and gradational between the two rock units (Sharan, 2000).

1.3 Regional stratigraphy

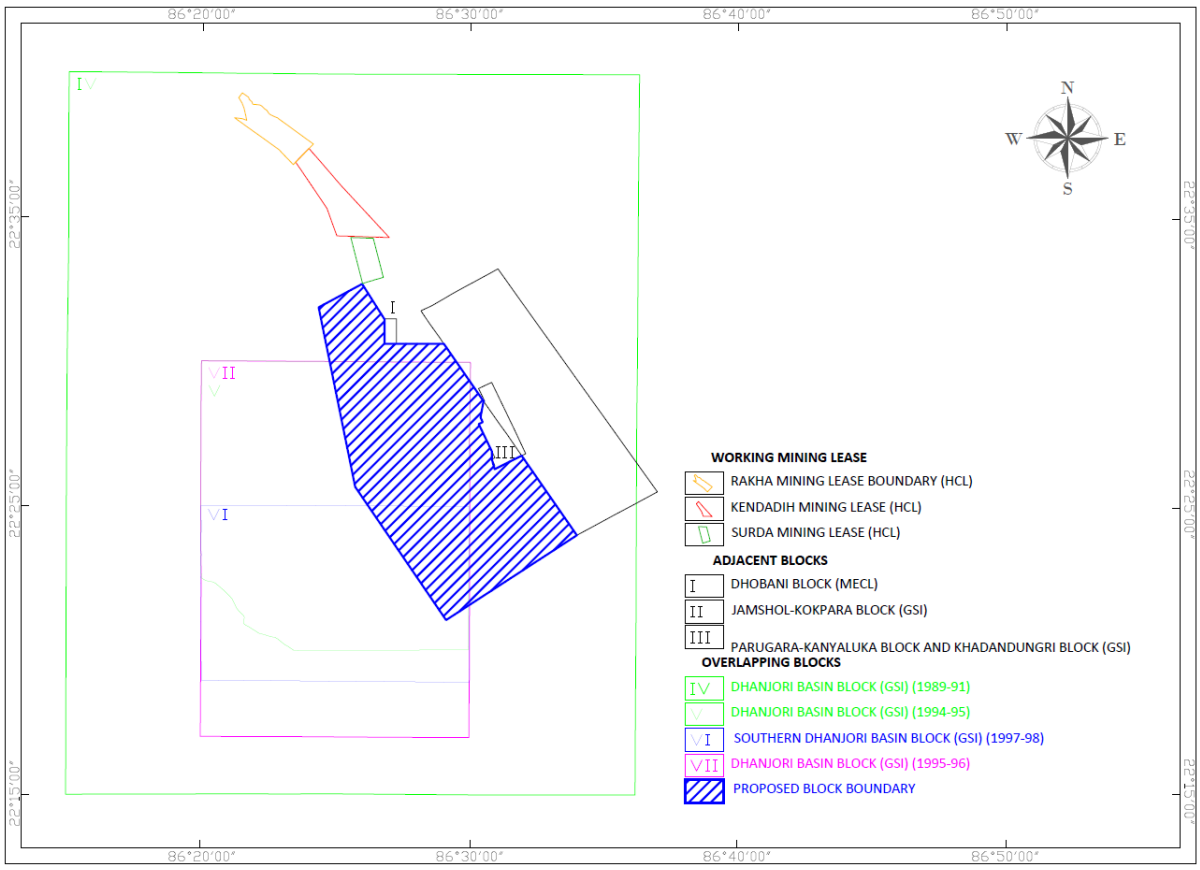
CHAIBASA FORMATION		Mica-schist with quartzites and hornblende schist Quartz-chlorite-biotite schist with quartzites and arkose Disconformity
DHANJORI GROUP	UPPER DHANJORI FORMATION	Granophyres/Acid volcanics Mafic and Ultramafic intrusives Quartz-Chlorite-biotite schist with minor quartzites & upper quartzite. Metabasalts (pillowed at places)
	LOWER DHANJORI FORMATION	Mixed tuffaceous volcano-sediments of mafic and ultramafic composition Quartzites (arkosic, gritty and conglomeratic at the base) & phyllites. Phyllites, gritty and pebbly shales with minor quartzites. Basal quartz pebble conglomerate (QPC) ---------- Unconformity ----------
Singhbhum Granite Gneiss and Iron-Ore Group of rocks		



Map-2: Regional geological map of the Singhbhum craton
(Source: after Saha, 1994 and modified from other sources)

1.4 Section of the block for exploration

The proposed block for exploration is having potentiality for hosting copper bearing minerals is selected after thorough review of the geology and past work carried out in and around the block by Geological Survey of India and MECL. The intended exploration block also shares common boundary with Surda copper lease of M/s Hindustan Copper Limited. Data furnished in NGDR and Bhukosh are extensively consulted to understand potentiality of the area. Based on the study and few traverses taken in the block, further incorporating suggestion provided during review on the project proposal for in-principal approval at 66th TCC, a total of 166.296 Sq. Km. area is finalized to carryout reconnaissance survey with an objective to locate target copper mineralized zones, narrow down potential area and then propose recommendations. It was tried to ensure with all available public domain information that the area is free from recent work carried out by GSI, MECL and other agencies for copper bearing minerals in G4 or higher stages of exploration.

