GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G-3) FOR COPPER, LEAD, ZINC & ASSOCIATED METALS IN

SALAIYA PHATAK BLOCK

DISTRICT- KATNI, STATE- MADHYA PRADESH

TEXT, ANNEXURE, PLATES

MINERAL EXPLORATION AND CONSULTANCY LIMITED

(Formerly known as Mineral Exploration Corporation Limited)

A Government of India Enterprises

CORPORATE OFFICE, NAGPUR

NOVEMBER 2025

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G-3) FOR COPPER, LEAD, ZINC & ASSOCIATED METALS IN SALAIYA PHATAK BLOCK, DISTRICT- KATNI, MADHYA PRADESH

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GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G-3) FOR COPPER, LEAD, ZINC & ASSOCIATED METALS IN SALAIYA PHATAK BLOCK, DISTRICT- KATNI, MADHYA PRADESH

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सलैया फाटक ब्लॉक, जिला–कटनी, मध्य प्रदेश में तांबा, सीसा, जस्ता एवं सह-संबद्ध धातुओं के प्रारंभिक अन्वेषण (जी–3) पर भूवैज्ञानिक प्रतिवेदन

अध्याय 1

1.0 कार्यकारी सारांश

1.1 सलैया फाटक ब्लॉक, जिसका क्षेत्रफल 1.50 वर्ग किलोमीटर है, तहसील बहोरीबांध, जिला कटनी, मध्य प्रदेश में स्थित है तथा सर्वे ऑफ इंडिया टोपीशीट क्रमांक 64A/06 में अंकित है। इस क्षेत्र की जाँच MECL द्वारा NMET फंडिंग के तहत की गई, जिसका उद्देश्य ब्लॉक में ताँबा, सीसा, जस्ता एवं संबद्ध धातुओं की संभाव्यता का मूल्यांकन करना था। अन्वेषण का उद्देश्य बहुधात्विक खनिजीकरण की स्ट्राइक एवं गहराई में निरंतरता स्थापित करना, G3 (प्रारंभिक अनुमानित) श्रेणी के संसाधनों का आकलन करना तथा राज्य सरकार को इस ब्लॉक को खनन लीज़ हेतु नीलामी में सहायक डेटा उपलब्ध कराना था।

1.2 भूवैज्ञानिक रूप से यह क्षेत्र महाकौशल सुप्राक्रस्टल बेल्ट का भाग है, जो ENE–WSW दिशा में फैली एक धात्विक पट्टी है, जिसमें फिलाइट, क्वार्ट्जाइट, डोलोमाइट और क्वार्ट्ज पोर्फिरी अंतःप्रवेश पाए जाते हैं। क्षेत्र में मुख्यतः डोलोमाइटिक शैलें फिलाइट की परतों के साथ प्रकट होती हैं, जिनमें क्वार्ट्ज़ की शिराएँ एवं डाइक अंतःप्रवेशित हैं। संरचनात्मक नियंत्रण N10°E–S20°W प्रवृत्ति तथा 60°–70°W डिप वाले शियर एवं फ्रैक्चर ज़ोन द्वारा परिभाषित है। सल्फाइड खनिजीकरण इन्हीं ज़ोनों में सीमित है, जिसमें मुख्यतः चाल्कोपाइराइट, पाइराइट, गैलेना, स्फैलेराइट, टेट्राहेड्राइट एवं बॉर्नाइट सम्मिलित हैं, साथ ही कॉवेलाइट व पायरोटाइट के अल्पांश भी मिलते हैं, जो हाइड्रोथर्मल शिरा-प्रकार बहुधात्विक प्रणाली का संकेत करते हैं।

1.3 अन्वेषण कार्यक्रम में 1:2000 पैमाने पर विस्तृत भूवैज्ञानिक मानचित्रण, टोपोग्राफिक सर्वेक्षण, ट्रेंचिंग तथा कोर ड्रिलिंग शामिल थी। कुल छह तिरछे बोरहोल पाँच सेक्शन लाइनों पर 100–150 मीटर अंतराल पर ड्रिल किए गए, जिनमें लगभग 50 मीटर (≈350 m RL) गहराई तक खनिजीकरण का प्रतिच्छेदन प्राप्त हुआ। नमूनाकरण लगभग 0.5 मीटर अंतराल पर किया गया तथा AAS तकनीक से Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni एवं Mo का विश्लेषण तथा Au का फायर-असे के बाद AAS से विश्लेषण किया गया।

खनिजीकृत क्षेत्रों से पाँच प्रतिनिधि नमूनों के विशिष्ट घनत्व का निर्धारण किया गया, जिसका औसत मान 2.9 उपयोग में लाया गया।

1.4 खनिज संसाधन आकलन संकर्ण विधि (Cross-Sectional Method) तथा लेवल प्लान (Slice) विधि दोनों द्वारा किया गया, जो संकीर्ण शिरा-प्रकार सल्फाइड भंडार के लिए उपयुक्त हैं। 0.1%, 0.2% एवं 0.5% Cu कट-ऑफ पर संसाधन आकलन किया गया, तथा 20 ppm Ag कट-ऑफ के आधार पर रजत का आकलन समानांतर रूप से किया गया। स्वर्ण संसाधन का आकलन 0.50 ppm Au कट-ऑफ पर किया गया है। सभी संसाधन औसत स्टोपिंग विड्थ पर विचार किए बिना अनुमानित किए गए हैं।

• संकर्ण विधि (नेट इन-सीटू):

- 114,922.935 टन @ 0.47% Cu एवं 1,219.46 ppm Ag (0.1% Cu कट-ऑफ)
- 79,201.598 टन @ 0.64% Cu एवं 335.13 ppm Ag (0.2% Cu कट-ऑफ)
- 51,890.522 टन @ 0.81% Cu एवं 498.77 ppm Ag (0.5% Cu कट-ऑफ)
- 39,793.178 टन @ 1.01 ppm Au (0.50 ppm Au कट-ऑफ)

• लेवल प्लान विधि (नेट इन-सीटू):

- 115,419.463 टन @ 0.48% Cu एवं 913.40 ppm Ag (0.1% Cu कट-ऑफ)
- 80,101.260 टन @ 0.64% Cu एवं 305.07 ppm Ag (0.2% Cu कट-ऑफ)
- 53,861.884 टन @ 0.86% Cu एवं 428.23 ppm Ag (0.5% Cu कट-ऑफ)
- 40,400.114 टन @ 0.97 ppm Au (0.50 ppm Au कट-ऑफ)

1.5 दोनों विधियों से प्राप्त परिणामों में 2% के भीतर उत्कृष्ट सामंजस्य पाया गया, जिससे संसाधन आकलन की विश्वसनीयता की पुष्टि होती है। खनिजीकरण गहराई एवं स्ट्राइक दिशा में खुला है, जिसके आधार पर संसाधन में वृद्धि की संभावनाएँ मौजूद हैं। समीपवर्ती इमलिया ब्लॉक, जिसे पहले ही नीलाम किया जा चुका है और जहाँ खनन प्रारंभ होने वाला है, के समान भूवैज्ञानिक परिवेश को देखते हुए, सलैया फाटक ब्लॉक में गहराई तक ड्रिलिंग, पार्श्व विस्तार अध्ययनों, तथा उपसतही भू-भौतिकीय सर्वेक्षण (IP, रेसिस्टिविटी, मैग्नेटिक) की अनुशंसा की जाती है। इस ब्लॉक को कॉम्पोज़िट लाइसेंस (CL) हेतु नीलामी पर विचार किया जा सकता है।

CHAPTER- 1

1.0 EXECUTIVE SUMMARY

1.1 The Salaiya Phatak Block, covering an area of 1.50 sq. km, is situated in Bahoribandh Tehsil, Katni District, about 60 km NNE of Jabalpur, Madhya Pradesh, and is delineated in Survey of India Toposheet No. 64A/06. The investigation was undertaken by MECL under the funding of NMET to assess the copper, lead, zinc, and associated metal potential of the block. The purpose of the exploration was to delineate the strike and depth continuity of polymetallic mineralization, estimate G3 (Preliminary Inferred) category resources, and generate data to facilitate the State Government in auctioning the block as a Mining Lease.

1.2 Geologically, the block forms part of the Mahakoshal Supracrustal Belt, a linear ENE–WSW trending metallogenic belt comprising phyllite, quartzite, dolomite, and quartz porphyry intrusives. The area mainly exposes dolomitic lithology intercalated with phyllite, intruded by quartz veins and dykes, and structurally controlled by shear and fracture zones trending N10°E–S20°W with dips of 60°–70°W. Sulphide mineralization is confined within these zones, consisting predominantly of chalcopyrite, pyrite, galena, sphalerite, tetrahedrite, and bornite, with minor covellite and pyrrhotite, indicating a hydrothermal vein-type polymetallic system.

1.3 The exploration program comprised detailed geological mapping (1:2000 scale), topographic survey, trenching, and core drilling. A total of six inclined boreholes were drilled along five section lines at 100–150 m spacing, intersecting mineralized zones up to a depth of approximately 50 m below surface (≈350 m RL). Sampling was carried out at ~0.5 m intervals, and chemical analyses were performed for Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo using AAS and for Gold (Au) using fire assay followed by AAS. Five representative samples from the mineralized zones were subjected to specific gravity determination, yielding an average value of 2.9, which was used for tonnage calculations.

1.4 The mineral resource estimation was carried out by both the Cross-Sectional Method and the Level Plan (Slice) Method, suitable for narrow vein-type sulphide deposits. Resources were estimated at 0.1%, 0.2%, and 0.5% Cu cut-off grades, with silver estimated concurrently using a 20 ppm Ag cut-off. Resource of gold has also been estimated at 0.50 ppm cut-off. All the resources estimated are done without considering the mean stopping width.

- Cross-Sectional Method (Net In-Situ):
    - 114,922.935 tonnes @ 0.47% Cu & 1,219.46 ppm Ag (0.1% Cu cut-off)
    - 79,201.598 tonnes @ 0.64% Cu & 335.13 ppm Ag (0.2% Cu cut-off)
    - 51,890.522 tonnes @ 0.81% Cu & 498.77 ppm Ag (0.5% Cu cut-off)
    - 39793.178 tonnes @ 1.01 ppm Au (0.50 ppm Au cut-off)
- Level Plan Method (Net In-Situ):
    - 115,419.463 tonnes @ 0.48% Cu & 913.40 ppm Ag (0.1% Cu cut-off)
    - 80,101.260 tonnes @ 0.64% Cu & 305.07 ppm Ag (0.2% Cu cut-off)
    - 53,861.884 tonnes @ 0.86% Cu & 428.23 ppm Ag (0.5% Cu cut-off)
    - 40400.114 tonnes @ 0.97 ppm Au (0.50 ppm Au cut-off)

1.5 The close agreement between both methods (within 2%) confirms the reliability of the estimation. The mineralization remains open at depth and along strike, indicating further potential for resource enhancement. Considering the similar geological setup and continuity of mineralization with the adjoining Imaliya Block, which has already been auctioned and is on the verge of mining, the Salaiya Phatak Block is recommended for further exploration through deeper drilling, lateral extension studies, and sub-surface geophysical surveys (IP, resistivity, magnetic), and may be considered for auction as a Composite License (CL) block.

CHAPTER- 2

2.0 DETAILS OF THE QUALIFIED PERSON(S) / EXPLORATION AGENCY

2.1 Details of Exploration Agency

Name: Mineral Exploration and Consultancy Limited (Formerly Mineral Exploration Corporation Limited), A Govt. of India Enterprise-A Miniratna PSE

Address: Dr. Babasaheb Ambedkar Bhavan, High Land Drive Road, Seminary Hills, Nagpur-440006

Contact: 0712-2510310

Email ID: headbd@mecl.co.in

Affiliation: Ministry of Mines

2.2 Details of persons associated with various aspects of exploration assessment of resources and reserves

Different Aspects of Work	Name & Designation
General Supervision and Guidance	Shri Srikant Sharma, DGM (Exploration)/ HOD (NEM) Shri P. Ravindran, Ex-GM (Exploration)
Overall palnning, co-ordination and Supervision	Shri Srikant Sharma, DGM (Exploration)/ HOD (NEM) Shri P. Ravindran, Ex-GM (Exploration) Shri Saptarshi Ghosh, Manager (Geology)
Field Operation	Shri Saptarshi Ghosh, Manager (Geology) Shri Dushyant Singh, Sr. Drilling Engineer Shri Narendra Kumar, Sr. Tech. (Sampling) Shri Dev Singh, Sr. Tech (S&D)
Data processing, Interpretation and Report Writting	Shri Saptarshi Ghosh, Manager (Geology)
Chemical Division/ Petrography Laboratory	Shri Rohit Sharma, Manager (Chemical) Dr. Deepti R. Rahangdale, Manager (Chemical) Shri Sayantan Pal, Manager (Geology)
Non-coal Report Cell	Shri NCS Reddy, Console Operator Shri Shivananda, Sr. Operator (Computer)

CHAPTER- 3

3.0 TITLE AND OWNERSHIP

3.1 Title of the Report

Title: GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G-3) FOR COPPER, LEAD, ZINC & ASSOCIATED METALS IN SALAIYA PHATAK BLOCK, DISTRICT- KATNI, MADHYA PRADESH

Ownership: Government of Madhya Pradesh

Name of Prospector: MINERAL EXPLORATION AND CONSULTANCY LIMITED (Formerly Mineral Exploration Corporation Limited)

Address of Prospector: Dr. Babasaheb Ambedkar Bhavan, High Land Drive Road, Seminary Hills, Nagpur, Pin- 440006

E-mail of Prospector: cmd@mecl.gov.in; gm-exploration@mecl.gov.in

Telephone numbers of Prospector: 0712-2510289; 0712-2511829

3.2 Details of period of prospecting

3.2.1 Background

The Mahakosal Supracrustal Belt is recognized for its mineral potential, particularly for iron, manganese, gold, graphite, base metals and dolomite/limestone. MECL conducted desktop studies using available geoscience data and identified the Sihora region in Jabalpur, Katni and Umariya district as a key area for iron and manganese mining. This led to the formulation of a reconnaissance (G4) survey proposal for iron, manganese, and associated minerals in the Salaiya Block, Madhya Pradesh, covering the study area within Jabalpur, Katni, and Umaria districts.

The exploration proposal was submitted to the 50th TCC of NMEDT for discussion, aiming to assess iron and associated mineral deposits to support India's mineral sector and economic growth. The proposal received approval from the 50th TCC of NMEDT and was subsequently approved by the Executive Committee (EC) of NMEDT on April 3,

2023. The reconnaissance survey (G4) was conducted from June 20, 2023, to October 19, 2023.

Following the review in the 63rd TCC of NMEDT, the Final Geological Report (FGR) was submitted in March 2024. In the FGR of Reconnaissance Survey (G4) in Salaiya block, an area near salaiya phatak & imaliya village has been delineated for base metal and gold mneralization. It was recommended to take up detailed mapping, channel sampling in this block to delineate the mineralization in the potential area.

The Salaiya Phatak (G-3) block is carved out from Salaiya G-4 block, potential for copper, lead, zinc and associated metals. This block is recommended by 66th TCC of NMEDT, in June, 2024 and approved by 36th EC of NMEDT on 29th August, 2024 vide letter no. 23/484/2024-NMET/304.

3.2.2 Period of prospecting

MECL commenced exploration activities on 5th September 2024, which included geological mapping at a 1:2000 scale, trenching, and channel sampling to identify mineralized zones for copper and gold.

Upon completion of the first phase of exploration, comprising surface geological mapping and sampling, MECL reviewed the results of the initial investigations. Based on the encouraging outcomes, the NMEDT approved sub-surface exploration involving 500 metres of drilling in six boreholes during its 8th TCC meeting held on 29th April 2025.

Exploratory drilling operations commenced on 13th May 2025, and after achieving a total of 498 metres of drilling, the sub-surface exploration phase was completed on 5th August 2025.

