RECONNAISSANCE SURVEY (G4) FOR IRON ORE IN THE MAHAKOSHAL GROUP AROUND CHAKDIYA, KUSHANIYA, JOBRA AND TUSGAON AREA, SONBHADRA DISTRICT, UTTAR PRADESH

Name of the Block: **A1 Chakdiya and Kushniya Block &**

A2 Jorba and Tusgaon Blocks

Explored block area**: 18.56 Sq. Km**

Toposheet No. 63 L/14

Submitted to

खान मंत्रालय
MINISTRY OF
MINES
सत्यमेव जयते

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LIST OF ABBREVIATIONS

Abbreviation	Description
GSI	Geological Survey of India
SOI	Survey of India
NMET	National Mineral Exploration Trust
NMEP	National Mineral Exploration Policy
NMEDT	National Mineral Exploration and Development Trust
MoM	Ministry of Mines
TCC	Technical – cum- Cost Committee
EC	Executive committee
DMG	Department of Mines and Geology
NQT	Nature, Quantum and Target
DGPS	Differential Global Positioning System
PPM	Parts per Million
Km^2	Square Kilometer
ENE	East - North - East
WSW	West - South - West
NE	North-East
SW	South-west
NW	North-West
SE	South-East
AAS	Atomic Absorption Spectrometers
RL	Reduced Level
EPMA	Electron probe Microanalysis
BH	Borehole
WD-XRF	Wavelength Dispersive X-ray Fluorescence
BHC&J	Banded Hematite Chert & Jasper

BMC&J	Banded Magnetite Chert & Jasper
BMC	Banded Magnetite Chert
BHC	Banded Hematite Chert
MIO	Massive Iron Ore
LC	Laterite Capping
OIO	Oxidized Iron Ore
BQ	Brecciated Quartzite
mT	Metric Tonnes
MT	Million Tonnes
CHS	Channel Samples
CS	Core samples
BRS	Bed Rock Sampling
HOB	Hematite Oxidized Band
mts	Meters
PPL	Plane polarized light
XPL	Cross polarized light
LSM	Large Scale Mapping
Cu. m	Cubic meter
MSL	Mean Sea Level
DL	Datum Line

CHAPTER 1: EXECUTIVE SUMMARY

1.1 Executive summary

A G4-stage investigation for Iron Ore and Associated Minerals titled **"Reconnaissance Survey (G4) for Iron Ore in Mahakoshal Group around Chakdiya (A1), Jorba (A2) Blocks, Sonbhadra District, Uttar Pradesh"** was carried out under the sanctioned letter F.No.23/433/2023-NMET/540 dated 29th February 2024. The study area falls within **Survey of India Toposheet No. 63L/14** and was undertaken with the objective of delineating iron ore mineralization associated with the **Mahakoshal Group**.

The Mahakoshal Group represents a **Paleo-Proterozoic volcano-sedimentary sequence** exposed along the **Son–Narmada Lineament Zone (SNLZ)** and bounded by the **Son Narmada North Fault (SNNF)** and **Son Narmada South Fault (SNSF)**. The rocks are mainly disposed along an **ENE–WSW trending shear zone**, which exerts an important structural control on the distribution of **Banded Iron Formation (BIF)** and associated iron-bearing lithologies.

During **Field Season (FS) 2024–25**, GeoExpOre carried out large-scale geological mapping covarying **18.56 sq. km** in Blocks **A1 and A2** on a **1:12,500 scale**. As part of the exploration programme, **91 bedrock samples (BRS)** and **150 channel samples (CH)** were collected. In addition, **10 petrological samples (PS), 10 ore microscopy samples (OPS), 10 samples for precious metal analysis by Atomic Absorption Spectroscopy (AAS), 10 samples for precious metal analysis by Fire Assay, and 20 samples for bulk density determination** were collected and analysed. Furthermore, a total of **700.10 m of diamond core drilling** was completed in Blocks A1 and A2, from which **309 core samples (CS)** were collected and analysed to evaluate the mineralization potential of the area which is given below:

1.1.1 Block A1: Banded Iron Formation (BIF)

Block A1 constitutes the major **Banded Iron Formation (BIF)** domain of the study area. BIF is represented predominantly by discontinuous bands of **Banded Hematite Chert and Jasper (BHC&J)** and **Banded Magnetite Chert and Jasper (BMC&J)** interbedded with phyllite.

The major BHC&J zone comprises **four parallel, discontinuous bands** generally trending **N70°E**, extending from west of **Bijaura to Khoriya**. These bands have strike lengths of approximately **4.5 km to 7.0 km** and widths ranging from **12 m to 45 m**. In addition, two minor discontinuous BHC&J bands were delineated, having strike lengths of about **450 m to 1.25 km** and widths of **20 m to 22 m**.

Three discontinuous **BMC&J bands** have been delineated in Block A1, with strike lengths ranging from **3.3 km to 7.00 km** and widths varying between **14 m and 22 m**. In addition, two minor BMC&J bands have been identified, with strike lengths of approximately **1.67 km to 3.3 km** and widths ranging from **16 m to 18 m**. To assess the surface expression and grade characteristics of the BIF units, **30 bedrock samples were collected from BHC&J and 31 from BMC&J**. The analytical results show that Fe content in the BHC&J varies from **21.36% to 65.88%**, with an average of **35.57% Fe**, whereas the BMC&J samples contain **14.67% to 54.18% Fe**, with an average of **29.40% Fe**. In addition to iron mineralisation, **titanium–vanadium mineralisation in Block A1 is predominantly associated with ferruginous phyllite**. However, the surface bedrock sampling programme was primarily focused on the BHC&J and BMC&J bands. Among the analysed BRS samples, only **two samples recorded TiO_2 values exceeding the 1.50% cut-off**, corresponding to **dolerite and pyroclastic rock**, with TiO_2 values of **2.12% and 2.34%**, respectively. Whereas the more significant Ti–V potential appears to be associated with **ferruginous phyllite**.

Based on geological mapping and encouraging bedrock analytical results, systematic **channel sampling** was subsequently carried out across the prospective BIF bands. A total of **nine channels were established across two BHC&J bands and two channels across one BMC&J band**, resulting in the collection of **110 channel samples**. The analytical results are encouraging, with **BHC&J-1** recording Fe values ranging from **15.78% to 50.04%**, with an average of **37.48% Fe** based on 63 samples; **BHC&J-2** recording **12.50% to 52.62% Fe**, with an average of **38.85% Fe** from 30 samples; and **BMC&J-6** recording **21.29% to 52.09% Fe**, with an average of **39.30% Fe** from 17 samples. The **titanium–vanadium mineralisation is mainly associated with ferruginous phyllite**, whereas the channel sampling programme was primarily focused on the BHC&J and BMC&J bands. Accordingly, **all channel samples recorded TiO_2 values below the 1.50% cut-off**, indicating not encouraging value of titanium.

The encouraging results obtained from geological mapping, bedrock sampling and channel sampling led to the implementation of a **diamond drilling programme in Block A1**. A total of **567.10 m of drilling was completed through six boreholes**. Five boreholes were drilled across the BHC&J bands in the western part

of the block, while one borehole targeted the BMC&J band in the eastern part. A total of **248 core samples** from the six boreholes were collected and analyzed.

The drilling results confirmed the presence of significant Fe mineralization within the BHC&J and BMC&J units. At a **30% Fe cut-off**, the thickness of mineralized zones ranges from **0.97 m to 13.58 m**, with a weighted average grade of **35.41% Fe**. At a **35% Fe cut-off**, the mineralized-zone thickness varies from **0.97 m to 5.82 m**, with a weighted average grade of **39.35% Fe**.

Based on these drilling results, the estimated Fe resource in BHC&J and BMC&J of Block A1 is 16.95 million tonnes (MT) at a 30% Fe cut-off, with an average grade of 35.41% Fe, and 6.76 MT at a 35% Fe cut-off, with an average grade of 39.35% Fe. The broader BMC&J mineralised envelope at a 15% Fe cut-off is estimated separately in Chapter 20; the corresponding tonnage and grade remain subject to final reconciliation of the true-thickness geometry and resource polygons before the estimate is treated as final.

The drilling programme also indicates potential for titanium and vanadium mineralisation in Block A1. Titanium–vanadium mineralisation is mainly associated with ferruginous phyllite and BMC&J, while BHC&J also records encouraging TiO_2 values. At a 1.50% TiO_2 cut-off, the current calculated resource is 11.66 MT with a weighted average grade of 2.28% TiO_2; the broader A1–A2 TiO_2 estimate is presented separately in Chapter 20. Similarly, at a 500-ppm V_2O_5 cut-off, the current A1 estimate is 4.47 MT at 894.72 ppm V_2O_5. These estimates represent geological mineralisation at the reconnaissance stage and should not be interpreted as recoverable products without beneficiation and metallurgical evidence.

1.1.2 Block A2: Massive and oxidised iron ore

In contrast to the BIF-dominated mineralization of Block A1, **Block A2 is characterized mainly by discontinuous bands of massive iron ore, locally oxidised, interbanded with phyllite and brecciated quartzite**. The mineralized bands show variable trends, predominantly **N70°E–S70°W**, with local trends of **N15°E–S15°W**, and extend from west of **Naudhwa Taula to west of Jorba**.

A total of eight discontinuous massive iron ore bands were delineated in Block A2. These bands range in strike length from 285 m to 975 m and have widths varying from 30 m to 65 m. In addition, three minor discontinuous Banded Hematite/Magnetite Chert and Jasper (BH/MC&J) bands were identified, with strike

lengths of 147 m to 290 m and widths of 35 m to 70 m. Four laterite cappings were also recorded, measuring approximately 140 m to 415 m in length and 40 m to 130 m in width.

To assess the grade characteristics of the different lithological units in Block A2, a total of **24 bedrock samples** were collected, comprising **13 samples from massive iron ore, 5 from BH/MC&J, 4 from laterite cappings, and 2 from brecciated quartzite with iron matrix**. The analytical results indicate that the **massive iron ore** contains **21.67% to 59.80% Fe**, with an average of **44.99% Fe**; **BH/MC&J** contains **12.12% to 48.16% Fe**, averaging **33.86% Fe**; **laterite cappings** contain **41.01% to 43.56% Fe**, averaging **42.06% Fe**; and **brecciated quartzite with iron matrix** records **46.67% to 48.89% Fe**, with an average of **47.78% Fe**. In addition to iron mineralisation, **titanium–vanadium mineralisation is mainly associated with tuff & Laterite;** however, the surface bedrock sampling programme was primarily focused on massive iron ore, BH/MC&J and laterite. Despite this sampling focus, **7 of the 24 BRS samples recorded TiO_2 values above the 1.50% cut-off**, ranging from **1.59% to 6.03%**, with an average of **3.21% TiO_2**. Similarly, **7 samples recorded V_2O_5 values above the 500-ppm cut-off**, ranging from **566 to 1,742 ppm**, with an average of **898.86 ppm V_2O_5**. These results indicate **encouraging Ti–V enrichment in Block A2**.

Based on the geological mapping and encouraging bedrock results, **two channels were established across two massive iron ore bands**, resulting in the collection of **40 channel samples**. The analytical results are particularly encouraging, with **Massive Iron Ore Band-1** recording Fe values ranging from **41.87% to 53.66%**, with an average of **49.99% Fe**, while **Massive Iron Ore Band-2** records **47.84% to 53.59% Fe**, with an average of **50.35% Fe**. In addition to iron mineralisation, **titanium–vanadium mineralisation is mainly associated with tuff & laterite**; however, the channel sampling programme was primarily focused on the massive iron ore bands. Nevertheless, **19 out of 40 channel samples recorded TiO_2 values above the 1.50% cut-off**, ranging from **1.90% to 3.20%**, with an average of **2.49% TiO_2**, indicating **encouraging TiO_2 enrichment.**

The drilling results indicate that Fe mineralisation in Block A2 occurs in significant thickness. At a 30% Fe cut-off, the mineralised zone thickness ranges from 0.49 m to 7.76 m, with a weighted average grade of 39.86% Fe, whereas at a 35% Fe cut-off, the thickness varies from 0.49 m to 4.85 m, with a weighted average grade of 45.36% Fe.

The estimated Fe resource for Block A2 is **3.47 MT** at a **30% Fe cut-off**, with an average grade of **39.86%**

Fe, and **1.94 MT** at a **35% Fe cut-off**, with an average grade of **45.36% Fe**.

In addition to iron mineralization, Block A2 shows encouraging potential for **titanium and vanadium mineralization**. This mineralization is mainly associated with **tuff with phyllite, tuff with hematite and massive iron ore**. The lateritic cap is also considered a potential host for TiO_2–V_2O_5 mineralization based on encouraging bedrock results; however, its potential remains to be established through systematic drilling and sampling because no borehole has yet been drilled in the lateritic unit.

At a **1.50% TiO_2 cut-off**, the mineralized-zone thickness ranges from **1.40 m to 12.61 m**, corresponding to an estimated resource of **8.01 MT** with a weighted average grade of **5.94% TiO_2**. Similarly, at a **500-ppm V_2O_5 cut-off**, the mineralized-zone thickness ranges from **1.40 m to 12.61 m**, with an estimated resource of **8.01 MT** and a weighted average grade of **1,089.63 ppm V_2O_5**.

1.1.3 Other Mineralogical and Geochemical Observations

In addition to the principal iron and Ti–V mineralization, **metabasalt and tuff bodies** have been identified both west and east of **Jorba village in Block A2**, while **dolerite occurs in Block A1**. These lithological units are locally associated with minor sulphide mineralization, as observed in hand specimens and supported by petrographic and mineralgraphic studies. However, the analytical results obtained by AAS and fire-assay methods are generally not significantly encouraging. The maximum Cu concentration recorded is **210 ppm**, followed by **167 ppm and 126 ppm**, while Au values are low, with a maximum of **14 ppb**. TiO_2 determined by AAS reaches up to **2.29%**.

Mineralogical studies indicate that the iron ore consists predominantly of **hematite, magnetite, martitized magnetite, goethite and quartz**, with minor clay minerals. **Pyrite occurs in trace amounts**.

1.1.4 Anomalous zones

Block	Rock Type	Band / Zone	Dimension (L × W × T) (m)	Cut-off Grade	Average Grade
A1	Banded Hematite Chert & Jasper (BHC&J)	BHC&J-1	4530 × 40 × 10.67	≥30% Fe	34.03% Fe
	Banded Hematite Chert & Jasper (BHC&J)	BHC&J/BMC&J-2	4405 × 28 × 23.28	≥30% Fe	35.35% Fe
	Banded Magnetite Chert & Jasper (BMC&J)	BMC&J-6	1835 × 15 × 16.98	≥15% Fe	30.19% Fe
	Banded Magnetite Chert & Jasper (BMC&J)	BMC&J-3	2250 × 29 × 35.89	≥15% Fe	33.37% Fe
	BHC&J	BHC&J-1	4530 × 40 × 5.82	≥1.5% TiO_2	1.69% TiO_2

	BMC&J	BMC&J-3	2250 x 29 x 14.55	≥1.5% TiO_2	2.16% TiO_2
	Ferruginous Phyllite	Ferruginous Phyllite-1	4530 × 40 × 14.55	≥1.5% TiO_2	2.28% TiO_2
	BMC&J	BMC&J-3	2250 × 29 × 14.55	≥500 ppm V_2O_5	1548.38 ppm V_2O_5
	Ferruginous Phyllite	Ferruginous Phyllite-1	4530 × 40 × 11.64	≥500 ppm V_2O_5	740.00 ppm V_2O_5
A2	Massive Iron Ore	Massive Iron Ore-1	800 × 48 × 17.46	≥30% Fe	43.15% Fe
	Massive Iron Ore	Massive Iron Ore-2	600 × 45 × 8.25	≥30% Fe	33.98% Fe
	Tuff with Phyllite	Tuff with Phyllite-1	800 × 48 × 22.31	≥1.5% TiO_2	4.29% TiO_2
	Tuff with Hematite	Tuff with Hematite-2	600 × 45 × 31.23	≥1.5% TiO_2	7.34% TiO_2
	Massive Iron Ore	Massive Iron Ore-2	600 × 45 × 9.16	≥1.5% TiO_2	4.78% TiO_2
	Tuff with Phyllite	Tuff with Phyllite-1	800 × 48 × 22.31	≥500 ppm V_2O_5	833.61 ppm V_2O_5
	Tuff with Hematite	Tuff with Hematite-2	600 × 45 × 31.23	≥500 ppm V_2O_5	1344.99 ppm V_2O_5
	Massive Iron Ore	Massive Iron Ore-2	600 × 45 × 9.16	≥500 ppm V_2O_5	805.14 ppm V_2O_5

Surface-Identified Potential Mineralised Bands within Anomalous Zones

Block A1	Banded Hematite Chert & Jasper Bands Block A1								
	S. No	Band ID	Length (m)	width (m)	Area sq. m	No of BRS samples collected	Strike	Dip Amount	Fe%(BRS)
	1	BHC&J-3	4500	18	81000	4	N65°E	74°	Avg. (28.39)
	2	BHC&J-4	1631	34	39144	3	N75°E	75°	Avg. (32.59)
	Banded Magnetite Chert & Jasper Bands Block A1								
	3	BMC&J-1	3034	15	45510	2	N75°E	75°	Avg. (31.70)
	4	BMC&J-2	2824	20	56680	3	N75°E	65°	Avg. (28.14)
	5	BMC&J-4	3203	24	76872	2	N75°E	72°	Avg. (37.65)
	6	BMC&J-5	1425	22	23450	3	N70°E	65°	Avg. (26.98
	Oxidized Iron Ore Bands Block A2								
Block A2	7	MIO-3	475	58	27550	2	N114°	74°	Avg. (39.29)
	8	MIO-4	385	55	21175	2	N70°	80°	Avg. (41.70)
	9	MIO-5	285	30	8550	1	N88°	78°	30.29
	10	MIO-6	625	58	36250	2	N78°	84°	Avg. (44.89)
	11	MIO-7	850	35	29750	2	N82°	72°	Avg. (40.57)
	12	MIO-8	295	40	11800	1	N87°	68°	37.24
	Banded Hematite/Magnetite Chert & Jasper Bands Block A2								
	13	BH/MC&J-1	215	70	15050	1	N55°	85°	41.7
	14	BH/MC&J-2	290	37	10730	1	N68°	74°	37.04
	15	BH/MC&J-3	147	50	7350	1	N63°	83°	48.16
	Laterite Caping Block A2								
	16	LCB-1	415	130	53950	1	-	-	43.56
	17	LCB-2	250	90	22500	1	-	-	41.01
	18	LCB-3	265	62	16430	1	-	-	41.36
	19	LCB-4	140	41	5740	1	-	-	46.67
	Brecciated Quartzite with Iron Matrix Body Block A2								
	20	BQ-1	1085	60	65100	1	N72°	78°	48.89

1.1.5 Overall Interpretation and Recommendation

The integrated exploration results demonstrate significant iron ore and associated Ti–V mineralization in both Blocks A1 and A2, although the style and geological setting of mineralization differ between the two blocks.

In Block A1, drilling provides preliminary evidence for continuity of banded magnetite iron mineralisation in the eastern and central parts of the block. The BMC&J-3 zone has a mapped/prospective strike extent of approximately 1,835 m and a mapped width of about 15 m; the maximum reported ≥15% Fe drill intersection should be quoted separately from the mapped dimensions. The BMC&J-6 zone has a mapped/prospective strike extent of approximately 2,250 m and a mapped width of about 29 m. BHC&J-1 has a mapped/prospective strike extent of approximately 4,530 m and a mapped width of about 40 m. BHC&J-2 has a mapped/prospective strike extent of approximately 4,405 m and a mapped width of about 28 m. These dimensions describe the interpreted surface/prospective envelope and should not be treated as a three-dimensional resource block without corresponding section-based geological control.

Block A2 demonstrates good potential for **titaniferous and vanadiferous massive iron ore mineralization**. The TiO_2 and V_2O_5 mineralized zones occur mainly within tuff with phyllite, tuff with hematite and massive iron ore, while the lateritic cap also represents a potential host requiring further investigation. Considering the encouraging Fe, TiO_2 and V_2O_5 results and the need to establish the continuity, grade distribution and resource potential of these mineralized zones, **Block A2 is recommended to be delineated into two sub-blocks and taken up for detailed exploration**.

The estimated resources for **Blocks A1 and A2**, together with their respective grades and cut-off parameters, are presented in the subsequent resource-estimation table.

Block	Host Rock	Fe Cut-off	Fe Resource (MT)	TiO_2 Resource @ ≥1.5% (MT)	V_2O_5 Resource @ ≥500 ppm (MT)
A1	BHC&J	≥35%	1.29	1.27	—
	BHC&J	≥30%	5.20	1.27	—
	BMC&J	≥35%	5.48	4.11	0.53
	BMC&J	≥30%	11.74	4.11	0.53
	BMC&J	≥15%	20.84	4.11	0.53
	Ferruginous Phyllite	—	—	6.28	3.94

A2	Massive Iron Ore	≥35%	1.67	1.48	1.48
	Massive Iron Ore	≥30%	2.56	1.48	1.48
	Tuff with Phyllite	—	—	2.44	2.44
	Tuff with Hematite	≥35%	0.26	4.09	4.093
	Tuff with Hematite	≥30%	0.91	4.09	4.093

1.2 कार्यकारी सारांश

G4-स्तरीय लौह अयस्क एवं संबद्ध खनिजों की खोज के अंतर्गत **"महाकोशल समूह में चकदिया (A1) एवं जोरबा (A2) ब्लॉकों के आसपास, सोनभद्र जिला, उत्तर प्रदेश में लौह अयस्क हेतु पुनर्विलोकन सर्वेक्षण (G4)"** नामक अन्वेषण कार्य, स्वीकृति पत्र संख्या **F.No.23/433/2023-NMET/540 दिनांक 29 फरवरी 2024** के अंतर्गत किया गया। अध्ययन क्षेत्र **भारतीय सर्वेक्षण विभाग के टोपोशीट संख्या 63L/14** में स्थित है तथा इसका मुख्य उद्देश्य **महाकोशल समूह से संबद्ध लौह अयस्क खनिजीकरण** का सीमांकन करना था।

महाकोशल समूह **पैलियो-प्रोटेरोज़ोइक ज्वालामुखीय-तलछटी अनुक्रम** का प्रतिनिधित्व करता है, जो **सोन-नर्मदा रेखीय क्षेत्र (SNLZ)** के साथ विस्तृत रूप से अनावृत है तथा **सोन नर्मदा नॉर्थ फॉल्ट (SNNF)** और **सोन नर्मदा साउथ फॉल्ट (SNSF)** द्वारा सीमांकित है। यहाँ की चट्टानें मुख्यतः **ENE–WSW प्रवृत्ति वाले शीयर ज़ोन** के साथ व्यवस्थित हैं, जो **बैंडेड आयरन फॉर्मेशन (BIF)** तथा संबद्ध लौह-युक्त शैल-समूहों के वितरण को महत्वपूर्ण संरचनात्मक नियंत्रण प्रदान करता है।

फील्ड सीज़न (FS) 2024–25 के दौरान, GeoExpOre द्वारा A1 एवं A2 ब्लॉकों में कुल **18.56 वर्ग किमी क्षेत्रफल** का **1:12,500 पैमाने पर विस्तृत भूवैज्ञानिक मानचित्रण** किया गया। अन्वेषण कार्यक्रम के अंतर्गत **91 बेडरॉक सैंपल (BRS)** तथा **150 चैनल सैंपल (CH)** एकत्र किए गए। इसके अतिरिक्त, **10 पेट्रोलॉजिकल सैंपल (PS), 10 अयस्क सूक्ष्मदर्शी अध्ययन सैंपल (OPS), बहुमूल्य धातुओं के विश्लेषण हेतु Atomic Absorption Spectroscopy (AAS) के 10 सैंपल, Fire Assay हेतु 10 सैंपल तथा Bulk Density निर्धारण हेतु 20 सैंपल** एकत्र कर उनका विश्लेषण किया गया।

इसके अलावा, A1 एवं A2 ब्लॉकों में कुल **700.10 मीटर डायमंड कोर ड्रिलिंग** पूर्ण की गई, जिससे **309 कोर सैंपल (CS)** एकत्र किए गए। इन सैंपलों का विश्लेषण क्षेत्र में **लौह खनिजीकरण की संभाव्यता एवं उसके विस्तार के आकलन** के लिए किया गया, जिसका विवरण निम्नानुसार प्रस्तुत किया गया है।