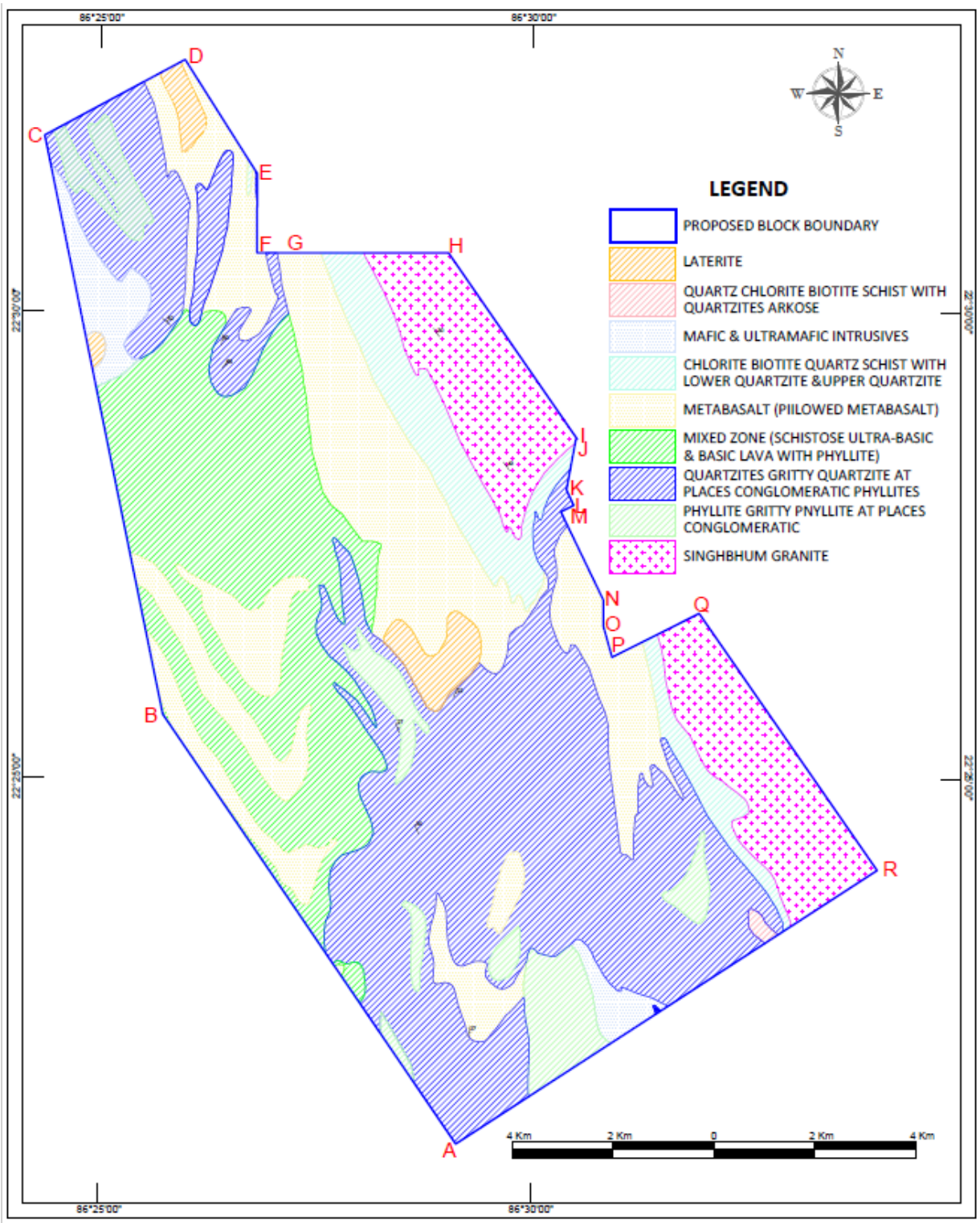


Map-3: Location of the proposed exploration block with adjoining working mines and the past exploration blocks

1.5 Geology of the Block

The geology of the block is well detailed in the 'Final Report on regional search in basal quartz pebble conglomerate and basic volcanics of Dhanjori basin for gold and base metals, Singhbhum District, Bihar'. The study was then conducted over an area of 535 Sq. Km. for preliminary search for gold and base metals, to evolve a geochemical model and to access the mineral potentiality of the Dhanjori basin, with the help of stream sediments panning and Lithogeochemical sampling (marked as Block-IV in Map-3). The present proposed exploration

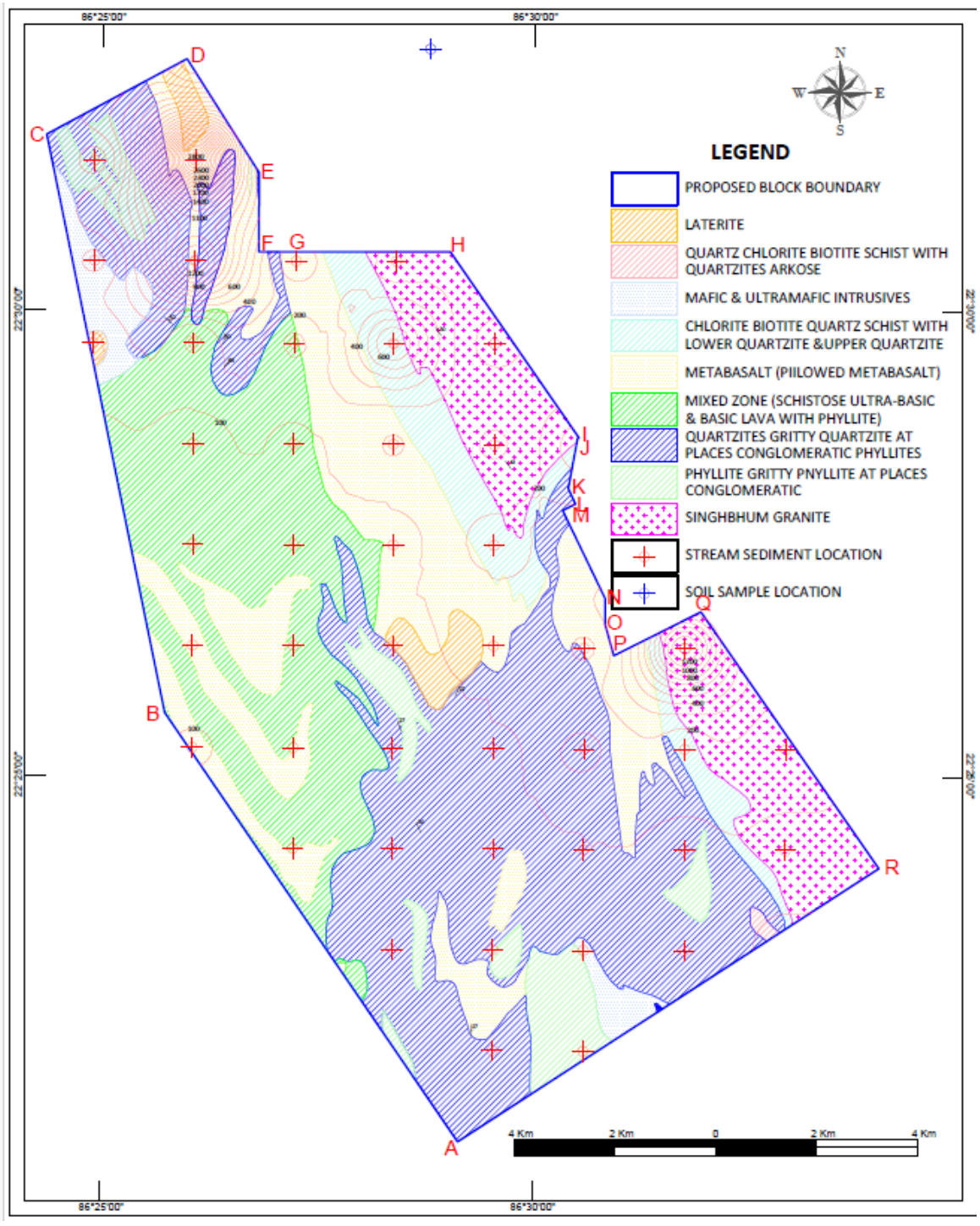
block is falling within this study area of GSI where mapping was carried out in 1:50000 scale. Geology of the area as mapped by GSI within the current proposed block is shown in Map-4.