CHAPTER- 4

4.0 DETAILS OF AREA UNDER STUDY

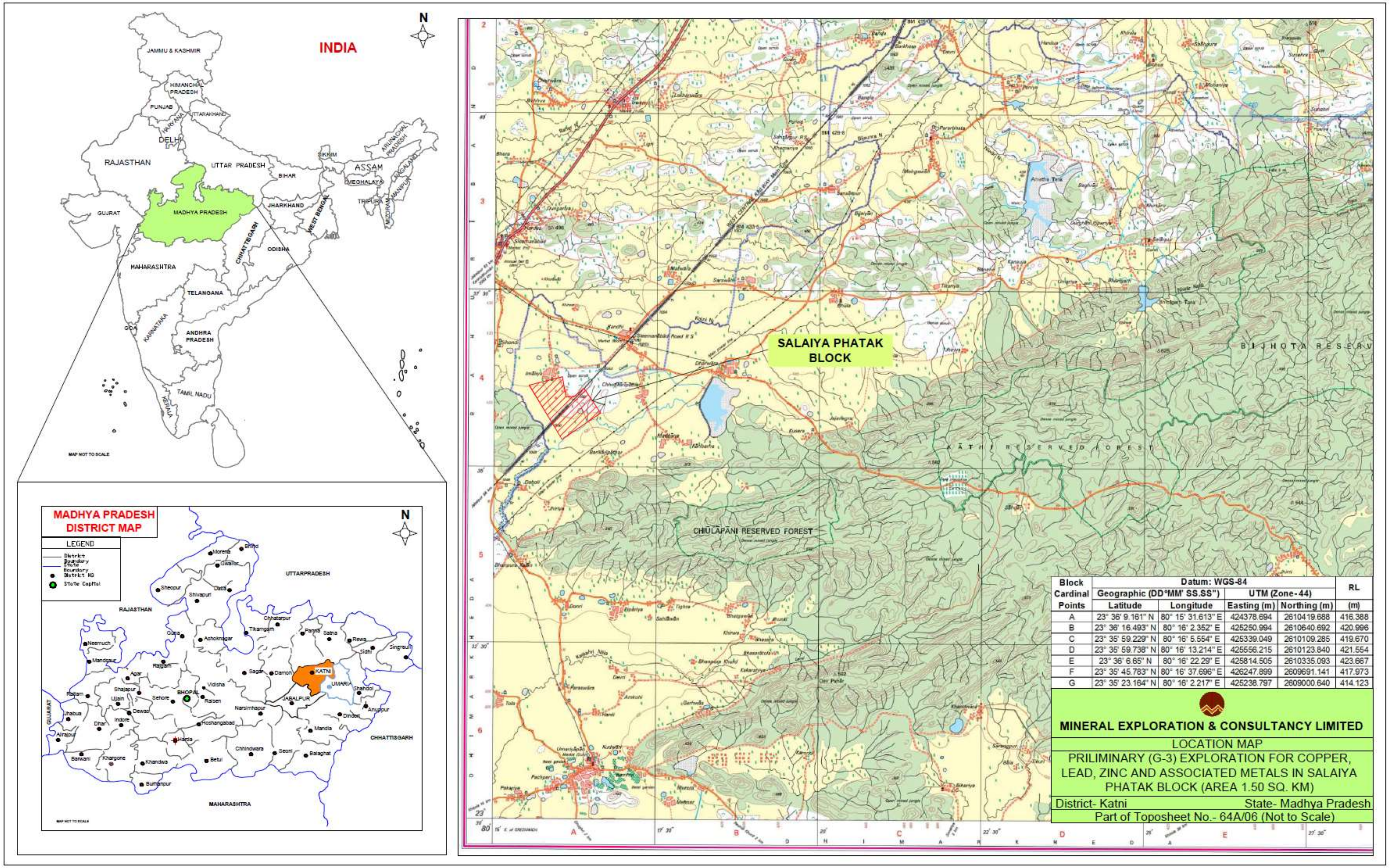
4.1 Village, District, State

The Salaiya Phatak Block encompasses the region delineated in Survey of India Toposheet No. 64A/06, spanning an area of 1.50 square kilometers. This geographical expanse spans across portions of Bahoribandh Tahsil, Katni district within the state of Madhya Pradesh, and nearly 60 Km NNE of Jabalpur district. From a geological perspective, several pivotal villages lie within the confines of the Salaiya Phatak Block, including but not limited to Imaliya & Bandhi. The location plan of Salaiya Phatak block on part of toposheet no 64A/06 is presented as Text Figure- 1 and Plate- I.

4.2 Coordinates of all corner points of the study area in Latitude and Longitude (Degree Minutes Second) format WGS-84 Datum

Block Cardinal Points	Datum: WGS-84				RL
	Geographic (DD°MM' SS.SS")		UTM (Zone- 44)		
	Latitude	Longitude	Easting (m)	Northing (m)	(m)
A	23° 36' 9.161" N	80° 15' 31.613" E	424378.694	2610419.688	416.388
B	23° 36' 16.493" N	80° 16' 2.352" E	425250.994	2610640.692	420.996
C	23° 35' 59.229" N	80° 16' 5.554" E	425339.049	2610109.285	419.670
D	23° 35' 59.738" N	80° 16' 13.214" E	425556.215	2610123.840	421.554
E	23° 36' 6.65" N	80° 16' 22.29" E	425814.505	2610335.093	423.667
F	23° 35' 45.783" N	80° 16' 37.696" E	426247.899	2609691.141	417.973
G	23° 35' 23.164" N	80° 16' 2.217" E	425238.797	2609000.640	414.123

Text Figure- 1: Map showing location of Salaiya Phatak block over toposheet no. 64A/06, District- Katni, Madhya Pradesh



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F	23° 35' 45.783" N	80° 16' 37.696" E	426247.899	2609691.141	417.973
G	23° 35' 23.164" N	80° 16' 2.217" E	425238.797	2609000.640	414.123

4.3 Cadastral details of the area with land use, area under forest with type of forest. In case the cadastral details are not available an indicative data of breakup of government, private and forest land

4.3.1 The surroundings of Salaiya Phatak block exhibits a diverse land use, featuring scattered patches of forested areas, with noteworthy sections such as the Chiulapani Reserve Forest to the South and Kathi Reserve Forest to the East of the block. Despite these pockets of forested terrain, the majority of the block is characterized by privately owned lands and Revenue lands. Notably, active mining leases are prevalent around the block, primarily concentrated to the west of Sleemnabad and in the vicinity of Dundi village.

4.4 Mineral(s) under investigation

4.4.1 The primary focus of the investigation in the Salaiya Phatak block revolves around the exploration of Copper, Lead, Zinc and other associated metal resources.

CHAPTER- 5

5.0 PHYSIOGRAPHY AND ENVIRONMENT

5.1 Relief of the area with minimum and maximum elevation, drainage pattern, natural water courses, reservoirs, etc.

5.1.1 The Salaiya Phatak block and its surroundings present a flat topography, characterized by a generally flat terrain with monotonous soil cover. To the south-east, ENE-WSE trending hill ranges of Chiulapani & Kathi Reserve Forest, reaching a maximum height of 596m above MSL, are covered by dense plantation. The Salaiya Phatak block itself is situated in a plain country with a very gentle slope from east to west. The terrain becomes uneven east and south of Salaiya Phatak village, transitioning into a hilly area with long ridges trending ENE-WSW, alternating with valleys and nalas along the margins. The minimum elevation is 410m above M.S.L. to the Imaliya part, the topography is flat, marked by continuous soil cover underlained by mostly dolomite.

5.1.2 The drainage pattern of the area is predominantly dendritic, controlled by lithological variations and structural trends. Several seasonal streams (locally known as nallahs) originate within the block and flow towards the southeast, ultimately joining the Umdar or Katni River systems. These streams exhibit flow only during the monsoon season and remain dry during the rest of the year. In and around the block, small village ponds and tanks serve as sources of water for domestic and agricultural purposes. The Bahoriband Reservoir is the major nearby surface-water body. No perennial river flows through the block, but the drainage network ensures efficient surface runoff during monsoon periods

5.2 Roads, railway track, electric transmission line, telephone line, etc., passing through the area or nearby

5.2.1 The study area spans portions of Katni district in Madhya Pradesh, conveniently located approximately 60km from Jabalpur on NH-7 and around 40km from Katni, also accessible via NH-7. The Sleemnabad Road Railway Station, situated approximately 5km from the block, serves as the nearest rail link. The Jabalpur airport is the closest air transportation hub.

5.2.2 The Salaiya Phatak block is traversed by two significant power lines. One power line follows the alignment of NH7, providing a critical energy infrastructure corridor along this major transportation route. The second power line runs south of the southern boundary of the block, reinforcing the electrical connectivity in the rural region.

5.3 Host population (local tribes), Human settlements within and nearby the area

5.3.1 In and around the Salaiya Phatak block, diverse tribal communities thrive, including the Gond, Baiga, Bhil, and Kol tribes. The Bhil tribe dominates with 37.7% of the total Scheduled Tribe (ST) population, followed by the Gond tribe at 35.6%. The Gond tribe, renowned for vibrant art, especially the famous Gond paintings, contributes significantly to the region's rich cultural heritage.

5.3.2 Several human settlements can be seen in and around the study area. Traditionally, rural households are made up of mud wall with single door and without ventilation window. Generally houses are one story and with a courtyard. Majority of the houses have no toilets.

5.4 Socio Demographic profile of the area and nearby

5.4.1 According to the 2011 Census, Katni district has a population of 1,292,042. This gives it a ranking of around 379th in India (out of 640). The district has a population density of 261 inhabitants per square kilometre. Its population growth rate over the decade 2001-2011 was 21.41 %. Katni has a sex-ratio of 952 females for every 1000 males. The literacy rate is 71.98 %. Around 20.4 % of the population lives in urban areas. Scheduled Castes and Scheduled Tribes made up approximately 12.05 % and 24.59 % of the population respectively.

5.4.2 The economic landscape in and around the study area is predominantly shaped by agricultural activities, serving as the primary source of livelihood for a significant portion of the population. The community relies heavily on cultivating crops and rearing livestock to sustain their households. In addition to agriculture, a substantial number of individuals in the vicinity find employment in the nearby marble industry as laborers. This industry provides an alternative source of income for many. Furthermore, a few entrepreneurial individuals have ventured into setting up their own small businesses.

5.5 Historical sites and archaeological monuments, places of worship, public utilities etc. within or near by

5.5.1 The Salaiya Phatak Block is situated within the Bahoriband Tehsil of Katni District, Madhya Pradesh, which has a rich cultural and historical background. Several important archaeological and religious sites are located within and around the area.

The most notable among them is the **Shri Digambar Jain Atishay Kshetra, Bahoriband**, located about 2 km from Bahoriband town. It houses a large ancient idol of Lord Shantinath (16th Tirthankara), believed to date back to the 11th–12th century (Kalchuri period). The temple complex is an important pilgrimage site for the Jain community and is also recognized for its archaeological and historical significance.

Another prominent site nearby is the **Tigawa (Tigwan) Temple Complex**, located in the Bahoriband area. The site contains remnants of Gupta-period temples (circa 400–425 CE), including the famous Kankali Devi Temple, known for its early temple architecture and stone carvings. This site is protected by the Archaeological Survey of India (ASI) and is an important cultural landmark of the region.

About 30–35 km away lies the **Vijayraghavgarh Fort**, a historical fortification named after Lord Vijayraghav. The fort contains ancient structures, including the Rangmahal Palace and a temple dedicated to Goddess Sharda, reflecting the architectural and historical richness of the region.

Public infrastructure in Katni district is well developed. The district headquarters, Katni town, serves as an important railway junction and administrative centre, equipped with educational institutions, hospitals, government offices, and modern civic amenities. The NH-30 and NH-78 highways connect Katni to Jabalpur, Satna, and Rewa, ensuring smooth transport and communication. Rural areas, including Bahoriband and surrounding villages, are connected through pucca and semi-pucca roads, and are served by electric transmission lines, hand pumps, and primary health centres.

5.6 Forests, sanctuaries, national park and wild life sanctuaries; grazing land and gochar land within or near by the area with distance from periphery of the area explored

5.6.1 Chiulapani and Kathi Reserve forest falls within 5-10 Km of South of the Salaiya Phatak Exploration block. As this region encompassing Katni district in central India, its surrounding is endowed with diverse and ecologically significant landscapes, featuring lush forests, sanctuaries, national parks, and wildlife sanctuaries. These areas serve as vital habitats for a plethora of flora and fauna, contributing to the region's biodiversity. Prominent among them is the Bandhavgarh National Park in Umaria district (120 Km E), renowned for its population of Bengal tigers and diverse wildlife. The Panna National Park, situated 150Km NE, adds to the ecological wealth of the region.

5.7 Flora and Fauna within and nearby

5.7.1 The study area, characterized by its diverse and vibrant ecosystem, hosts a rich variety of flora and fauna contributing to the region's ecological significance. Noteworthy floral species include Mango (*Mangifera Indica*), Sal (*Shorea robusta*), Sagon (*Tectona grandis*), Mahua (*Madhuka latifolia*), Tendu (*Disaphyros metamoxylon*), Imli (*Tamarindus indica*), Neem (*Azadirachta indica*), Bamboo (*Bambusa vulgaris*) and Bel (*Aegle marmacas*).

5.7.2 In terms of fauna, the study area boasts a diverse array of wildlife, including boars, cheetal, sambar, rabbits, snakes, foxes, wild bears, deer, and various antelopes. The area is also marked by the prevalence of large-sized jet-black to brownish-black scorpions, with brown-colored scorpions observed in the laterites of amoch village.

5.8 Water bodies such as river, nala, stream, reservoir, etc., within or nearby

5.8.1 Katni District forms part of the Son–Narmada river basin system and is drained mainly by the Katni, Mahanadi, Chhoti Mahanadi, and Umrar rivers, along with numerous seasonal nalas and minor streams. The drainage pattern is predominantly dendritic to sub-dendritic, typical of the Vindhyan terrain.

The Katni River, an important tributary of the Mahanadi, flows through the central part of the district and passes near Katni town, providing a major surface water source for domestic and agricultural use. The Umrar River flows in the southern and southeastern parts of the district, while the Chhoti Mahanadi River drains the western and southwestern sectors before joining the larger river system downstream.

Several small seasonal streams such as Doodhi Nala, Gaur Nala, and Bharat Nala contribute to local drainage, particularly during the monsoon months. These nalas ensure effective runoff and groundwater recharge in the region.

The district also hosts a number of reservoirs and tanks, such as the Bahoribandh Tank (Nearest to the block), Rohaniya Reservoir, Bansagar Reservoir (in the adjoining Rewa–Katni border region), and Katni Dam, which serve irrigation and domestic purposes. Many village ponds and check dams are also developed across the district for minor irrigation and livestock use.

5.9 Climatic conditions

5.9.1 The study area is characterized by a subtropical climate, marked by distinct seasonal variations. Winters are relatively cool, with temperatures dropping to as low as 5°C, while summers can be hot and semi-dry, reaching up to 46°C. The region experiences an average annual rainfall of about 1560 mm, with the monsoon active from July to September, contributing significantly to the precipitation.

CHAPTER- 6

6.0 INFRASTRUCTURE

6.1 The Salaiya Phatak block, situated near the Katni district of Madhya Pradesh, benefits from a robust network of infrastructure, enhancing its connectivity and industrial potential. The study area is positioned 3Km from National Highway 7, facilitating easy access to major cities such as Jabalpur, Katni and Nagpur. Additionally, Sleemnabad Road, the nearest raiway station, is well-connected by the Indian Railways' West Central Main line, with the Jabalpur-Katni Railway line passing through the block area, providing efficient freight and passenger transportation.

6.2 The area is equipped with reliable electricity supply from the Madhya Pradesh Power Transmission Company Limited (MPPTCL), ensuring uninterrupted power for residential and industrial use. Furthermore, water supply is managed by the Public Health Engineering Department (PHED), guaranteeing access to clean and potable water for the local population.

6.3 Katni District is one of the important industrial centers of eastern Madhya Pradesh, known for its mineral-based, cement, and agro-processing industries. The cement industry is the dominant sector in Katni, supported by the availability of limestone from the Vindhyan formations. Major cement plants in and around Katni include units of Birla Corporation Limited (Maihar region), ACC Cement, J.K. Cement, which contribute significantly to the local economy and employment. The district also has a thriving lime and refractory industry, with several medium and small-scale units engaged in lime burning, dolomite processing, and marble cutting/polishing. Katni's dolomite, limestone, and bauxite resources have encouraged the growth of mineral-based industries, including small foundries and chemical plants.

CHAPTER- 7

7.0 GEOLOGY

7.1 Brief regional geology of the area outlining the broad geological, stratigraphical and structural frame work

7.1.1 The central part of the Indian Precambrian Shield is characterized by the presence of two separate crustal provinces: the Northern Crustal Province, which includes the Bundelkhand region, and the Southern Crustal Province, known as Bastar. Within the Northern Crustal Province, there is a subdivision into the Bundelkhand Cratonic area and a more extensive zone of accretion to its south, following an ENE–WSW trend, recognized as the Central Indian Tectonic Zone (CITZ).

7.1.2 The Bastar Crustal Province exhibits distinctive features, including an Archean cratonic nucleus manifested by widely scattered older supracrustals, such as the Sukma Group and its equivalents. These supracrustals have undergone regional deformation and metamorphism, accompanied by a tonalite-trondhjemite-granodiorite (TTG) crust dating back to greater than 3.0 billion years. Additionally, within this province, there are younger supracrustals ranging from Neo-Archean to Meso-Proterozoic, organized into well-defined north-south trending volcanosedimentary belts. The geological landscape is further influenced by the intrusion of younger granitic bodies into both the older and more recent supracrustals.