1.2.1 ब्लॉक A1: बैंडेड आयरन फॉर्मेशन (BIF)

ब्लॉक A1 अध्ययन क्षेत्र के प्रमुख बैंडेड आयरन फॉर्मेशन (BIF) क्षेत्र का निर्माण करता है। BIF मुख्यतः बैंडेड हेमेटाइट चर्ट एवं जैस्पर (BHC&J) तथा बैंडेड मैग्नेटाइट चर्ट एवं जैस्पर (BMC&J) की असंतत पट्टियों के रूप में पाया जाता है, जो फिलाइट के साथ अंतःस्तरित हैं।

प्रमुख BHC&J क्षेत्र में सामान्यतः N70°E दिशा में प्रवृत्त चार समानांतर, असंतत पट्टियाँ शामिल हैं, जो बिजौरा के पश्चिम से खोरिया तक विस्तारित हैं। इन पट्टियों की स्ट्राइक लंबाई लगभग 4.5 किमी से 7.0 किमी तथा चौड़ाई 12 मीटर से 45 मीटर तक है। इसके अतिरिक्त, दो छोटी असंतत BHC&J पट्टियों का सीमांकन किया गया है, जिनकी स्ट्राइक लंबाई लगभग 450 मीटर से 1.25 किमी तथा चौड़ाई 20 मीटर से 22 मीटर है।

ब्लॉक A1 में तीन असंतत BMC&J पट्टियों का सीमांकन किया गया है, जिनकी स्ट्राइक लंबाई 3.3 किमी से 7.00 किमी तथा चौड़ाई 14 मीटर से 22 मीटर के बीच है। इसके अतिरिक्त, दो छोटी BMC&J पट्टियों की पहचान की गई है, जिनकी स्ट्राइक लंबाई लगभग 1.67 किमी से 3.3 किमी तथा चौड़ाई 16 मीटर से 18 मीटर के बीच है। BIF इकाइयों के सतही प्रकटीकरण एवं ग्रेड विशेषताओं के आकलन हेतु BHC&J से 30 तथा BMC&J से 31 बेडरॉक सैंपल एकत्र किए गए। विश्लेषणात्मक परिणामों से ज्ञात हुआ कि BHC&J में Fe की मात्रा 21.36% से 65.88% तक है, जिसका औसत 35.57% Fe है, जबकि BMC&J के सैंपलों में Fe की मात्रा 14.67% से 54.18% तक है, जिसका औसत 29.40% Fe है। लौह खनिजीकरण के अतिरिक्त, ब्लॉक A1 में टाइटेनियम-वैनेडियम खनिजीकरण मुख्यतः फेरुजिनस फिलाइट से संबद्ध है। हालांकि, सतही बेडरॉक सैंपलिंग कार्यक्रम मुख्य रूप से BHC&J एवं BMC&J पट्टियों पर केंद्रित था। विश्लेषित BRS सैंपलों में केवल दो सैंपलों में TiO_2 की मात्रा 1.50% कट-ऑफ से अधिक दर्ज की गई, जो क्रमशः डोलेराइट एवं पाइरोक्लास्टिक शैल से संबंधित थे तथा इनमें TiO_2 की मात्रा क्रमशः 2.12% एवं 2.34% थी। जबकि अधिक महत्वपूर्ण Ti–V संभाव्यता फेरुजिनस फिलाइट से संबद्ध प्रतीत होती है।

भूवैज्ञानिक मानचित्रण एवं उत्साहजनक बेडरॉक विश्लेषणात्मक परिणामों के आधार पर, संभावित BIF पट्टियों के आर-पार व्यवस्थित चैनल सैंपलिंग की गई। कुल नौ चैनल दो BHC&J पट्टियों के आर-पार तथा दो चैनल एक BMC&J पट्टी के आर-पार स्थापित किए गए, जिससे कुल 110 चैनल सैंपल एकत्र किए गए। विश्लेषणात्मक परिणाम उत्साहजनक रहे। BHC&J-1 में 63 सैंपलों के आधार पर Fe की मात्रा 15.78% से 50.04% तक दर्ज की गई, जिसका औसत 37.48% Fe है; BHC&J-2 में 30 सैंपलों के आधार पर Fe की मात्रा 12.50% से 52.62% तक रही, जिसका औसत 38.85% Fe है; तथा BMC&J-3 में 17 सैंपलों के आधार पर Fe की मात्रा 21.29% से 52.09% तक रही, जिसका औसत 39.30% Fe है। टाइटेनियम-वैनेडियम खनिजीकरण मुख्यतः फेरुजिनस फिलाइट से संबद्ध है, जबकि चैनल सैंपलिंग कार्यक्रम मुख्य रूप से BHC&J एवं BMC&J पट्टियों पर केंद्रित था। तदनुसार, सभी चैनल सैंपलों में TiO_2 की मात्रा 1.50% कट-ऑफ से कम दर्ज की गई, जो टाइटेनियम के लिए उत्साहजनक मान नहीं दर्शाती है।

भूवैज्ञानिक मानचित्रण, बेडरॉक सैंपलिंग एवं चैनल सैंपलिंग से प्राप्त उत्साहजनक परिणामों के आधार पर ब्लॉक A1 में डायमंड ड्रिलिंग कार्यक्रम लागू किया गया। कुल छह बोरहोलों के माध्यम से 567.10 मीटर ड्रिलिंग पूर्ण की गई। इनमें से पाँच बोरहोल ब्लॉक के पश्चिमी भाग में स्थित BHC&J पट्टियों के आर-पार ड्रिल किए गए, जबकि एक बोरहोल पूर्वी भाग में स्थित BMC&J पट्टी को लक्षित करते हुए ड्रिल किया गया। छह बोरहोलों से कुल 248 कोर सैंपल एकत्र किए गए तथा उनका विश्लेषण किया गया।

ड्रिलिंग परिणामों ने BHC&J एवं BMC&J इकाइयों में महत्वपूर्ण Fe खनिजीकरण की उपस्थिति की पुष्टि की। 30% Fe कट-ऑफ पर खनिजीकृत क्षेत्रों की मोटाई 0.97 मीटर से 13.58 मीटर तक है, जिसका भारित औसत ग्रेड 35.41% Fe है। 35% Fe कट-ऑफ पर खनिजीकृत क्षेत्र की मोटाई 0.97 मीटर से 5.82 मीटर तक है, जिसका भारित औसत ग्रेड 39.35% Fe है।

इन ड्रिलिंग परिणामों के आधार पर, ब्लॉक A1 के BHC&J एवं BMC&J में अनुमानित Fe संसाधन 30% Fe कट-ऑफ पर 16.95 मिलियन टन (MT) है, जिसका औसत ग्रेड 35.41% Fe है, तथा 35% Fe कट-ऑफ पर 6.76 MT, जिसका औसत ग्रेड 39.35% Fe है। 15% Fe कट-ऑफ पर व्यापक BMC&J खनिजीकृत एन्वेलप का अलग से अनुमान अध्याय 20 में प्रस्तुत किया गया है; संबंधित टन भार एवं ग्रेड को वास्तविक मोटाई (true thickness) की ज्यामिति तथा संसाधन पॉलीगॉन के अंतिम सामंजस्य (reconciliation) के अधीन रखा गया है, इसलिए इस अनुमान को अंतिम नहीं माना जाना चाहिए।

ड्रिलिंग कार्यक्रम से ब्लॉक A1 में टाइटेनियम एवं वैनेडियम खनिजीकरण की संभाव्यता भी संकेतित होती है। टाइटेनियम-वैनेडियम खनिजीकरण मुख्यतः फेरुजिनस फिलाइट एवं BMC&J से संबद्ध है, जबकि BHC&J में भी उत्साहजनक TiO_2 मान दर्ज किए गए हैं। 1.50% TiO_2 कट-ऑफ पर वर्तमान गणना के अनुसार संसाधन 11.66 MT है, जिसका भारित औसत ग्रेड 2.28% TiO_2 है; व्यापक A1–A2 TiO_2 अनुमान अलग से अध्याय 20 में प्रस्तुत किया गया है। इसी प्रकार, 500 ppm V_2O_5 कट-ऑफ पर वर्तमान A1 अनुमान 4.47 MT है, जिसका भारित औसत ग्रेड 894.72 ppm V_2O_5 है। ये अनुमान पुनर्विलोकन (G4) स्तर पर भूवैज्ञानिक खनिजीकरण को दर्शाते हैं और इन्हें लाभकारी खनिज प्रसंस्करण (beneficiation) तथा धातुकर्मीय साक्ष्य के बिना पुनर्प्राप्त किए जा सकने वाले उत्पाद के रूप में नहीं समझा जाना चाहिए।

1.2.2 ब्लॉक A2: मैसिव एवं ऑक्सीकृत लौह अयस्क

ब्लॉक A1 के BIF-प्रधान खनिजीकरण के विपरीत, **ब्लॉक A2 की प्रमुख विशेषता विशाल लौह अयस्क की असंतत पट्टियाँ हैं, जो स्थानीय रूप से ऑक्सीकृत हैं तथा फिलाइट और ब्रेशिएटेड क्वार्टजाइट के साथ अंतःस्तरित हैं**। खनिजीकृत पट्टियों की प्रवृत्ति में विविधता पाई जाती है, जो मुख्यतः **N70°E–S70°W** तथा स्थानीय रूप से **N15°E–S15°W** है। ये पट्टियाँ **नौधवा तौला के पश्चिम से जोरबा के पश्चिम** तक विस्तारित हैं।

ब्लॉक A2 में कुल **आठ असंतत विशाल लौह अयस्क पट्टियों** का सीमांकन किया गया। इन पट्टियों की स्ट्राइक लंबाई **285 मीटर से 975 मीटर** तथा चौड़ाई **30 मीटर से 65 मीटर** तक है। इसके अतिरिक्त, **बैंडेड हेमेटाइट/मैग्नेटाइट चर्ट एवं जैस्पर (BH/MC&J)** की तीन छोटी असंतत पट्टियों की पहचान की गई, जिनकी स्ट्राइक लंबाई **147 मीटर से 290 मीटर** तथा चौड़ाई **35 मीटर से 70 मीटर** तक है। इसके अलावा, चार **लेटराइट कैपिंग** भी दर्ज की गईं, जिनकी लंबाई लगभग **140 मीटर से 415 मीटर** तथा चौड़ाई **40 मीटर से 130 मीटर** तक है।

ब्लॉक A2 में विभिन्न शैल-इकाइयों की ग्रेड विशेषताओं का आकलन करने के लिए कुल **24 बेडरॉक सैंपल** एकत्र किए गए, जिनमें **ठोस/सघन अयस्क से 13 सैंपल, BH/MC&J से 5 सैंपल, लेटराइट कैपिंग से 4 सैंपल तथा लौह मैट्रिक्स युक्त ब्रेशिएटेड क्वार्टजाइट से 2 सैंपल** शामिल हैं। विश्लेषणात्मक परिणामों से पता चलता है कि **ठोस लौह अयस्क** में Fe की मात्रा **21.67% से 59.80%** तक है, जिसका औसत **44.99% Fe** है; **BH/MC&J** में Fe की मात्रा **12.12% से 48.16%** तक है, जिसका औसत **33.86% Fe** है; **लेटराइट कैपिंग** में Fe की मात्रा **41.01% से 43.56%** तक है, जिसका औसत **42.06% Fe** है; तथा **लौह मैट्रिक्स युक्त ब्रेशिएटेड क्वार्टजाइट** में Fe की मात्रा **46.67% से 48.89%** तक है, जिसका औसत **47.78% Fe** है। लौह खनिजीकरण के अतिरिक्त, **टाइटेनियम-वैनेडियम खनिजीकरण मुख्यतः टफ एवं लेटराइट से संबद्ध है**; हालांकि, सतही बेडरॉक सैंपलिंग कार्यक्रम मुख्य रूप से विशाल लौह अयस्क, BH/MC&J एवं लेटराइट पर केंद्रित था। इस सैंपलिंग के बावजूद, **24 BRS सैंपलों में से 7 सैंपलों में TiO_2 की मात्रा 1.50% कट-ऑफ से अधिक** दर्ज की गई, जो **1.59% से 6.03%** तक थी, जिसका औसत **3.21% TiO_2** था। इसी प्रकार, **7 सैंपलों में V_2O_5 की मात्रा 500 ppm कट-ऑफ से अधिक** दर्ज की गई, जो **566 से 1,742 ppm** तक थी, जिसका औसत **898.86 ppm V_2O_5** था। ये परिणाम **ब्लॉक A2 में उत्साहजनक Ti–V संवर्धन** को दर्शाते हैं।

भूवैज्ञानिक मानचित्रण एवं उत्साहजनक बेडरॉक परिणामों के आधार पर, **दो विशाल लौह अयस्क पट्टियों के आर-पार दो चैनल** स्थापित किए गए, जिससे कुल **40 चैनल सैंपल** एकत्र किए गए। विश्लेषणात्मक परिणाम

विशेष रूप से उत्साहजनक रहे। **ठोस लौह अयस्क पट्टी-1** में Fe की मात्रा **41.87% से 53.66%** तक दर्ज की गई, जिसका औसत **49.99% Fe** है, जबकि **विशाल लौह अयस्क पट्टी-2** में Fe की मात्रा **47.84% से 53.59%** तक रही, जिसका औसत **50.35% Fe** है। लौह खनिजीकरण के अतिरिक्त, **टाइटेनियम-वैनेडियम खनिजीकरण मुख्यतः टफ एवं लेटराइट से संबद्ध है**; हालांकि, चैनल सैंपलिंग कार्यक्रम मुख्य रूप से विशाल लौह अयस्क पट्टियों पर केंद्रित था। इसके बावजूद, **40 चैनल सैंपलों में से 19 सैंपलों में TiO_2 की मात्रा 1.50% कट-ऑफ से अधिक** दर्ज की गई, जो **1.90% से 3.20%** तक थी, जिसका औसत **2.49% TiO_2** था। यह **TiO_2 के उत्साहजनक संवर्धन** को दर्शाता है।

ड्रिलिंग परिणामों से संकेत मिलता है कि ब्लॉक A2 में **Fe खनिजीकरण महत्वपूर्ण मोटाई** में पाया जाता है। **30% Fe कट-ऑफ** पर खनिजीकृत क्षेत्र की मोटाई **0.49 मीटर से 7.76 मीटर** तक है, जिसका भारित औसत ग्रेड **39.86% Fe** है, जबकि **35% Fe कट-ऑफ** पर मोटाई **0.49 मीटर से 4.85 मीटर** तक है, जिसका भारित औसत ग्रेड **45.36% Fe** है।

ब्लॉक A2 के लिए अनुमानित Fe संसाधन **30% Fe कट-ऑफ पर 3.47 MT** है, जिसका औसत ग्रेड **39.86% Fe** है, तथा **35% Fe कट-ऑफ पर 1.94 MT**, जिसका औसत ग्रेड **45.36% Fe** है।

लौह खनिजीकरण के अतिरिक्त, ब्लॉक A2 में **टाइटेनियम एवं वैनेडियम खनिजीकरण की उत्साहजनक संभाव्यता** भी दिखाई देती है। यह खनिजीकरण मुख्यतः **फिलाइट के साथ टफ, हेमेटाइट के साथ टफ तथा विशाल लौह अयस्क** से संबद्ध है। उत्साहजनक बेडरॉक परिणामों के आधार पर **लेटराइटिक कैपिंग को भी TiO_2–V_2O_5 खनिजीकरण के संभावित होस्ट** के रूप में माना जाता है; हालांकि, इसकी संभाव्यता को व्यवस्थित ड्रिलिंग एवं सैंपलिंग के माध्यम से स्थापित किया जाना अभी शेष है, क्योंकि लेटराइटिक इकाई में अभी तक कोई बोरहोल ड्रिल नहीं किया गया है।

1.50% TiO_2 कट-ऑफ पर खनिजीकृत क्षेत्र की मोटाई **1.40 मीटर से 12.61 मीटर** तक है, जिसके अनुरूप अनुमानित संसाधन **8.01 MT** है तथा भारित औसत ग्रेड **5.94% TiO_2** है। इसी प्रकार, **500 ppm V_2O_5 कट-ऑफ** पर खनिजीकृत क्षेत्र की मोटाई **1.40 मीटर से 12.61 मीटर** तक है, जिसका अनुमानित संसाधन **8.01 MT** तथा भारित औसत ग्रेड **1,089.63 ppm V_2O_5** है।

1.2.3 अन्य खनिजवैज्ञानिक एवं भू-रासायनिक अवलोकन

मुख्य लौह एवं **Ti–V खनिजीकरण** के अतिरिक्त, **ब्लॉक A2 में जोरबा गाँव के पश्चिम एवं पूर्व में मेटाबेसाल्ट तथा टफ निकायों** की पहचान की गई है, जबकि **ब्लॉक A1 में डोलेराइट** पाया जाता है। ये शैल-इकाइयाँ स्थानीय रूप से **अल्प सल्फाइड खनिजीकरण** से संबद्ध हैं, जैसा कि हस्त नमूनों में देखा गया तथा पेट्रोग्राफिक एवं मिनरलोग्राफिक अध्ययनों से भी इसकी पुष्टि हुई है। हालांकि, **AAS एवं फायर-असे विधियों** द्वारा प्राप्त विश्लेषणात्मक परिणाम सामान्यतः विशेष रूप से उत्साहजनक नहीं हैं। दर्ज की गई अधिकतम **Cu कि मात्रा 210 ppm** है, इसके बाद **167 ppm एवं 126 ppm** है, जबकि Au के मान निम्न हैं, जिनमें अधिकतम **14 ppb** दर्ज किया गया। AAS द्वारा निर्धारित **TiO_2 की मात्रा अधिकतम 2.29%** तक पाई गई।

खनिजवैज्ञानिक अध्ययनों से पता चलता है कि लौह अयस्क मुख्यतः **हेमेटाइट, मैग्नेटाइट, मार्टिटाइज़्ड मैग्नेटाइट, गोएथाइट एवं क्वार्ट्ज** से निर्मित है, जिसमें अल्प मात्रा में **क्ले खनिज** उपस्थित हैं। **पाइराइट अल्प मात्रा (ट्रेस मात्रा)** में पाया जाता है।

1.2.4 विषम खनिजीकृत क्षेत्र (Anomalous Mineralized Zone)

Block	Rock Type	Band / Zone	Dimension (L × W × T) (m)	Cut-off Grade	Average Grade
A1	Banded Hematite Chert & Jasper (BHC&J)	BHC&J-1	4530 × 40 × 10.67	≥30% Fe	34.03% Fe
	Banded Hematite Chert & Jasper (BHC&J)	BHC&J/BMC&J-2	4405 × 28 × 23.28	≥30% Fe	35.35% Fe
	Banded Magnetite Chert & Jasper (BMC&J)	BMC&J-6	1835× 15 × 16.98	≥15% Fe	33.37% Fe
	Banded Magnetite Chert & Jasper (BMC&J)	BMC&J-3	2250× 29 × 35.89	≥15% Fe	30.19% Fe
	BHC&J	BHC&J-1	4530 × 40 × 5.82	≥1.5% TiO_2	1.69% TiO_2
	BMC&J	BMC&J-3	2250 × 29 × 14.55	≥1.5% TiO_2	2.16% TiO_2
	Ferruginous Phyllite	Ferruginous Phyllite-1	4530 × 40 × 14.55	≥1.5% TiO_2	2.28% TiO_2
	BMC&J	BMC&J-3	1835 × 15 × 1.94	≥500 ppm V_2O_5	1548.38 ppm V_2O_5
	Ferruginous Phyllite	Ferruginous Phyllite-1	4530 × 40 × 11.64	≥500 ppm V_2O_5	740.00 ppm V_2O_5
A2	Massive Iron Ore	Massive Iron Ore-1	800 × 48 × 17.46	≥30% Fe	42.31% Fe
	Massive Iron Ore	Massive Iron Ore-2	600 × 45 × 8.25	≥30% Fe	35.21% Fe
	Tuff with Phyllite	Tuff with Phyllite-1	800 × 48 × 22.31	≥1.5% TiO_2	4.29% TiO_2
	Tuff with Hematite	Tuff with Hematite-2	600 × 45 × 31.23	≥1.5% TiO_2	7.34% TiO_2
	Massive Iron Ore	Massive Iron Ore-2	600 × 45 × 9.16	≥1.5% TiO_2	4.78% TiO_2
	Tuff with Phyllite	Tuff with Phyllite-1	800 × 48 × 22.31	≥500 ppm V_2O_5	833.61 ppm V_2O_5
	Tuff with Hematite	Tuff with Hematite-2	600 × 45 × 31.23	≥500 ppm V_2O_5	1344.99 ppm V_2O_5
	Massive Iron Ore	Massive Iron Ore-2	600 × 45 × 9.16	≥500 ppm V_2O_5	805.14 ppm V_2O_5

विसंगत क्षेत्रों (Anomalous Zones) के अंतर्गत सतही रूप से पहचाने गए संभावित खनिजीकृत बैंड

	Banded Hematite Chert & Jasper Bands Block A1								
	S. No	Band ID	Length (m)	width (m)	Area sq. m	No of BRS samples collected	Strike	Dip Amount	Fe%(BRS)
	3	BHC&J-3	4500	18	81000	4	N65°E	74°	Avg. (28.39)
	4	BHC&J-4	1631	34	39144	3	N75°E	75°	Avg. (32.59)
Block A1	Banded Magnetite Chert & Jasper Bands Block A1								
	1	BMC&J-1	3034	15	45510	2	N75°E	75°	Avg. (31.70)
	2	BMC&J-2	2824	20	56680	3	N75°E	65°	Avg. (28.14)
	5	BMC&J-4	3203	24	76872	2	N75°E	72°	Avg. (37.65)
	6	BMC&J-5	1425	22	23450	3	N70°E	65°	Avg. (26.98
	Oxidized Iron Ore Bands Block A2								
Block A2	7	MIO-3	475	58	27550	2	N114°	74°	Avg. (39.29)
	8	MIO-4	385	55	21175	2	N70°	80°	Avg. (41.70)
	9	MIO-5	285	30	8550	1	N88°	78°	30.29

	10	MIO-6	625	58	36250	2	N78°	84°	Avg. (44.89)
	11	MIO-7	850	35	29750	2	N82°	72°	Avg. (40.57)
	12	MIO-8	295	40	11800	1	N87°	68°	37.24
	Banded Hematite/Magnetite Chert & Jasper Bands Block A2								
	13	BH/MC&J-1	215	70	15050	1	N55°	85°	41.7
	14	BH/MC&J-2	290	37	10730	1	N68°	74°	37.04
	15	BH/MC&J-3	147	50	7350	1	N63°	83°	48.16
	Laterite Caping Block A2								
	16	LCB-1	415	130	53950	1	-	-	43.56
	17	LCB-2	250	90	22500	1	-	-	41.01
	18	LCB-3	265	62	16430	1	-	-	41.36
	19	LCB-4	140	41	5740	1	-	-	46.67
	Brecciated Quartzite with Iron Matrix Body Block A2								
	20	BQ-1	1085	60	65100	1	N72°	78°	48.89

1.2.5 समग्र व्याख्या एवं अनुशंसा

समेकित अन्वेषण परिणामों से **ब्लॉक A1 एवं A2 दोनों में महत्वपूर्ण लौह अयस्क तथा संबद्ध Ti–V खनिजीकरण** की उपस्थिति प्रमाणित होती है, हालांकि दोनों ब्लॉकों में खनिजीकरण की शैली एवं भूवैज्ञानिक स्थिति अलग-अलग है।

ब्लॉक A1 में ड्रिलिंग से ब्लॉक के पूर्वी एवं मध्य भागों में **बैंडेड मैग्नेटाइट लौह खनिजीकरण की निरंतरता** के प्रारंभिक प्रमाण प्राप्त होते हैं। **BMC&J-3 क्षेत्र** की मानचित्रित/संभावित स्ट्राइक विस्तार लगभग **1,835 मीटर** तथा मानचित्रित चौड़ाई लगभग **15 मीटर** है; **≥15% Fe** वाली अधिकतम रिपोर्टेड ड्रिल इंटरसेक्शन को मानचित्रित आयामों से अलग से उद्धृत किया जाना चाहिए। **BMC&J-6 क्षेत्र** का मानचित्रित/संभावित स्ट्राइक विस्तार लगभग **2,250 मीटर** तथा मानचित्रित चौड़ाई लगभग **29 मीटर** है। **BHC&J-1** का मानचित्रित/संभावित स्ट्राइक विस्तार लगभग **4,530 मीटर** तथा मानचित्रित चौड़ाई लगभग **40 मीटर** है। ये आयाम व्याख्यायित **सतही/संभावित खनिजीकृत एन्वेलप** को दर्शाते हैं और संबंधित सेक्शन-आधारित भूवैज्ञानिक नियंत्रण के बिना इन्हें **त्रि-आयामी संसाधन ब्लॉक** के रूप में नहीं माना जाना चाहिए।

ब्लॉक A2 में **टाइटेनिफेरस एवं वैनेडिफेरस विशाल लौह अयस्क खनिजीकरण** की अच्छी संभाव्यता प्रदर्शित होती है। **TiO_2 एवं V_2O_5 खनिजीकृत क्षेत्र** मुख्यतः **फिलाइट के साथ टफ, हेमेटाइट के साथ टफ तथा ठोस लौह अयस्क** के भीतर पाए जाते हैं, जबकि **लेटराइटिक कैप** भी एक संभावित होस्ट के रूप में उपस्थित है, जिसकी पुष्टि हेतु आगे विस्तृत अन्वेषण आवश्यक है। उत्साहजनक **Fe, TiO_2 एवं V_2O_5 परिणामों** तथा इन खनिजीकृत क्षेत्रों की **निरंतरता, ग्रेड वितरण एवं संसाधन संभाव्यता** स्थापित करने की आवश्यकता को ध्यान में रखते हुए, **ब्लॉक A2 को दो उप-ब्लॉकों में सीमांकित कर विस्तृत अन्वेषण हेतु लिया जाना अनुशंसित है।**

ब्लॉक A1 एवं A2 के अनुमानित संसाधन, उनके संबंधित ग्रेड तथा कट-ऑफ मानदंडों सहित, आगामी **संसाधन-आकलन तालिका** में प्रस्तुत किए गए हैं।

Block	Host Rock	Fe Cut-off	Fe Resource (MT)	TiO_2 Resource @ ≥1.5% (MT)	V_2O_5 Resource @ ≥500 ppm (MT)
A1	BHC&J	≥35%	1.29	1.27	—
	BHC&J	≥30%	5.20	1.27	—
	BMC&J	≥35%	5.48	4.11	0.53
	BMC&J	≥30%	11.74	4.11	0.53
	BMC&J	≥15%	20.84	4.11	0.53
	Ferruginous Phyllite	—	—	6.28	3.94
A2	Massive Iron Ore	≥35%	1.67	1.48	1.48
	Massive Iron Ore	≥30%	2.56	1.48	1.48
	Tuff with Phyllite	—	—	2.44	2.44
	Tuff with Hematite	≥35%	0.26	4.09	4.093
	Tuff with Hematite	≥30%	0.91	4.09	4.093

CHAPTER 2: DETAILS OF THE QUALIFIED PERSON(S) / EXPLORATION AGENCY

2.1 Details of the exploration agency

(a) Name: GeoExpOre Pvt. Ltd.