Map 4: Geology of the proposed exploration area as mapped (1:50000 scale) during 1989-1991 by Geological Survey of India while carried out exploration on the project titled 'Final Report on Regional search in basal quartz pebble conglomerate and basic volcanics of Dhanjori basin for gold and base metals, Singhbhum District, Bihar'.

1.6 Mineral potentiality based on Geology, Geophysics and Geochemistry

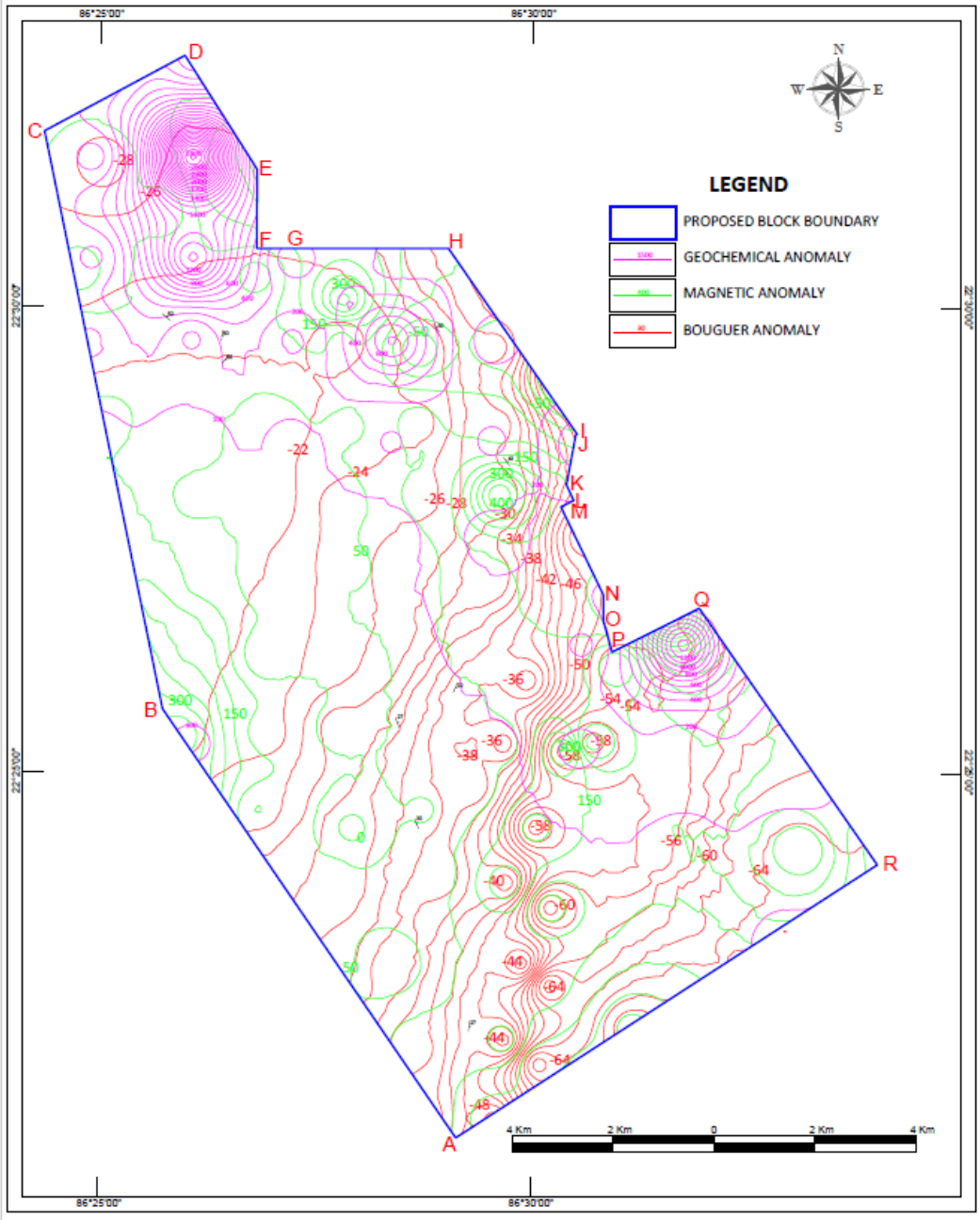
Past work by Geological Survey of India and MECL within and around the area highlight that copper mineralization in the area is mainly contained within the quartz-chlorite schist, shared quartzites, conglomerates, in the contact zone of soda granite with schists and in meta-basalt. The lithological units mapped during FS 1989-1991 by GSI within the proposed exploration block indicate presence favorable lithological units such as Chlorite-Biotite-Quartz schist, quartzite, meta-basalt, contact zone of mafic and ultramafic intrusive with schists (Map-4). Association of such favorable set-up support for carrying out systematic and oriented exploration in search of favorable areas for copper mineralization.



Map 5: Plot of NGCM data over geology of the area (Source: Bhukosh, Report ID- UE 11962)

Review of NGCM data sourced from Bhukosh website of GSI indicate elevated concentration of copper in the northern and southeastern part of the proposed exploration block. These data point represents stream samples spaced at 2.0 K.M. to 2.5 K.M. grid. Although data points are widely spaced, still there are anomalous zones of higher copper concentration which stress upon for detail investigation. However, data of systematic soil and BRS sampling are not present in the block. Hence, proper soil and bed rock sampling (BRS) as applicable, and then chemical analysis followed by interpretation is expected to provide better understanding on mineral potential of the area.

The National Geophysical Mapping Program (NGMP) data available in Bhukosh while referred has helped to understand possible trend of alignment of Litho-units and the areas of geological disturbances. These data are going to help while establishing litho-structural control on mineralization with captured detail lithological, structural, and geochemical information from the area.



Map 6: Overlay of Magnetic, Bouguer Gravity, and Stream sediment data of copper within the proposed exploration block area (Source: Bhukosh)

Past exploration (G2/G3 stage) carried out by GSI and MECL in the adjoining areas (in the eastern side of the block indicate that there is possibility of mineralization in the footwall side of the blocks within the suitable geological set-up.