7.1.3 The Bundelkhand Crustal Province is characterized by a semicircular granite-gneiss massif, represents the Archean cratonic nucleus (> 3.0 Ga). This massif includes numerous older supracrustal enclaves. The southern and southeastern boundaries of the Bundelkhand massif are covered by the Paleo- to Meso-Proterozoic Bijawar Group, primarily composed of metasediments and associated volcanic rocks. In the northern part of the Bundelkhand massif, there is another metasedimentary unit called the Gwalior Group, considered to be time-equivalent with the Bijawar Group. The northern limit of the Bundelkhand massif is marked by the Indo-Gangetic alluvial cover. In the southern, southeastern, and western parts of the Bundelkhand craton, there is an unconformable overlay of Vindhyan sediments. This overlay causes a significant separation, at the present exposure level, from the Precambrian rocks (BGC-Aravalli-Delhi) of Western India, as well as the Mahakoshal belt of the Central Indian Tectonic

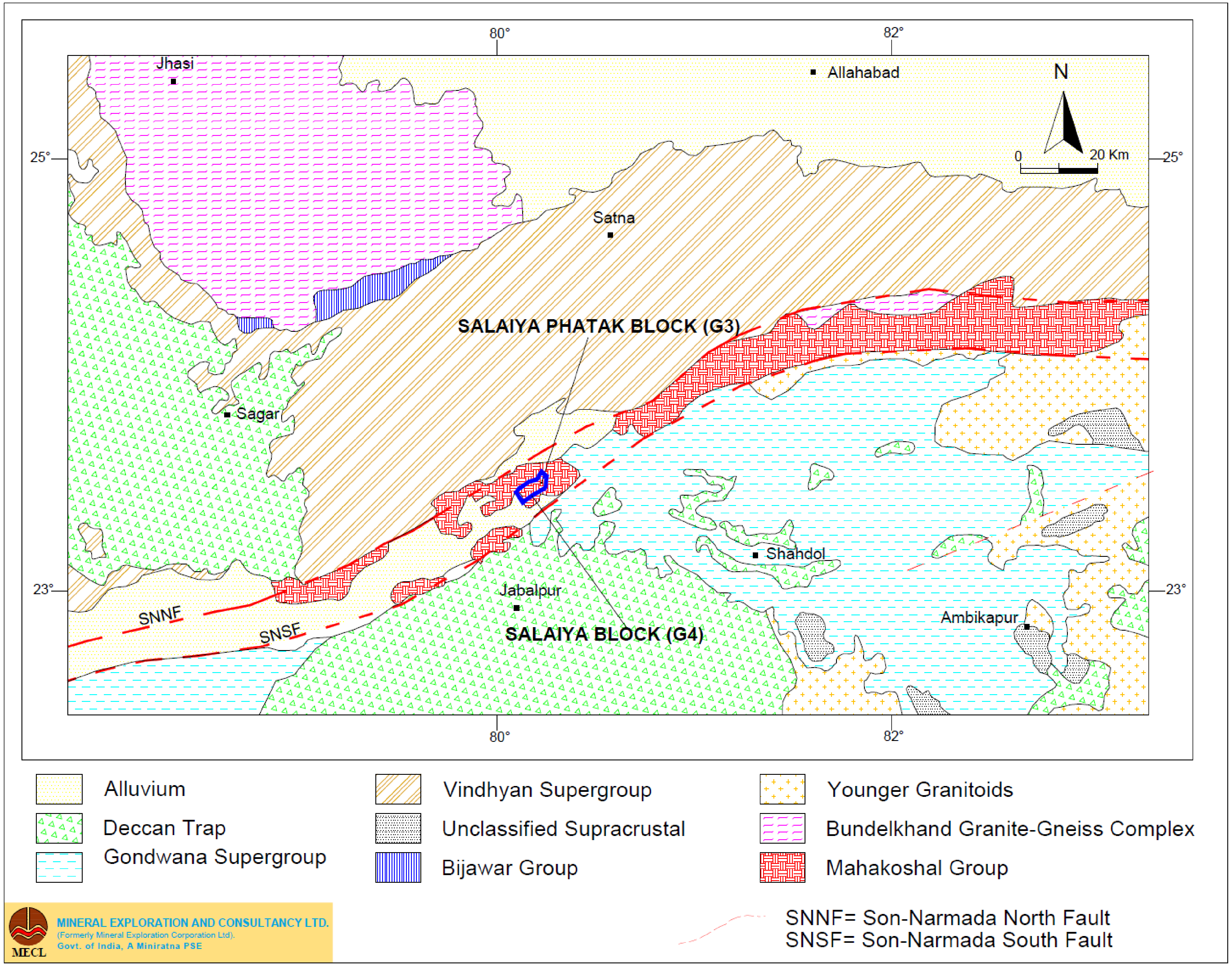
Zone (CITZ) lying to its south. This geological setting outlines the complex history and stratigraphic relationships within the Bundelkhand Crustal Province.

7.1.4 The Central Indian Tectonic Zone (CITZ), initially known as the Satpura Province in early literature, is delineated by the Son–Narmada North Fault (SNNF) in the north and the Central Indian Shear (CIS) in the south (Roy and Hanuma Prasad, 2003). Within the CITZ, there are several Proterozoic mobile belts (< 2.5 Ga) embedded in predominantly undifferentiated gneiss, featuring locally identified TTG (tonalite-trondhjemite-granodiorite) members and syn to post-kinematic K-rich granitic bodies. Large parts of this region are covered by the Vindhyan and Gondwana sequences, as well as the Deccan Trap rocks, limiting the exposure of the Precambrian basement. Despite this, three distinct supracrustal belts of varying ages stand out: Mahakoshal (2.2–1.8 Ga), Betul (> 1.55–0.85 Ga), and Sausar (1.1–0.95 Ga). These belts, extending from north to south, are each bounded by brittle–ductile/ductile shear zones. The CITZ is characterized by multiple brittle–ductile to ductile shear zones, with notable examples being the Son–Narmada North Fault (SNNF) running along the northern contact of the Mahakoshal belt with the Vindyans, and the Son–Narmada South Fault (SNSF) demarcating the southern boundary of the Mahakoshal belt.

7.1.5 The Mahakoshal supracrustal belt, oriented in an ENE–WSW to E–W direction, stretches approximately 600 km from the southwest of Jabalpur, Madhya Pradesh, to Palamau district in Jharkhand. It maintains an average width of about 20 km, covering an area of around 9000 sq km. This belt is characterized as a fault-controlled asymmetric rift basin, with the Son–Narmada North Fault (SNNF) and Son–Narmada South Fault (SNSF) bounding its northern and southern sides, respectively. The present area of study i.e. Salaiya Phatak block falls within this Mahakoshal belt. Regional Geological Map showing Salaiya Phatak block boundary on the Mahakoshal belt is presented as Text Figure- 2 and Plate- II.

7.1.6 To the north of the Mahakoshal belt, the Vindhyan Supergroup forms its border, except for a limited stretch in the Sidhi area where a linear belt of basement (Archean) Gneissic Complex intervenes. On the southern margin of the belt, there is an extensive presence of Proterozoic Granitic Intrusives, and in some areas, it is juxtaposed against the rocks of the Gondwana Supergroup, with the prominent Son–Narmada South Fault passing in between.

Text Figure- 2: Regional Geological map showing location of Salaiya Phatak block within Mahakoshal belt



7.1.7 The Mahakoshal Group comprises various rock types, with predominant meta-sediments such as quartzite, pelites, carbonates, greywacke, and banded iron formation (BIF). Additionally, there are subordinate metabasalt and ultramafic rocks, along with infrequent occurrences of acid tuffs, intrusive mafic dyke swarms, and granitoids. Occasional intrusions of albitite with alkane affinity, as well as reported carbonatite (?), add to the geological diversity.

7.1.8 Roy and Devrajan (2000) classified the supracrustal assemblages into three formations. In the lower part, exposed in the northern section of the belt, basaltic volcanic rocks are prominent, accompanied by minor volcanic and shallow marine sediments. This sediment association indicates characteristics of pre-rift shallow marine intertidal to shelf-slope facies sedimentation. Following this, there was a phase of limited rifting and emplacement of basic volcanic rocks with arc affinity. Overlying these formations are sediments of moderate to deeper water conditions, including BIF.

7.1.9 Nair et. at. (1995) categorized Mahakoshal group of rocks into three formations based on lithological characteristics, which is very similar to the classification proposed by Roy and Devrajan (2000). The lowermost Chitrangi Formation consists of a volcanic assemblage, including basic and ultrabasic lavas with associated dykes and ultrabasic plugs. Situated in the anticlinal valleys in the northern half of the belt, this formation features peridotitic lava, pillow metabasalt, epidiorite, agglomerate and calc-chlorite schist in the lower horizons, transitioning to minor andesitic lavas towards the upper part of the lava pile.

7.1.10 The middle formation, known as the Agori Formation or Sleemnabad Formation, follows volcanic activity in the basin and incorporates clastic and non-clastic sediments along with minor volcanics. It includes tuffs with metabasic lenses, lenticular bodies of dolomite and impure marble, banded hematite quartzite, banded magnetite quartzite, jasperite and quartzite. This formation, primarily found in the northern half of the basin along the limbs of anticlines, features ridges of quartzite and BHQ/BMQ trending ENE-WSW, extending across the basin as lenticular bands. Depositional structures like load casts, bedding, and color banding are observed in the BHQ/BMQ.

7.1.11 Throughout the Agori Formation, Banded Iron Formations (BIF) are present with gradational contacts with marbles and other members. The BIF, forming long linear ridges, is thinly bedded. Along the strike, there is a transition to chert and cherty quartzite, evolving into brecciated quartzite/jasper.

7.1.12 The Parsoi Formation, the youngest lithounit in the Mahakoshal Group, is developed in a broad synclinorium in the southern half of the belt. It is characterized by tuffaceous phyllites with intercalations of felspathic quartzite bands. Some phyllites are carbonaceous and sedimentary structures like graded bedding, current bedding, convolute laminations, and slump structures are observed. The Parsoi Formation carries a significant intrusion of quartz veins parallel to the fold axes.

General Stratigraphic succession of Mahakoshal Group, after Nair et. al. (1995)

<table>
<tr><th>Group</th><th>Formation</th><th>Litho units</th></tr>
<tr><td rowspan="7">MAHAKOSHAL GROUP</td><td colspan="2">Vindhyan Supergroup and Jungel Group of Sediments</td></tr>
<tr><td colspan="2">Uncomformable and Faulted Contact</td></tr>
<tr><td>Intrusives</td><td>Dunite, gabbro, dolerite, quartz- porphyry and quartz veins, syenite and associated alkaline dykes, carbonatites, barite veins and lamprophyres/ trachytes and associated intrusives. Barambaba granite and equivalents.</td></tr>
<tr><td>Parsoi Formation</td><td>Tuffaceous and carbonaceous phyllites, felspathic quartzite and conglomerate, tuffaceous phyllite with metabasalt intercalations.</td></tr>
<tr><td>Agori Formation or Sleemnabad Formation</td><td>Banded hematite/magnetite quartzite and jasperiod with associated tuffs and ash beds.
Impure marble, dolomite and inter- bedded calc-chlorite schist with occasional metabasalt lenses, conglomerate.</td></tr>
<tr><td>Chitrangi Formation</td><td>Basic and ultrabasic plugs and dykes including periodtite and serpentinite, Agglomerates, metabasalt and peridotitic pillow lava.</td></tr>
<tr style="display:none"></tr>
<tr><td colspan="2">Sidhi Gneissic Complex (Basement)</td><td>Gneissic Complex with associated mafic, ultramafic rocks and metasediments</td></tr>
</table>

7.1.13 The Mahakoshal belt is framed by two major faults: the Son–Narmada North Fault (SNNF) in the north and the Son–Narmada South Fault (SNSF) in the south. These large faults have been reactivated multiple times during the Mahakoshal orogeny and subsequent periods. The Mahakoshal Group of rocks bears evidence of several phases of deformation (D1, D2, and D3). Among these, D1 and D2 are particularly intense, and their combined effects have led to the elongation of the belt in an ENE–WSW direction.

7.1.14 The geometry of D1 and D2 folds indicates a predominant flattening type of strain in response to north-south compression. As flattening progressed, a distinct ductile shear zone developed along the southern margin of the belt, coinciding with the SNSF. This shear zone exhibits a reverse slip movement with a direction towards the north.

7.2 Local geological setting detailing the common rock types, controls of mineralization, details of old workings if any, surface exposures, etc., of the area under study also of adjoining nearby areas, if the information is likely to have an impact on the area under study

7.2.1 Geological Setting

The Salaiya Phatak Block lies within the Mahakoshal Supracrustal Belt, an ENE–WSW to E–W trending linear geological belt extending for about 600 km from southwestern Jabalpur in Madhya Pradesh to Palamau district in Jharkhand. The Mahakoshal Group consists of a diverse assemblage of meta-sediments, metabasalt, ultramafic rocks, acid volcanic tuffs, mafic dykes, and granitoids, reflecting a complex geological history of sedimentation, volcanism, and metamorphism.

According to Nair et al., the Mahakoshal Group is subdivided into three formations—Chitrangi, Agori (Sleemnabad), and Parsoi. The Agori (Sleemnabad) Formation, which occupies the Salaiya Phatak region, comprises clastic and non-clastic sediments, including banded iron formations (BIF) such as BHQ/BMQ, chert, and ferruginous quartzite. The BIF units exhibit a general ENE–WSW trend, occasionally showing transitions to chert and brecciated quartzite/jasper along the strike.

In and around the study area, the geological sequence is dominantly represented by rocks of the Agori (Sleemnabad) Formation, displaying typical supracrustal characteristics. The region around Chhapra, Amoch, Nimas, Sleemnabad, and Mahagwan shows widespread distribution of supracrustal rocks, interspersed with lateritic and Quaternary alluvial cover in low-lying areas.

The northern part of the study area is characterized by prominent ferruginous quartzite ridges, which gradually grade into cherty quartzite, brecciated quartzite, and banded quartzite–jasper with notable manganese enrichment. Dolomite formations occur to the north of these ridges and are often concealed beneath a thick laterite cap, which varies in color from yellow and greyish-white to light and dark brown, depending on the ferruginous content.

Towards the southern sector, exposures of phyllite and metabasalt occur as discontinuous hillocks, indicating the base of the supracrustal sequence. The Amoch area reveals a representative stratigraphic sequence consisting of quartzite/chert bands, dolomite, phyllite (locally manganiferous), and banded quartzite–chert/jasper, suggesting a continuous sedimentary deposition without any major unconformity.

In the Salaiya Phatak area, dolomite constitutes the predominant lithology, occasionally intercalated with thin bands of phyllite (Field Photograph- 1). The dolomites are traversed by dykes of quartz-porphyry and irregular vein quartz stringers, indicating later intrusive activity. The general strike of the dolomitic rocks is N60°E to N70°E, with southerly dips varying from 55° to 80°. Within these dolomites, phyllite bands of about 1 metre thickness and thin stringers are observed along bedding planes.

The dolomitic units of the block area are fine- to medium-grained, white to grey, and siliceous, frequently traversed by quartz veins (Field Photograph- 2), particularly near old workings. The rock exposures are limited, as much of the area is covered under soil and laterite, ranging from 1 m to 4 m in thickness.

Local stratigraphic column established after geological mapping in and around Salaiya Phatak block

<table>
<tr><th>Group</th><th colspan="2">Lithounits</th></tr>
<tr><td rowspan="2">Qarternary</td><td colspan="2">Alluvium</td></tr>
<tr><td colspan="2">Laterite</td></tr>
<tr><td rowspan="5">Mahakoshal</td><td rowspan="5">Sleemnabad Formation</td><td>Metabasalt</td></tr>
<tr><td>BIF</td></tr>
<tr><td>Phyllite</td></tr>
<tr><td>Chert, Cherty quartzite</td></tr>
<tr><td>Carbonates, Dolomite</td></tr>
<tr><td colspan="3">----- Base Not Exposed -----</td></tr>
</table>

Structure

The major litho-units in and around the Salaiya Phatak Block is governed by ENE–WSW regional trend, overprinted by NNW–SSE extensional shears, faults, and joint systems. These structures have exerted significant control over the emplacement of quartz-porphyry dykes and localization of base metal mineralization zones, making them key structural features of exploration significance.

The dolomitic beds in the area exhibit a more or less homoclinal structure, with a general strike of N65°E–S65°W and a southeasterly dip ranging between 55° and 70°. A prominent system of NNW–SSE trending extensional shears and fractures cuts across the regional lithological trend in an en echelon pattern (Field Photograph- 3). These zones trend N10°W–S10°E with steep westerly or vertical dips. The fracture system often hosts oxidized zones and gossans, while thin fractures in the same orientation contain pyrite, chalcopyrite, and limonitic encrustations, suggesting structural control on sulphide mineralization. The emplacement of quartz-porphyry dykes appears to have been influenced by this NNW–SSE fracture system.

Two prominent joint sets are recorded within the dolomite. First set: Striking N20°–30°E, dipping eastward and the second set: Striking N10°–20°W, dipping westward. Minor folds in dolomite and shale are observed, indicating localized deformation associated with compressional phases. Drag folds accompanied by parallel sheared fractures (striking N25°W–S22°E) are seen in argillaceous dolomite near the old workings close to the railway line.

7.2.2 Common Rock Types

In and around the study area, metasedimentary litho-units encompass both clastic and non-clastic compositions. The clastic components consist of Phyllite and BIF, while the non-clastic components are primarily dolomite with minor occurrences of cherts. Massive metabasalts of the uppers Mahakoshal group has also been identified in the drill cores. Detailed descriptions of each observed rock type in the study area are provided in the following paragraphs.