(b) Address: 45(S), 2nd A, Main Road, 2nd Cross, Chandra Layout, Bengaluru, 560040.

(c) Contact Mobile No: 9591167745/9980118930

(d) E-Mail id: info@geoexpore.com

(e) Qualification: NA

(f) Experience: Received NABET accreditation, and notified by Ministry of Mines, Govt. of India.

(g) Affiliation to any organization/ company, if yes, specify the name of the organization or company: NA

As per the requirement based on the quantum of work assigned by NMEDT, GeoExpOre Pvt. Ltd. had assigned a Project Coordinator, Senior Geologist, Geologist, Laborers (for sampling), etc., to complete

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

Sr. No.	Name/ Email/Company	Qualification and experience	Designation	Main Contributions
1	Ritesh Singh (ritesh@geoexpore.com) GeoExpOre Pvt Ltd.	M.Sc. with 1.5 year of experience	Junior Geologist	Geological mapping, topographic surveying, channel sampling, core drilling, sampling and chemical analysis, data interpretation, map preparation, and report writing.

2	Ms. Mansi Kesarwani (mansi@geoexpore.com) GeoExpOre Pvt Ltd.	M.Sc. M. Tech with 1.5 year experience	Assistant Manager - Geoscience	Interpretation of data, report writing and preparation
3	Mr. Mohammad Muslemeen (mohammad@geoexpore.com) GeoExpOre Pvt Ltd.	M.Sc. with 15 years of experience	Senior Geologist	Geological mapping, topographic survey, core drilling, selection of samples for chemical analysis, core drilling, interpretation of data, map preparation, and report writing
4	Mr. Sandeep Hamilton (sandeep@geoexpore.com) GeoExpOre Pvt Ltd.	M.Sc. (35 years of experience). Formerly Additional Director, Atomic Mineral Directorate (AMD)	Project Coordinator	Guidance throughout the field season, sample processing, analysis and report writing
5	Mr. Channamallikarjun B. Patil (cm@geoexpore.com) GeoExpOre Pvt Ltd.	M.Tech with 25 years of experience	Project Director	Supervision and guidance in geological mapping, topographic survey, core drilling, selection of samples for chemical analysis, and interpretation of data, map preparation and report writing.

6	Dr. Yerriswamy Pateel (ypateel@geoexpore.com) GeoExpOre Pvt Ltd.	M.Tech, Ph. D with 28years of experience	Project Director	Supervision and guidance in geological mapping, topographic survey, core drilling, selection of samples for chemical analysis, and interpretation of data, map preparation, and report writing.

CHAPTER 3: TITLE AND OWNERSHIP

3.1 Name of the explorer/ Mining or prospecting rights holder

Name: GeoExpOre Private Limited, Bangalore is a notified private exploration agency accredited by QCI-NABET (Govt. of India) based in Bengaluru, Karnataka.

Address: 45(S), 2nd A Main Road, 2nd Cross, Chandra Layout, Bengaluru, 560040

Telephone No: 9591167745/9980118930

E-Mail i.d.: info@geoexpore.com

3.2 Details of period of prospecting/mineral right if any

Nil. Exploration was carried out under an NMET-sanctioned order during the period from 19 February 2024 to 30 September 2026; no prospecting/mineral right was granted.

In case of a license or lease: NA.

CHAPTER 4: DETAILS OF THE AREA UNDER STUDY

4.1 Village, District, State

The Jogail village is situated in Obra Tehsil, Sonbhadra District, Uttar Pradesh, India, and falls within the Mirzapur Division. The study area comprises the villages of Chura, Bijura, Jogail, Murgidand, Bharhari, and Ghorgatti, along with parts of the surrounding villages.

4.2 Survey of India Toposheet No. & Differential Global Positioning System (DGPS) coordinates of all corner points of the area and borehole points in latitude and longitude (Degree Minutes Second) format WGS-84 Datum

Differential Global Positioning System (DGPS) survey was carried out in Sonbhadra Iron Ore Block A1 & A2 to establish accurate ground control for the proposed drilling programme. The Explored area falling(Shrivastav & Ahmad,2019.) under Toposheet no; 63 L/14. A total of nine DGPS points were surveyed and fixed, including one base point and eight borehole fixation points which are furnished in Table- 4.1. The base point was first established and observed for a sufficient duration to obtain highly accurately corrected coordinates, which served as the primary reference for the entire survey. Using this base station, eight additional points corresponding to the planned borehole locations were surveyed.

Table -1.1: DGPS-Derived geographic and UTM coordinates with elevation of borehole locations of 01 base point & 08 borehole point.

Point name	code	Original Latitude	Original Longitude	Original Altitude	Antenna Height (m)	Northing (mts)	Easting (mts)	Elevation (m)
1	Base Station	N24°32'56.4585"	E82°53'07.1499"	238.686	1.44	2716317.67	690958.29	298.004
2	UPCKB-01	N24°33'03.3809"	E82°52'14.2664"	317.941	1.44	2716510.79	689467.17	377.656
3	UPCKB-02	N24°33'16.4958"	E82°53'03.3443"	289.145	1.44	2716932.70	690842.76	348.472
4	UPCKB-03	N24°33'26.4735"	E82°53'39.0172"	308.253	2.07	2717254.73	691842.57	415.390
5	UPCKB-04	N24°33'09.2571"	E82°52'12.3878"	304.323	1.44	2716690.87	689411.85	363.651
6	UPCKB-05	N24°33'22.6162"	E82°53'01.6135"	334.233	1.44	2717121.80	690791.34	393.569
7	UPCKB-06	N24°34'05.5200"	E82°55'55.8480"	251.232	1.44	2718509.26	695676.09	309.796
8	UPJTB-01	N24°31'14.4911"	E82°51'42.9014"	240.076	1.44	2713148.66	688629.74	299.304
9	UPJTB-02	N24°30'28.5065"	E82°52'08.5887"	221.22	1.44	2711743.64	689371.95	280.421

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

The mapped exploration area falls in parts of Survey of India Toposheet nos. 63L/14 and comprises the **Chakdiya (A1)** and **Jorba (A2)** Blocks, covarying a total area of approximately **18.69 km²**. The location map of the **Chakdiya (A1) and Jorba (A2) Blocks** is presented in Figure. 4.1. Since detailed cadastral records and parcel-wise land-use information are presently not available, the land-use breakup has been considered on an indicative basis from the available records. **Block A1 (Chakdiya), covering 7.34 km², falls entirely (100%) under Government Reserved Forest land. Block A2 (Jorba), covering 11.35 km², comprises approximately 60% Government Reserved Forest land and 40% private land**, corresponding to about **6.81 km² of forest land and 4.54 km² of private land**. Accordingly, the combined area comprises approximately **14.15 km² of Government Reserved Forest land (about 75.7%)** and **4.54 km² of private land (about 24.3%)**.

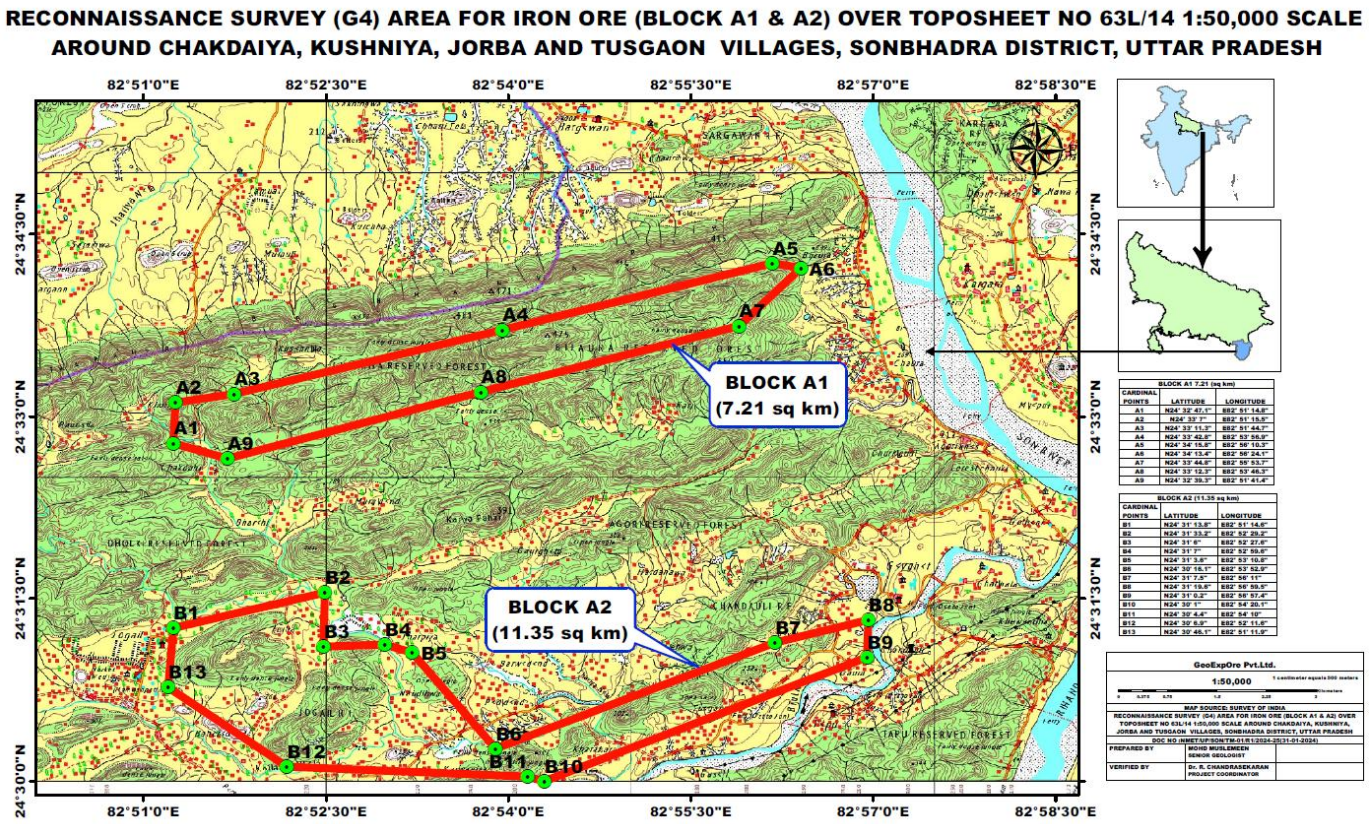


Figure- 4.1 Toposheet map of block A1& A2

4.3.1 Geo-coordinates of all corner points of the A1 & A2 block

The Table -4.2 presents the geographical coordinates of the **nine boundary points (A1–A9)** defining **Block A1**, which covers an area of approximately **7.21 sq. km**. The latitude and longitude coordinates are provided in **Degrees–Minutes–Seconds (DMS)** format and represent the locations of the boundary points used for delineation and preparation of the study-area map. **Coordinate Range:** The block extends from **24°33′11.3″N to 24°34′42.8″N latitude** and **82°50′10.3″E to 82°53′56.9″E longitude**.

Table -4.2: Geographical coordinates of the corner points of the block A1 boundary (7.21 sq. km.)

Block A1 (7.21 sq. km.)		
Corner Points	Latitude	Longitude
A1	N24° 32' 47.1"	E82° 51' 14.8"
A2	N24° 33' 07.0"	E82° 51' 15.5"
A3	N24° 33' 11.3"	E82° 51' 44.7"
A4	N24° 33' 42.8"	E82° 53' 56.9"

A5	N24° 34' 15.8"	E82° 56' 10.3"
A6	N24° 34' 13.4"	E82° 56' 24.1"
A7	N24° 33' 44.8"	E82° 55' 53.7"
A8	N24° 33' 12.3"	E82° 53' 46.3"
A9	N24° 32' 39.3"	E82° 51' 41.4"

The Table- 4.3 presents the geographical coordinates of the **thirteen boundary points (B1–B13)** defining **Block A2**, which covers an area of approximately **11.35 sq. km**. The latitude and longitude coordinates are provided in **Degrees–Minutes–Seconds (DMS)** format and represent the locations of the boundary points used for delineation and preparation of the study-area map. **Coordinate Range:** The block extends from **24°30′16.1″N to 24°31′33.2″N latitude** and **82°51′08.0″E to 82°56′59.5″E longitude**.

Table-4.3: Geographical coordinates of corner points of the boundary of block A2 (11.35 sq. km.)

Block A2 (11.35 sq. km.)		
Corner Points	Latitude	Longitude
B1	N24° 31' 13.8"	E82° 51' 14.6"
B2	N24° 31' 33.2"	E82° 52' 29.2"
B3	N24° 31' 06.0"	E82° 52' 27.6"
B4	N24° 31' 07.0"	E82° 52' 59.6"
B5	N24° 31' 03.6"	E82° 53' 10.8"
B6	N24° 30' 16.1"	E82° 53' 52.9"
B7	N24° 31' 07.5"	E82° 56' 11.0"
B8	N24° 31' 19.6"	E82° 56' 59.5"
B9	N24° 31' 0.20"	E82° 56' 57.4"
B10	N24° 30' 01.0"	E82° 54' 20.1"
B11	N24° 30' 04.4"	E82° 54' 10.0"
B12	N24° 30' 06.9"	E82° 52' 11.6"
B13	N24° 30' 46.1"	E82° 51' 11.9"

4.4 Mineral(s) under investigation or granted under license or lease

Iron ore (Fe) and associated minerals, including titanium and vanadium, are under investigation. No mineral has been granted under any prospecting license or mining lease.

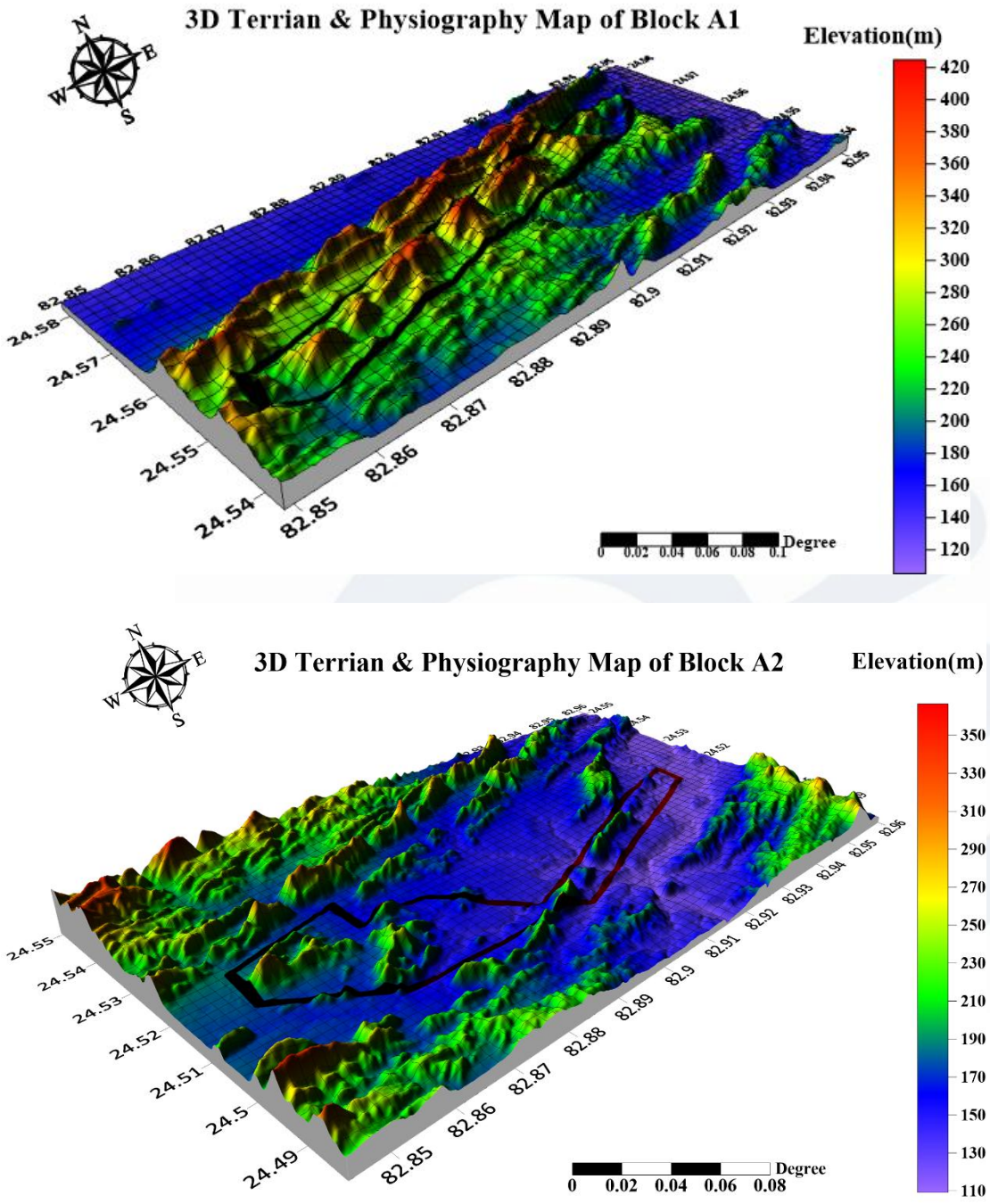
CHAPTER 5: PHYSIOGRAPHY AND ENVIRONMENT

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

The terrain of the investigated blocks is generally **undulating to moderately rugged**, with considerable variation in elevation between the two blocks. In **Block A1** the elevation ranges from a minimum **RL of approximately 120 m** to a maximum **RL of approximately 420 m**, giving a total relief of about **300 m**. The **Son River** is located approximately **2 km east of the eastern boundary of Block A1** and represents a major regional drainage feature in the vicinity of the block.

In **Block A2** the elevation ranges from a minimum **RL of approximately 110 m** to a maximum **RL of approximately 360 m**, representing a total relief of about **250 m**. The **Bijul River** is located approximately **50 m east of the eastern boundary of Block A2**, while the **Rihand River** lies approximately **3.2 km east of the eastern boundary**. **Kala Nala passes through the central part of Block A2 in a N–S direction, particularly near Kharara village**, and constitutes an important local drainage feature within the block. The drainage network is largely controlled by the regional topography and structural features of the area. Digital Elevation Models are drawn using surfer software and the same is depicted in Figure 5.1 for both A1 and A2 blocks.

The 3D terrain and physiographic maps of **Blocks A1 and A2** illustrate the spatial variation in elevation and topographic relief within the respective study areas. **Block A1** shows comparatively higher and more rugged terrain, whereas **Block A2** exhibits moderate to locally rugged relief with relatively lower central elevations. The colour gradient represents elevation variation from lower (blue–purple) to higher (green–yellow–red) zones. Overall, the figures provide a clear visualization of the physiographic and elevation characteristics of both blocks.



Figur-5.1: 3D terrain and physiographic representation showing the spatial variation in elevation and topographic relief of blocks A1 and A2

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

The investigation area is located around **Jogail**, approximately **28 km west of Chopan** in **Sonbhadra district, Uttar Pradesh**. Chopan is well connected by both railway and metal road with **Robertsganj**, the district headquarters. The area is also connected with **Prayagraj, Mirzapur and Varanasi** through metal roads. The nearest railway station is **Chopan Railway Station**.

The area falls under **Survey of India Toposheet No. 63L/14**. The major villages within and around the mapped area include **Chakdiya, Kushniya, Jorba and Tusgaon**. The region is generally backward in terms of development. Most of the local population depends mainly on **agriculture and daily-wage labour** for their livelihood. However, agriculture is difficult due to unfavourable terrain conditions and scarcity of water. Unscientific agricultural practices have also contributed to degradation of existing land resources in the area (Pandey, 1990). The major linear BIF zone occurs within a fairly dense mixed forest in the northern part of the study area.

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

Jogaeal Village is a large village located in Robertsganj Tehsil of Sonbhadra District, Uttar Pradesh. As per the **2011 Census**, the village has a population of **21,736**, comprising **11,351 males** and **10,385 females** across **3,934 households**. The village has a **sex ratio of 915** and a **child sex ratio of 939**, both slightly higher than the state averages. The overall **literacy rate is 34.11%**, with **male literacy at 45.81%** and **female literacy at 21.23%**. The village is governed by an elected **Gram Panchayat** headed by Gram **Pradhan (Sarpanch)**. Demographic and Socio-Economic Profile of Jogaeal Village Based on Census 2011 showed in Figur-5.2.