Considering all these observations from past work, the proposed block is expected to host copper mineralization in geologically suitable areas and hence systematic reconnaissance survey is planned to delineate potential zone for copper mineralization and then propose for further exploration to quantity economic resources (if any).

1.7 Scope for proposed exploration

On review of existing baseline and past exploration data, reports from areas within and around this proposed block, it is planned to carryout reconnaitory traverses along selected section lines across the block and collect BRS and soil sampling at specific interval to narrow down potential area based on chemical assay results. After that in the reduced target area, geological mapping (1:12500 scale) and close spaced systematic bedrock and soil sampling (as applicable) is planned to be undertaken with complete suite of elemental analysis. Results thus acquired will be synthesized with all other field collected and past exploration data to identify suitable selective target zones to conduct ground geophysical investigation and acquire subsurface signature of possible mineralization in depth. Finally suggest scope for preliminary exploration within the identified target zones.

2 Previous Work

2.1 Previous Exploration in adjoining area

2.1.1 PROGRESS REPORT ON THE INTEGRATED STUDY AND ASSESSMENT OF BASEMETAL POTENTALITY IN THE GAP AREAS IN SINGHBHUM COPPER BELT (SCB) PARUGARA KANYALUKA BLOCK AND KHADANDUNGRI BLOCK, EAST SINGHBHUM DISTRICT, JHARKHAND BY GSI

The study was carried out by GSI over an area of 5.5 Sq. Km. during F. S. 1993 -94 with 1:5000 scale mapping, lithogeochemical sampling on 200 x 20 meters grid pattern and collection of 510 nos. of bed rock samples. Another 15 rock samples were collected for petrochemical analyses. Geophysical survey viz I.P., S.P., and magnetic methods were also taken up by Geophysical Division of Eastern Region. Drilling in Khadandungri area was also taken up in Oct. 1993 and planned to intersect at 100 meters R. L. at 200 meters interval. A total of 591.70 m. of drilling was done during the field season 1993 94 in three boreholes namely BKD 10, 11, 12 and 13. The analytical results of Borehole BKD 10 have revealed a zone of 0.82 % Cu at 0.3% cut off. The width of the mineralized zone was about four meters. The width of the mineralized zone for borehole BKD 11 being 2.15 m. at 0.83% Cu at 0.3 % cut off, and for borehole BKD 12 being 2.30 m. at 0.5 % cu at 0.3 % cut off. Study of drill cores of Khadandungri area suggested moderate copper mineralization in close association with bands of magnetite and apatite. On the metallogeny of copper mineralization, the exploration work proposed that the quartzo-feldspathic rocks/soda granite/pegmatitic bodies might have remobilized the base metals from Dhanjori metavolcanics and then emplaced in suitable host rocks at higher concentrations.

2.1.2 REPORT ON "RECONNAISSANCE SURVEY FOR COPPER, GOLD AND ASSOCIATED MINERALS IN JAMSHOL-KOKPARA BLOCK, EAST SINGHBHUM DISTRICT, JHARKHAND" (STAGE G-4) BY GSI

The study was carried out by GSI over an area of 100 Sq. Km. during F. S. 2020-21 in 1:12500 scale collection of 84nos. of bedrock samples (BRS), 50nos. of pitting and trenching samples (PTS), 80nos. of stream sediment and soil samples (SSS/SS) for chemical analysis, 20nos. of petrochemical samples (PCS) for whole rock analysis and 20nos. of petrological samples (PS) for petrographic studies, 15nos. of ore microscopic samples (OM) and 05nos. of EPMA studies to assess the copper and gold potentiality of the study area. The anomalous value of Au yields from 14nos. of BRS samples, 01 nos. of SS sample and 10nos. PTS samples in Trench-1 ranges 0.10ppm to 0.33ppm. Apart from the Cu, Ni ranges 9 to 1515 ppm, Cr ranges 41 to 2362 ppm, TiO2 ranges 0.05 to 1.93%, V ranges 36 to 404 ppm. From the received analytical result, it was concluded that the southwestern part of the study area is potential for copper, gold and associated mineralization and should be studied in detail with advanced stage of mineral exploration.

2.1.3 GEOLOGICAL REPORT ON EXPLORATION FOR COPPER ORE IN DHOBANI MINE AREA, SINGBHUM COPPER BELT DIST. EAST SINGHBHUM, JHARKAND BY MECL

Previously the area was explored by GSI during FS: 1980-81 and 81-82, involving drilling of 4445 m in 22 boreholes at 150m spacing along the strike. They have had identified a total of 10 sub-parallel lodes over the strike length of 1.1km; Of these, 5 lodes are the most promising. GSI has estimated a total probable ore reserve of 1.59 m.t with 2.36% Cu at 0.5% Cu cut-off, or else, 3.72 m.t with average grade of 1.37% Cu at 0.3% Cu cut-off up to a vertical depth of 200m from the surface.

Later further detail exploration was carried out by MECL during 2007-08 with exploratory drilling involving 4000.25m in 20 boreholes along with the associated geological mapping, surveying, sampling, and laboratory studies. The exploration work by MECL was carried out in the earlier established mineralized zones by GSI over a strike length of about 1.40km across 400m and up to vertical depth of 260.00m from the datum line. The detailed exploration by MECL, thus estimated the reserves of Dhobani Mine area as 13.071 million tonnes with 0.61% Cu and 5.22 m.t with 1.31% Cu at 0.20% Cu and 0.50% Cu cut-off, respectively.

2.2 Previous Exploration in the proposed block area

FINAL REPORT ON REGIONAL SEARCH IN BASAL QUARTZ PEBBLE CONGLOMERATE AND BASIC VOLCANICS OF DHANJORI BASIN FOR GOLD AND BASE METALS, SINGBHUM DISTRICT, BIHAR

The study was carried out by GSI between 1989-1991 over an area of 535 Sq. Km. A total of 287 litho-geochemical and 310 stream sediment samples were collected on 1 sq.km. grid as far as practicable while geological mapping was conducted at 1:50,000 scale. The study concentrated towards assessment of gold potentiality in Dhanjori group of rocks. Statistical analysis of litho-geochemical samples has revealed the presence of several anomalous zone for gold and copper located over different rock types. The study had helped to classify Dhanjori gold into 5 categories

namely (i) Disseminated primary gold in Acid volcanics, (ii) Disseminated primary gold in basic, ultrabasic and tuffaceous rocks, specially within those having komatiitic composition, (iii) Gold occurring in Quartz veins (Auriferous quartz veins), (iv) Gold occurring in QPC and (v) alluvial gold. Source for gold has been the mafic/ ultramafic rocks of komatiitic composition. It was mentioned that further search for gold should be continued in the Dhanjori basin. The study could not find any potential zone of copper mineralization within Dhanjori group of rocks.