Phyllite: Phyllite occurs as interbands within dolomite and marble in the Salaiya Phatak Block. The frequent intercalation of thin argillaceous bands within the carbonate sequence is a characteristic feature of the Sleemnabad (Agori) Formation of the Mahakoshal Group. The rock appears greenish-grey in color, well-foliated, and exhibits a distinct phyllitic sheen on fresh surfaces. The phyllite is sericitic to chloritic in composition, with fine-grained sericite, chlorite, and subordinate quartz forming the dominant mineral assemblage. In certain instances, it displays a slightly arenaceous character, resembling micaceous quartzite due to an increase in quartz content.

Dolomite: Dolomite is the dominant lithounit exposed in and around the Salaiya Phatak Block, forming both massive and bedded varieties. The rock varies in color from pale yellow to milky white, and is generally fine- to medium-grained. Prominent exposures occur around Salaiya phatak, south of Imalia, and south of Bandhi villages.

The massive dolomite type typically displays "elephant-skin" weathering, while the bedded variety develops lenticular ribs on the surface, reflecting differential weathering along bedding planes. The general strike of the dolomite bands is NE–SW to E-W, with a steep southerly dip varying between 55° and 70°.

The rock exhibits mineral lineation, influenced by preferential orientation of biotite flakes, and contains numerous thin quartz veins that traverse the rock in a cross-cutting pattern. In several places, these quartz veins are smoky in appearance. Dolomite powder shows effervescence with diluted HCl, confirming its carbonate nature.

Of particular note, dolomite near Salaiya Phatak and Imalia is reported to host sulphide mineralization and minor gold occurrences. A dextral shear zone, approximately 10 cm thick, containing sulphide enrichment, has been observed within these dolomitic units, indicating structurally controlled mineralization.

Under the microscope, the dolomite consists of granular aggregates of dolomite crystals, showing grain-size coarsening and sparry patches in localized areas. Quartz occurs both as intruding veins and as very fine to fine clasts dispersed within a dolomitic matrix. Sericite appears as fine disseminated specks, while opaque minerals occur as fine anhedral grains, hairline vein fillings, and minute disseminations associated with reddish ferruginous staining.

Metabasalt: Prominent surface exposures of metabasalt are not observed within the Salaiya Phatak Block, though a large dyke of metabasalt is present towards the western part of the area. Within the block, metabasalt has been intersected in boreholes MBSP-1 and MBSP-2. Based on the core examination, the metabasalt is massive, dark green in color, and exhibits disseminated pyrite mineralization throughout the rock, indicating sulphide enrichment. The rock shows clear signs of alteration, marked by the development of chlorite and sericite, suggesting low-grade metamorphic overprinting.

Under the microscope, chlorite appears as patches composed of very fine microcrystalline aggregates, while plagioclase occurs as fine to very fine subhedral prismatic laths, anhedral grains, and pseudomorphic patches that are partly altered to sericite. Carbonates are also present as very fine to fine-grained intrusive patches and irregular fillings, often associated with alteration zones.

Quartz Porphyry: In the Imalia area, the dolomites are traversed by a quartz-porphyry dyke trending approximately NNW–SSE. The dyke appears as small hummocks due to its higher resistance to weathering compared to the enclosing dolomites. The width of the dyke varies from 2 to 4 metres. Although not exposed as a single continuous body, a series of widely separated outcrops aligned along the same strike suggest that they represent segments of one major dyke extending for about 4.5 km, from 1 km southwest of Imalia to the southern foothill of Hardua Hill. Another small dyke is observed in the southwestern corner of Imalia village. The dykes show a steep westerly dip and are intrusive into the dolomites, often causing silicification of the adjacent host rock.

In hand specimen, the rock is light greenish to pale yellow, compact, and exhibits a distinct porphyritic texture. On weathered surfaces, quartz phenocrysts stand out prominently within a kaolinised, fine-grained matrix. The rock varies from fine- to coarse-grained, occasionally showing a cherty character with grain size gradation from the central to the marginal zones (Field Photograph- 4).

Disseminations of pink to amethyst fluorite occur within the dyke, with concentrations generally higher along the margins, where the composition has been modified by interaction with the surrounding dolomite. The quartz-porphyry dykes of the Imalia group trend N–S to NNW–SSE with steep dips (60°–85°) — westerly in the central Imalia zone and easterly in the southern group.

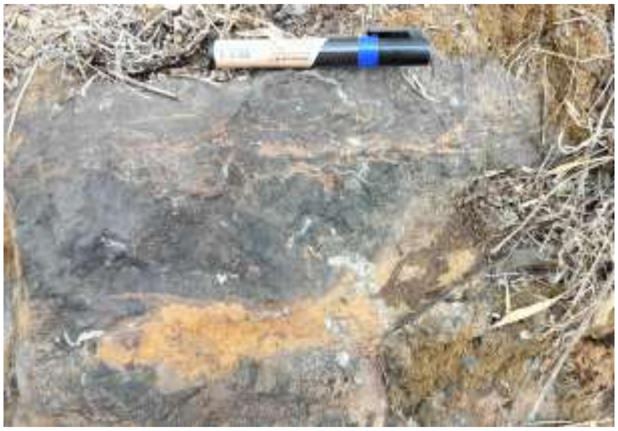
Under microscope, it is made up of very fine aggregates of quartz and sericite. Fine to moderately coarse sub-rounded quartz phenocrysts are seen present in the distribution. Quartz is also seen present as fine subhedral to euhedral crystal as secondary fillings. Fluorite is present as fine subhedral prismatic and subrounded grains in dissemination. Muscovite/ phlogopite occur as fine disseminated flakes. Opaques occur as very fine specks. Calcite is noted as fine patches and patchy fillings. Tourmaline is found present as very fine prismatic grains in accessories.

 Field Photograph 1: Intercalation of shale in dolomite, with shear fracture	 Field Photograph 2: Fine quartz veins intruded in Dolomite
 Field Photograph 3: Shear fractures across the regional trend intruded by quartz veins in en-echelon pattern	 Field Photograph 4: In-situ quartz porphyry showing purple coloured fluorite grains

7.2.3 Controls of mineralization

The sulphide mineralization in the Salaiya Phatak–Imalia area is primarily structurally controlled, occurring along sheared, brecciated, and silicified zones within dolomites and quartz-porphyry dykes. These zones host quartz and sulphide-bearing veins, which generally follow a NNW–SSE to N–S orientation with steep westerly dips (60°–85°). The spatial association between mineralization and these structural features clearly indicates that faults, fractures, and shear planes have played a dominant role in localizing and channelizing hydrothermal solutions responsible for sulphide deposition (Field Photograph- 5).

Within the dolomitic sequence, mineralization occurs mainly along shear fractures trending N10°W to N20°W, dipping 60°–70°W. The mineralized fractures, varying from a few millimetres to about 0.5 m in width, are closely spaced, forming a network of intersecting mineralized veins with thin partings of dolomite. These zones are generally transverse to the strike of the enclosing dolomite, and locally show disseminated sulphide specks and stringers in the adjacent host rock. The ore minerals identified include chalcopyrite, chalcocite, pyrite, galena, sphalerite, tetrahedrite, bornite, and covellite, with pyrrhotite occurring in minor quantities (Field Photograph- 6). Gossan zones, exhibit a well-developed box-work structure, indicating oxidation of primary sulphides (Field Photograph- 7).



Field Photograph 5: Fracture controlled mineralized veins have been gossnised

Field Photograph 6: Mineralised veins contains chalcopyrite, pyrite, galena within sheared dolomite

Field Photograph 7: Gossan zone within dolomite is the prominent indication of sulphide mineralization

Field Photograph 8: Old shaft used for excavation of copper ore in Imaliya village

7.2.4 Old Workings

Several old trenches, shafts (Field Photograph- 8), and pits are observed within the Salaiya Phatak–Imalia area, generally flanked by rock and ore debris indicative of historical exploration or small-scale mining activities. These workings occur predominantly within dolomitic formations, which host the sulphide mineralization.

The trenches are oriented roughly in a north–south direction, coinciding with the trend of the mineralized horizons. Four prominent old trenches, located about 0.5 km south of Imalia village, reveal that the mineralization occurs in dolomites as disseminations and stringers, primarily composed of pyrite and chalcopyrite.

The trenches are closely spaced and sub-parallel, suggesting that they were excavated along a single mineralized zone or lode system. The exposed dolomites from these trenches exhibit distinct stains of malachite and azurite, along with gossanized bands showing variegated ferruginous and greenish-blue coloration, characteristic of oxidized copper mineralization.

7.3 Structural details of the area such as dip, strike, folds, faults, etc.

7.3.1 The predominant structural feature identified in the region is bedding, particularly evident in the phyllite and dolomite formations. Bedding is characterized by alternating layers of different composition. In metapelites, this structural arrangement presents as compositional layering, featuring thin silica-rich bands alternating with thicker layers rich in mica, typically measuring 2 to 4 centimeters in thickness. Within the dolomites, thin chert and phyllite layers are discernible, indicating the presence of bedding planes.

7.3.2 The general orientation of the bedding planes is ENE-WSW, with a steep dip ranging from 55° to 70° towards the south. Notably, the Chemogenic rocks of the Sleemanabad Formation exhibit well-developed primary stratification, particularly in the carbonate banded hematite chert (jasper) sequence (Field Photograph- 9) and carbonate with thin-bedded phyllite. Primary bedding planes in these formations are often marked by distinct changes in color within the rock.

7.3.3 The metabasalts of the Sleemanabad Formation exhibit vesicles at various locations, showcasing effects of flattening along the regional fabric. Additionally, some metabasalts display an amygdular nature with secondary developments such as quartz and chlorite. This indicates a complex geological history and metamorphic processes that have influenced the rock formations in the area.

7.3.4 The dominant diastrophic structures in the area encompass foliation, mesoscopic folds, and minor folds. The regional fabric is predominantly characterized by a pervasive foliation, which primarily trends ENE-WSW. However, it is noteworthy that trends of NE-SW and E-W have also been documented in certain locations. The dip of the foliation is either vertical or steeply inclined towards the south.

7.3.5 This pervasive foliation is considered significant as it serves as the S1 axial planar feature to the F1 folds. This indicates a correlation between the orientation of the foliation and the primary folding structures in the region. The presence of mesoscopic and minor folds further contributes to the overall complexity of the diastrophic history in the area, suggesting multiple deformation events that have influenced the geological framework.

7.3.6 The volcano-sedimentary sequence of Mahakoshal has experienced three distinct phases of folding, with the first two being the most intense. During the initial deformational event, folds were generated that are doubly plunging, upright to slightly overturned, with axial planes oriented ENE-WSW and steeply dipping towards the south. These folds exhibit steep plunges either to the ENE or WSW. The pervasive schistosity developed in pelitic rocks during this first deformation event is evident in thin sections, marked by the parallel development of muscovite, sericite, and biotite. Mafic rocks display varying degrees of fabric intensity, with common observations including the flattening of amygdules and the development of spaced schistosity.

7.3.7 The second deformational event also produced upright to northerly overturned, doubly plunging folds, with axial planes striking ENE-WSW and steeply dipping to the south. These folds plunge at shallow angles either to the ENE or WSW. Notably, the F1 and F2 folds are co-planar and nearly coaxial. In pelitic rocks, the second deformation event is characterized by a spaced crenulation cleavage, with no complete transposition of the earlier fabric observed (Field Photograph- 10).

7.3.8 The third deformational event has resulted in broad warps with axial planes trending North-South. The overall map pattern of the volcano-sedimentary rocks is predominantly influenced by the combined effects of the first two deformation events. This complex history of folding and deformation suggests a dynamic geological evolution in the Mahakoshal region, with each phase contributing to the development of the observed structural features.

7.4 A discussion on the type of the deposit based on the style of mineralisation and minerals under investigation. Suggested exploration plan with spacing of the sampling points and depth of exploration commensurate with the stage of exploration.

7.4.1 Type of deposits

The copper and gold mineralization in the Salaiya Phatak Block occurs within dolomites and dolomitic limestones of the Sleemanabad Formation, traversed by quartz veins and quartz-porphyry dykes. The mineralization is mainly composed of chalcopyrite, chalcocite and pyrite, with minor galena, sphalerite, and tetrahedrite, and is observed as vein fillings, disseminations, and fracture-controlled zones (Photomicrograph- 1 & 2).

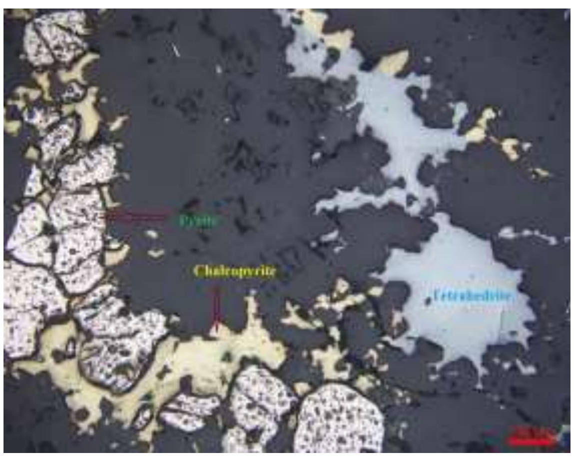
The mineralization is epigenetic in nature and shows a clear structural and hydrothermal control, localized along NNW–SSE trending shear and fracture zones. Associated alteration includes silicification and sericitization restricted mainly to mineralized zones.

Although the presence of quartz-porphyry intrusives and associated hydrothermal alteration reflects a genetic affinity with porphyry-type systems, the mineralization here lacks the broad stockwork veining, zoned alteration pattern, and disseminated ore spread typical of classic porphyry copper deposits.

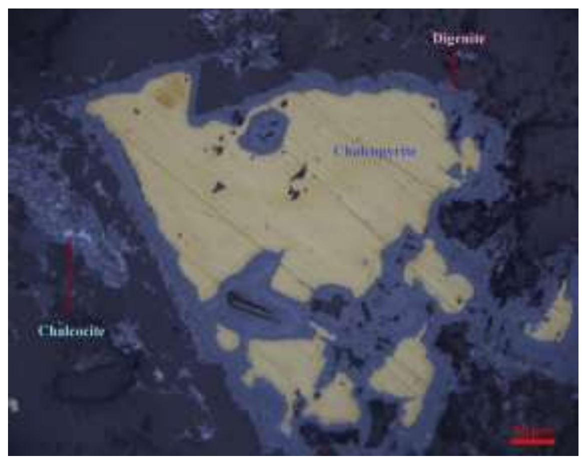
Hence, the mineralization at Salaiya Phatak is best described as a structurally controlled hydrothermal vein-type copper–lead–zinc–gold system, exhibiting localized porphyry-like features related to minor intrusive activity, but fundamentally distinct from large-scale porphyry copper deposits.

Field Photograph 9: Banded carbonate jasper sequence

Field Photograph 10: Crenulatin cleavage in pelitic (phyllite) rock



Field Photograph 11: pyrite is being cut across by chalcopyrite veinlets and associated tetrahedrite patches as seen under reflected light.



Field Photograph 12: chalcopyrite is being replaced by digenite and chalcocite from periphery as seen under reflected light.

7.4.2 Exploration Plan

Based on the nature of sulphide mineralization delineated through detailed geological mapping and supported by previous literature studies, exploration activities are primarily focused in the northern part of the Salaiya Phatak block, parallel to the mineralized zone identified in the adjacent Imaliya block, which has already been auctioned.

During detailed mapping, mineralized gossan zones occurring within sheared and silicified dolomites have been identified. To assess their potential, systematic channel sampling has been carried out across the exposed shear zones. In areas where the mineralized shear/fracture zones within dolomite were not exposed, trenches were excavated to uncover these zones for detailed examination and sampling. Notably, these shear and fracture zones are intruded by thin quartz veins, indicating hydrothermal activity associated with sulphide mineralization.

On the basis of surface exploration data and identified mineralized trends, five boreholes have been proposed at an average spacing of 100–150 meters, strategically located to intersect the projected mineralized zones at approximately 50 meters below the surface. This drilling program aims to confirm subsurface continuity, thickness, and grade of the mineralized zones delineated on surface.

7.5 The extent and variability of the mineralisation expressed as length (in meter) (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource

Based on the results of surface and subsurface exploration, two parallel mineralized lodes for copper and gold mineralization have been delineated up to a depth of 50 meters below the surface in the northern part of the Salaiya Phatak block. These lodes occur parallel to the mineralized zone identified in the adjacent Imaliya block, which has already been auctioned.

The easternmost lode, designated as Lode–I, extends for approximately 500 meters, trending north–south to north-northeast–south-southwest (N–S to NNE–SSW). Adjoining it towards the west, another parallel lode, designated as Lode–II, has been delineated. Within Lode–II, a 10-meter-thick non-mineralized massive dolomite band divides it into two sub-lodes, identified as Lode–IIA and Lode–IIB.