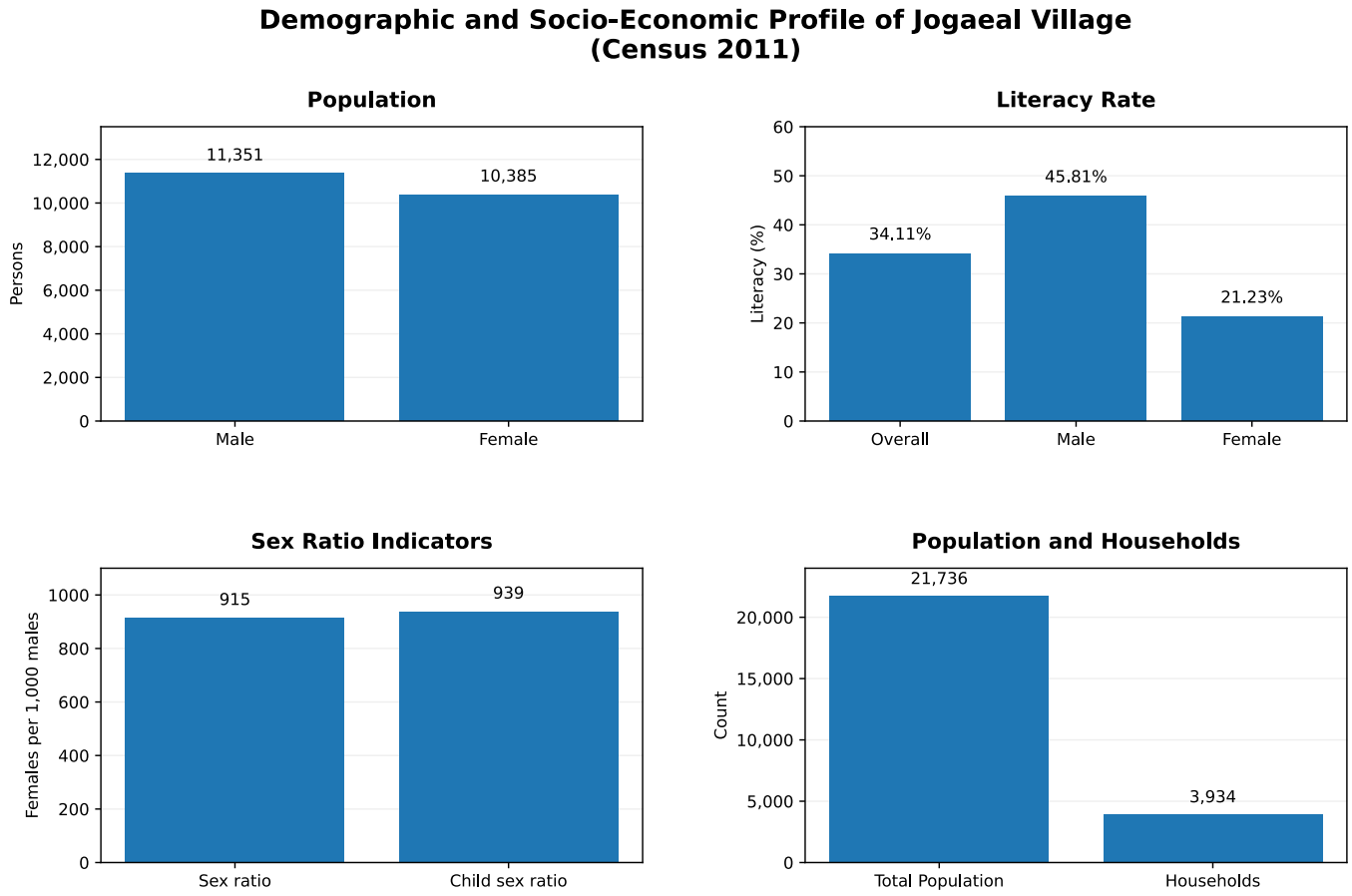


Figure-5.2: Demographic and socio-economic profile of jogaeal village based on census 2011

5.4 Socio Demographic profile of the area and nearby

The investigation area is socio-economically underdeveloped, with most of the local population dependent on agriculture and daily-wage labour for their livelihood. Agricultural productivity is limited by undulating terrain, poor soil conditions, and inadequate water availability. The major linear **Banded Iron Formation (BIF)** zone is exposed within a moderately dense mixed forest in the northern part of the study area.

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

The region's historical narrative is anchored by the riverside ruins of Agori Fort, steeped in ancient tribal folklore, and the rugged slopes of Vijaygarh Fort, which protects ancient cave art and Gupta-era inscriptions. Nearby, the famous Veer Lorik Stone stands as a unique monument to local folklore, while the internationally acclaimed **Salkhan Fossil Park((Singh, 2014** in Sonbhadra showcases 1.4-billion-year-old **stromatolite** structures. This rich history is mirrored by profound spiritual landmarks, most notably Shiv Dwaar—affectionately called the "Gupt Kashi" of the region—which houses a masterfully carved 11th-century black stone idol alongside a dedicated archaeological museum. Travelers and devotees are also drawn to the prehistoric cliff art at Panchmukhi Mahadev Mandir, the remote, forest-veiled heights of Mangleshwar Mahadev Temple, and the modern, cave-replicated architecture of the Vaishnodevi Mandir in Dala. Coming alive during the lush monsoon and crisp winter months, this entire circuit offers a timeless journey through India's ancient past and enduring devotion.

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

The proposed exploration area includes portions of Government Reserved Forest within the block. The **Kaimur Wildlife Sanctuary** is present in the surrounding region; however, it does not fall within the exploration block or its peripheral area. Grazing land (charagah) and Gochar land are present within and in the vicinity of the exploration area. The locations and distances of these lands from the exploration block/periphery have been identified and are provided in the relevant maps and annexures.

5.7 Flora and Fauna within and nearby

The area supports a **tropical mixed monsoon forest**. The dominant tree and shrub species include **Boswellia serrata** *(Salai)*, **Diospyros melanoxylon** *(Tendu)*, **Ziziphus mauritiana** *(Ber)*, **Buchanania lanzan** *(Chiraunji/Pyar)* and **Madhuca indica** *(Mahua)*, Acacia nilotica(Babool), Tectona grandis(Sagaon), Azadirachta indica(Neem tree).

The forest provides habitat to various wildlife species, including *Vulpes bengalensis* (**foxes), Melursus ursinus(bears), Axis axis(deer), *Lepus nigricollis* (wild rabbit), Sus scrofa(wild pig), several varieties of birds and reptiles**, particularly snakes.

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

There is no major water body within or traversing the investigated exploration blocks A1 and A2. The Son River is located approximately 2 km east of Block A1. The Bijul River occurs about 50 m east of the eastern boundary of Block A2, while the Rihand River lies approximately 3.2 km east of the same boundary. Kala Nala, an important local drainage feature, passes through the central part of Block A2 in a north–south direction, particularly in the vicinity of Kharara village are Integrated Map Showing Blocks A1 and A2 with 3D Terrain, Watershed and Drainage Network, Digital Elevation Model (DEM), and Slope Analysis in Figure-5.3.

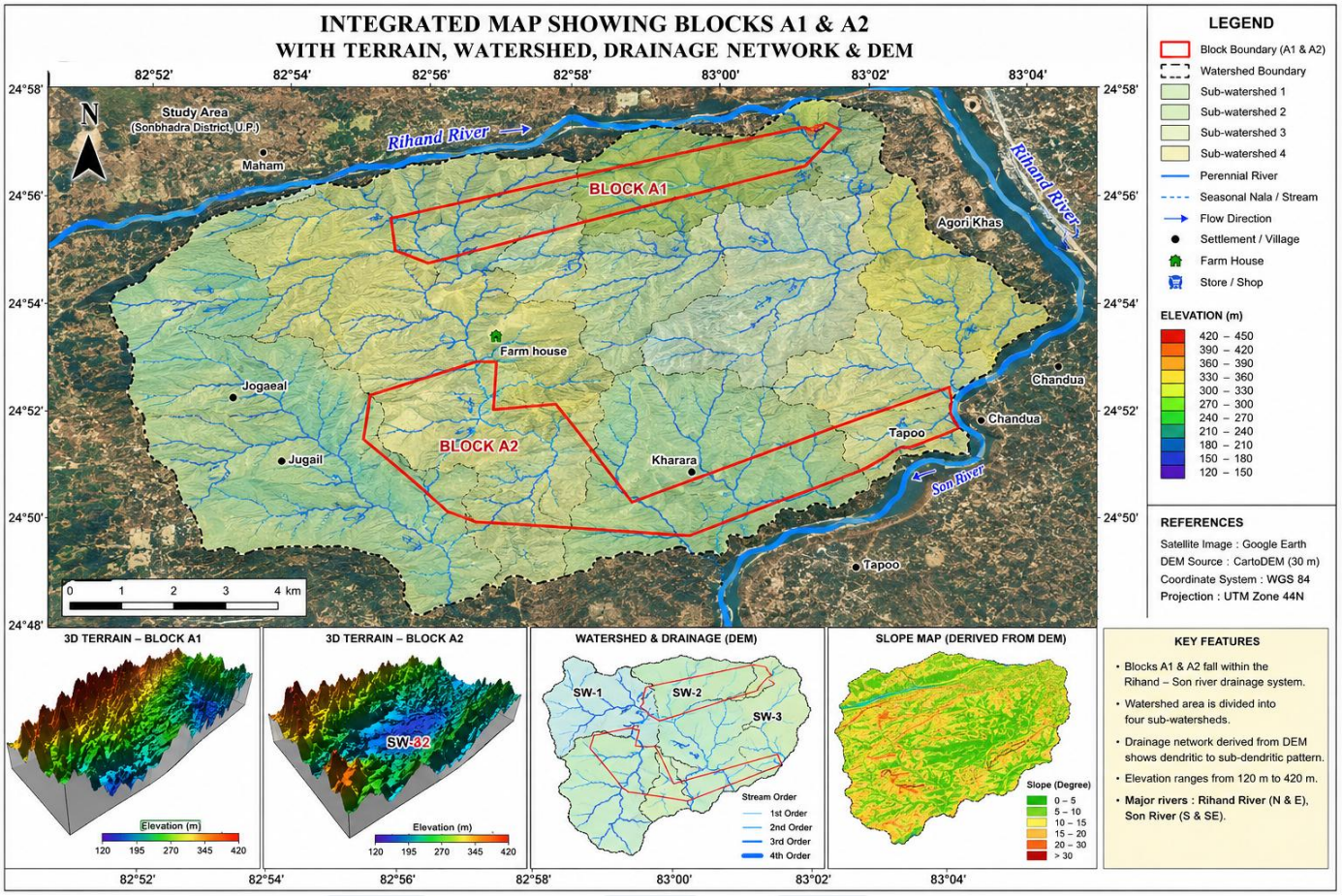


Figure-5.3: Integrated map showing blocks a1 and a2 with 3d terrain, watershed and drainage network, digital elevation model (dem), and slope analysis.

5.9 Climatic conditions

(a) Temperature (annual) min 4°C max 48°C Avg 24-26°C

(b) Rain falls (annual) min 540 mm max ≥1200 mm Avg 1000-1200 mm

(c) Humidity (annual) min 21% max 84% Avg 60-65%

The area experiences a **subtropical climate**, characterized by moderately severe winters and very hot summers. The winter season generally extends through **December and January**, whereas severe summer conditions prevail from **late March to June**. From **May to mid-June**, temperatures may rise to approximately **48°C**. The summer season is followed by the **monsoon period from mid-June to September**,

with an average annual rainfall of approximately **1,225 mm**. During winter, temperatures may fall to nearly **4°C**, particularly in December.

5.10 Any other physiographic, social and environmental factors having potential to affect the viability of the project and assessment of resources and reserves.

No significant physiographic, social, or environmental factors have been identified that are likely to adversely affect the estimation of mineral resources and reserves or the overall viability of the project in either of the blocks. The mineralized zones are predominantly located away from major settlements, drainage channels, and other environmentally sensitive surface features. The existing terrain and local physiographic conditions do not present any significant constraints to exploration or potential mining activities. Likewise, no major social constraints, habitation-related issues, or environmentally sensitive areas have been identified within or in the vicinity of the mineralized zones that could materially affect the future development and viability of the project.

CHAPTER 6: INFRASTRUCTURE

6.1 Local infrastructure with roads, railways, port facilities, electricity, water etc. with distance from the area. Details of nearby industries in the area which may use the mineral commodity likely to be mined

The principal settlements within and around the investigation area include Chura and Bijura villages within the block, while Gaor Gatti, Ghothani, Jogail, and Murgidand are in the surrounding area. The block is well connected by metalled roads to nearby towns and major highways. The nearest railway station is Chopan, situated approximately 28 km southeast of the study area, while Lal Bahadur Shastri Airport, Varanasi, is located about 150 km away.

Groundwater, accessed through wells and borewells, along with local nalas, serves as the primary source of water for drinking and domestic purposes. Basic infrastructure, including healthcare facilities, police stations, and government and private schools, is available in the surrounding villages. Agori Fort, a prominent historical site, is located approximately 3 km southeast of the study area near Agori Village.

The area experiences a sub-tropical climate, characterized by moderate to severe winters and very hot summers. The presence of established industrial and mining infrastructure in the vicinity provides favourable conditions for future mineral development. The Dala Cement Industry ((District Administration, 2026)is located approximately 35 km from the study area, while an iron ore block that has been auctioned is situated within about 5 km of the investigation area. These existing industrial and mining activities may provide potential logistical and infrastructural advantages for the future development and minealability of the deposit.

CHAPTER 7: GEOLOGY

7.1 Brief regional geology of the area outlining the broad geological, stratigraphical and structural framework.

The **regional geological succession** comprises **Archaean to Palaeoproterozoic basement rocks, the Palaeoproterozoic Mahakoshal Group, and younger Proterozoic intrusive rocks**. The oldest rocks are represented by the **Dudhi Gneissic Complex**, consisting mainly of **feldspathic, porphyroblastic, banded and biotite gneisses with migmatite**. These rocks form the **crystalline basement of the region**, as summarized in **Table -7.1**.

The basement is overlain by the **Mahakoshal Group**, which is broadly subdivided into the **Agori, Parsoi and Dudhamaniya Formations**. The group comprises **phyllite, quartzite, shale, greywacke, metabasics, Banded Iron Formation (BIF), and basic to ultrabasic rocks**. The **Agori and Dudhamaniya Formations** are particularly significant due to the occurrence of **BIF**. The contact between the **Dudhamaniya and Parsoi Formations is generally gradational**, while the **Amsi–Jiyawan Fault** represents an important regional structural feature, as summarized in **Table -7.2**.

The succession is intruded by **granite, granodiorite, diorite, dolerite, syenite and lamprophyre**, with locally developed **quartz–carbonate veins and quartz reefs** associated with mineralization. The overall regional geological setting, particularly the occurrence of **BIF within the Mahakoshal Group**, provides a favourable environment for **iron ore and associated mineral exploration**, as illustrated in **Figure -7.1**.

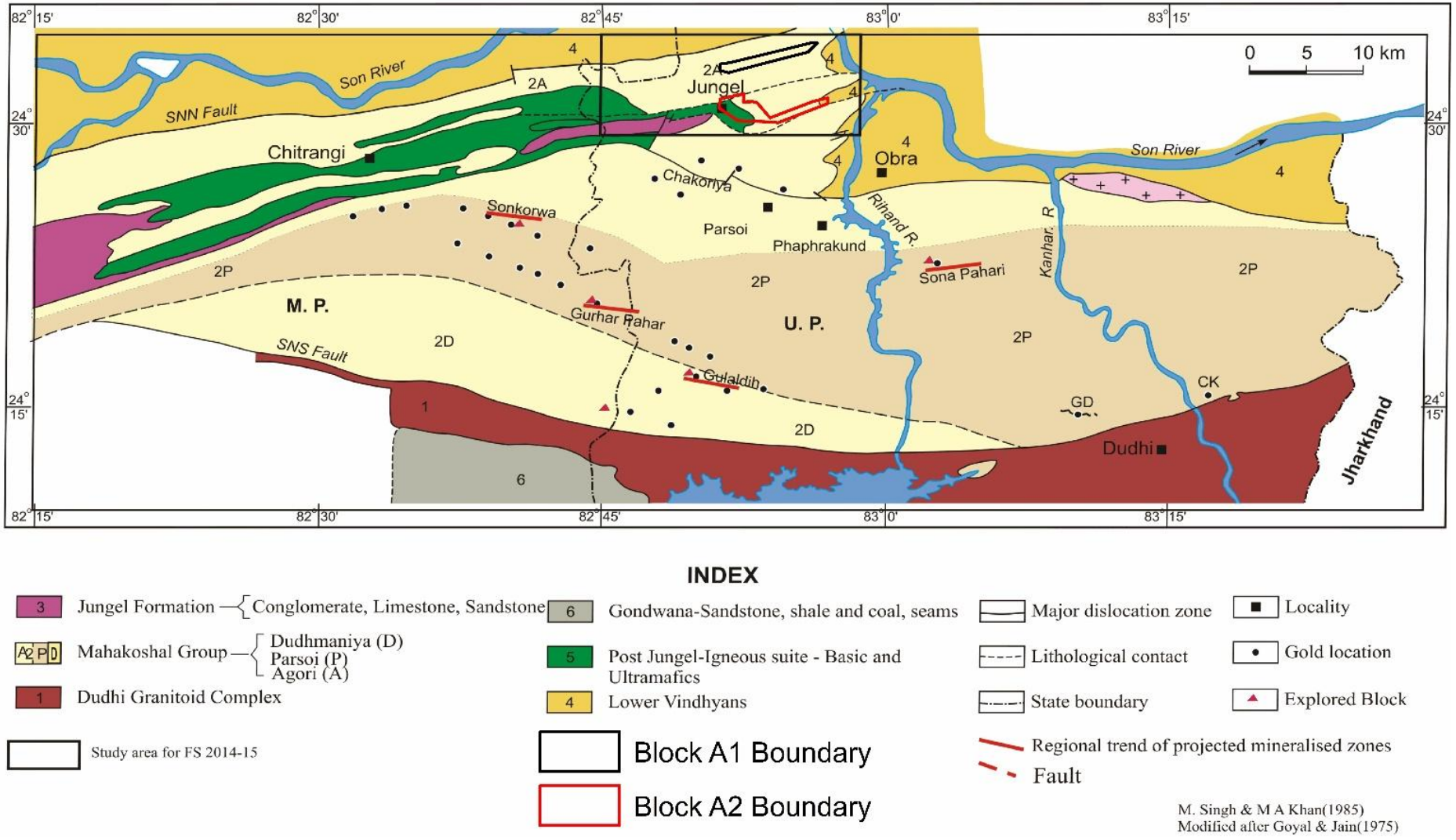


Figure-7.1: Regional geological map showing the geological setting, study area and boundaries of blocks a1 and a2 (source: M. Singh & Ma Khan (1985).

Table-7.1: Regional lithotectonic stratigraphic succession of the area (after Roy and Devarajan 2000)

Geological Unit	Formation / Unit	Major Lithology and Geological Characteristics
INTRUSIVES	**Gold-bearing quartz–carbonate veins, quartz reefs and dolerite**. Granite–granodiorite intrusive plutonic belt occurs along the southern margin, including **Jhargadandi Granite and its equivalents**. **Lamprophyre and syenite** are also reported in the Sidhi area.	
MAHAKOSHAL GROUP	**DUDHAMANIYA FORMATION**	**Banded Iron Formation (BIF)** with mixed **oxide–sulphide–carbonate–silicate facies**, interbedded with **phyllite**.
		--------- Gradational Contact ---------
	PARSOI FORMATION	Dominantly **phyllite**, with bands of **greywacke, quartz arenite and carbonaceous phyllite**. The **Amsi–Jayanti Fault** is associated with this geological succession.
		--------- (Amsi–Jiyawan) Fault ---------
	SLEEMANABAD (= AGORI) FORMATION	**Quartz arenite and carbonate** in the lower part, followed upward by **massive and bedded chert, BIF, highly carbonated and fragmented metabasalt**, locally showing **pillows and suspected pahoehoe toes**, along with **thin argillites and ultramafic plugs**.
SIDHI COMPLEX (BASEMENT)	**Gneissic complex associated with mafic and ultramafic rocks and metasedimentary units**, forming the **basement complex** of the succession.	

Table-7.2: Stratigraphic sequence of mahakoshal group (compiled by gsi nr, in the unified legend, 2011)

Age	Group / Complex	Formation / Geological Unit	Lithology / Description
Undifferentiated – Proterozoic	—	**Jhiganadi, Baghisoti–Dumar, Asnadahar and Sirpalia Granite**	**Two-mica granite, diorite, porphyritic granite, mesocratic granite and leucogranite.**
Palaeo-Proterozoic	**Mahakoshal Group**	**Dudhamaniya Formation**	**Phyllite, quartzite, shale/slate and mica schist**, with younger intrusive rocks.
		Parsoi Formation	**Variegated phyllite, greywacke, quartzite, metabasics, dolerite dykes and quartz veins.**
		Agori Formation	**Shale, siltstone, sandstone, BIF, basic and ultrabasic rocks.**
Palaeo-Proterozoic to Archaean	**Dudhi Gneissic Complex**	**Feldspathic Gneiss**	**Feldspathic gneiss.**
		Porphyroblastic Gneiss	**Porphyroblastic gneiss.**
		Banded Gneiss / Migmatite / Biotite Gneiss	**Banded gneiss, migmatite and biotite gneiss.**

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.

The study area is predominantly underlain by lithounits of the **Agori Formation of the Mahakoshal Group**, comprising **brecciated chert–jasper–quartzite, banded hematite–magnetite chert and jasper, ferruginous quartzite–jasper–chert, brecciated quartzite with iron-rich matrix/gossan, phyllite and ferruginous phyllite**. The **post-Mahakoshal succession** includes the **Jungel Mafic and Ultramafic Suite**, represented by **dolerite, metabasalt and pyroclastic rocks**, along with **gritty–pebbly sandstone and fault breccia** of the Jungel Sedimentary Formation.

The Mahakoshal rocks are structurally disposed along an **ENE–WSW-trending structural/shear zone** and exhibit **tight folding, steeply dipping bedding (S_0), and ENE–WSW-trending foliation (S_1)**. The **Son–Narmada North Fault (SNNF)** and associated subsidiary faults constitute important structural features controlling the regional geological framework.

Iron mineralization is mainly associated with **ferruginous quartzite, chert–jasper, banded hematite–magnetite chert and jasper, and brecciated quartzite with iron-rich matrix/gossan**. Its distribution is primarily controlled by **lithological contacts, folding, shearing, fracturing and faulting**.

Surface exposures are generally represented by **discontinuous outcrops of quartzite, chert–jasper, ferruginous lithologies and phyllite**, with locally developed iron-rich and gossanous exposures. **No significant old or abandoned workings were observed during the investigation**. The geology and structural characteristics of the **adjoining areas** have also been considered to assess the **regional continuity of the mineralized formations and associated structural controls**.

7.2.1 Large scale mapping on 1:12,500 scale:

The present exploration work involved **large-scale geological mapping on a 1:12,500 scale** covering the **Chakdiya, Kushniya, Jorba and Tusgaon areas** of **Sonbhadra District, Uttar Pradesh**. A total area of **18.56 sq. km** was systematically mapped to delineate the **lithological units, structural features, surface manifestations of mineralization, and associated geological controls** within the explored area.

7.2.1.1 Outcrop map on 1:12,500 scale

The geological map depicts the distribution and disposition of various lithological units exposed within the mapped area, along with the **structural data** recorded during the field investigation. A significant portion of the area is **rugged and covered by dense vegetation**, resulting in discontinuous rock exposures. Therefore, systematic traverses at approximately **125 m spacing** were undertaken along hill slopes, plain areas, nala sections and accessible outcrops to identify and trace the exposed lithological units and associated structural features. Based on field observations, the **outcrop maps of Block A1 and Block A2** are presented in **Plate 1(a) and Plate 1(b)**, respectively.