3. Block description

The block covers an area of 166.296 Sq. Km. area with 19 corner points. Coordinates of these points in degree decimal is given in the below table.

Block Corner points Cardinal Points	Latitude	Longitude
A	22.35111	86.48560
B	22.42789	86.42885
C	22.53149	86.40569
D	22.54510	86.43271
E	22.52471	86.44671
F	22.51054	86.44671
G	22.51054	86.45416
H	22.51063	86.48364
I	22.47739	86.50855
J	22.47727	86.50831
K	22.46829	86.50653
L	22.46549	86.50794
M	22.46437	86.50546
N	22.44868	86.51366
O	22.44404	86.51369
P	22.43834	86.51542
Q	22.44622	86.53219
R	22.40030	86.56663

4. Planned Methodology

It is planned to carryout following activities to explore the area adequately at G4 stage.

1. Reconnaitory traverses, samples collection and analysis for initial target defining.
2. Litho-structural mapping, systematic sampling, and analysis over a reduced target area.
3. Petrographic and mineragraphic studies.
4. Analysis of all collected data to carryout geophysical survey over the most promising target zones.
5. Conduct ground magnetic with IP over the potential target area and analyse data.
6. Pull together all collected data and define target resource size of the area for copper bearing minerals and others, if any.

5. Nature, Quantum, and Target

5.1 Geological Mapping & Geochemical Sampling:

Initially 6 traverses will be undertaken across the general strike of the area (Map-7) to collect soil or else bed rock samples (BRS) at 100m interval. These collected samples will be analysed for 32 radicals for identifying spots, zones having higher value of target element(s).

With the assay data, geochemical contour map shall be derived for copper to identify zones of higher concentration of copper and other elements of economic importance from the background. It is assumed that about 20% of the total area i.e., 33.0 Sq. Km. area will be identified as potential targets zones for next stage of detail data collection and analysis.

Lithological mapping and systematic sample collection then shall be conducted in the reduced 33.0 Sq. Km. area with close spaced traverse mapping spaced at 250m interval across the anomaly zones. Ground control points (GCP) along the traverse paths shall be collected minimum at 100m interval over same lithology or at lesser spacing where there is change im lithology or structural features. Along these traverse paths (spaced at 500m apart), soil or bed rock samples shall be collected at 50m intervals to generate more detail geochemical data.

Soil samples are planned to be collected from a depth of about 1.0 ft. from surface to avoid surface contamination. Care shall be taken to avoid sample collection from the transported soil (if identified) especially around villages, site of construction etc. In the case of bed rock sampling, rock chips shall be collected from three or more locations of about equal proportion over the same lithology to avoid biasness.

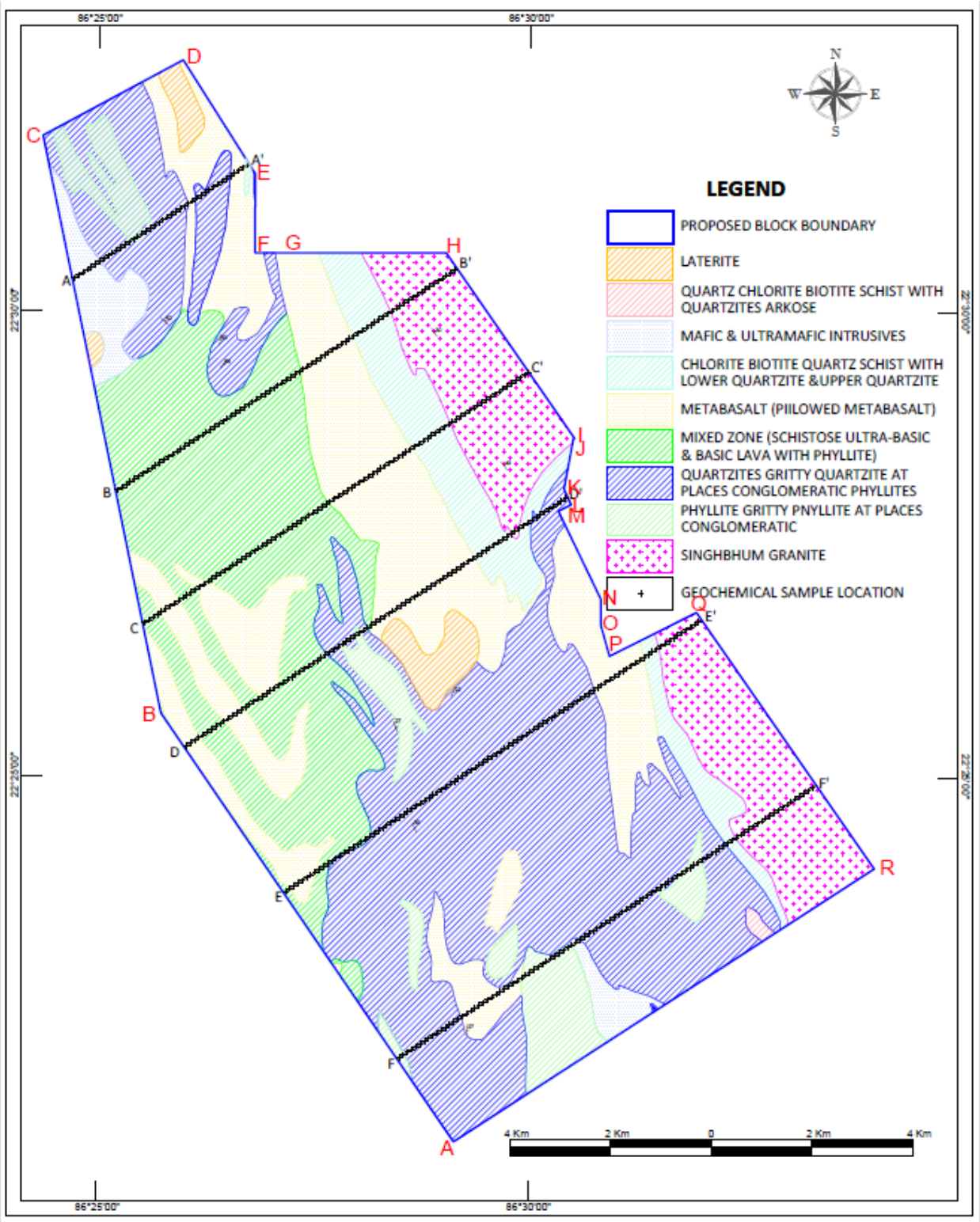
All samples thus collected from the zones shall be analysed for 32 radicals to define most potential zones having definite anomaly for target element(s) by generating geochemical contours for copper and other elements.