In terms of geometry, these are lean, narrow lodes with an average true thickness of less than 2 meters. As subsurface exploration has so far been limited to 50 meters depth, the lodes have been delineated only up to this level. However, based on the structural continuity and mineralization characteristics, it is anticipated that both the thickness and grade of mineralization may increase with depth.

CHAPTER- 8

8.0 PREVIOUS EXPLORATION

8.1 Name and address of prospecting agency or permit holder or licensee involved in the exploration of the area with year and period of exploration

The following prospecting agencies involved in the exploration in and around the study area.

A. Geological Survey of India (GSI)

B. Mineral Exploration and Consultancy Limited (MECL)

8.2 Brief details of the exploration carried out

8.2.1 Geological Survey of India (GSI)

During 1997–1998, the Geological Survey of India (GSI) carried out detailed exploration in the Imaliya block of Sleemanabad with a special focus on gold, along with silver and other polymetallic mineralization, to evaluate the mineral potential of the area. A total area of 1.40 sq. km was geologically mapped on a 1:2,000 scale, and pitting and trenching were undertaken to delineate small gossanised zones. Targeting the eastern NNW–SSE trending gossanised shear zone, 14 boreholes were drilled for a cumulative 1,042.60 meters, covering a 600-meter strike length. During 1999–2000, the project was identified as a “Fast Track Project”, and its duration was extended by two years to facilitate completion. By 30.10.2001, the exploration work concluded after 60 boreholes had been drilled in the Imaliya block.

Subsequently, during the Field Season Programme (FSP) 2016–17, further G2 stage exploration was undertaken to evaluate the mineralization at different depths. In this phase, six boreholes were drilled at various levels to assess subsurface continuity and grade variation.

8.2.2 Mineral Exploration and Consultancy Limited (MECL)

Mineral Exploration Corporation Limited (MECL) has conducted systematic exploration in the Mahakosal Supracrustal Belt, identifying significant deposits of iron, manganese, gold, graphite, base metals, and dolomite/limestone. A preliminary desktop study pinpointed the Sihora region in Jabalpur district as a key mining area, leading to the proposal and approval of a reconnaissance (G4) survey in the Salaiya Block, covering about 110 Sq. Km area spanning parts of Jabalpur, Katni, and Umaria districts. The 50th Technical-cum- Cost Committee (TCC) of the National Mineral Exploration Trust (NMET) approved the survey, with execution from June 20, 2023, to October 19, 2023, to assess the mineral potential.

Sulphide mineralization, comprising pyrite, chalcopyrite, and galena, was identified by MECL during the Reconnaissance Survey (G4) of the Salaiya block, within gossanised zones located south of Imaliya and in the Salaiya Phatak area. The investigation revealed encouraging copper values ranging from 300 ppm to 0.32%, representing the southern continuation and western extension of the Imaliya mineralization zone.

8.3 Reserves or resources estimated, if any, during the previous exploration campaign with quantity and grade under various categories

8.3.1 Gold

GSI identified gold and sulphide mineralization in the Imaliya area, extending over a strike length of about 750 metres with an average width of 2 metres, during the field investigations carried out between 1997–2001 and 2016–2017. Based on the exploration data, the total gold resource in the Imaliya block was estimated at 466,011 tonnes with an average grade of 1.27 g/t Au, using the cross-section method. As per the UNFC classification, the Imaliya block gold resource falls under the category of Indicated Mineral Resource (332).

CHAPTER- 9

9.0 AERIAL OR GROUND GEOPHYSICAL OR GEOCHEMICAL DATA

9.1 Details of aerial, ground geophysical and geochemical survey taken up and their results

No aerial, ground geophysical and geochemical survey has been taken up.

CHAPTER- 10

10.0 EXPLORATION UNDERTAKEN DURING CURRENT INVESTIGATION

10.1 Details of pitting, trenching, drilling, etc., with spacing and distribution of the sample points along with geographical co-ordinates.

10.1.1 Scheme of Exploration

To align with the defined objectives for the preliminary exploration (G3) of the Salaiya Phatak block, a structured exploration program is proposed, adhering to the guidelines outlined in the Minerals (Evidence of Mineral Contents) Rule-2015. The outlined scheme of exploration aims to systematically achieve the specified objectives, with detailed activities elaborated in the subsequent paragraphs.

The detailed objectives of the preliminary exploration are furnished below:

1. To check the strike continuity of polymetallic mineralization in the south of imaliya area by channeling, trenching and systematic drilling up to 1^{st} level intersection.

2. Further west, near Salaiya phatak area, delineate parallel polymetallic mineralization by channeling, trenching and systematic drilling up to 1st level intersection.

3. To estimate preliminary mineral resource (333) and grade for Copper, Lead, Zinc and associated minerals as per UNFC and MEMC- 2015.

4. To facilitate the State government to auction the block as a mining lease.

10.1.2 Detailed Geological Mapping

The exploration scheme involved detailed geological mapping (on 1:2000 scale) in an area of 1.50 square kilometers in and around Salaiya Phatak block. The mapping aimed to determine the lithological contact and stratigraphic succession of various litho units and to identify potential mineralized zones and their characteristics. Almost 90% of the block area is covered by agricultural land and exposure density is very less. Therefore, all the exposures have been examined carefully. Hand-held GPS devices were used to identify and mark the lithological contacts between larger litho-units.

Conduct preliminary field reconnaissance survey to identify key geological features, including the distribution of supracrustals of Mahakoshal Group around Salaiya Phatak, imaliya and bandhi areas. Dolomites of the north of Salaiya Phatak area are intercalated with phyllites and intruded by shear & fracture controlled secondary quartz veins. Upon observation, it is understood that on surface there are few small gossanised zone within sheared dolomite. Within the sheared dolomite, numerous quartz veins have intruded.

Mapping of the outcrop area and thickness of gossanised shear zones forms a deliberate and crucial component of the geological mapping process. The objective of this exercise is to understand the nature of mineralization, associated alteration patterns, and their influence on the host geological formations. During fieldwork, exposures of dolomite and quartz porphyry are systematically documented. The alignment and extent of quartz porphyry dykes are carefully mapped and traced by taking front and back bearings using a Brunton Compass, ensuring accurate structural correlation and continuity across the study area.

All the data and information collected during the fieldwork were plotted, analyzed, and presented in the form of a geological map, which is provided as Plate-III.

10.1.3 Topographic Survey

The triangulation network had been laid down in the block area with the help of DGPS (Field Photograph- 10) & Total Station and the same have been tied up with the GTS triangulation station present in the nearby area. Where a GTS triangulation station is not available or could not be located, a base station has been established using Differential Global Positioning System (DGPS). This ensures accurate geospatial referencing and provides a reliable control point for the survey. All the surface features have been picked up and marked on a map on 1: 2000 scale. The entire area has been covered by doing contouring at 2m interval. The block boundary and drilled boreholes have been surveyed by DGPS & total station in WGS-84 Datum for demarcation of Block Boundary points and ancillary area to facilitate the State Governments for auctioning of the Block.

10.1.4 Exploratory drilling

Based on the encouraging analytical results obtained from surface samples collected by MECL during the first phase of surface exploration, a total of six inclined boreholes were drilled in the Salaiya Phatak block during the second phase of exploration. These boreholes were designed to intersect the mineralized zones at a depth of approximately 50 meters below the surface, aiming to confirm the down-dip continuity of mineralization and to facilitate the estimation of mineral resources. The drilling pattern was planned along five section lines, with borehole spacing maintained at 100–150 meters to ensure systematic subsurface coverage.

Drilling Depth and Objectives

The boreholes were designed to intersect the mineralized zones at a vertical depth of approximately 50 meters from the surface. The orientation of the mineralized zones, as interpreted from detailed geological mapping, indicates a strike of NNE–SSW to N–S with a steep westerly dip ranging between 60° and 70°. Accordingly, section lines were positioned perpendicular to the strike direction, trending N100°E–S100°W, at an interval of 100–150 meters, with a drilling inclination of 50° towards N100°E. The borehole spacing has been maintained in accordance with the guidelines prescribed under the Mineral (Evidence of Mineral Contents) Rules, 2015 (amended up to 2021) for Preliminary Exploration (G3 stage) of vein-type sulphide deposits.

A total of five section lines were established to intersect three main mineralized lodes.

- Sections 1, 2, and 4 each contain a single borehole, strategically placed to intersect Mineralized Lode–I.
- Section 3 includes two boreholes: MBSP-2, located towards the east, targets Lode–I at a 50m vertical depth, while MBSP-3, located towards the west, is aimed at intersecting Lode–II, which runs parallel to Lode–I, at the same depth level.
- Section 5 is positioned along the southern continuation of the mineralized zone of the Imaliya block, adjacent to the eastern boundary of the Salaiya Phatak block. This zone, known to host gold mineralization, has already been auctioned. A single

borehole, MBSP-5, was strategically located on this section to assess the continuity of mineralization.

The details of the borehole collar data are provided in Annexure–IB.

After the completion of drilling, down-hole deviation surveys were conducted for all boreholes. However, due to technical constraints, deviation surveys for boreholes MBSP-2 and MBSP-3 could not be carried out. In these cases, the average deviation values derived from the other boreholes have been considered for consistency in data interpretation. The detailed deviation data are presented in Annexure–IC.

MECL carried out drilling of six inclined boreholes using the wireline diamond core drilling method. The MBSP-1 borehole was drilled with a Kores make KME-1000 model skid-mounted drill rig, while the remaining boreholes were drilled using a Kores make KDR-600 model hydrostatic truck-mounted drill rig.

Drilling was conducted with NQ drill rods, having a borehole diameter of 74 mm and a core diameter of 46 mm. Both in-house make diamond bits (Formation-3 and Formation-4) and Sandvik make diamond bits were employed during drilling operations. Wet drilling was performed using water mixed with polymer and cutting oil to ensure smooth operation and minimize bit wear.

Short core runs of 1.0 to 3.0 meters were maintained to achieve optimum core recovery. Detailed borehole information is presented in Annexure–IB, and their locations are accurately shown on the Topographical/Geological Plan (Plate No.–III).

10.1.5 Core Logging

The core obtained through drilling, was systematically stored run-wise in GI core boxes lined and wrapped in polythene sheet.

Each core, fragment, and cutting was carefully examined, with detailed observations recorded depth wise, run wise on color, lithology, structure, physical characteristics, ore mineral constituents/assemblage, and the mode of ore mineral occurrence. Additionally, a visual estimate of sulphide mineralization, mainly copper mineralization was made and an approximate mineralized zone has been marked. Rock Quality Designation (RQD) has been calculated for each run of the core. The detailed borehole core log is provided as Annexure-II.

10.1.6 Core Sampling

For sample preparation, the drill core from each borehole was split into two equal halves using a core splitter. One half was retained and preserved in core boxes for future reference and studies, while the other half was processed for chemical analysis.

Sampling was carried out at approximately 50 cm intervals, according to the delineated mineralized zone and core recovery. The core samples were initially powdered to (-) 120 mesh size, and approximately 200 g of sample was collected using the coning and quartering method for gold analysis. After drawing the gold samples, the remaining powdered material was further pulverized to (-) 200 mesh size for analysis of base and trace metals such as Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo by the Atomic Absorption Spectrophotometry (AAS) method.

To ensure analytical accuracy and reproducibility, about 10% of the total samples were selected as check samples and reanalyzed for Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo using the same AAS method.

10.1.7 The table below is showing target quantum of work approved for preliminary exploration of Salaiya Phatak block and the actual quantum achived.

Sl. No.	ITEMS OF WORK	UNIT	Proposed Quantum for Salaiya Phatak Block	Achieved till date
	Phase- I			
1	Geological Mapping (1:2000 scale)	Sq. Km	1.50	1.50
2	Primary + Check Sample (BRS Channel) for Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni & Mo by AAS method	Nos.	110 (50 BRS + 50 Trench)	84
3	Primary Sample (BRS Channel) for Au by fire assay method	Nos.	25	24
4	Excavation (Trenching)	Cu.m	80	80
	Phase- II			
5	Topographic Survey (2m contour interval)	Sq. Km	1.50	1.50
6	Drilling (Core)	m.	500 (6 Bh with 1st level 50m intersection)	498 (6 Bh with 1st level 50m intersection)
7	Primary + Check Sample (Core) for Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni & Mo by AAS method	Nos.	90	96
8	Primary + Check Sample (Core) for Au by fire assay method		30	31
9	Petrographic Study	Nos.	10	10
10	Ore microscopic Study	Nos.	10	10
11	Determination of specific gravity	Nos.	5	5
12	Exploration Report [As per Mineral (Evidence of Mineral Contents) Rule-2015] /UNFC	Nos.	1	1

CHAPTER- 11

11.0 LOCATION OF DATA POINT

11.1 Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys, azimuth, inclination, coordinates of bore holes etc), trenches, mine workings and other locations used in mineral resource estimation.

11.1.1 The accuracy and quality of surveys are crucial components in mineral investigation, ensuring reliable data collection and precise mapping of geological features. In the present investigation, the BAP Precision S Series S812H model GPS has been employed as the primary tool for detailed mapping.

11.1.2 The specified accuracy of the GPS, ranging from few centimeters to 1 meter, implies that the positional information provided by the device is within this margin of error. In the context of geological mapping conducted at a scale of 1:2000, where the minimum map plotable unit is 2 meters, the GPS accuracy is suited for the purpose.

11.1.3 Since the minimum map plotable unit is 2 meters, the GPS accuracy falls comfortably within this range. This means that the GPS is capable of delineating and recording the geographic coordinates of geological elements with a precision that aligns with or exceeds the minimum plotable unit on the geological map.

11.1.4 To accurately locate drill holes, block boundaries, and surface features, a DGPS (Differential Global Positioning System) instrument (Trimble R8s) was utilized. DGPS is a high-precision surveying tool and its maintenance and calibration are conducted to the highest standards to ensure optimal accuracy. For geodetic control, the WGS84 datum was used as the reference system, ensuring consistency and reliability in positioning. Additionally, a properly established DGPS base station was set up to further enhance accuracy and minimize positional errors in the survey data.

11.1.5 For down-hole deviation survey, an in-house fabricated deviation instrument was employed, which operates on the principle of the Earth’s magnetic field and gravitational force. The instrument consists of a magnetically sensitive ball, precisely scaled and marked, and housed within a cylindrical probe. When the probe is lowered into the naked borehole, any inclination or deviation from the vertical axis causes the ball to rotate and align itself according to the combined effects of gravity and magnetic north.

The position of the ball, as indicated on the internal scale, provides a direct measure of the borehole inclination, while the magnetic alignment gives the azimuthal direction. The probe is allowed to stabilize at predetermined depth intervals—typically every 6.0 meters—to ensure accurate and consistent readings.

After completing the measurements up to the borehole termination depth, the instrument is retrieved, and the recorded data, in form of videos, are carefully interpreted to determine the true deviation profile of the borehole.

11.2 Quality and adequacy of topographic control

11.2.1 For the topographic survey, a DGPS instrument (Trimble make, R8s GNSS system) was used to ensure high-precision mapping. The instrument's maintenance and calibration are conducted to the highest standards, enhancing survey accuracy. To establish proper geodetic control, the WGS84 datum was used as the reference system, and a properly established DGPS base station was set up to further improve positional accuracy.

Given the relatively small size of the block and the requirement for detailed mapping during preliminary exploration, the topographical survey was carried out on a 1:2000 scale with 1-meter contour intervals, providing sufficient topographic precision and representation.

To maintain control and accuracy during the survey, a base station, SP-1 (425288.532, 2610481.902) was established as the primary reference point. The survey was conducted using Differential GPS (DGPS) instruments, with data collected simultaneously from the Base and Rover units. Upon completion of fieldwork, the raw DGPS data were downloaded and processed using Trimble Business Centre (TBC) software to generate the point list summary and baseline processing report.

The survey methodology involved multiple measurements and cross-checks, ensuring high data reliability and positional accuracy. Furthermore, low vegetation cover and favorable weather conditions during the survey period enhanced visibility and contributed significantly to the overall quality and accuracy of the topographic data.

CHAPTER- 12

12.0 SAMPLING TECHNIQUE

12.1 Nature and quality of sampling (eg. cut channels, random chips, etc.) and measures taken to ensure sample representation.

12.1.1 During the Reconnaissance Survey (G4) of the Salaiya block, the parent block of the Salaiya Phatak block, surface sampling was conducted in the form of channel sampling. Based on the encouraging analytical results from these channel samples, the potential area within the Salaiya Phatak block was identified for further investigation. As a result, a Preliminary Exploration (G3) program was undertaken, involving the drilling of boreholes to assess mineralization. During 1st phase of exploration, Bed Rock Samples (BRS) were taken from of channels and trenches.

12.1.2 During detailed geological mapping, probable mineralized zones were delineated along sheared, fractured, and gossanized zones. At locations where mineralized zones were exposed on outcrops, systematic channel sampling was carried out across the strike of mineralization. In areas where outcrops were concealed, trenches were excavated to expose the mineralized horizons, followed by systematic sampling. A total of 12 channels were cut, from which 34 samples were collected, and 5 trenches of approximately 10 m length each were opened, yielding 50 samples in total.