PLATE-1a

OUTCROP MAP OF IRON ORE BLOCK A1 SONBHADRA, ON SCALE 1:12,500

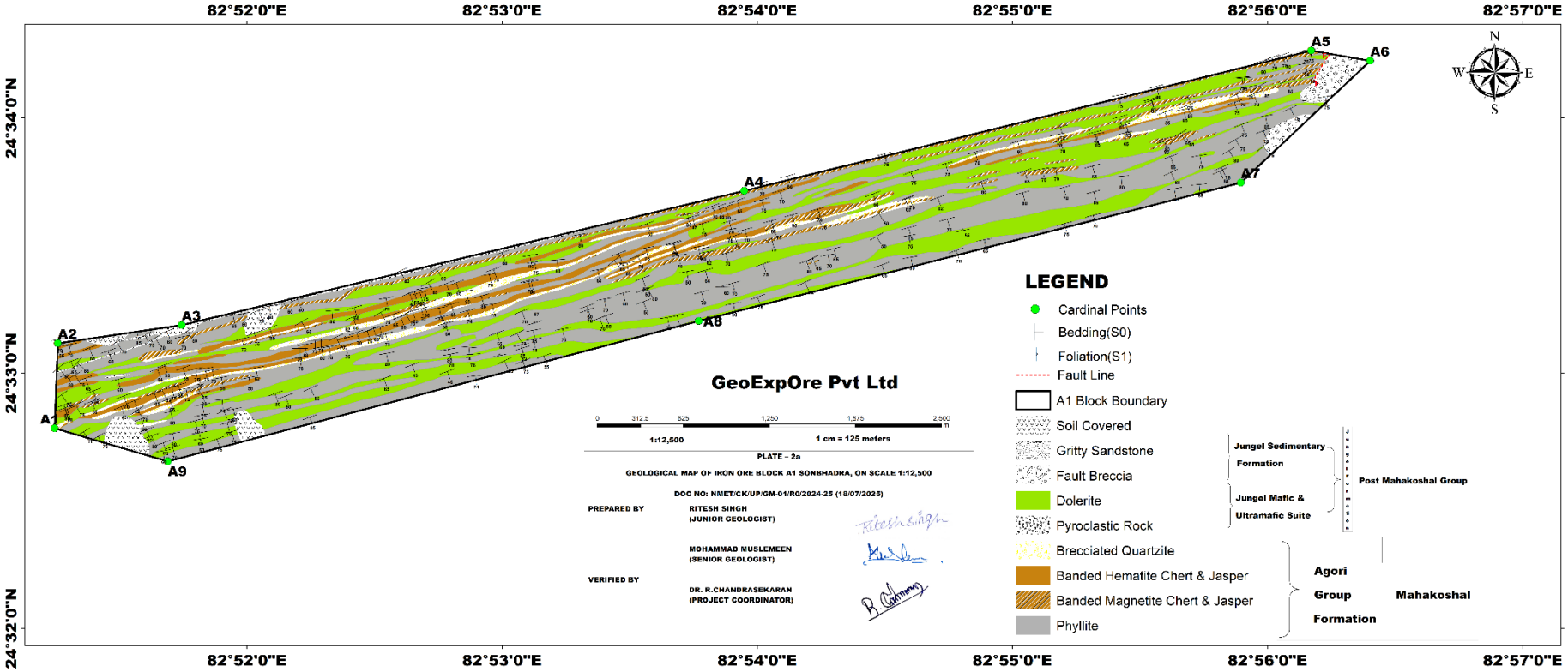
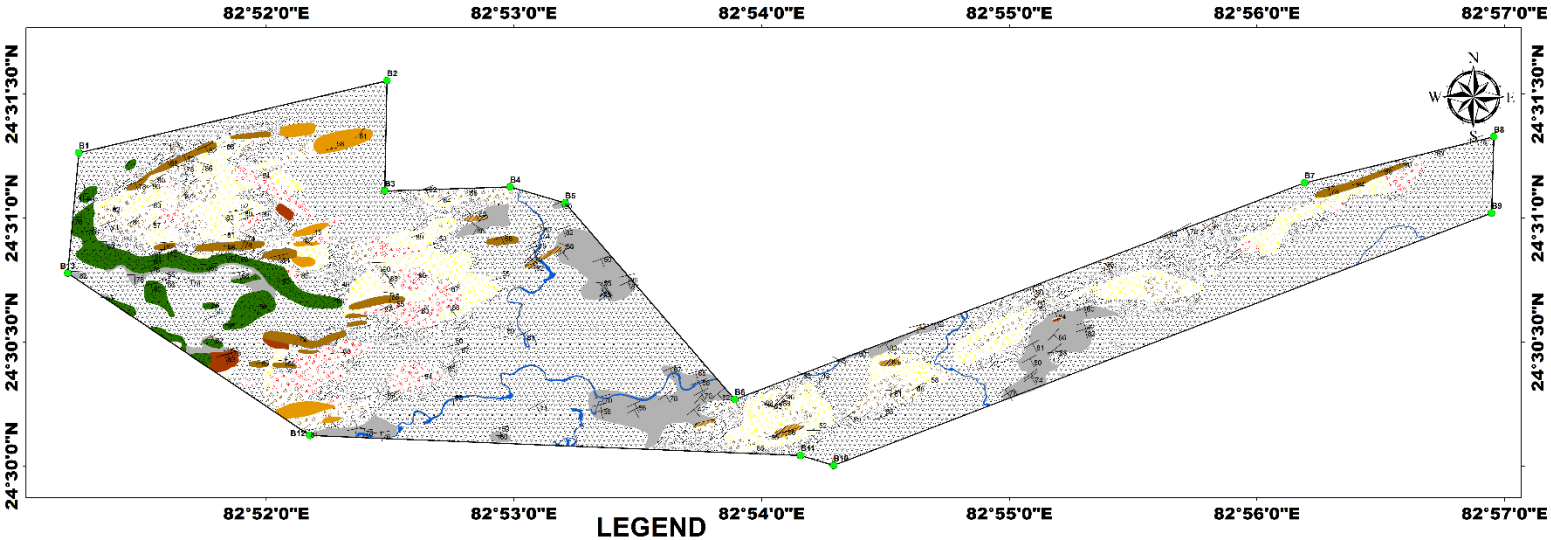


PLATE - 1b

OUTCROP MAP OF IRON ORE BLOCK A2 SONBHADRA, SCALE 1:12,500



GeoExpOre Pvt Ltd

0 312.5 625 1,250 1,875 2,500 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 1b

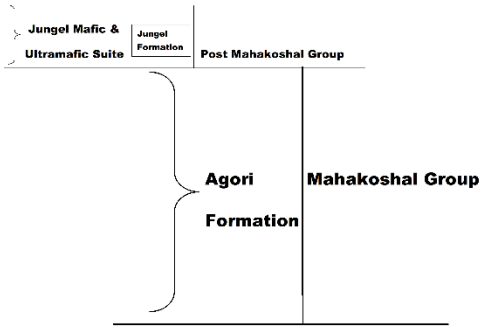
OUTCROP MAP OF IRON ORE BLOCK A2 SONBHADRA, ON SCALE 1:12,500

DOC NO: NMET/UP/JT/OGM-01/R0/2024-25 (19/07/2025)

PREPARED BY	KITESH SINGH (JUNIOR GEOLOGIST)	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)	

LEGEND

- Cardinal Points
- A2 Block Boundary
- Nala Channel
- Bedding (S0)
- Foliation (S1)
- Foliation (S2)
- Joint
- Soil Covered
- Laterite Caping
- Felsic Tuff
- Metabasalt
- Phyllite covered with BQ boulders & fragments
- Brecciated Quartzite
- Brecciated Quartzite with Jasper
- Brecciated Quartzite with Iron Matrix
- Massive Iron Ore
- Banded Hematite/Magnetite Chert & Jasper
- Phyllite



7.2.1.2 Geological mapping on 1:12,500 scales

A detailed geological map on a scale of **1:12,500** was prepared by plotting lithological outcrops, structural measurements, and lithological contacts, as presented in **Plate 2a and Plate 2b** for Blocks A1 and A2, respectively.

In **Block A1**, the major **Banded Iron Formation (BIF)** zone comprises four parallel and discontinuous bands of **Banded Hematite Chert and Jasper (BHC&J)** interbedded with phyllite. These bands generally trend **N70°E–S70°W** and extend from west of **Bijaura** to **Khoriya**. The major discontinuous BHC&J bands range in strike length from approximately **4.5 km to 7.0 km**, with widths varying from **12 m to 45 m**. In addition, two minor discontinuous BHC&J bands have been delineated, with strike lengths ranging from approximately **450 m to 1.25 km** and widths varying between **20 m and 22 m**.

Total Three discontinuous bands of **Banded Magnetite Chert and Jasper (BMC&J)** have also been recorded in Block A1. These bands range in strike length from approximately **3.3 km to 7.0 km**, with widths varying from **14 m to 22 m**. In addition, two minor discontinuous BMC&J bands have been mapped, with strike lengths ranging from approximately **1.67 km to 3.3 km** and widths varying between **16 m and 18 m**.

In **Block A2**, the major iron ore mineralisation is represented by discontinuous bands of **massive iron ore**, locally oxidised, interbedded with phyllite and brecciated quartzite. These bands exhibit variable trends, predominantly along **N70°E–S70°W** and locally along **N15°E–S15°W**, extending from west of **Naudhwa Taula** to west of **Jorba**.

A total of **eight discontinuous massive iron ore bands** has been delineated in Block A2. These bands range in strike length from approximately **285 m to 975 m**, with widths varying between **30 m and 65 m**. In addition, three minor discontinuous bands of **Banded Hematite/Magnetite Chert and Jasper (BH/MC&J)** have been identified, with strike lengths ranging from approximately **147 m to 290 m** and widths varying between **35 m and 70 m**. Four **lateritic caps** have also been recorded, measuring approximately **140 m to 415 m in length** and **40 m to 130 m in width**.

Table-7.3: Details of Banded Hematite Chert & Jasper (BHC&J) and Banded Magnetite Chert & Jasper (BMC&J) bands in block A1

Banded Hematite Chert & Jasper Bands Block A1										
S. No	Band ID	Length (m)	width (m)	Thickness(m)	Area sq. m	No of BRS samples collected	Strike	Dip Amount	Fe%(BRS)	Fe% (Core Sample)
1	BHC&J-1	4530	40	10.67	171000	10	N70°E	75°	Avg. (35.98)	Avg. (34.03)
2	BH/MC&J-2	4405	28	23.28	165000	9	N70°E	74°	Avg. (27.56)	Avg. (35.35)
3	BHC&J-3	4500	18	-	81000	4	N65°E	74°	Avg. (28.39)	-
4	BHC&J-4	1631	34	-	39144	3	N75°E	75°	Avg. (32.59)	-
Banded Magnetite Chert & Jasper Bands Block A1										
5	BMC&J-1	3034	15	-	45510	2	N75°E	75°	Avg. (31.70)	-
6	BMC&J-2	2824	20	-	56680	3	N75°E	65°	Avg. (28.14)	-
7	BMC&J-3	2250	29	35.89	27525	9	N70°E	75°	Avg. (30.93)	Avg. (33.37)
8	BMC&J-6	1835	15	16.98	65250	4	N75°E	74°	Avg. (30.21)	Avg. (30.19)
9	BMC&J-4	3203	24	-	76872	2	N75°E	72°	Avg. (37.65)	-
10	BMC&J-5	1425	22	-	23450	3	N70°E	65°	Avg. (26.98	-

Table-7.4: Details of Massive Iron Ore (MIO) and Banded Hematite/Magnetite Chert & Jasper (BMC&J) bands in block A2

Oxidized Iron Ore Bands Block A2										
S. No	Band ID	Length (m)	Width (m)	Thickness (m)	Area sq. (m)	No of BRS samples collected	Strike	Dip Amount	Fe%(BRS)	Fe% (Core Sample)
1	MIO-1	800	48	17.46	46800	4	N68°	82°	Avg. (54.14)	Avg.43.15
2	MIO-2	600	45	8.25	38025	2	N135°	75°	Avg. (45.97)	Avg.33.98
3	MIO-3	475	58	-	27550	2	N114°	74°	Avg. (39.29)	-
4	MIO-4	385	55	-	21175	2	N70°	80°	Avg. (41.70)	-
5	MIO-5	285	30	-	8550	1	N88°	78°	30.29	-
6	MIO-6	625	58	-	36250	2	N78°	84°	Avg. (44.89)	-
7	MIO-7	135	35	-	4725	2	N82°	72°	Avg. (40.57)	-
8	MIO-8	295	40	-	11800	1	N87°	68°	37.24	-
Banded Hematite/Magnetite Chert & Jasper Bands Block A2										
9	BH/MC&J-1	215	70	-	15050	1	N55°	85°	41.7	-
10	BH/MC&J-2	290	37	-	10730	1	N68°	74°	37.04	-
11	BH/MC&J-3	147	50	-	7350	1	N63°	83°	48.16	-
Laterite Caping Block A2										
12	LCB-1	415	130	-	53950	1	-	-	43.56	-
13	LCB-2	250	90	-	22500	1	-	-	41.01	-
14	LCB-3	265	62	-	16430	1	-	-	41.36	-
15	LCB-4	140	41	-	5740	1	-	-	46.67	-
Brecciated Quartzite with Iron Matrix Body Block A2										
16	BQ-1	1085	60		65100	1	N72°	78°	48.89	-

PLATE - 2a

GEOLOGICAL MAP OF IRON ORE BLOCK A1 SONBHADRA, ON SCALE 1:12,500

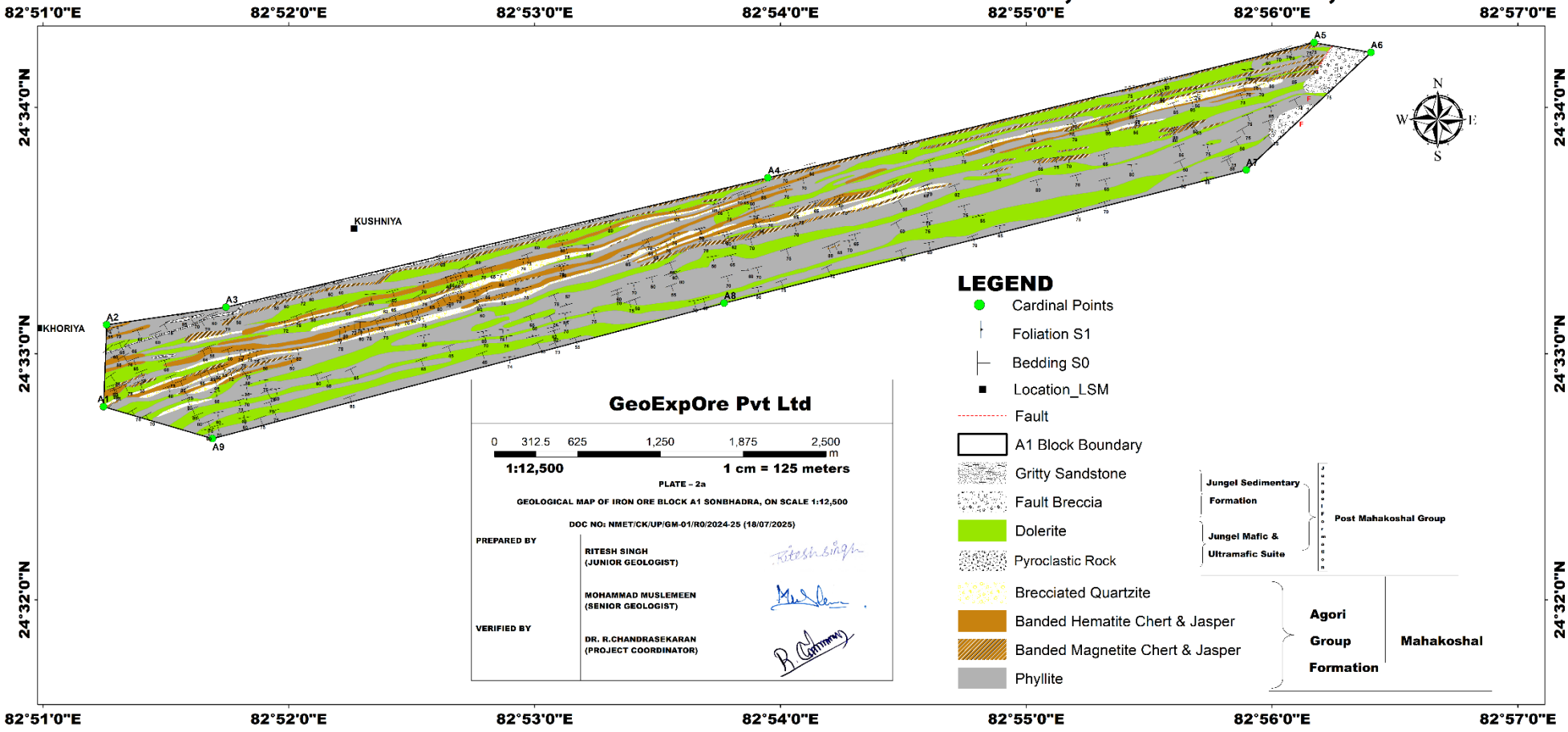
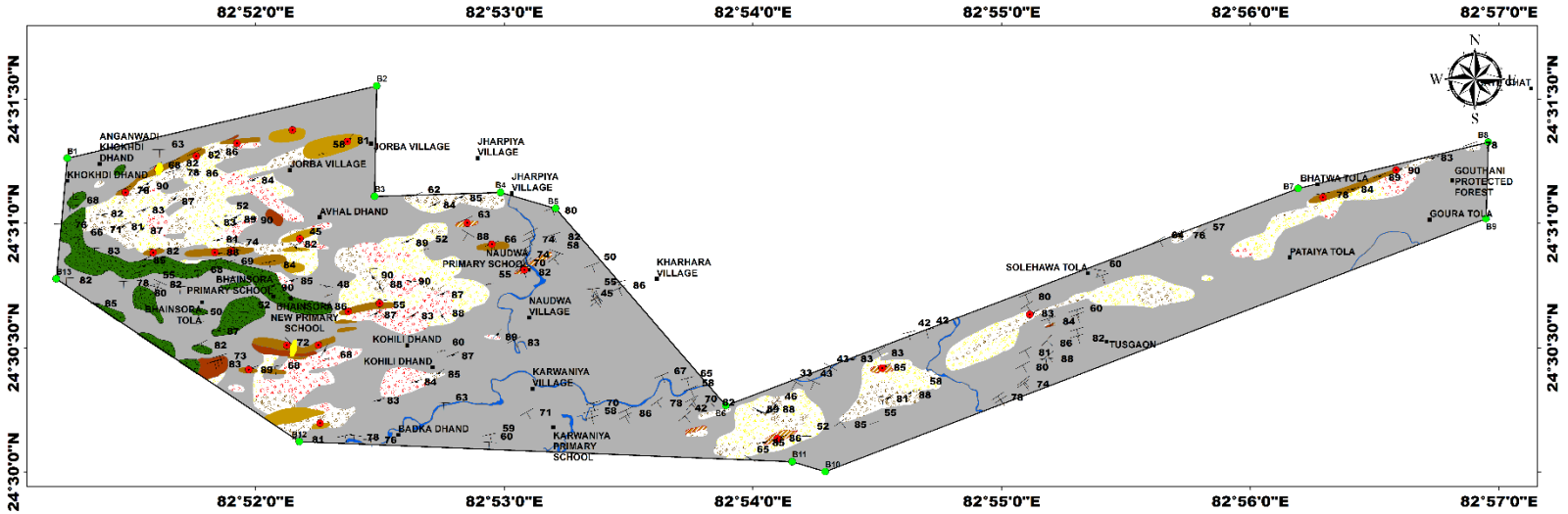


PLATE - 2b

GEOLOGICAL MAP OF IRON ORE BLOCK A2 SONBHADRA, SCALE 1:12,500



GeoExpOre Pvt Ltd

0 310 620 1,240 1,860 2,480 Meters

1:12,500 1 cm = 125 meters

PLATE – 2b

GEOLOGICAL MAP OF IRON ORE BLOCK A2 SONBHADRA, ON SCALE 1:12,500

DOC NO: NMET/JT/UP/GM-01/R0/2024-25 (19/07/2025)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

- CARDINAL POINT
- A2 BLOCK BOUNDARY
- BEDDING (S0)
- FOLIATION(S1)
- FOLIATION (S2)
- JOINT
- LOCATION
- NALA
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Agori Formation — **Mahakoshal Group**

7.2.1.3 Local geological setting

The investigated area lies near the known **Banded Iron Formation (BIF)** occurrences around **Chakdiya, Kushniya, Jorba and Tusgaon villages** in Sonbhadra district, Uttar Pradesh.

Table-7.5: Lithostratigraphy of the explored block (After Neogi and Raza, 2017).

Group	Formation	Lithology
Vindhyan Supergroup		
---------- Son-Narmada-North-Fault ----------		
		Soil
Post Mahakoshal Group	**Jungel Sedimentary Formation**	Sandstone/Breccia/Gritty-pebbly sandstone Quartzite
	Jungel mafic and ultramafic suite	Pyroclastic rock Quartz vein Dolerite Agglomerate (Blocky, bomb, splintery) Basalt (massive, porphyritic, vesicular and glassy)
Mahakoshal Group	**Agori Formation**	Brecciated chert-jasper-quartzite with BIF clasts in the silicate matrix, mylonite
		Banded siliceous hematite-magnetite quartzite, banded siliceous hematite jasper-chert, banded hematite chert with few volume percentages of magnetite, ferruginous quartzite- jasper-chert.
		Mauve, khaki yellow, brownish red colour well foliated phyllite and carbonaceous phyllite.

The **study area is predominantly represented by lithounits of the Agori Formation of the Mahakoshal Group**, comprising **brecciated chert–jasper–quartzite with BIF clasts, banded hematite–magnetite quartzite, banded hematite jasper/chert, banded hematite–magnetite chert, ferruginous quartzite–jasper–chert, and phyllite**. These lithologies constitute the principal rock assemblage exposed within the explored block.

The **post-Mahakoshal succession** is represented by the **Jungel Mafic and Ultramafic Suite** and the **Jungel Sedimentary Formation**. The Jungel Mafic and Ultramafic Suite comprises **pyroclastic rocks, quartz veins, dolerite, agglomerate and basalt**, including vesicular and glassy varieties. The **Jungel Sedimentary Formation** is represented by **sandstone, breccia and gritty–pebbly sandstone**, with quartzite also reported. The lithological succession of the explored block is presented in **Table -7.3**.

7.2.2 Description of rock types

7.2.2.1 Banded Iron Formation

In the study area, the major linear BIF zone comprises five parallel BIF bands interbedded with phyllite and consisting predominantly of Banded Hematite Chert and Jasper (BHC&J), Banded Magnetite Chert and Jasper (BMC&J), and Banded Hematite Quartzite (BHQ). The total strike length of this linear BIF zone is approximately 7 km, with widths varying from 12 m to 45 m. Brecciated chert–jasper–quartzite occurs as linear patches, with widths of up to 60 m, interbedded with the BIF bands. Medium- to coarse-grained massive quartzite, chert, and gritty quartzite also occur locally as linear patches, with widths of up to 40 m, within the BIF zone. Shear fabrics and boudinage structures are locally observed within the silicate-rich layers of the BIF bands.

Apart from the major BIF zone, several individual bands of Banded Hematite Chert and Jasper (BHC&J) and Banded Hematite Chert (BHC) occur south of Murgidand and northeast of Karwaniya. These bands have exposed strike lengths of approximately 250 m and widths ranging from 5 m to 8 m and are interbedded with phyllite, particularly along the ridge tops (Fig. 7.2). In general, two generations of folding are observed within the BHC&J/BHC units. The F1 folds plunge at approximately 32° towards S58°W, whereas the F2 folds plunge at approximately 25° towards N75°W.

Individual bands of BHC&J, BMC&J, and BHQ, with strike lengths of approximately 4,530 m and 1,385 m, respectively, are exposed along the ridge tops north of Murgidand and north of Kerji, where they are interbedded with massive chert–jasper–quartzite. These BIF bands are underlain by brownish-red, mauve, and khaki-green, well-foliated phyllite. The BIF bands exposed north of Murgidand and north of Kerji have strike lengths of approximately 4,530 m and 1,385 m, respectively.

A few magnetite-rich patches are also observed within hematite-rich BIF in and around Kushniya. Within the BIF, the thickness of the hematite-rich layers, locally containing magnetite, varies from less than 0.2 cm to 3.0 cm. Alternating ferruginous and siliceous layers define the primary compositional banding (S_0) of the BIF (Fig. 7.3). Limonitization is developed along multiple fractures and locally along the S_0 bedding surfaces within the BHC&J and BHQ units (Figs. 7.4 and 7.5).



Figure-7.2: Field photograph showing exposure of banded hematite–chert–jasper (BHC&J) in block A1 near kushniya.

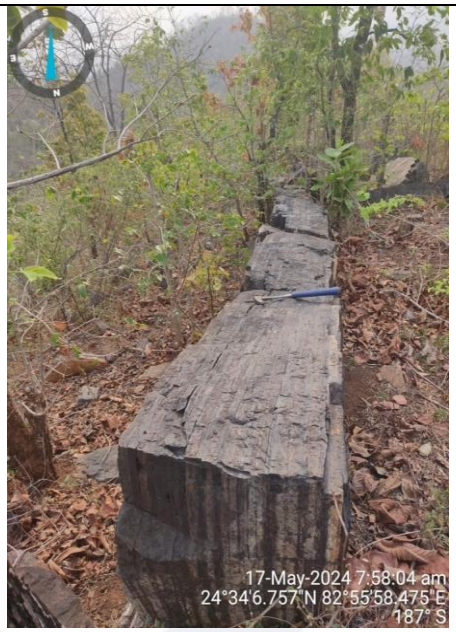


Figure-7.3: Field photograph showing alternating layers of banded magnetite–chert–jasper (BMC&J in block A1 near bijura.



Figure-7.4: Field photograph showing well-developed alternating bands of magnetite-rich chert and jasper in Block A1 near lakshaman pahad.