Litho-structural data collected from the 33.0 Sq. Km. area will be used to update existing 1:50000 scale geological map of the area. The updated geological map thus generated may be considered as 1:12500 scale for this 33.0 Sq. Km. area.

At this point detail review will be conducted with all newly collected data and integrating existing base data, information to understand control of mineralization if any. The information then shall be used to design next stage of investigation with ground geophysical survey.

5.2 Ground Geophysical Survey:

Ground geophysical survey is proposed to be conducted in 6.0 Sq. Km. area (i.e., 20% of the 33.0 Sq. Km.) to confirm subsurface continuity of the anomalies as identified by geological and geochemical sampling, over the most potential target zones. A combination of ground magnetic and IP (dipole-dipole) survey shall be conducted at 250m section spacing to collect field data. All collected data therefore shall be analysed to define nature of mineralization, extent and expected depth etc. An attempt shall be made to project target resource size for the next stage of investigation i.e., preliminary exploration complying latest guidelines of MEMC Rule.



Map 7: Proposed 6 nos. of traverse lines across the block for acquiring BRS and soil samples for targeting potential areas for next stage of detail study.

(Base Map from GSI Report ID- UE 11962)

5.3 Broad Quantum of Work

Components	Quantum
Phase-I	
Reconnaitory traverses over selected section lines	No. of section lines = 6 Traverse length = 50.42-line Km Sample interval over the section lines = 100m Soil and bedrock samples = 504 Nos. QAQC samples = 51 Nos.
Lithological Mapping (1:12500 scale) and Sampling	33.0 Sq. Km area Traverse line intervals =250m; GCP spacing over traverse lines = 100m Traverse length = 132-line Km Soil and bedrock sampling grid = 500m X 50m Soil and Bedrock samples =1320 Nos. QAQC samples = 132 Nos.
Petrographic and mineragraphic studies	1. Thin Sections = 20 Nos 2. Polished thin section = 20 Nos 3. Complete petrographic/ ore microscopic/ mineragraphic study = 20 Nos. 4. EPMA = 20 hours 5. XRD analysis for identification of minerals (random) = 40 Nos
Phase-II	
Geophysical Survey 1. Magnetic 2. IP (Dipole-Dipole)	Area = 6.0 Sq. Km. Line Spacing = 250m Line KM = 24
Synthesis of all available data	Peer Review Preparation of G3 Stage exploration proposal Report writing and submission with recommendations.

6. Manpower deployment

Broad Activities	Man-days	Designation
Field Geological Activities	235	Geologist
Project Manager at HQ (for overall supervision, liaisoning etc.,	47	Geologist
Sample collection and field assistance	470	Field assistant (Labour)
Supervision in Sample Preparation	114	Sampler
Sample preparation for chemical analysis, packaging, and dispatch to laboratory	457	Labour
Geophysical Survey	112	Geophysicist
Field assistance in Geophysical Survey	336	Labour
Geophysical Survey planning and data interpretation	22	Geophysicist
Analysis and interpretation of Petrographic and mineragraphic studies	15	Geologist
Preparation of exploration proposal (G3 stage)	7	Geologist
Report Preparation	21	Geologist

Activity Timeline for the Project

Sl. No.	Activity Plan	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
1	Reconnaitory Traverses and Sample Collection over 6 section lines; 50.43-line Km																								
2	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES/ ICP-MS (sequential technique)																								
3	Analysis of data and plan for LSM over potential areas																								
4	**Review by TCC on progress and Outcome**																								
5	LSM and Sample Collection over potential 20% of the total block area of 166.296 Sq.Km. i.e., 33 Sq. Km; 132 Line Km																								
6	Sample Preparation for Chemical Analysis																								
7	Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES/ ICP-MS (sequential technique)																								
8	Petrographic study, EPMA/SEM Lab, Mineral Physics Studies																								
9	Analysis of data and plan for Geophysical Survey over the most potential target areas and project review																								
10	**Review by TCC on progress and Outcome**																								
11	Geophysical Survey over potential 6 Sq. Km. area																								
12	Interpretation of Geophysical survey data																								
13	Synthesis of all data, interpretation, and review																								
14	Peer review by external expert																								
15	**Review by TCC on progress and Outcome**																								
16	Preparation of Exploration proposal (G3 Level)																								
17	Final Report preparation and Submission																								

7. Break-up of expenditure

Estimated Cost for Reconnaissance Survey (G4 stage) for Copper Bearing Minerals around Musabani, Dumriya, Maheshpur areas in West Singhbhum District of Jharkhand Name of the Exploration Agency - Natural Resources Division, Tata Steel Limited Total Area - 166.296 Sq. Km; Completion Time - 24 Months									
Sl. No	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal		Additional charge for most affected LWE districts	Total Amount (Rs)	Remarks
			SoC-Item-S. No.	Rates as per SoC	Qty.	Total Amount (Rs)	Factor of multiplication		
1	**Reconnaitory Traverses and Sample Collection over 6 section lines; 50.43-line Km**								
1.1	Reconnaitory traverses on 6 section lines with BRS or Soil Sampling (Field work)	Mandays	1.2	11000	59	647185	1.25	808981	This will include sample collection at about 100m interval; daily 2.0-line Km traverse target with sample collection by 2-member team; 6 days working per week.
1.2	Project Manager at HQ (for overall supervision, liaisoning etc)	Mandays	1.2	9000	12	105903		105903	
1.3	Labour charges (for sample collection, packaging, carrying)	Mandays	5.7	500	118	58835	1.25	73544	2 labour per geologist; Amount will be reimbursed as per the notified rates by the Central Labour Commission or respective State Govt. whichever is higher.
2	**LSM and Sample Collection over potential 20% of the total block area of 166.296 Sq. Km. i.e., 33 Sq. Km; 132 Line Km**								
2.1	LSM (1:12500 scale) with BRS or Soil Sampling (Field work)	Mandays	1.2	11000	176	1936000	1.25	2420000	Traverses for mapping will be undertaken over section lines spaced at about 250m intervals while samples shall be collected from nodes of the rectangular (500m X 50m) grid. Daily 1.8-line Km traverse target with sample collection by two-member team; 6 days working per week.
2.2	Project Manager at HQ (for overall supervision, liaisoning etc)	Mandays	1.2	9000	35	316800		316800	
2.3	Labour charges (for sample collection, packaging, carrying)	Mandays	5.7	500	352	176000	1.25	220000	2 labour per geologist; Amount will be reimbursed as per the notified