12.1.3 During the geochemical sampling process, both channel and trench samples were meticulously collected. To maintain sample integrity, the weathered or oxidized portions of the outcrop were carefully removed, and samples were collected from the fresh and representative sections. Sampling was done at regular intervals to ensure uniform coverage and unbiased representation of the mineralized zones. Each sample, weighing approximately 1.0–1.5 kg, was carefully collected, labeled, and packed in durable cotton bags for transport and further chemical analysis.

12.1.4 During the second phase of exploration, drill core sampling was carried out to assess subsurface mineralization. After detailed core logging, probable mineralized zones were delineated based on visual estimation of sulphide concentration, alteration, and lithological features. Samples were collected from these identified zones at regular intervals of approximately 50 cm. However, depending on core recovery and lithological variation, the sample lengths were suitably adjusted to ensure representative sampling.

12.1.5 The cores were cut using a hydraulic core splitter, ensuring that the mineralized portion was divided into two equal halves to maintain unbiased sampling. The cutting was performed perpendicular to the structural control of mineralization, such as shear and fracture planes. One half of the split core was preserved in the core box for future reference and validation, while the other half was carefully labeled, packed in durable cotton bags, and dispatched for pounding, sample preparation, and chemical analysis.

12.1.6 During sample preparation, adherence to standard operating procedures is paramount. Samples are powdered to -120 mesh and -200 mesh size, using a mortar and pestle. Rigorous cleaning procedures, including the mortar, pestle, sample tray, brush, and all tools, are implemented after each sample is processed, maintaining a contamination-free environment.

12.1.7 Following the initial crushing, representative samples of around 100 grams are drawn through successive reduction using the coning and quartering method. This technique involves pouring the bulk sample onto a flat surface, forming a cone, and systematically dividing it into four quadrants. Two opposite quadrants are selected for further processing, and the method is repeated, reducing the sample size while preserving representatively. The resulting 300 grams are then packed into three separate packets, each containing 100 grams, for primary and check analyses. The remaining powdered samples are carefully stored for future reference, with preventive measures in place to avoid sample mixing. Thorough cleaning of all tools used in the sampling, drawing, and packaging processes further ensures the integrity of the collected samples.

CHAPTER- 13

13.0 DRILLING TECHNIQUE AND DRILL SAMPLING EMPLOYED

13.1 The Salaiya Phatak block, characterized by sheared and gossanised dolomite with intrusions of quartz veins, required a systematic and carefully planned drilling approach to ensure optimal core recovery and geological accuracy. A total of six inclined boreholes were drilled using the wireline diamond core drilling method.

Drilling for borehole MBSP-1 was carried out with a Kores make KME-1000 skid-mounted drill rig, while the remaining boreholes were drilled using a Kores make KDR-600 hydrostatic truck-mounted drill rig. These rigs were selected for their proven efficiency in hard and fractured formations, such as those present within the Salaiya Phatak block.

13.2 Drilling Technique

13.2.1 Drill Rod & Casing Setup

- NW-size drill rods were used for the initial few meters to stabilize the borehole.
- After setting the casing, drilling continued with NQ-size drill rods to ensure minimal borehole deviation and better core recovery.

13.2.2 Core Recovery Optimization

- In-house make diamond bits of Formation–3 & 4 and Sandvik make diamond bits were used for drilling, proven effective for penetrating dolomite, quartz veins, and gossanised sulphide-bearing formations encountered in the Salaiya Phatak block.
- Short drilling runs of 1.0m to 3.0m intervals were adopted to ensure optimum core recovery and to minimize sample loss, particularly in fractured and sheared zones.
- Frequent borehole flushing with water, polymer, and cutting oil was performed to prevent material blockage and maintain smooth drilling operation.
- The overall core recovery exceeded 90%, ensuring representative sampling and eliminating any significant correlation between sample recovery and assay grade.

13.2.3 Borehole Dimensions & Logging

- The borehole diameter was approximately 74 mm, and the core diameter was around 46 mm, providing sufficient sample volume for detailed analysis.
- Systematic geological logging of the recovered cores was carried out, documenting lithology, color, texture, mineralization, alteration, and structural features in detail.
- All the boreholes in the Salaiya Phatak block were inclined, designed to intersect the mineralized zones at 50m vertical depth; therefore, a down-hole deviation survey was conducted for most boreholes to monitor borehole alignment. However, due to technical reasons, deviation for MBSP-2 and MBSP-3 could not be performed, and average deviation values of the remaining boreholes were adopted for these.

13.2.4 Quality Control & Data Accuracy

- Core handling and preservation were given high priority to prevent contamination, breakage, or loss of material. The recovered cores were carefully placed in high-quality GI core boxes containing five channels of 1m each, wrapped in polyethylene sheets to minimize moisture and oxidation. Cores were arranged in a book pattern, and depth markers were inserted at the end of each run to indicate the corresponding bottom depth.
- Precise geospatial referencing of all borehole collar locations was carried out using Differential GPS (DGPS) to ensure accurate positioning and correlation with geological and topographic plans.

This drilling methodology ensured efficient core recovery, accurate geological interpretation, and reliable resource estimation while adapting to the geological constraints of the mineralized zone.

13.3 Sampling employed

13.3.1 Primary sample

Half-split drill core samples, drawn at variable intervals (generally 0.5m, depending on the mineralized zone and lithological variations), were considered as primary samples for the analysis of Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo. A total of 76 primary samples were collected from the drill cores of six boreholes drilled in the Salaiya Phatak block. The analytical results have been furnished as Annexure- III C.

13.3.2 External check sample

To check the reliability of analysis of primary samples (84 BRS and 76 Core), 10% of them are sent to an external chemical laboratory. Around 20 such samples are analyzed as external check sample in JNARDDC, Nagpur.

13.3.3 Primary sample for Gold

Adjacent to the Salaiya Phatak block, the Imaliya block has been auctioned for gold, and the area is also known for old gold workings. Considering this, sampling for gold analysis was undertaken in both phases of exploration in the Salaiya Phatak block. In the first phase, a total of 24 channel and trench samples were analyzed for gold, while in the second phase, 26 drill core samples were analyzed. Thus, a total of 50 samples were analyzed for gold. Additionally, 5 samples (10%) were sent to JNARDDC, Nagpur as external check samples to ensure analytical accuracy and quality control.

CHAPTER- 14

14.0 SUB-SAMPLING TECHNIQUES AND SAMPLE PREPARATION

14.1 If core, whether cut or sawn and whether quarter, half or all core taken.

The borehole cores from the Salaiya Phatak block were split into two equal halves using a core splitter. One half was powdered to (-) 200 mesh size for chemical analysis of Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo and (-) 120 mesh for Gold (Au) analysis. While the other half was preserved for future reference and studies. The sample length was generally maintained at 1-meter intervals, adjusted slightly based on lithological variations and core recovery. As the core recovery consistently exceeded 90%, the collected material is considered to be a reliable and accurate representation of the in-situ geological formation.

14.2 Nature, quality and appropriateness of the sample preparation technique

The sample preparation technique adopted in the Salaiya Phatak block is systematic, scientifically robust, and adheres to the standard protocols prescribed for metallic sulphide mineralization studies. The overall procedure ensures that the collected samples are representative, contamination-free, and suitable for reliable chemical and geochemical analysis.

The nature of sampling encompasses both surface and subsurface investigations. At the surface, systematic channel and trench sampling was conducted across mineralized shear and gossanized zones, ensuring unbiased representation of exposed mineralization. In the subsurface, drill core sampling targeted visually identified sulphide-bearing zones and alteration features, collected at regular intervals and adjusted to lithological variations to capture true geological variability.

The sample quality has been maintained through rigorous handling and preparation procedures. Weathered and oxidized portions were removed prior to sampling to obtain fresh, representative material. Cores were split using a hydraulic core splitter, ensuring that mineralized portions were divided into equal halves to minimize sampling bias. Overall consistent sample lengths and more than 90% core recovery further validate the reliability of the samples.

During sample preparation, strict adherence to standard operating procedures (SOPs) was maintained. Each sample was crushed and powdered to -120 mesh (for Gold) and -200 mesh sizes (for Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo), providing homogeneity and ensuring analytical precision. The use of the coning and quartering method for reduction to approximately 300 grams guarantees representativeness while minimizing sampling error.

To uphold analytical integrity, thorough cleaning of all tools and equipment—such as the mortar, pestle, trays, and brushes—was carried out after processing each sample, effectively eliminating any chance of cross-contamination. The samples were then packed in high-quality, labeled cotton bags, with additional precautions taken to avoid mixing or loss.

14.3 Quality Control Procedures

- Stringent quality control measures were implemented at all stages of sub-sampling to ensure representativeness and accuracy:
- Cleaning of all tools (mortar, pestle, sample tray, brush, and other equipment) after processing each sample to prevent contamination.
- Coning and quartering technique was used for sample reduction, ensuring that the final sample size maintains representatively of the bulk material.
- The final 300-gram sample was divided into three equal portions (100 grams each) for primary analysis, check analysis, and storage as a reference sample.

14.4 Representativeness of Sampling

- The sampling methodology ensured that all collected material accurately represents the in-situ deposit.
- The high core recovery (>90%) guarantees minimal loss of material.
- Consistent sampling intervals were maintained to avoid bias.
- The coning and quartering method was used for sub-sample selection, reducing bias and maintaining homogeneity.

14.5 Sample Size Appropriateness

- The sample size was appropriate for the grain size of the material

- The -200 mesh size is used for Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo and -120 mesh size is used for Gold (Au) analysis.

- The final 100 gram sample size was adequate for accurate laboratory testing while preserving enough material for duplicate and future reference analyses.

14.6 A total of 84 BRS primary samples and 76 core samples were generated. The detailed analytical results of primary samples are provided in Annexure-IIIA respectively.

CHAPTER- 15

15.0 QUALITY OF ASSAY DATA AND LABORATORY TESTS

15.1 The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total

15.1.1 Two types of assay have been performed in the in-house chemical laboratory of MECL. First type is analysis of Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo, carried out by Atomic Absorption Spectroscopy (AAS) method by Analytical Jena ZEEnit model instrument. The second type is analysis of Gold, carried out by Fire assay followed by AAS method.

15.1.2 Elemental analysis by AAS method

For the determination of metal concentration, 0.3–1.0 g of finely powdered sample is accurately weighed in a 250 ml beaker, followed by the addition of 50–60 ml of aqua regia. The beaker is covered with a watch glass and the mixture is digested on a hot plate for 5–6 hours until a syrup-like solution is obtained, ensuring complete dissolution of the sample. After digestion, 10–20 ml of distilled water is added, and the solution is heated for an additional 5–10 minutes. The solution is then filtered through a Whatman Grade-40 filter paper into a 250 ml volumetric flask. The residue is washed four to five times with hot distilled water, and all washings are combined with the filtrate. The total volume is then made up to 250 ml with distilled water.

The prepared sample solution is aspirated into the Atomic Absorption Spectrophotometer (AAS), operated in Air–Acetylene flame mode, using the following instrumental settings: wavelength – 324.7 nm, slit width – 0.5 nm, lamp current – 4.0 mA, and instrument mode – absorbance. Prior to testing, the AAS is calibrated using at least ten calibration standards to ensure analytical accuracy. Finally, the absorbance and concentration of the analyte are recorded using an Analytik Jena ZEEnit model AAS, providing precise quantitative results for the elements under investigation.

15.1.3 Gold analysis by fire assay method

Samples are prepared in batches of 50 fusion pots for analysis. Before weighing, each fusion pot is visually inspected to ensure it is clean and free from contamination. A 50 g sample is accurately weighed into a fusion crucible containing a flux mixture of lead monoxide (PbO), sodium carbonate (Na_2CO_3), borax ($Na_2B_4O_7$), silica (SiO_2), and silver nitrate ($AgNO_3$). The crucible is then placed in a preheated fusion furnace at 1050°C for approximately 45 minutes, allowing the complete fusion of the sample and flux.

After fusion, the molten charge is poured into a cast iron mold, where it separates into two layers — the lead button and the slag. The lead button, which collects the precious metals, is carefully separated from the slag and subjected to cupellation in a cupellation furnace for about one hour using a magnesia or bone ash cupel. During this process, the lead is oxidized and absorbed by the cupel, leaving behind a precious metal prill.

The obtained prill is then cooled, transferred to a 250 ml beaker, and digested in aqua regia to bring the metal values into solution. The resulting solution is aspirated into an Atomic Absorption Spectrometer (AAS) to determine the precious metal content at parts-per-million (ppm) levels, ensuring high analytical accuracy and reproducibility.

15.2 Nature of quality control procedures adopted (eg. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie. lack of bias) and precision have been established

Typical Quality Control procedures adopted during the chemical analysis

(i) Analysis of Certified reference materials/measurement standards

(ii) Analysis of blind samples

(iii) Use of QC samples and control charts

(iv) Analysis of blanks

(v) Analysis of spiked samples

(vi) Analysis in duplicates & Internal Check standards.

Accuracy and precision (standard deviation): Accuracy and precision (standard deviation) for elemental analysis were assessed, showing either excellent (<5%) or good (5–10%) performance.

15.3 Check analysis of at least 10% of samples should be analyzed from third party National Accreditation Board for Testing and Calibration Laboratories (NABL) accredited or Department of Science and Technology (DST) or Bureau of Indian Standards (BIS) recognized laboratories or government laboratories for assessing the acceptable levels of accuracy

15.3.1 To verify the reliability of chemical analysis conducted in the in-house laboratory, 20 primary samples of Cu, Pb, Zn, Ag, Sn, Cd, Co, Ni, and Mo and 5 samples of Gold (Au) were analyzed at JNARDDC, an NABL-accredited laboratory, as external check samples. These samples were randomly selected from the duplicate set of primary samples. To ensure unbiased testing, the sample numbers were altered, with only the concerned geologist maintaining the record. The selected samples were then securely packed and sent to the external laboratory for analysis.

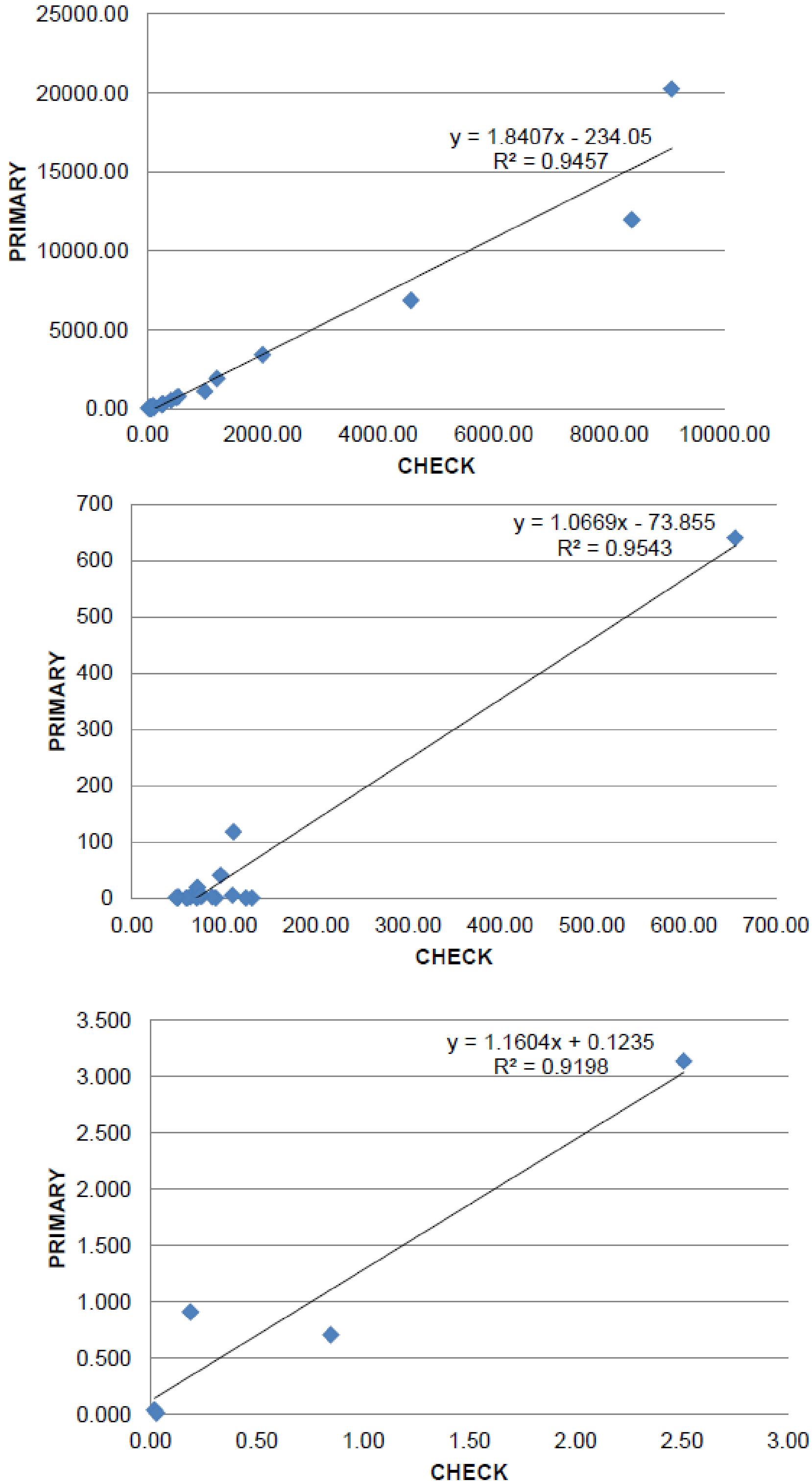
15.3.2 The dataset for the Primary vs. External Check analysis consists of 20 sample pairs. A statistical comparison has been conducted for Copper (Cu), Silver (Ag) and Gold (Au), for which resource has been estimated.