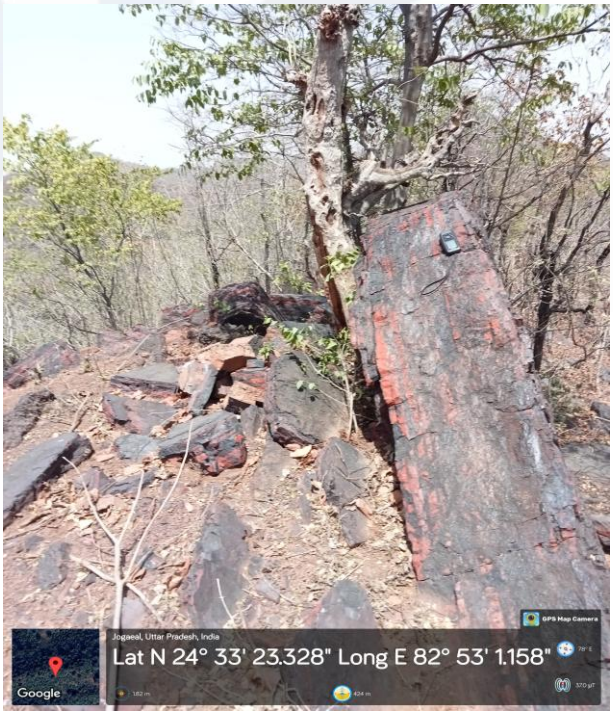


Figure-7.5: Field photograph showing well-developed banded magnetite–chert–jasper (BMCJ) exposure with distinct alternating dark and reddish bands near murgidant, block A1.

7.2.2.2 Brecciated Quartzite-Chert-Jasper

This lithounit is **very hard, compact, and resistant** in nature and occurs interbedded with **Banded Iron Formation (BIF)**, represented in Figure-7.7 by **Banded Hematite Jasper (BHJ), Banded Hematite Chert (BHC), and Banded Hematite Quartzite (BHQ)**, along with phyllite within the mapped area.

The lithounit is generally **reddish to brownish white** in colour and is characterized by the presence of **angular to sub-angular clasts** of BIF, chert, jasper, quartzite, and vein quartz, embedded within a **ferruginous and siliceous matrix**. It is exposed in and around **Chakariya, Jorba, Jharpiya, and Chhalehwa Taula**.

The unit has an exposed strike length of up to approximately **3,000 m** and attains a maximum width of about 25**m** within the mapped area.

Pulverization and intense fracturing of the parent rock are locally observed within this lithounit, indicating **brittle deformation**. Locally, **mylonitic fabric** is also developed in the vicinity of sympathetic faults, suggesting **ductile shearing and deformation along subsidiary fault planes**.



Figure-7.6: Field photograph showing banded hematite chert & jasper (BHC&J) bands interbedded with phyllite

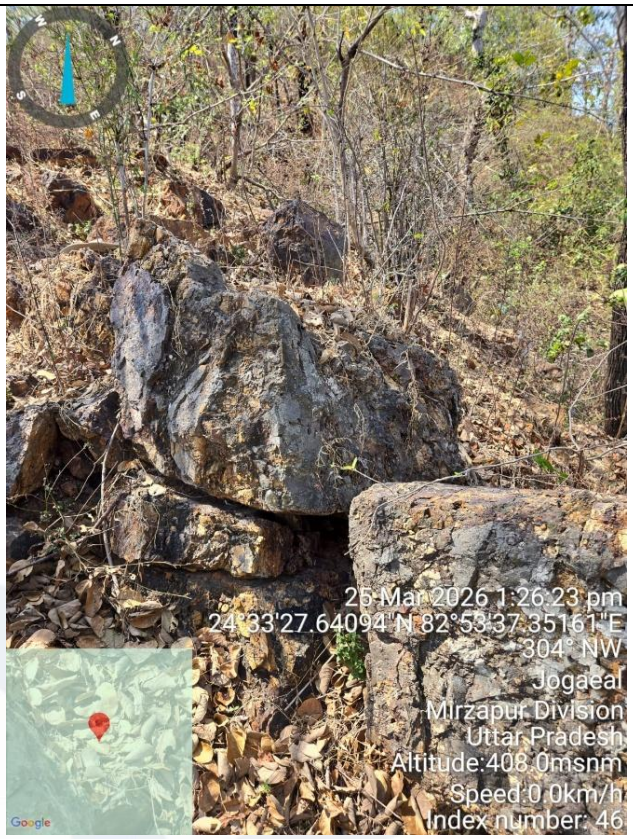


Figure-7.7: Field photograph showing banded hematite–chert–jasper (BHCJ) exposure dominated by quartzite, chert and jasper in Block A1 near bhaghakur.

7.2.2.3 Phyllite

It is the **dominant lithounit** exposed in the study area, as shown in **Figure-7.8 & 9**. The rock is generally **fine-grained** and exhibits variable colours, including **khaki-yellow, khaki-green, brownish-red, grey, and mauve**, and commonly displays a distinct **phyllitic sheen**. Locally, the rock is relatively compact.

The phyllite is **thinly foliated**, with individual laminae or bands ranging in thickness from a few millimetres to less than **1 cm**. Alternating **quartz–feldspar-rich and mafic-rich layers** define the compositional layering, interpreted as the primary bedding **(S_0)**.

In the northern part of the mapped area, particularly **southwest of Chhalehwa Tola**, a linear patch of **carbonaceous phyllite** has been observed. It is **grey to greenish-grey**, fine-grained, and distinctly foliated. The foliation **(S_1)** is defined by the alignment of minerals and alternating **quartzo-feldspathic and black-coloured mafic/carbonaceous layers**. The S_1 foliation generally trends **N60°E** and dips **35° towards the south.**



Figure-7.8: Field photograph showing in cross section along road dark grey to black phyllitic rock with well-developed cleavage near bhaghakur, block A1.

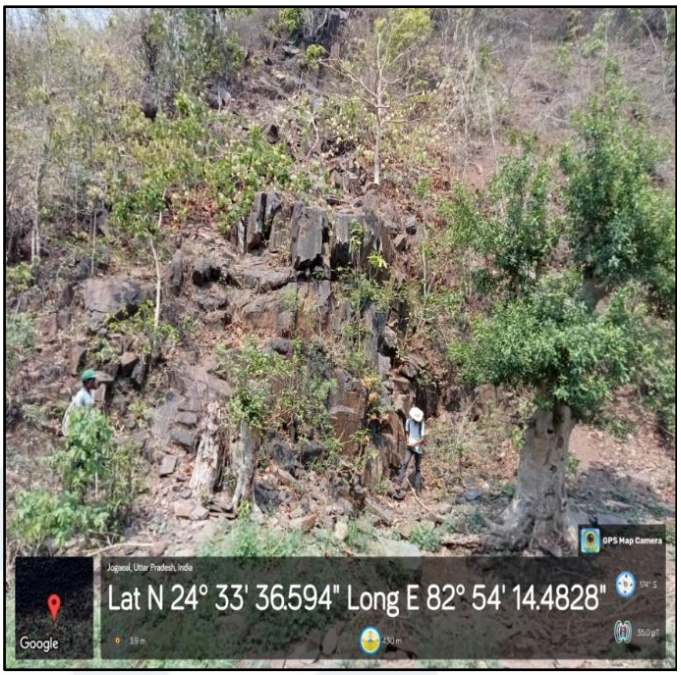


Figure-7.9: Field photograph showing banded iron formation (BIF) interbedded with phyllite in block A2 near tusgaon, with distinct phyllitic layers occurring between the bif bands.

7.2.2.4 Brecciated Quartzite-Chert

Brecciated quartzite and chert exposed in the mapped area are generally **grey to greyish white** in colour, **medium- to coarse-grained**, and compact in nature. The quartzite is mainly composed of **quartz and feldspar**, with subordinate **mafic minerals and phyllosilicates**, chiefly **muscovite**. The relative proportion of phyllosilicates varies locally.

The brecciated quartzite bands generally trend from **N70°E to E–W**, broadly following the trend of the **BIF bands**. They occur as discontinuous linear patches and are commonly associated with **BIF bands and phyllite**, as shown in **Figure 7.10 & 11.** The exposed strike length of the quartzite unit is up to approximately **2,000 m**, with widths reaching up to **87 m**.

Chert bands also occur as linear patches within the BIF zone, with an exposed strike length of up to approximately **2,000 m** and widths of up to **20 m**. The chert occurs in both **massive and thinly banded varieties**. In the banded variety, the banding is defined by alternating **white to greyish-white and reddish-coloured bands**, generally a few millimetres in thickness. Locally, minor **ferruginous leaching** is observed along fracture surfaces within the quartzite.



Figure-7.10: Field exposure showing predominantly brecciated quartzite with associated chert–jasper layers in block A1.



Figure-7.11: Field photograph showing brecciated chert dominated by grey to dark-grey cherty material with associated quartzite and iron-oxide staining in block A1.

7.2.2.5 Ultramafic Rock

The ultramafic rock exposed in the area is generally greyish green to greyish in colour, massive and medium-grained in nature. This lithounit has been observed towards the southwest of Jogail.

7.2.2.5.1 Felsic Tuff

The **tuffaceous rocks** exposed in the mapped area are generally **creamish to dirty-white/off-white** in colour, locally exhibiting **purple to reddish hues**. They are **fine-grained to aphanitic** and display **laminated to lumpy textures**, with fine laminations approximately **3–5 mm** thick. Fresh surfaces exhibit a **vitreous lustre and conchoidal fracture**, whereas weathered surfaces commonly show a **waxy lustre** (**Fig. 7.12**). These rocks are interpreted to be of **volcanic origin** and are considered to occur near the **upper part of the iron-bearing sequence** in the study area.

Petrographically, the rock comprises predominantly **quartz, feldspar, and devitrified volcanic glass**, with minor **magnetite and goethite**. Locally, **quartz–feldspar-filled vesicles** are also observed. The presence of **relict glass shards and devitrification textures**, together with secondary **iron-oxide alteration**, indicates **metamorphic and hydrothermal modification of the volcanic protolith** (**Fig. 7.13**). Geochemical analyses also indicate the presence of **vanadium (V) and titanium (Ti)**. The unit is mainly exposed in the **central part of Block A2**, with minor occurrences in the **western part of the block**. In addition, a few thin tuffaceous patches have been encountered in **boreholes**, occurring in association with the **BIF bands**.



Figure-7.12: Field exposure of pinkish felsic tuff showing fine-grained volcaniclastic texture and reddish-brown weathering in block A2 near jorba.



Figure-7.13: Felsic tuff outcrop in block A1 showing pale grey to whitish colour, fine-grained nature, fractures and local iron-oxide staining

7.2.2.5.2 Meta basalt

Basalt exposed in and around **Jogail** is generally **grey to greenish grey** in colour and **fine-grained** in texture representing in Figure-7.14. The rock is composed predominantly of **clinopyroxene and plagioclase**, with locally preserved **olivine**, and secondary **amphibole, chlorite, epidote, carbonate, and minor opaque minerals**. Petrographically, the rock exhibits a **microlitic texture**, with plagioclase laths showing distinct **polysynthetic twinning** and variable degrees of **sericitization**. Clinopyroxene is locally altered to **amphibole and chlorite**, while abundant interstitial carbonate indicates significant **carbonatization.**

The alteration assemblage, comprising **amphibolization, chloritization, epidotization, sericitization, and carbonatization**, indicates **low-grade metamorphic and hydrothermal alteration** of a **basic volcanic protolith** (Shrivastav et al., 2019.). The combined textural and mineralogical characteristics support classification of the rock as **metabasalt**, reflecting significant **post-magmatic alteration under relatively low-temperature conditions**.



Figure -7.14: Field photograph showing an outcrop of carbonate-bearing meta basalt in block.

7.2.2.6 Meta- Dolerite

The **metadolerite** identified during large-scale geological mapping is generally **dark green to greenish-grey**, fine- to medium-grained, and compact in nature showing in figure-7.15 & 7.16. Petrographically, it exhibits a characteristic **ophitic to sub-ophitic texture**, with **plagioclase laths enclosed by**

clinopyroxene (augite) and subordinate orthopyroxene. Plagioclase shows distinct **polysynthetic twinning** and moderate **sericitization**, whereas the pyroxenes are locally altered to **chlorite**. Minor **titanite and opaque minerals**, including **chalcopyrite, pyrite, and ilmenite**, are also present.

The rock is locally traversed by **late-stage quartz–chlorite veins and epidote veinlets**. The observed alteration assemblage, comprising **sericitization, chloritization, epidotization, and silicification**, indicates **low-grade metamorphic and hydrothermal alteration** of the original mafic igneous protolith.

Based on the **preservation of the ophitic to sub-ophitic texture, plagioclase–pyroxene mineral assemblage, and its meta-basic geochemical character**, the rock is interpreted as **metadolerite**. The geochemical data indicate a **subalkalic basaltic affinity**, consistent with its mafic composition. The occurrence of the metadolerite in association with the **BIF and other iron-bearing lithological units** suggests that it forms a subordinate mafic component within the iron-bearing geological sequence of the mapped area.



Figure -7.15: Field exposure of dark grey, fine- to medium-grained metadolerite with prominent plagioclase-rich texture in block A1 near chakdiya.



Figure-7.16: Photograph showing representative metadolerite

7.2.2.6.1 Pyroclastic Rock

The **dark-grey pyroclastic rock** exposed south of **Kushniya** in Figure-7.17 & 7.18 extends for an approximate strike length of **1 km**, with the outcrops generally trending **E–W**. The rock is **polymictic**, comprising **angular to sub-angular clasts of quartz, feldspar, phyllite rock**, ranging in size from a few millimetres to approximately **12 cm**, set within a **fine-grained volcanic matrix**. The long axes of the clasts are preferentially aligned parallel to the **E–W trend**. Numerous **vugs**, ranging from approximately **2 mm to 6 cm** in size, are also present and exhibit a similar **E–W alignment**.

Petrographically, the rock consists of **angular to sub-angular lithic fragments, quartz and calcite clasts**, embedded in an **amphibole–chlorite–quartz-rich groundmass** composed predominantly of **plagioclase, amphibole, and quartz**, with secondary **chlorite, calcite, and magnetite**. Amphibole is variably altered to **chlorite**, whereas plagioclase exhibits well-developed **polysynthetic twinning** and variable **sericitization**. The **fragmental texture, diverse clast assemblage, preferred E–W alignment, and alteration assemblage** are consistent with a **pyroclastic origin**, followed by **hydrothermal/metasomatic alteration**.



Figure-7.17: Field exposure of dark grey pyroclastic rock in the northeastern part of block A1 near chakdiya



Figure-7.18: Field exposure of coarse-clastic pyroclastic rock showing angular to sub-angular volcanic clasts set in a fine-grained matrix in block A1.

7.2.2.6.2 Quartz Vein

Quartz veins in the mapped area are generally **milky white to white and locally greyish white** in colour, massive, medium- to coarse-grained, and commonly fractured. These veins generally trend from **N75°E to E–W**. Their exposed widths range from a few **millimetres to approximately 4 m**, while their exposed strike lengths range from a few **centimetres to nearly 40 m**.

The quartz veins occur both **parallel to and sub-parallel to the S_0/S_1 surfaces** of phyllite and as **cross-cutting veins**, making angles of approximately **20° to 45°** with the foliation. Quartz veins are also observed **within the BIF bands**, where they locally occur as vein fillings along fractures and discontinuities. **Minor ferruginous leaching** is observed along some quartz veins; however, the veins are generally **devoid of visible sulphide mineralization**.

7.2.2.7 Jungel Sedimentary Formation

The **Jungel Sedimentary Formation** occurs as a narrow belt, approximately **1.0–1.5 km wide**, occupying an **E–W-trending hilly tract** that forms the southern limit of the **Jogail Valley**. The formation is predominantly represented by **jasper–breccia–chert/conglomerate, gritty to pebbly sandstone, and quartzite**. These lithounits are briefly described below.

7.2.2.7.1 Breccia

The **fault breccia** associated with the **Jungel Sedimentary Formation** is polymictic and comprises **angular to sub-angular fragments of jasper, quartzite, chert, banded hematite quartzite, vein quartz, and phyllite**, set within a **siliceous to locally ferruginous matrix**. The clasts range in size from approximately **1.5 to 20 cm** and are poorly sorted, reflecting **intense tectonic fragmentation**. Locally, the breccia is strongly fractured and cemented by **silica and iron oxides**, indicating repeated **fault movement and subsequent hydrothermal cementation** it is showing in Figure-7.19 & 7.20.

The occurrence of this breccia marks zones of **significant brittle deformation** and represents a product of **tectonic brecciation along the fault zone**. The fault breccia is exposed **almost continuously along**

the southern boundary of the Jogail Valley, defining a prominent zone of brittle deformation associated with the Jungel sedimentary succession.



Figure-7.19: Field exposure of breccia comprising angular to sub-angular siliceous fragments within an iron-oxide-rich matrix in block A2 near jorba along the jogail range.



Figure-7.20: Field Exposure of Polymictic breccia with light-coloured and reddish lithic clasts embedded in a greyish-brown fine-grained matrix.

7.2.2.7.2 Gritty-Pebbly Sandstone

The sandstone is generally **pinkish white to white** in colour, **medium- to coarse-grained**, and locally foliated. It contains pebbles of **quartzite, vein quartz, chert, phyllite and jasper**, which impart a gritty to pebbly appearance to the rock

7.2.3 Petrography/mineralgraphic and ore microscopy

A total of 20 representative rock samples, comprising 15 bedrock samples (BRS) and 5 core samples, were sanctioned by TCC-NMET for thin-section, polished-section, petrographic, mineralographic, and ore-microscopic studies. The petrological and ore-microscopic investigations were carried out at the Petrology Laboratory, Geological Survey of India (GSI), Bengaluru. Details of the samples subjected to petrographic, mineralographic, and ore-microscopic studies are presented in **Table 7.4**, and their respective petrographic descriptions are provided in the following sections.

Table-7.6: Details of sample subjected for petrographic and mineralographic studies

S.No.	Sample ID.	Latitude	Longitude	Elevation	Lithology
BRS Samples					
1	UPCK/BRS-7/2024-2025	24.54933	82.85830	283 m	BHC&J
2	UPCK/BRS-10/2024-2025	24.55118	82.85768	291 m	Pyroclastic Rock
3	UPCK/BRS-16/2024-2025	24.55027	82.87755	385 m	Ferruginous Phyllite
4	UPCK/BRS-29/2024-2025	24.56012	82.89550	320 m	Dolerite
5	UPCK/BRS-52/2024-2025	24.56610	82.92410	314 m	BMC&J
6	UPCK/BRS-14/2024-2025	24.55160	82.87047	421 m	BHC&J
7	UPCK/BRS-61/2024-2025	24.56842	82.9322	312 m	BMC&J
8	UPJT/BRS-68/2024-25	24.51634	82.85642	345 m	Brecciated Quartzite with Iron matrix
9	UPJT/BRS-69/2024-25	24.51364	82.85782	255 m	Carbonated Metabasalt
10	UPJT/BRS-75/2024-25	24.50723	82.86415	240 m	Felsic Tuff
11	UPJT/BRS-91/2024-25	24.51669	82.88086	226 m	BHC&J
12	UPJT/BRS-93/2024-25	24.51354	82.88468	219 m	BHC&J
13	UPJT/BRS-74/2024-25	24.5148	82.8651	275 m	Massive Iron Ore
14	UPJT/BRS-94/2024-25	24.50278	82.89618	214 m	Brecciated Quartzite with Iron matrix
15	UPJT/BRS-102/2024-25	24.50224	82.90164	300 m	BHMC&J
Core Samples					
16	UPCKB-01/CH/01	24.55094	82.87063	377.656	Ferruginous Phyllite
17	UPCKB-02/CH/02	24.55458	82.88426	348.472	Banded Hematite Chert & Jasper
18	UPCKB-05/CH/03	24.56830	82.93211	309.7964	Dolerite
19	UPCKB-06/CH/04	24.55628	82.88378	393.569	Banded Magnetite Chert & Jasper
20	UPJTB-01/CH/05	24.52069	82.86192	299.304	Massive Iron

7.2.3.1 Petrographic description of sample no. UPCK/BRS-07/24-25 banded ferruginous chert (BFC)

The rock is characterized by alternating cherty and ferruginous bands. Petrographically Figure-7.21a to 7.21d, it consists predominantly of microcrystalline quartz (chert) with ferruginous layers composed mainly of magnetite, goethite, and minor specular hematite. Magnetite is commonly replaced by goethite, indicating secondary oxidation, while recrystallized quartz exhibits polygonal grains with well-developed triple junctions. Micro-quartz veinlets cutting across the primary banding, along with minor offsets, indicate later brittle deformation.



Figure 7.21a: Hand sample of banded ferruginous chert (BFC) (Sample no. UPCK/BRS-7/24-25).

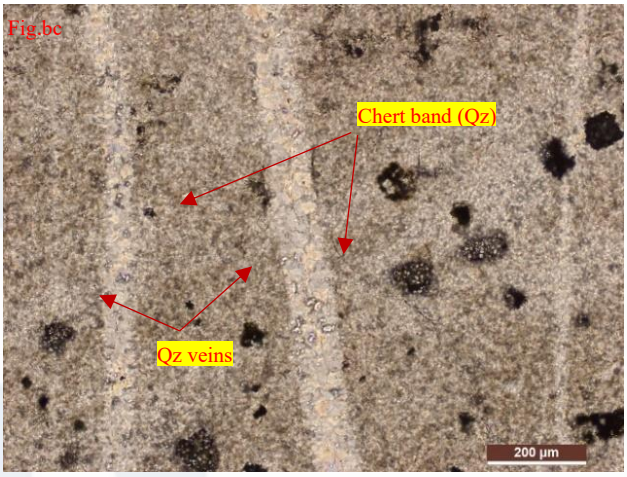


Figure 7.21b: Photomicrograph showing multiple quartz vein intruded into chert band under PPL image (Sample no. UPCK/BRS-7/24-25).

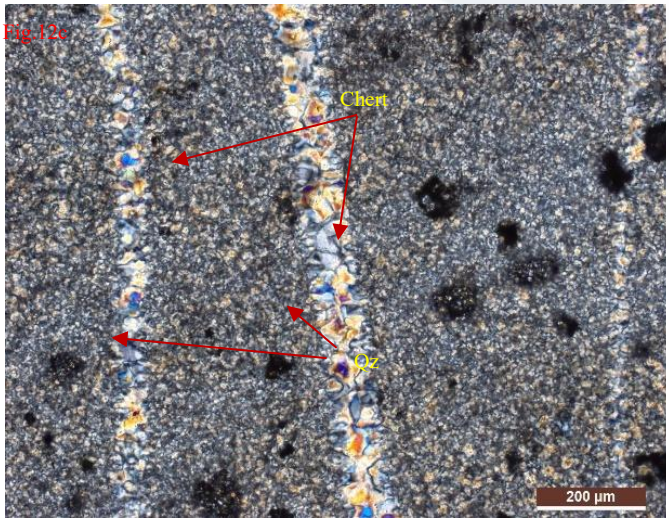


Figure -7.21c: Photomicrograph showing multiple quartz (Qtz) vein intruded into chert band under XPL image (Sample no. UPCK/BRS-7/24-25).

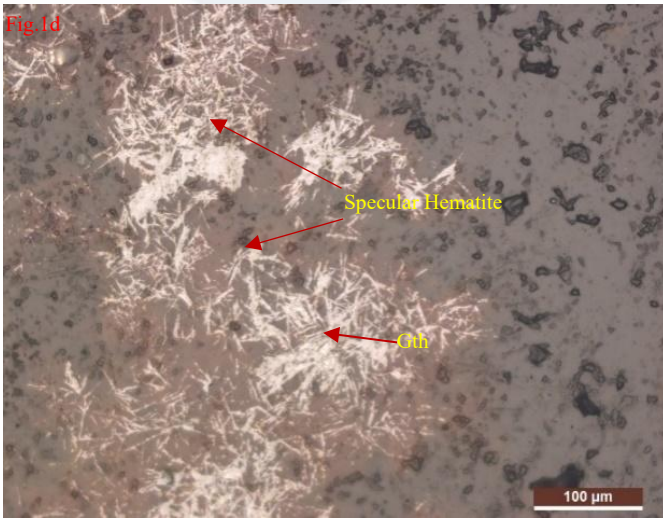


Figure-7.21d: Photomicrograph showing specular hematite in association with goethite (Gth) ore under reflected light (Sample no. UPCK/BRS-7/24-25).