									rates by the Central Labour Commission or respective State Govt. whichever is higher.
3	**Sample Preparation for Chemical Analysis**								
3.1	Charges for one sampler per day	Mandays	1.5.2	5100	114	583116		583116	2 shift operation; 2 samplers; daily 40 samples to be prepared
3.2	Labour charges (for sample preparation)	Mandays	5.7	500	457	228673		228673	4 persons in one shift; 2 shift operation
4	**Geophysical Survey over potential 6 Sq. Km. area - Outsource Activity**								
4.1	Magnetic Surveys (10–30-line km)	No. of Stations	3.2a	1800	480	864000	1.25	1080000	24 Line Km; 250m line spacing at 50m station interval
4.2	Induced Polarization (Dipole-Dipole) (10-20 Km)	Line Km	3.4a	69950	24	1678800	1.25	2098500	250m section spacing
4.3	Labour charges for assisting in geophysical survey	Mandays	5.7	500	336	168000	1.25	210000	Daly 2.0 Line Km traverses; 6 labour per day; 6 days working
4.4	Geophysicist man days for Geophysical Survey (Field)	Mandays	3.18	11000	112	1232000	1.25	1540000	Daly 2.0 Line Km traverses; 2 Geophysicist; 6 days working
4.5	Geophysicist man days for Geophysical Survey (HQ)	Mandays	3.18	9000	22	201600		201600	
5	**Analysis of one rock/ soil sample for determination of a package by 34 elements by ICP-AES/ CP-MS (sequential technique) - Outsource Activity**								
5.1	Samples from 6 master sections (9.95 KM + 9.92 KM + 9.10 KM + 9.16 KM + 8.10 KM + 4.19 KM = 50.42 KM); Sample spacing 100m	No. of Samples	4.1.14	7731	504	3898743		3898743	Samples collected during reconnaitory traverses along 6 identified section lines Sample interval = about 100m
5.2	BRS & Soil samples over identified promising 33 Sq. Km. zones; Line spacing 500m; Sample spacing 50m	No. of Samples	4.1.14	7731	1320	10204920		10204920	
5.3	QAQC Sample (10% of the total samples)	No. of Samples	4.1.14	7731	182	1410366		1410366	
6	**Petrographic study - Outsource Activity**								

6.1	Preparation of standard thin section of rock	No. of Samples	4.3.1	2353	20	47060		47060	
6.2	preparation of polished thin section of rock	No. of Samples	4.3.2	1549	20	30980		30980	
6.3	Complete petrographic/ ore microscopic/ mineragraphic study	No. of Samples	4.3.4	4232	20	84640		84640	
7	**EPMA/SEM Lab - Outsource Activity**								
7.1	EPMA	No. of hours	4.4.1	8540	20	170800		170800	
8	**Mineral Physics Studies - Outsource Activity**								
8.1	XRD analysis for identification of minerals (random)	No. of Samples	4.5.1	4000	40	160000		160000	
9	**Project Cost without GST (1 to 8)**							**25894627**	
10.1	Total Outsourced Cost							21137610	
10.2	Operational Charges against outsourced activities							1406880	
11	Peer review by external expert		As per EC decision			30000		30000	
12	Preparation of Exploration proposal (G3 Level)		5.1	380000	1	380000		380000	2% of approved project cost or 3.8 lakh whichever is lower
13	Geological Report Preparation (@3% of the project cost or 7.5 Lakh whichever is more)		5.2		1	776839		776839	Reconnaissance Survey exceeding Rs. 150 lakhs but less than 300 lakhs: A minimum Rs. 7.5 lakh or 3% of the value of the work whichever is more.
14	**Total Project cost (Without GST)**							**28488346**	
15	**Total Project Cost with GST**	%				18		**33616248**	

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1. Interim Report on the investigation for Copper in Dhobani, Singhbhum District, Bihar (UE 10251), 1981-82.

2. Report on the geophysical investigation for copper ores in Mosabani-Khejurdari sector, Singhbhum copper belt, Bihar (UE 9674), 1962-63

3. Final report on regional search in basal quartz pebble conglomerate and basic volcanics of Dhanjori basin for gold and base metals, Singhbhum District, Bihar (UE 11962), 1989-91.

4. Progress report on the integrated study and assessment of base metal potentiality in the gap areas in Singhbhum Copper Belt (SCB) Parugara Kanyaluka block and Khadandungri block, East Singhbhum district, Jharkhand (erstwhile, Bihar) (UE 13143), 1993-94.

5. Report on Reconnaissance Survey for copper, gold, and associated minerals in Amshol-Kokpara block, East Singhbhum district, Jharkhand (Stage G-4) (2020-21).

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7. Exploration report on Pathargora Intervening Block - Copper Deposit, Singhbhum Copper Belt - downloaded from report section of MECL Website.

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https://www.mecl.co.in/Reports/