Comparison of Primary v/s Check sample analysis						
Comparison Index	**Cu**		**Ag**		**Au**	
	Primary	**Check**	**Primary**	**Check**	**Primary**	**Check**
No. of sample pairs	20		20		5	
Arithmetic mean	2417.21	1440.38	42.21	108.78	0.96	0.72
Standard Deviation	5135.952	2713.397	143.103	131.025	1.279	1.057
Standard error of mean	1148.434	606.734	31.999	29.298	0.572	0.473
Variance	26378002.42	7362521.04	20478.40	17167.61	1.64	1.12
Mean of deviation	976.83		-66.57		0.24	
Standard Deviation (Error)	2576.15		31.82		0.40	
Correlation Co-efficient	0.97		0.98		0.96	
Mean absolute error	1000.22		67.28		0.30	
Mean relative random error	59.53		17338.43		66.93	
Paired T-value	1.70		-9.36		1.34	
F- test	3.58		1.19		1.46	

15.3.3 The statistical comparison of Primary and Check sample analyses for Cu, Ag and Au indicates a high degree of linear association, as reflected by strong correlation coefficients (0.96–0.98). The arithmetic means show measurable differences between

Primary and Check datasets, which provide insights into analytical behaviour and sampling characteristics. Standard deviation, variance and standard error values highlight the inherent variability within each dataset, with Cu exhibiting comparatively larger spread due to the wider grade range. Mean deviation and mean absolute error further describe the magnitude of variation between paired results, while relative random error values help understand stability across the concentration ranges evaluated.

Paired t-values and F-tests support the interpretation of systematic patterns between Primary and Check analyses, indicating consistent relationships across the elements studied. Ag reflects a particularly distinct pattern in paired comparisons, while Cu and Au show closer alignment in terms of variability and sample distribution. Overall, the results demonstrate strong relational consistency between Primary and Check datasets, reliable grade-trend matching and well-defined patterns of analytical behaviour that can support further resource evaluation and quality-control decisions.



Text Figure- 3: Graph showing comparison between primary and check analysis of different elements

15.4 Security and chain of control of samples should be clearly mentioned

15.4.1 The security and chain of control of samples from the Burhar project's sampling unit to the chemical laboratory exemplify a meticulous and well-organized process. The samples were initially prepared at the sampling unit, where a qualified sampling technician oversaw the entire process. The samples were meticulously labeled and tagged before being sent to the chemical laboratory under the direct supervision of the technician. During transportation, the samples were securely sealed in bags, and the integrity of the seals was verified at the sampling unit before the bags were opened. Adhering to standard procedures, the sampling unit implemented robust precautionary measures to prevent any potential contamination, ensuring the reliability of the sample analysis. Additionally, the remaining samples were appropriately preserved and tagged for future reference, highlighting a commitment to maintaining a secure and traceable chain of control under the company's custody.

CHAPTER- 16

16.0 MOISTURE

Moisture analysis has not been done at this preliminary stage of exploration. Hence, no information can be provided.

CHAPTER- 17

17.0 SPECIFIC GRAVITY

17.1 Specific gravity (S.G.) determination is a crucial step in the estimation of mineral resources, as it directly influences the conversion of volumetric data into tonnage. In the case of the Salaiya Phatak block, specific gravity was determined using the Walker's Steel Yard Balance method, which is a precise and widely used laboratory technique for measuring the density of rock samples, particularly in mineralized zones.

In this method, dry and saturated weights of the rock samples are measured using a steel yard balance. Each sample is first dried and weighed in air to obtain its dry weight. It is then soaked in water to achieve full saturation, and its suspended weight in water and saturated surface-dry weight are recorded. Using these values, the specific gravity is calculated using the formula:

$$\text{Specific Gravity (S.G.)} = \frac{W_{dry}}{W_{sat} - W_{susp}}$$

where:

W_{dry} = Weight of the dry sample in air

W_{sat} = Weight of the saturated sample in air

W_{susp} = Weight of the saturated sample in water

For the Salaiya Phatak block, five representative samples from the mineralized zones were collected and subjected to specific gravity determination following this method. The average specific gravity obtained from these measurements is 2.9.

The adjacent Imaliya block, which exhibits a similar geological setup and style of mineralization, was earlier studied by GSI, which had considered specific gravity value 3.0 for resource estimation. Given the lithological and mineralogical similarities between the two blocks, the average specific gravity value of 2.9 from the Salaiya Phatak block is considered both realistic and representative for resource calculation.

CHAPTER- 18

18.0 BENEFICIATION STUDIES

Beneficiation study has not been done at this preliminary stage of exploration. Hence, no information can be provided.

CHAPTER- 19

19.0 RESOURCE ESTIMATION TECHNIQUES

19.1 General

19.1.1 MECL conducted a preliminary exploration in the Salaiya Phatak block to establish the vertical and lateral continuity, thickness, and grade of copper and gold mineralization. The exploration involved drilling six inclined boreholes on an approximate 100-150m sectional interval. The primary objective was to conduct a systematic assessment of copper and gold mineralized lode grades and estimate the inferred resource (Category 333).

19.2 Assumptions for resource estimation

19.2.1 The mineral resource has been estimated using both the **Cross-Sectional Method** and the **Level Plan Method**. These methods are appropriate for narrow, structurally controlled vein-type sulphide deposits. Certain fundamental assumptions have been adopted while computing the overall grade and tonnage of the copper lodes, as described below.

19.2.2 Resource estimation has been carried out for copper at three different cut-off grades — 0.1%, 0.2%, and 0.5% Cu, to assess the variability and continuity of mineralization under different economic conditions. The copper zones are very much corresponds with silver zones having 20 ppm cut-off. Hence, resource of Silver (Ag) has also been automatically estimated along with copper (Cu).

19.2.3 Resource for Gold (Au) has also been estimated at 0.50 ppm Au, without considering the mean stopping width.

19.2.3 The mineralized zones have been delineated based on analytical values obtained from primary drill core samples. No minimum stoping width has been considered, as the lodes are narrow and structurally controlled. However, a non-mineralized parting up to 2 meters has been included within a mineralized zone only if the average grade of the entire zone meets or exceeds the respective cut-off value.

19.2.4 In accordance with the Mineral (Evidence of Mineral Contents) Amendment Rules, 2021, for G3 (preliminary exploration) of small, discontinuous, and vein-type base metal deposits, the section line spacing has been maintained within 100–150 meters, which is appropriate for estimating resources under the Inferred Mineral Resource (333) category.

19.2.5 The mineralized zones identified at borehole intersections have been correlated with surface exposures, wherever available. In the down-dip direction, these zones have been projected up to 25 meters, assuming minimum geological continuity of the mineralized lodes.

19.2.6 Along the strike direction, the mineralized zones have been extrapolated halfway between adjacent section lines. For the extreme end sections, continuity has been conservatively extended up to 50 meters beyond the last intersection, based on structural trends and lithological consistency.

19.2.7 A total of five representative samples from the mineralized zones were subjected to specific gravity determination by Walker's Steel Yard Balance method. The average specific gravity of 2.9 has been adopted for tonnage estimation, as it aligns with similar mineralization characteristics observed in the adjacent Imaliya block.

19.2.8 To account for unseen geological uncertainties, including variations in core recovery, cavities, structural complexities, and lithological irregularities, a 20% deduction from the Gross In-situ Resource has been applied to derive the Net In-situ Resource, following standard geological resource estimation practices.

19.3 Methodology adopted for Cross Sectional method for resource estimation

19.3.1 The Cross-Sectional Method is a conventional and widely accepted technique for estimating mineral resources in structurally controlled, vein-type, or irregular deposits. The following systematic procedure was adopted for resource estimation of the Salaiya Phatak block using this method:

Preparation of Geological Cross-Sections

- Geological cross-sections were prepared along vertical section lines spaced 100–150 meters apart, in accordance with the MEMC Rules (Amended, 2021) for G3 (preliminary) exploration.
- Each cross-section was constructed perpendicular to the general strike direction of the mineralized lodes.
- Borehole lithological logs, assay data, and structural information were plotted on each section to delineate the mineralized zones.

Delineation of Ore Zones

- Mineralized zones were identified and correlated based on analytical values exceeding the specified cut-off grades (0.1%, 0.2%, and 0.5% Cu).
- Zones with internal waste partings less than 2 meters were included within the mineralized width, provided the overall weighted average grade met the respective cut-off criterion.
- The down-dip continuity of the mineralized zones was projected up to 25 meters below the last mineralized intercept, based on geological reasoning and core evidence.
- For resource estimation, sectional influence for each section was considered up to halfway to the adjacent section lines. For the endmost sections, influence was restricted to 50 meters beyond the last borehole section, based on the geological continuity of the lodes.

Computation of Cross-Sectional Areas and Volumes

- For resource estimation, the cross sectional area of mineralized lode corresponding to a particular borehole was defined. Cross sectional area on each section has been measured with the help of Auto CAD map 2018 software and recorded systematically.

- To calculate the volumee, the sectional area corresponding to each borehole was multiplied by the sectional influence. This method ensured an accurate representation of the mineralized lode volume associated with each borehole.

Conversion of Volume to Tonnage

- The computed volume was converted to tonnage multiplying the volume with tonnage factor. Here, specific gravity is used as tonnage factor.
- A specific gravity of 2.9, determined from five representative samples of the mineralized zone, was applied uniformly for resource computation.
- Finally, the total in-situ geological resource was determined by summing the individual resource estimates from all boreholes. This methodology ensures a systematic and accurate assessment of the aluminous laterite resource within the block, providing a solid foundation for further geological and economic evaluations.

19.4 Methodology adopted for Level plan method for resource estimation

19.4.1 The Level Plan Method, also known as the Slice Plan Method, has been adopted for resource estimation of the Salaiya Phatak block to complement the cross-sectional approach and provide volumetric validation. In this method, the estimation was carried out by preparing horizontal slice plans at 10-meter intervals, starting from the surface down to the 350 m RL, resulting in a total of eight slices.

19.4.2 At each level, the intersections of the mineralized lodes corresponding to the borehole data were plotted and extrapolated laterally in the same manner as in the cross-sectional method, considering geological continuity and structural controls of mineralization. The plan area of the mineralized zone at each level was computed using AutoCAD software, ensuring precision in defining the areal extent of the mineralized bodies.

19.4.3 The volume of the ore for a perticular level was then calculated by multiplying the area of the mineralized zone at that level by the vertical influence, which was taken as half the distance to the adjacent levels.

19.4.4 The computed volume was converted to tonnage multiplying the volume with tonnage factor. Here, specific gravity is used as tonnage factor. A specific gravity of 2.9, determined from five representative samples of the mineralized zone, was applied uniformly for resource computation. Finally, the total in-situ geological resource was determined by summing the individual resource estimates from all boreholes. This methodology ensures a systematic and accurate assessment of the aluminous laterite resource within the block, providing a solid foundation for further geological and economic evaluations.

19.5 Computation of Average grade

All calculations for grade estimation are made by weighted average method. Since the sample interval was uniformly maintained along with different litho-units, the length of the sample was mostly maintained at 50cm interval with the exception of litho-unit variations, and any structural implications. The, weighted average method of calculation is made by the following formula:

$$\text{Weighted average grade} = \frac{V1XG1 + V2XG2 + V3XG3 + ----------- + VnXGn}{V1 + V2 + V3 + ----------- + Vn}$$

Where `V’ = Volume of lode in individual borehole

`G’= Grade of the respective lode in the corresponding borehole

CHAPTER- 20

20.0 REPORTING OF RESOURCE

20.1 The resource estimation for copper and gold was conducted using two methods: the **Cross Sectional Method** as the principal method and the **Level Plan Method** as a check method. In the **Corss Sectional Method**, resources were estimated on a section wise, borehole-wise and lode wise basis. In the **Level Plan Method**, resources were estimated on level wise, section wise, borehole-wise and lode wise basis, following the specifications and basic assumptions established earlier.

20.2 A deduction of 20% from Gross in-situ resources has been made to arrive at Net-in-situ resources by geological cross-section and, level plan method for unseen geological factors i.e. nature of core, recovery factor, cavities/caverns and other structural features.

20.3 **The Cross sectional method estimates:**

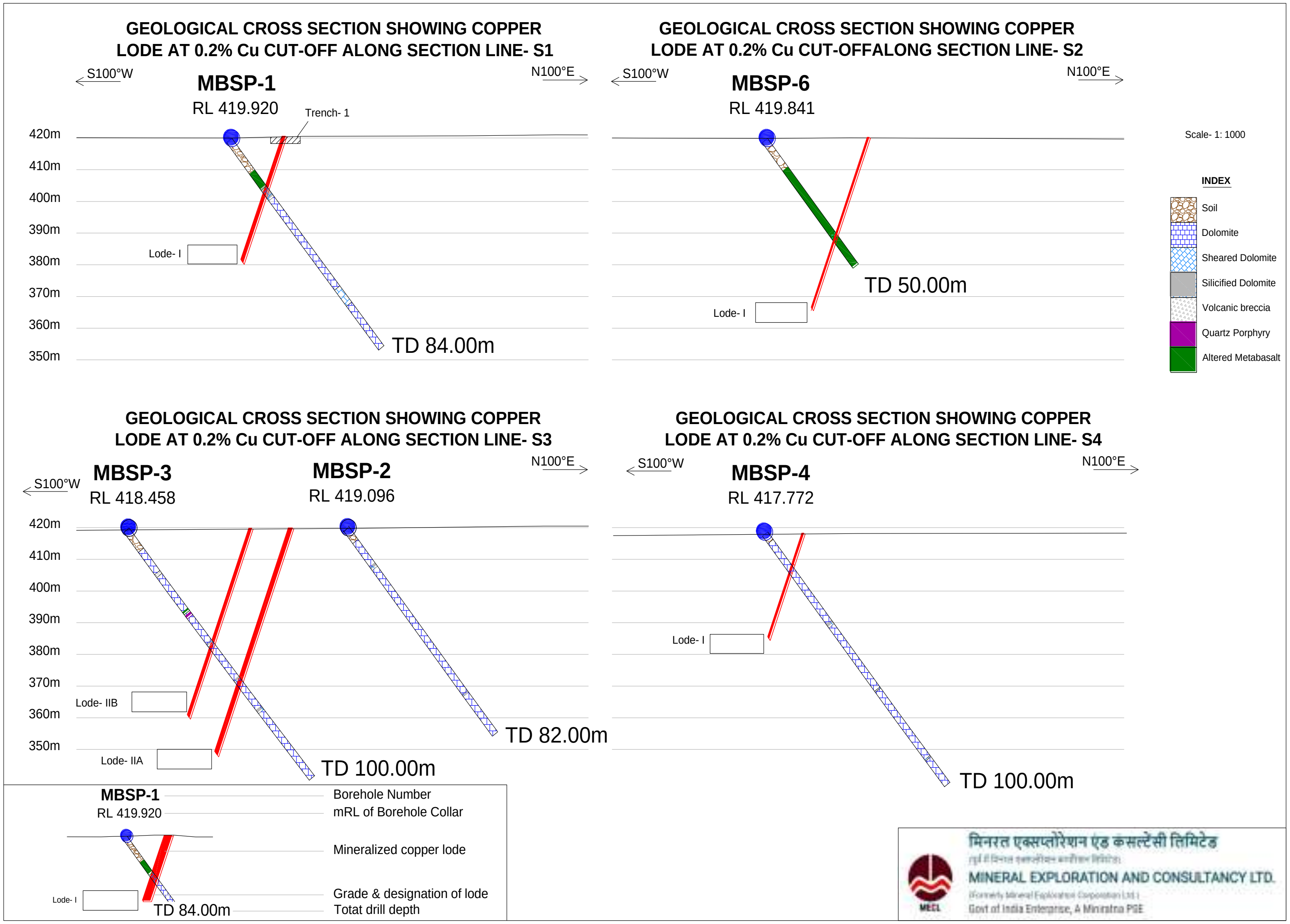
- 114922.935 tonnes resources with 0.47% Cu & 1219.46 ppm Ag at 0.1% Cu cut-off
- 79201.598 tonnes resources with 0.64% Cu & 335.13 ppm Ag at 0.2% Cu cut-off
- 51890.522 tonnes resources with 0.81% Cu & 498.77 ppm Ag at 0.5% Cu cut-off
- 39793.178 tonnes resources with 1.01 ppm Au at 0.50 ppm Au cut-off

20.4 **The Level plan method estimates**:

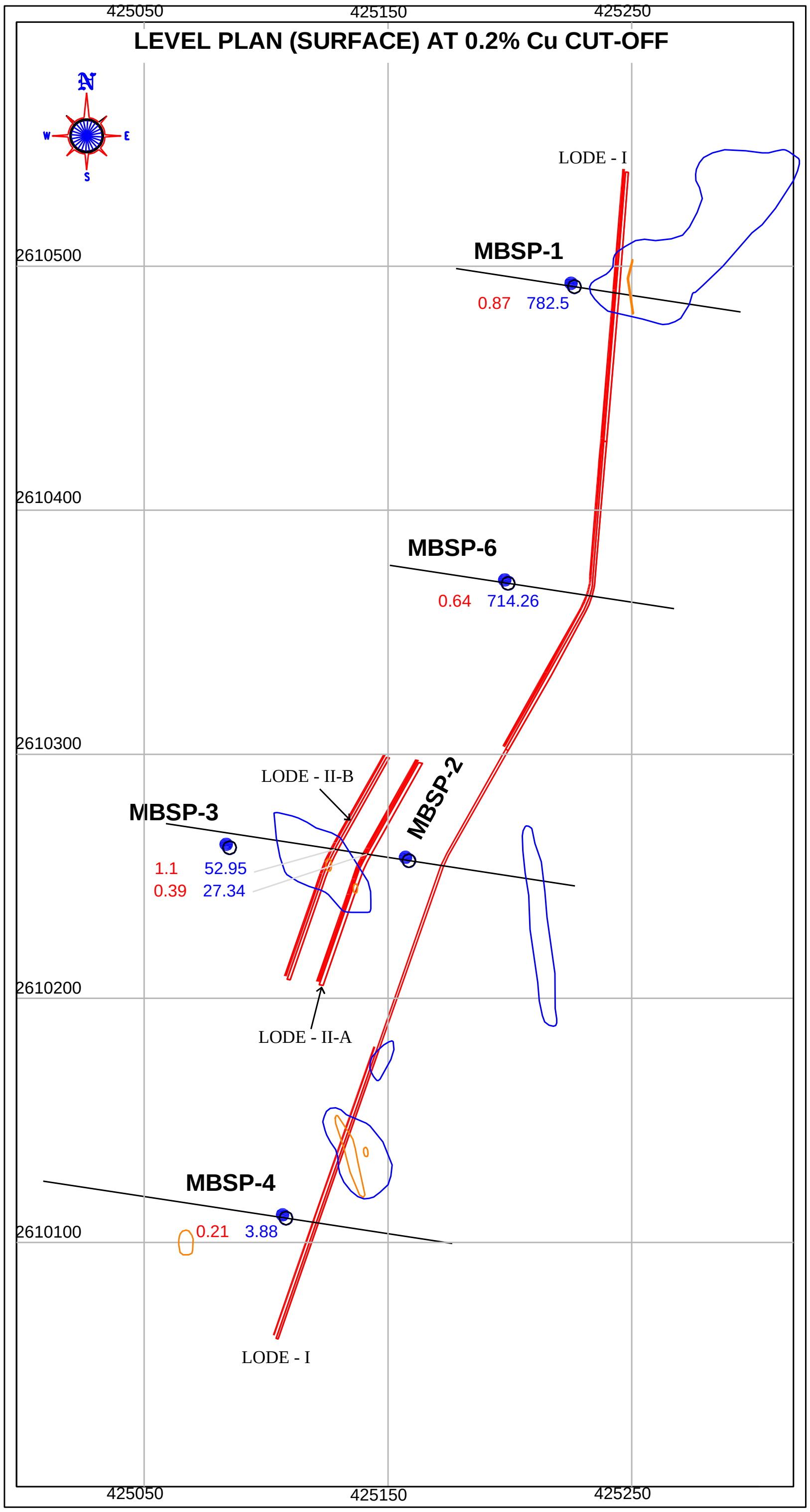
- 115419.463 tonnes resources with 0.48% Cu & 913.40 ppm Ag at 0.1% Cu cut-off
- 80101.260 tonnes resources with 0.64% Cu & 305.07 ppm Ag at 0.2% Cu cut-off
- 53861.884 tonnes resources with 0.86% Cu & 428.23 ppm Ag at 0.5% Cu cut-off
- 40400.114 tonnes resources with 0.97 ppm Au at 0.50 ppm Au cut-of

20.5 Resource estimates derived from the Cross Sectional and Level Plan methods were compared to evaluate confidence. The Cross Sectional Method, used as the primary approach, returned values only 1.8% lower than the Level Plan Method, indicating that the results are well within acceptable limits and support a reliable estimation.

Text Figure- 4: Representative Geological Cross Section showing mineralized Copper lodes (at 0.2% Cu cut-off)



Text Figure- 5: Representative Level plan (Surface) showing extension of mineralized copper lodes (at 0.2% cut-off) in strike direction



CHAPTER- 21

21.0 SUMMARY AND RECOMMENDATIONS

21.1 A discussion on the outcome of the exploration work detailing the nature of the deposit, the dimension of the deposit, general structural trend, depth of occurrence and depth up to which exploration has been done, possibility of continuity of mineralisation beyond the depth of exploration and future exploration requirements, if any.

2.1.1 The exploration work carried out in the Salaiya Phatak block has led to the delineation of sulphide mineralization hosted primarily within sheared and fractured zones traversing quartz veins, quartz porphyry, and dolomitic formations. The mineralization occurs as disseminated, stringer, and fracture-filling sulphides, primarily comprising chalcopyrite, pyrite, and minor galena and sphalerite, indicating a hydrothermal origin associated with structural controls.

2.1.2 The mineralized zones exhibit a general NNE–SSW to N–S strike with a steep westerly dip of 60°–70°. Detailed surface mapping and trench/channel sampling during the first phase, followed by core drilling in the second phase, confirmed the presence of three distinct lodes within the block. The mineralized zones show moderate lateral and vertical continuity, with individual lodes traced up to 300–350 m along strike and 50–60 m down dip, as inferred from the borehole intersections.

2.1.3 The depth of exploration in this phase has been restricted to the first level of intersection, i.e., approximately 50 m below surface, targeting the upper portion of the mineralized system. The analytical results from the borehole samples confirm the continuity of mineralization at depth, suggesting the possibility of further extension of the mineralized zones below the explored level.

2.1.4 Considering the geological setting and mineral assemblage, the Salaiya Phatak mineralization shows similar characteristics to porphyry-style mineralization, such as disseminated sulphides, quartz–sulphide veinlets, and structural–hydrothermal alteration. However, the restricted thickness and localized concentration indicate a vein-type sulphide deposit with porphyry affinity rather than a true porphyry system.

2.1.5 For future exploration, deeper drilling is recommended to assess the down-dip and lateral continuity of the mineralized zones beyond the present 50 m level.

Additionally, geophysical surveys (IP/Resistivity) may be useful to trace the subsurface extension of sulphide zones.

21.2 The resources estimated under various classes with grade

The mineral resource estimation for the Salaiya Phatak block was carried out using both the Cross-Sectional Method and the Level Plan Method, which are appropriate for narrow, structurally controlled vein-type sulphide deposits. The estimation was performed at three copper cut-off grades — 0.1%, 0.2%, and 0.5% Cu — to evaluate the grade-tonnage relationship and the economic potential of the deposit. Since copper (Cu) mineralization is closely associated with silver (Ag), the resource of silver has also been estimated simultaneously using a 20 ppm Ag cut-off. Further, resource for gold (Au) has also been estimated at 0.50 ppm Au cut-off.

The Cross-Sectional Method estimated (Net In-Situ):

- 114,922.935 tonnes @ 0.47% Cu and 1,219.46 ppm Ag at 0.1% Cu cut-off
- 79,201.598 tonnes @ 0.64% Cu and 335.13 ppm Ag at 0.2% Cu cut-off
- 51,890.522 tonnes @ 0.81% Cu and 498.77 ppm Ag at 0.5% Cu cut-off
- 40400.114 tonnes resources with 0.97 ppm Au at 0.50 ppm Au cut-of

The Level Plan Method estimated (Net In-Situ):

- 115,419.463 tonnes @ 0.48% Cu and 913.40 ppm Ag at 0.1% Cu cut-off
- 80,101.260 tonnes @ 0.64% Cu and 305.07 ppm Ag at 0.2% Cu cut-off
- 53,861.884 tonnes @ 0.86% Cu and 428.23 ppm Ag at 0.5% Cu cut-off
- 39793.178 tonnes resources with 1.01 ppm Au at 0.50 ppm Au cut-off

21.3 The possibility of economic extraction based on present technological, environmental, social and market conditions

21.3.1 The Salaiya Phatak block hosts structurally controlled vein-type sulphide mineralization comprising copper and silver, occurring in narrow but persistent lodes. The mineralization of Salaiya Phatak block is comparable to the adjoining Imaliya block, where gold and sulphide mineralization of similar nature has been established. The Imaliya block, situated immediately east of Salaiya Phatak, has already been auctioned and is on the verge of commencing mining operations, further substantiating the economic potential and continuity of mineralization across the region.

21.3.2 From a technological standpoint, the narrow, vein-type mineralization of the Salaiya Phatak block is suitable for underground selective mining methods, such as cut-and-fill or shrinkage stoping. The copper–silver sulphide assemblage is amenable to conventional flotation-based beneficiation techniques, making the deposit technically mineable with existing equipment and processing technologies.

21.3.3 Environmentally and socially, the block is of moderate size and located in a region with limited ecological sensitivity. With proper environmental safeguards and community engagement, the project can be developed sustainably, adhering to statutory clearances and regulatory norms.

21.3.4 Given strong global demand for copper, gold, and silver—driven by renewable energy, electric vehicles, and electronics—polymetallic vein-type deposits like Salaiya Phatak remain economically attractive under current market conditions.

21.3.5 In conclusion, the geological similarity and proximity to the already auctioned and mine-ready Imaliya block strongly indicate that the Salaiya Phatak mineralization has significant economic extraction potential under current technological, environmental, social, and market conditions. Advancing to detailed exploration (G2 stage) is therefore justified to establish deeper continuity, improve resource confidence, and support future mine planning and feasibility assessment.

21.4 Recommendations

21.4.1 It is recommended that further deeper boreholes may be drilled to establish the second level of intersections and confirm the down-dip continuity of mineralization. Lateral extensions along the strike should also be explored through detailed mapping, trenching, and sampling to assess the full extent of mineralization. Sub-surface geophysical surveys, including IP, resistivity, and magnetic methods, are suggested to delineate hidden mineralized zones and guide future drilling. Considering the proximity and geological similarity to the adjacent Imaliya block, which has already been auctioned and is on the verge of mining, the Salaiya Phatak block may be considered for auction as a Composite License (CL) block.

CHAPTER- 22

22.0 PLATES AND MAPS

22.1 Regional Geological Map of Salaiya Phatak block for Copper, Lead, Zinc & Associated metals (1.50 Sq. Km) District- Katni, Madhya Pradesh given as Plate- I

22.2 Regional Geological Map of Salaiya Phatak block for Copper, Lead, Zinc & Associated metals (1.50 Sq. Km) District- Katni, Madhya Pradesh given as Plate- II

22.3 Geological Map of Salaiya Phatak block for Copper, Lead, Zinc & Associated metals (1.50 Sq. Km) District- Katni, Madhya Pradesh (1: 2000) given as Plate-III.

22.4 Geological cross section showing copper lodes at 0.1%, 0.2%, 0.5% Cu cut-off and 0.5 ppm Au cut-off in Salaiya Phatak block for Copper, Lead, Zinc & Associated metals (1.50 Sq. Km) District- Katni, Madhya Pradesh given as Plate- IV A, B, C & D respectively.

22.5 Level plan (Surface to 350 mRL) showing copper lodes at 0.1%, 0.2%, 0.5% Cu cut-off and 0.5 ppm Au cut-off in Salaiya Phatak block for Copper, Lead, Zinc & Associated metals (1.50 Sq. Km) District- Katni, Madhya Pradesh given as Plate- V A, B, C & D respectively.

CHAPTER- 23

23.0 ANNEXURES OR ENCLOSURES TO THE REPORT

The report includes all the relevant annexure and maps/plans, photographs etc.

CHAPTER- 24

24.0 ANY OTHER INFORMATION

All the relevant information regarding this preliminary exploration has been documented in this report. There is no additional information available can be inferred in the block.

CHAPTER- 25

25.0 CERTIFICATE FROM THE QUALIFIED PERSON

This is to certify that geological report has been prepared in respect of Salaiya Phatak block, District- Jabalpur, Madhya Pradesh at G3 level for exploration for Copper, Lead, Zinc and Associated Metals by Mineral Exploration and Consultancy Limited (MECL) on behalf of National Mineral Exploration and Development Trust (NMEDT). The report has been prepared in accordance with the Minerals (Evidence of Mineral Contents) Rule 2015, Amendment up to 2021 specified under Mineral Auction Rule, 2015 and amended up to 2021.

HEAD OF THE DEPARTMENT (EXPLORATION)

Locality Index

Village Name	Latitude	Longitude
Bandhi	23° 35' 53.29" N	80° 16' 21.04" E
Imaliya	23° 36' 19.74" N	80° 15' 53.37" E
Sleemnabad	23° 38' 11.96" N	80° 15' 02.67" E
Khachhargaon	23° 34' 11.37" N	80° 9' 13.98" E
Mohla	23° 33' 14.49" N	80° 9' 50.19" E
Dhagawan	23° 33' 58.85" N	80° 10' 53.86" E
Salaiya Phatak	23° 33' 6.24" N	80° 11' 30.02" E
Dundi	23° 32' 21.4" N	80° 11' 38.1" E
Hardua Kala	23° 33' 18.14" N	80° 13' 15.44" E
Mahagwan	23° 33' 50.6" N	80° 13' 37.62" E

References

Nair, K.K.K., Jain, S.C. and Yedekar, D.B. (1995) Stratigraphy, Structure and Geochemistry of the Mahakoshal Greenstone Belt. *In:* S. Sinha-Roy and K.R. Gupta (Eds.), Continental Crust of Northwestern and Central India, Mem. Geol. Soc. India, no.31, pp.403-432.

Roy, Abhinab and Devarajan, M.K. (2000) A reappraisal of the Stratigraphy and Tectonics of the Palaeoproterozoic Mahakoshal Supracrustal Belt, Central India, *In* Precambrian Crust in Eastern and Central India. Geol. Surv. India. Spec. Publ. no.57, pp.79-97.

Roy, Abhinaba and Prasad, M. Hanuma (2003) Tectonothermal events in Central Indian Tectonic Zone (CITZ) and its implications in Rodinian crustal assembly. Jour. Asian Earth Sci., v.22, pp.115–129.

Mathur, S.M. (1951) A report on the continuation of geological survey of the partially excluded area south of Kaimur range, Mirzapur District, Madhya Pradesh. Geol. Surv. India, Unpub. Report (FS 1950-51).

Kedar Narain (1955) Progress report on systematic mapping in Sidhi district, Madhya Pradesh Geol. Surv. India. Unpub. Report (FS 1952-54).

Sharma, R.K., (1961-1962), Geology and Copper-Lead Deposit of the Sleemanabad area, Jabalpur District, MP Unpub. Prog. Report GSI.

Tiwari R.K. (1965) Systematic geological mapping in Jabalpur, Sihora and Katni tehsils Jabalpur, District, MP.

RK Gour & ND Gupta (1977-78) Investigation Of Dolomite In Sleemnabad Area, District Jabalpur, Madhya Pradesh

Narain, A. and Thambi, P.I. (1978) Geology and structure of Khaddi-Gajrehi area, Gopad-Banas, Tehsil, Sidhi District, MP Geol. Surv. India, Unpub. Report (FS 1978-79).

Jha, D.K. and Gurusiddappa, L. (1983) A report on the Geology of Salaiya Phatak-Sihora area, Jabalpur District, Madhya Pradesh. Geol. Surv. India, Unpub. Report (FS 1982-83).

Bandyopadhyaya, B.K. and Roy, A. (1987) Geochemistry and environmental significance of banded garnet amphibole rock (BGA) around Naurhiya, Bijawar Group in Sidhi District, Madhya Pradesh. Jour. Geol. Soc. India, V.30

Devarajan, M.K. and Shrivastava, H.S. (1996) A report on transact mapping of a part of the Mahakoshal group of rocks in Bhula area, Jabalpur District, Madhya Pradesh Geol. Surv. India, Unpub. Report (FS 1994-95).

Singhai, R. K, Final report on exploration for Gold, Silver & Basemetal in Imaliya block, Sleemanabad area, Katni district, Madhya Pradesh. F.S. 1997-2001

Shrivastava, H.S. and Anand Agasti (1997) A report on the preliminary investigation for gold in Selarpur-Imaliya-Barkhera blocks, Sleemanabad area of Sihora Tehsil, Jabalpur district, MP. Geol. Surv. India, Unpub. Report (FS 1995-96).

Kumar & Gupta (2016-17), Report on General exploration for gold, silver & basemetal in Imaliya block, Sleemanabad area, Katni District, Madhya Pradesh