7.2.3.2 Petrographic description of sample no. UPCK/BRS-16/24-25(Jaspillite or Jaspilite)

The rock is fine-grained and massive Figure-7.22a, composed predominantly of quartz/jasper and hematite, with minor magnetite and goethite. Quartz occurs as equigranular grains, locally exhibiting a reddish tint due to iron oxide impurities, while hematite forms subhedral to euhedral grains displaying characteristic anisotropy and blood-red internal reflection. The close association of quartz/jasper with iron oxide minerals indicates an iron-rich siliceous rock, characteristic of Jaspilite (Jaspillite) in Figure-7.22b to 7.22d.



Figure-7.22a: Hand sample of jaspillite (Sample no. UPCK/BRS-16/24-25).

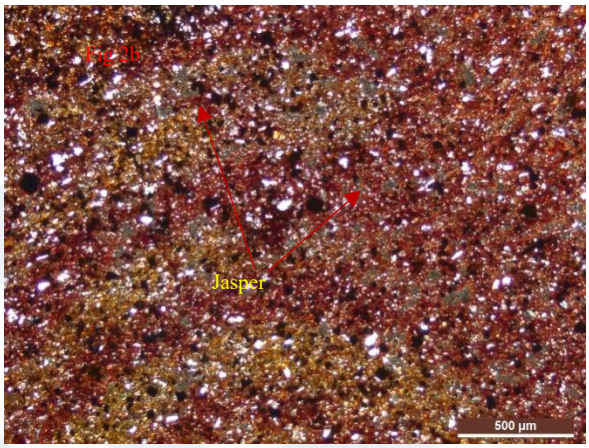


Figure-7.22b: Photomicrograph showing Jasper with iron oxide under transmitted light (Sample no. UPCK/BRS-16/24-25).

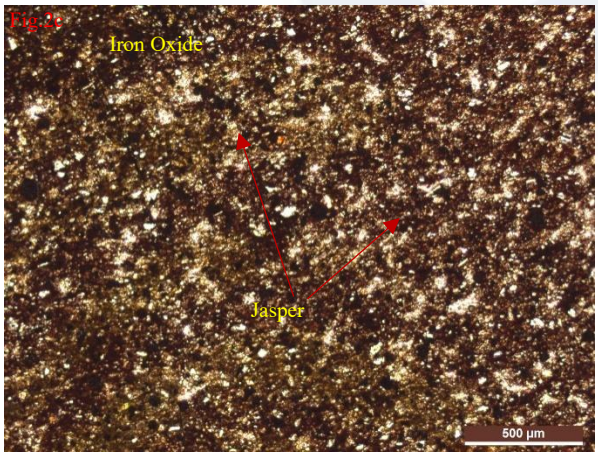


Figure-7.22c: Photomicrograph showing jasper with iron oxide under XPL image (Sample no. UPCK/BRS-16/24-25).

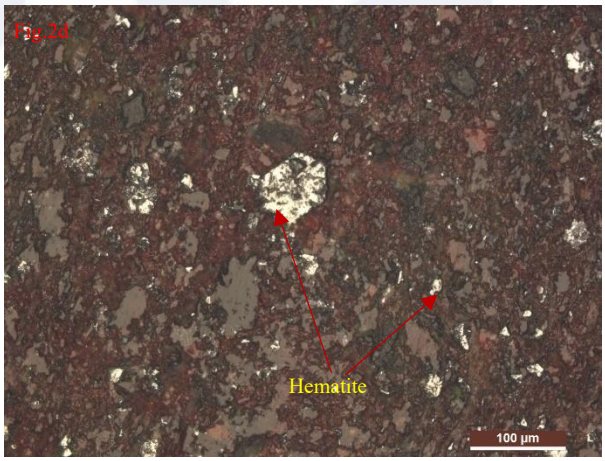


Figure- 7.22d: Photomicrograph showing subhedral to euhedral Hematite under reflected light (Sample no. UPCK/BRS-16/24-25).

7.2.3.3 Petrographic description of sample no. UPCK/BRS-52/24-25 (Ferruginous Chert)

The rock is fine-grained and massive in Figure-7.22a, composed predominantly of microcrystalline quartz with iron oxides comprising magnetite, hematite, and goethite. Quartz exhibits a granulose texture, while

magnetite occurs as euhedral grains randomly distributed within the quartz matrix. Hematite is commonly altered to goethite, with specular hematite occurring in association with quartz and goethite Showes in Figure-7.23b to 7.23d. Local replacement of quartz by hematite indicates metasomatic alteration, confirming the ferruginous nature of the rock.



Figure-7.23a Hand sample of ferruginous chert (Sample no. UPCK/BRS-52/24-25).

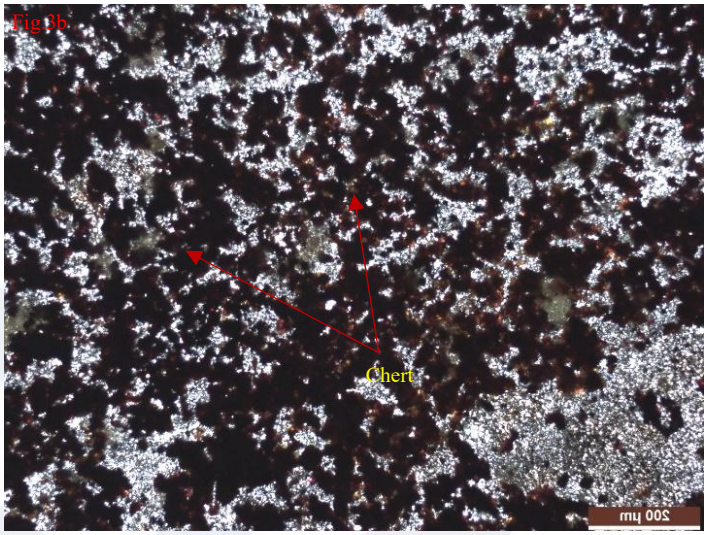


Figure-7.23b: Photomicrograph of ferruginous chert showing chert with iron oxide under XPL image (Sample no. UPCK/BRS-52/24-25).

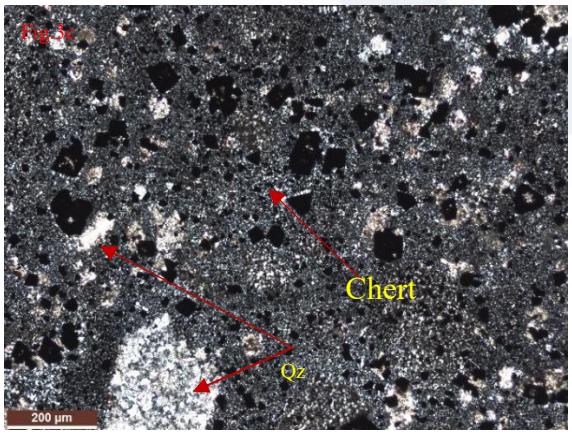


Figure-7.23c: Photomicrograph of ferruginous chert showing chert and quartz clast along with iron oxide under XPL image (Sample no. UPCK/BRS-52/24-25).

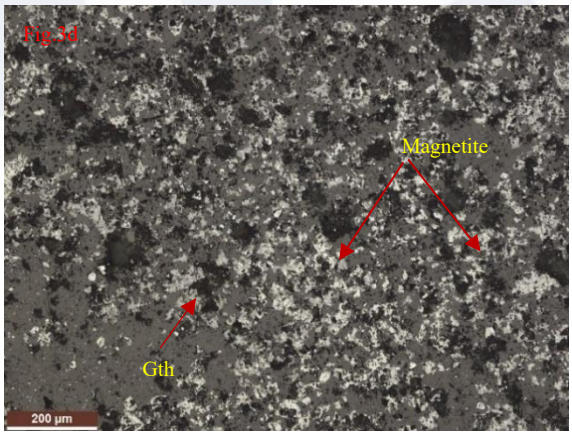


Figure-7.23d: Photomicrograph showing replacement of magnetite by goethite under reflected light (Sample no. UPCK/BRS-52/24-25).

7.2.3.4 Petrographic description of sample no. UPCK/BRS-91/24-25 (Banded Magnetite Chert)

The rock is characterized by alternating cherty and ferruginous bands in Figure-7.24a, composed predominantly of microcrystalline quartz (chert) and magnetite, with minor goethite. The quartz exhibits an equigranular, recrystallized texture with wavy extinction, while magnetite occurs as massive bands and as euhedral grains disseminated within the chert. Partial replacement of magnetite by goethite indicates secondary oxidation, preserving the primary banded iron formation texture showing in Figure-7.25b to 7.25d.



Figure-7.24a: Hand sample of banded magnetite chert (Sample no. UPCK/BRS-91/24-25).

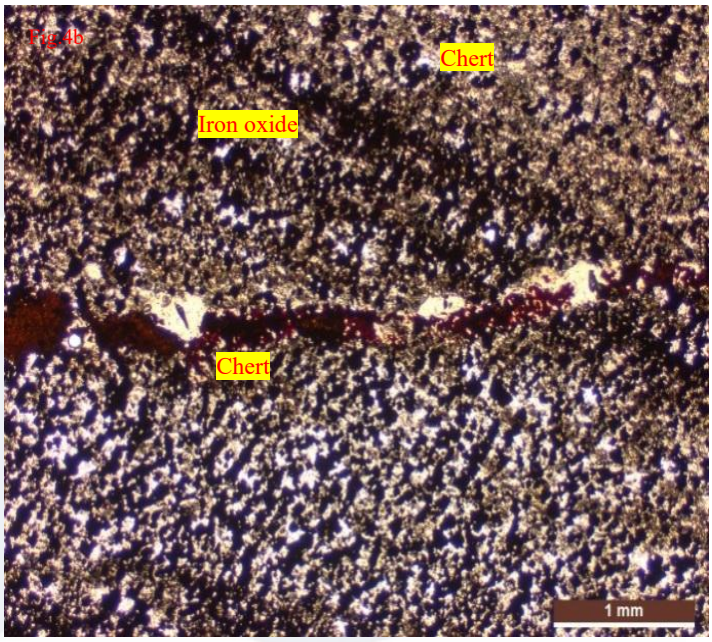


Figure-7.25b Photomicrograph of banded magnetite chert showing alternate chert and iron oxides banding under XPL image (Sample no. UPCK/BRS-91/24-25).

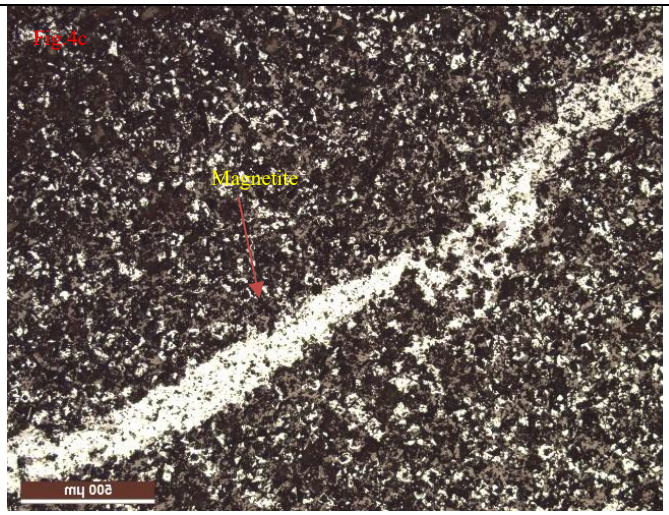


Figure-7.25c: Photomicrograph of banded ferruginous chert showing massive magnetite band interspersed within the chert band ((Sample no. UPCK/BRS-91/24-25).

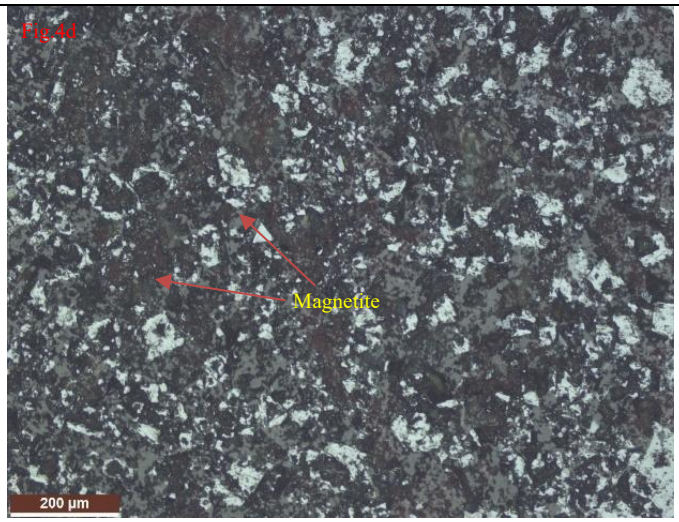


Figure-7.25d: Photomicrograph showing euhedral magnetite under reflected light view (Sample no. UPCK/BRS-91/24-25).

7.2.3.5 Petrographic description of sample no. UPCK/BRS-93/24-25 (Banded Magnetite Chert)

The rock showing Figure-7.26a is characterized by well-developed alternating siliceous and ferruginous bands, composed predominantly of microcrystalline quartz (chert), jasper, magnetite, and goethite. Chert exhibits a recrystallized granulose texture, while jasper shows a reddish colour due to iron oxide impurities. Ferruginous bands are mainly composed of magnetite with partial replacement by goethite, indicating secondary oxidation in Figure-7.26b to 7.26d. Local offsets of the primary banding record minor brittle deformation after deposition.



Figure-7.26a: Hand sample of banded ferruginous chert/jasper (BHJ/BHC) (Sample no. UPCK/BRS-93/24-25).

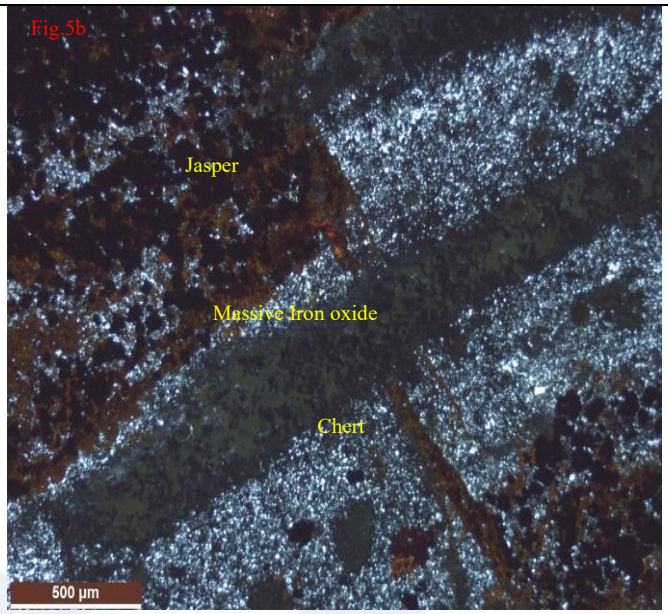


Figure-7.26b: Photomicrograph of banded ferruginous chert/jasper showing massive magnetite band interspersed with the chert and jasper bands ((Sample no. UPCK/BRS-93/24-25).

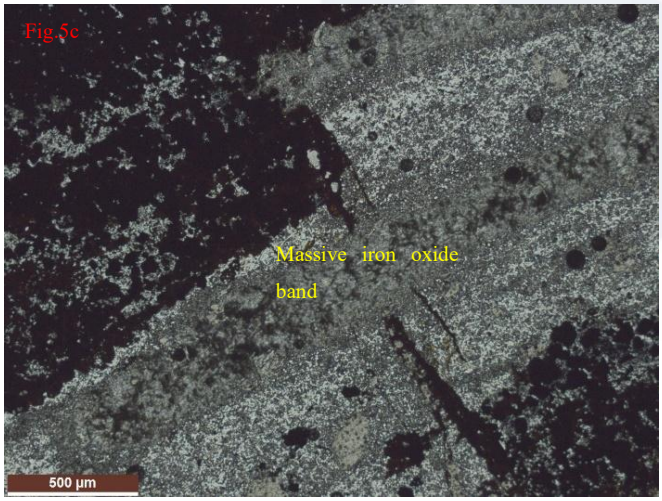


Figure-7.26c: Photomicrograph of massive magnetite band interspersed with jasper/chert bands in BMC/BMJ (Sample no. UPCK/BRS-93/24-25).

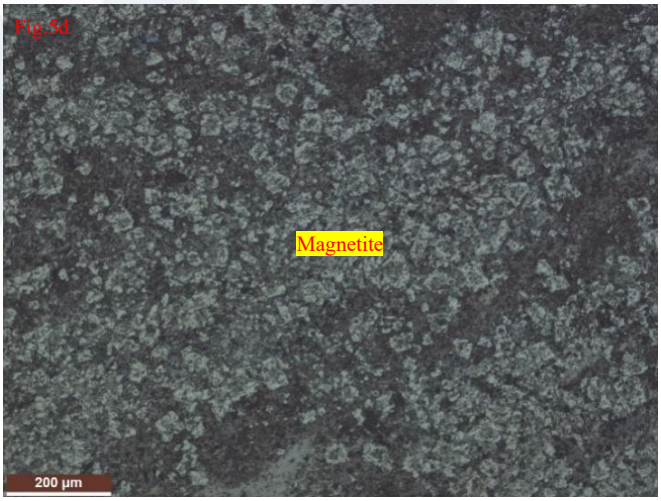


Figure-7.26d: Photomicrograph showing magnetite partly altered by goethite at places under reflected light view (Sample no. UPCK/BRS-93/24-25).

7.2.3.6 Petrographic description of sample no. UPCK/BRS-14/24-25 (Massive Hematite-Geothite Iron Ore)

The rock is massive Showing Figure-7.27a and composed predominantly of hematite and goethite. Hematite occurs as granular and bladed (specular hematite/specularite) varieties, while goethite commonly replaces hematite along grain boundaries, indicating secondary oxidation. The dominance of iron oxides and the massive ore texture confirm its classification as a massive hematite–goethite iron ore are given below Figure-7.27b.



Figure-7.27a: Hand sample of massive iron ore (Sample no. UPCK/BRS-14/24-25).

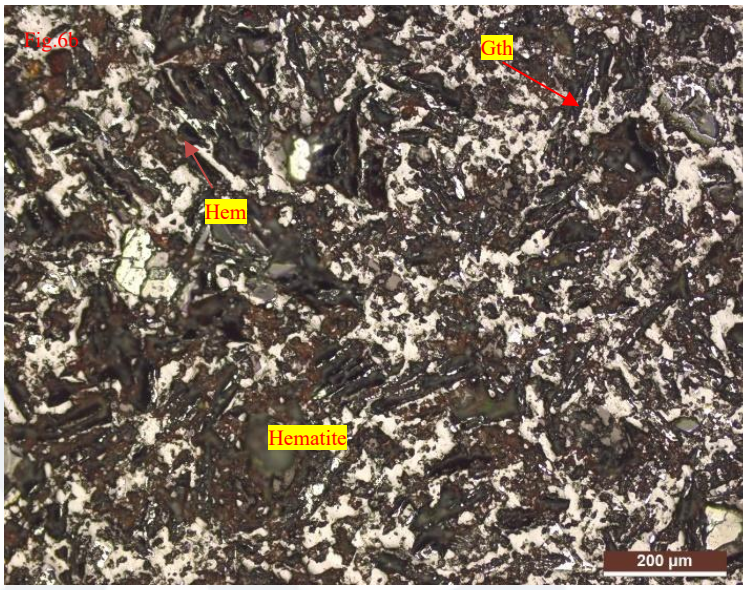


Figure-7.27b: Photomicrograph showing blade like hematite (Hem) replaced by goethite in massive iron ore under reflected light (Sample no. UPCK/BRS-14/24-25).

7.2.3.7 Petrographic description of sample no. UPCK/BRS-61/24-25 (BHC&J)

The rock is characterized by well-developed alternating hematite-rich and siliceous bands composed of microcrystalline quartz and jasper in Figure-7.28a. Quartz exhibits a recrystallized polygonal texture, while jasper shows reddish colouration due to iron oxide impurities. Hematite occurs mainly as fine blade- to needle-like crystals (specular hematite/specularite) with minor granular varieties, commonly occupying intergranular spaces within quartz–jasper bands. The mineral assemblage and banded texture confirm its classification as Banded Hematite Jasper/Chert is showing in Figure-7.28b to 7.28c.



Figure -7.28a: Hand sample of banded hematite chert/jasper (Sample no. UPCK/BRS-61/24-25).

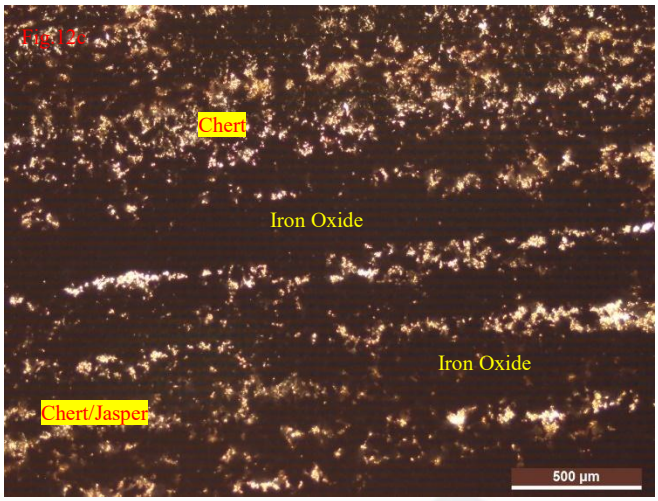


Figure-7.28b: Photomicrograph of BHJ/BHC showing alternation of ferruginous and chert/jasper bands under PPL view (UPCK/BRS-61/24-25).

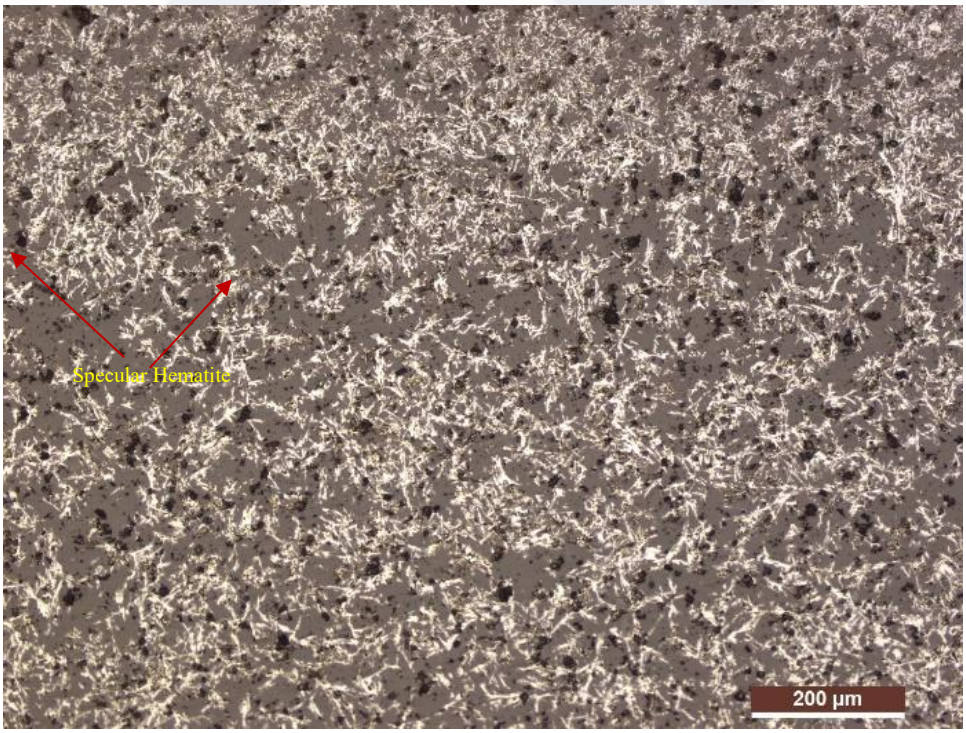


Figure-7.28c: Photomicrograph of specular hematite replacing magnetite and quartz under reflected light view (UPCK/BRS-61/24-25).

7.2.3.8 Petrographic description of sample no. UPCK/BRS-74/24-25 (Oxidized Iron Ore)

The rock is characterized by angular to sub-angular quartz clasts enclosed within a goethite-rich iron oxide matrix are representing in Figure-7.29a to 7.29c. Goethite is the dominant mineral, showing characteristic bluish-grey reflectance with reddish to orange internal reflections, while magnetite occurs as a minor constituent. The clastic/brecciated texture and iron oxide cementation indicate a quartz-clast-bearing goethite ore.