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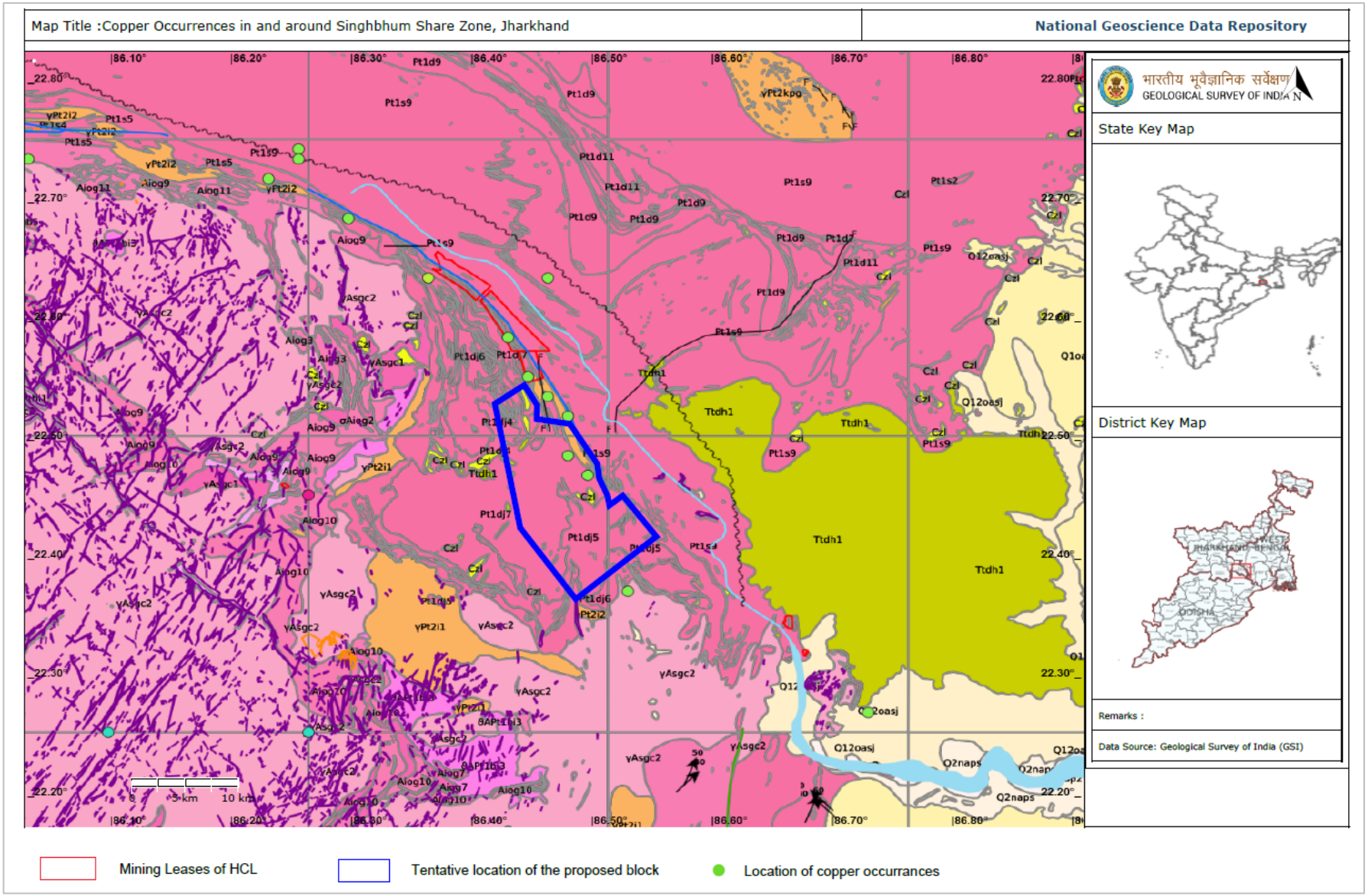
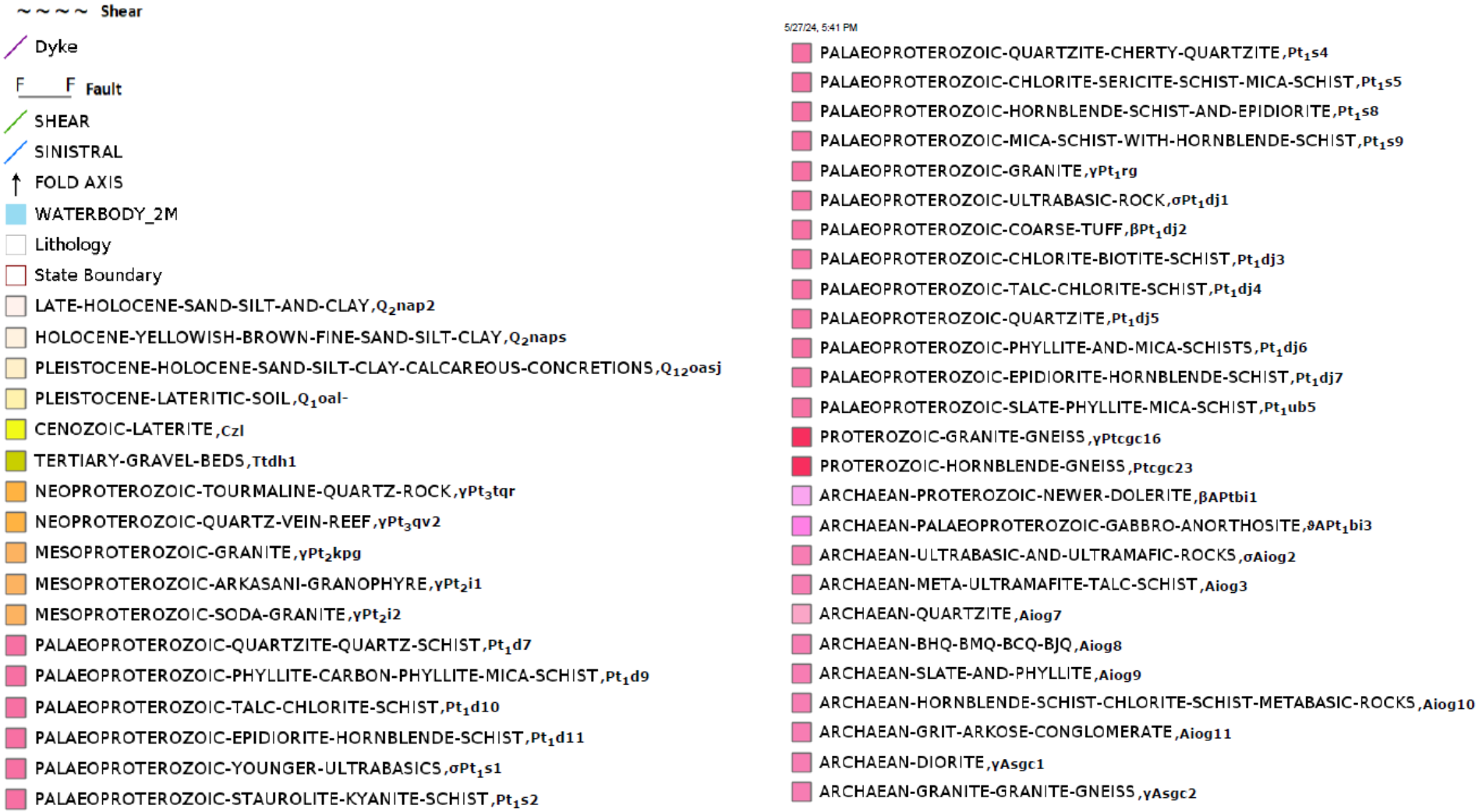
Annexure-1: Geological Map on 1:50000 scale with location index and the proposed bock boundary (Source: NGDR Portal)



Legend of Annexure-1



Estimated Cost for Reconnaissance Survey (G4 stage) for Copper Bearing Minerals around Musabani, Dumriya, Maheshpur areas in West Singhbhum District of Jharkhand

Name of the Exploration Agency - Natural Resources Division, Tata Steel Limited

Total Area - 166.296 Sq. Km; Completion Time - 24 Months

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