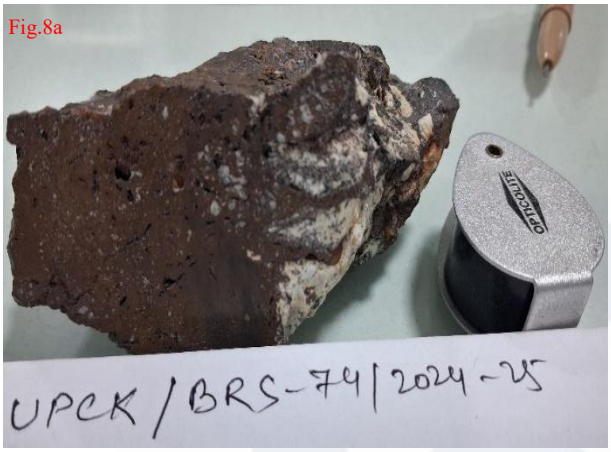


Figure-7.29a: Hand sample of details iron ore (Sample no. UPCK/BRS-74/24-25).

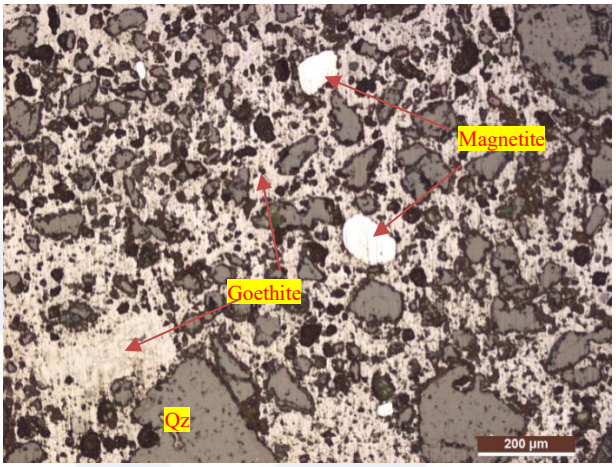


Figure-7.29b: Photomicrograph of goethite with few grains of magnetite under reflected light (Sample no. UPCK/BRS-74/24-25).

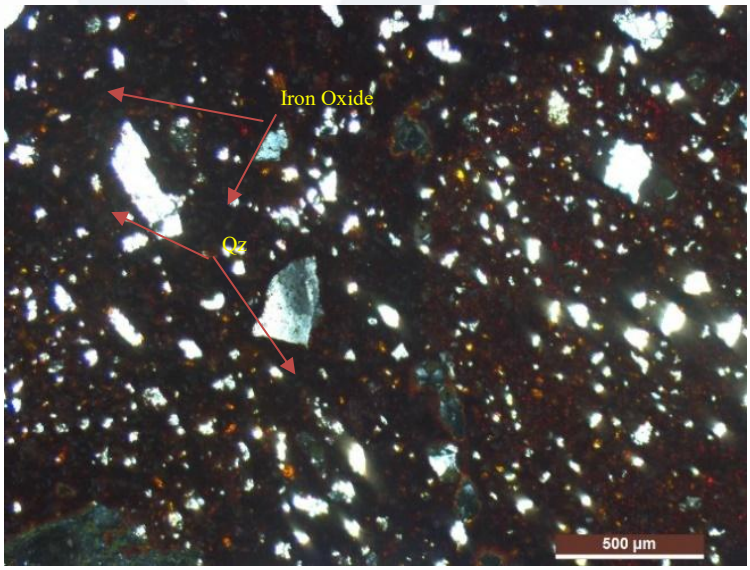


Figure -7.29c: Photomicrograph of goethite ore showing quartz clasts cemented by goethite under XPL image (Sample no. UPCK/BRS-74/24-25).

7.2.3.9 Petrographic description of sample no. UPCK/BRS-94/24-25 (BH)

The rock is characterized by well-developed alternating jasper and ferruginous bands, composed predominantly of microcrystalline quartz (jasper) and hematite with minor magnetite showing in Figure-7.30a . Quartz exhibits wavy extinction and recrystallized polygonal textures, while relict magnetite within hematite indicates oxidation of magnetite to hematite. Two generations of micro-quartz veins, including cross-cutting veins with minor offsets, record post-banding deformation and recrystallization are illustrated in Figure-7.30b to 7.30d.



Figure-7.30a: Hand sample of banded ferruginous chert (Sample no. UPCK/BRS-94/24-25).

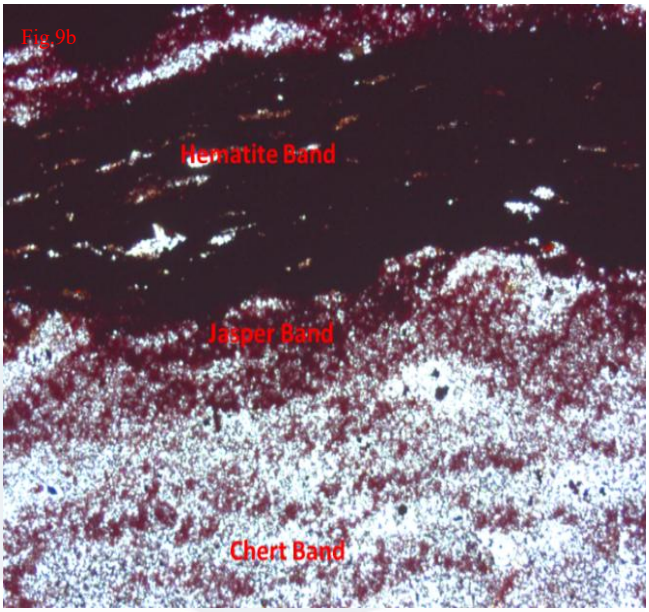


Figure-7.30b: Photomicrograph of banded hematite jasper (BHJ)/BHC showing alternations of hematite, jasper and siliceous (cherty) bands/ layers under XPL image (Sample no. UPCK/BRS-94/24-25).

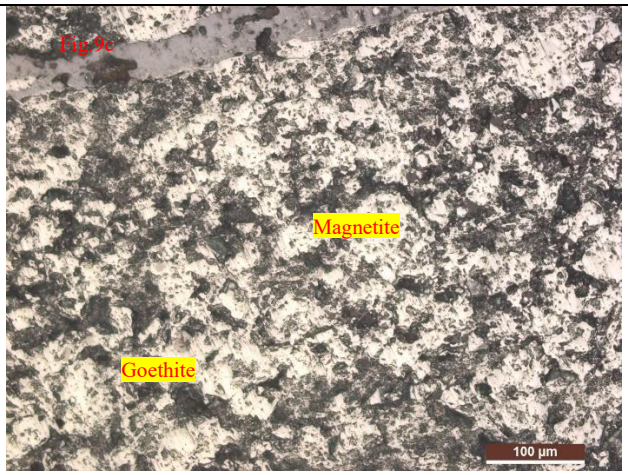


Figure-7.30c: Photomicrograph of massive magnetite ore alterations under reflected light (Sample no. UPCK/BRS-94/24-25).

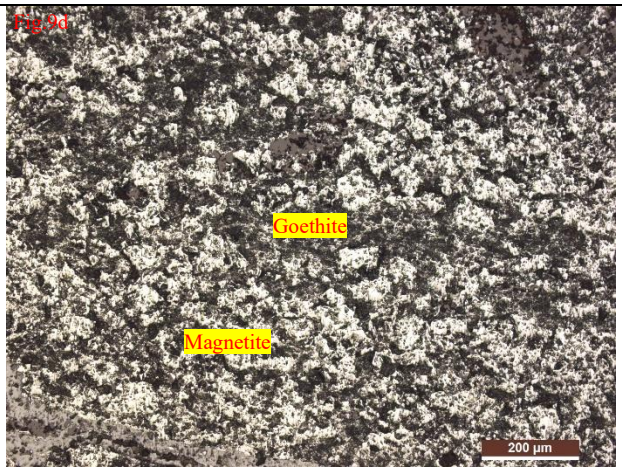


Figure-7.30d: Photomicrograph of massive magnetite ore replaced by goethite under reflected light (Sample no. UPCK/BRS-94/24-25).

7.2.3.10 Petrographic description of sample no. UPCK/BRS-102/24-25 (Goethite Ore)

The rock is characterized by goethite-rich ferruginous zones with discontinuous chert/jasper bands, showing well-developed colloform textures are given below in Figure-7.31a to 7.31d. The mineral assemblage comprises hematite, goethite, and minor magnetite associated with microcrystalline quartz and jasper. Martitization of magnetite and subsequent replacement of hematite by goethite indicate progressive oxidation and supergene enrichment. Micro-quartz veins with recrystallized polygonal quartz and minor offsets record post-depositional deformation. The association of ferruginous oxides with chert/jasper confirms its classification as Hematite–Goethite Chert/Jasper.



Figure-7.31a: Hand sample of goethite ore (Sample no. UPCK/BRS-102/24-24).

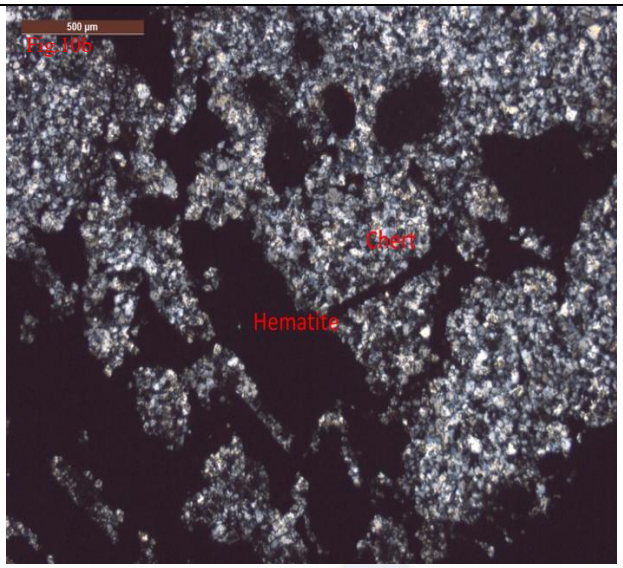


Figure -7.31b: Photomicrograph of goethite ore showing fracture filling iron ore (hematite-goethite) in the chert band XPL image (Sample no. UPCK/BRS-102/24-24).

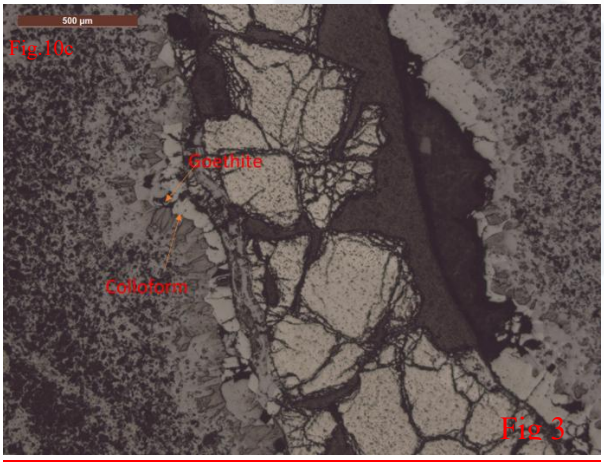


Figure-7.31c: Photomicrograph of BHC showing partly alteration of martite-hematite band by goethite exhibit colloform structure under reflected light view (Sample no. UPCK/BRS-102/24-25.

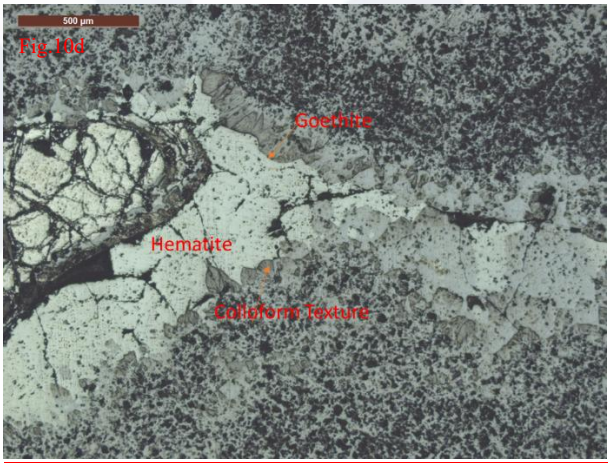


Figure-7.31d: Photomicrograph showing massive martite-hematite ore band replaced by goethite resulting desilicification through the action of hydrothermal fluids under reflected light view (Sample no. UPCK/BRS-102/24-25).

7.2.3.11 Petrographic Description of Sample no. UPCK/BRS-68/24-25 (Botryoidal Goethite Ore)

The rock is a dark brownish iron ore characterized by a well-developed botryoidal–colloform texture, composed predominantly of goethite with minor relic hematite is represented in Figure-7.32a & 7.32b. Goethite occurs as cauliflower-like bands showing characteristic bluish-grey reflectance with red to orange

internal reflections. Quartz and chert clasts are embedded within the goethitic matrix, while partial replacement of hematite by goethite indicates secondary oxidation and supergene enrichment.



Figure-7.32a: Hand sample of botryoidal goethite ore (Sample no. UPCK/BRS-68/24-25).

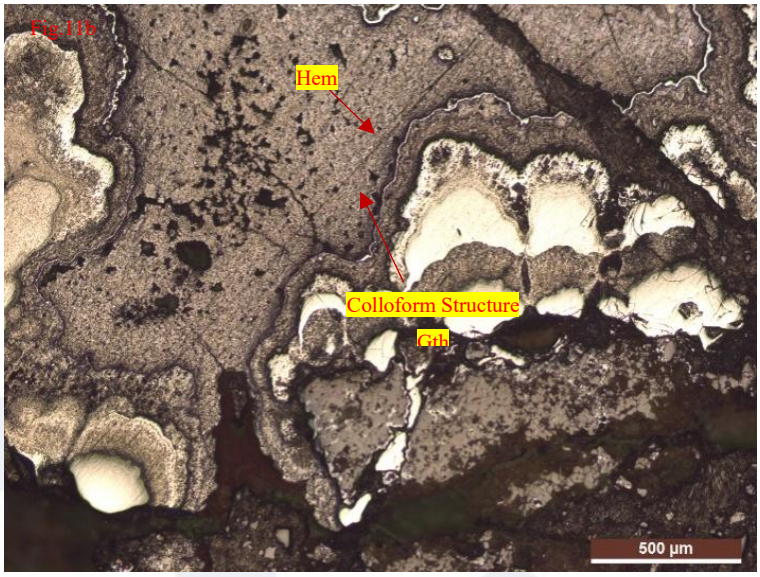


Figure-7.32b: Photomicrograph showing Colloform structure defined by hematite-goethite under reflected light. (Sample no. UPCK/BRS-68/24-25).

7.2.3.12 Petrographic Description of Sample no. UPCK/BRS-69/24-25(Carbonated Metabasalt)

The rock is fine-grained and greenish grey, composed predominantly of clinopyroxene, plagioclase, and olivine with secondary amphibole, chlorite, epidote, carbonate, and opaque minerals. It exhibits a microlitic texture with plagioclase laths showing polysynthetic twinning and variable sericitization. Clinopyroxene is partly altered to amphibole and chlorite, while abundant interstitial carbonate indicates carbonatization. The alteration assemblage reflects low-grade metamorphism and hydrothermal alteration of a basic volcanic protolith, confirming its classification as carbonated metabasalt are given below in Figure-7.33a to 7.33d.

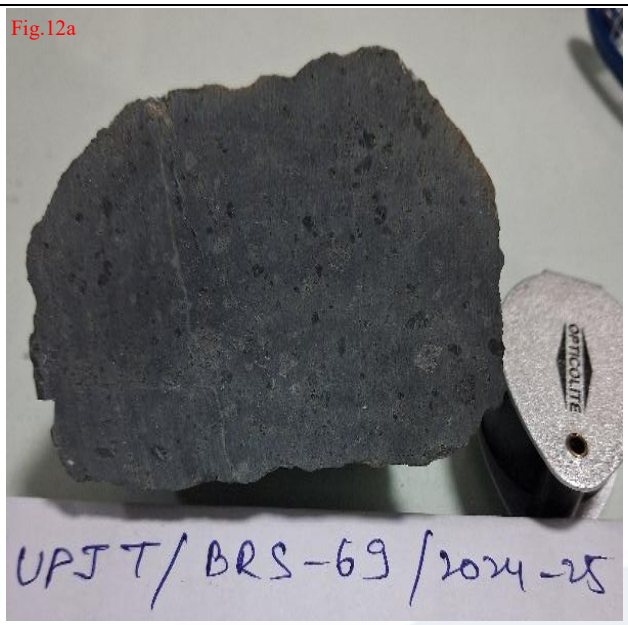


Figure-7.33a: Hand sample of carbonate metabasalt. (Sample no. UPCK/BRS-69/24-25).

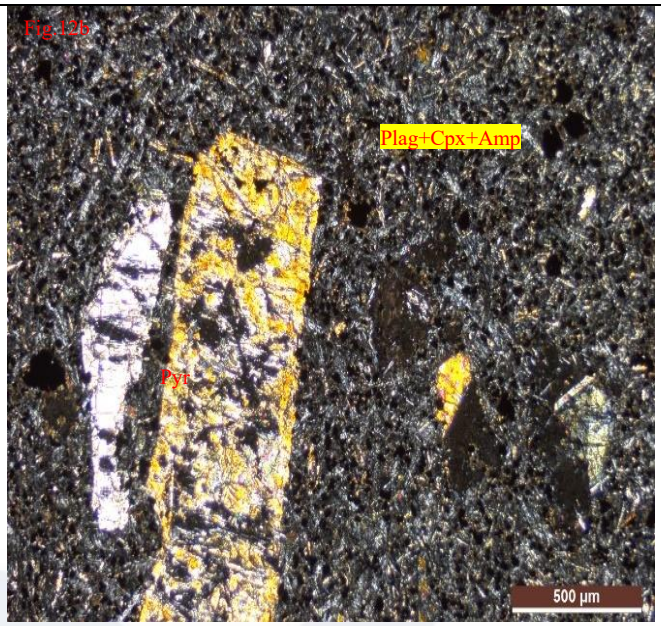


Figure-7.33b: Photomicrograph of carbonated metabasalt showing fine grained ground mass of plagioclase, clinopyroxene, amphibole and Pl phenocryst under XPL image (sample no. UPCK/BRS-69/24-25).

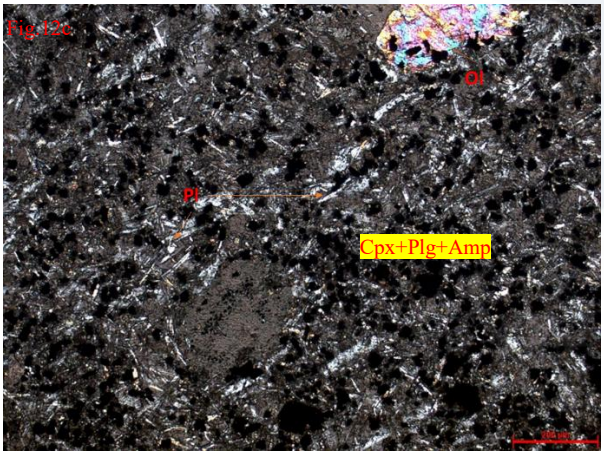


Figure-7.33c: Photomicrograph of carbonated metabasalt showing microlite texture under XPL image (sample no. UPCK/BRS-69/24-25).



Figure-7.33d: Photomicrograph showing Olivine phenocryst in the carbonated metabasalt under XPL image (sample no. UPCK/BRS-69/24-25).

7.2.3.13 Petrographic Description of Sample no. UPCK/BRS-10/24-25(Pyroclastic rock)

The rock is fine-grained and fragmental, composed of angular to sub-angular lithic fragments, quartz, and calcite clasts embedded within an amphibole–chlorite–quartz-rich groundmass. The groundmass consists mainly of plagioclase, amphibole, and quartz with secondary chlorite, calcite, and magnetite. Amphibole is variably altered to chlorite, while plagioclase shows polysynthetic twinning and sericitization. The fragmental texture and alteration assemblage indicate a pyroclastic origin with subsequent hydrothermal/metasomatic alteration are reflected in Figure-7.34a to 7.34d.



Figure-7.34a: Hand sample of pyroclastic rock (Sample no. UPCK/BRS-10/24-25).

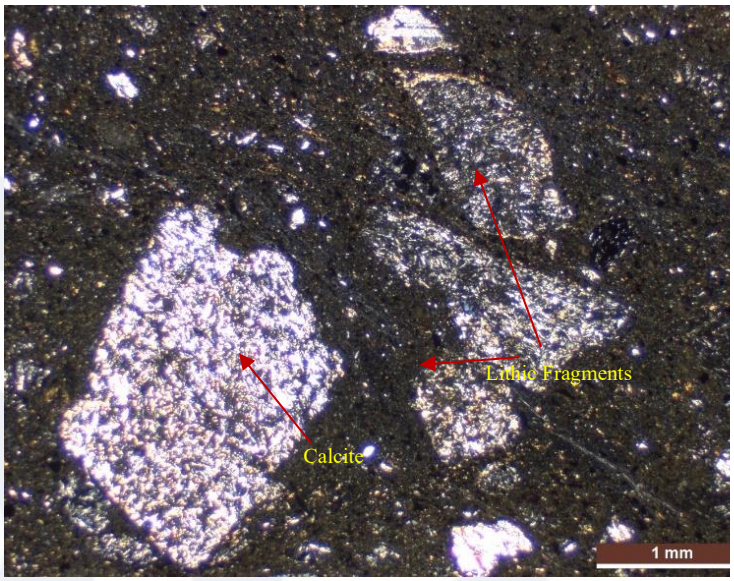


Figure -7.34b: Photomicrograph showing lithic fragments, calcite embedded in the groundmass in pyroclastic rock under XPL image (Sample no. UPCK/BRS-10/24-25).

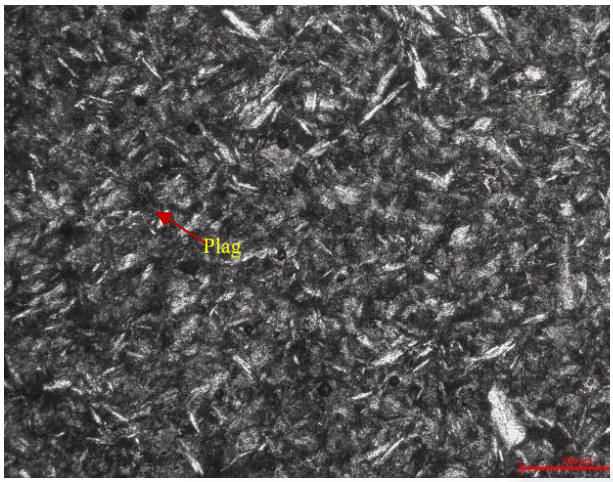


Figure-7.34c: Photomicrograph showing plagioclase, amphibole and chlorite groundmass in the pyroclastic rock under XPL image (Sample no. UPCK/BRS-10/24-25).

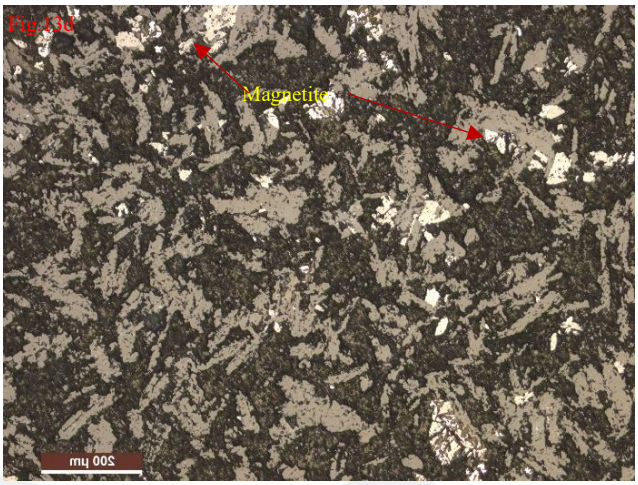


Figure-7.34d: Photomicrograph showing magnetite under reflected light (Sample no. UPCK/BRS-10/24-25).

7.2.3.14 Petrographic Description of Sample no. UPCK/BRS-75/24-25(Meta Tuff)

The rock is fine-grained and aphanitic, characterized by vesicles filled with quartz and feldspar within a devitrified glassy groundmass is represented in figure-7.65a . It consists mainly of quartz, feldspar, and altered volcanic glass, with minor magnetite and goethite as opaque minerals. The presence of relict glass shards, devitrification textures, and secondary iron oxide alteration indicates a metamorphosed and hydrothermally altered volcanic tuff are reflected in Figure-7.35b to 7.35c.



Figure-7.35a: Hand sample of meta tuff (Sample no. UPCK/BRS-75/24-25).

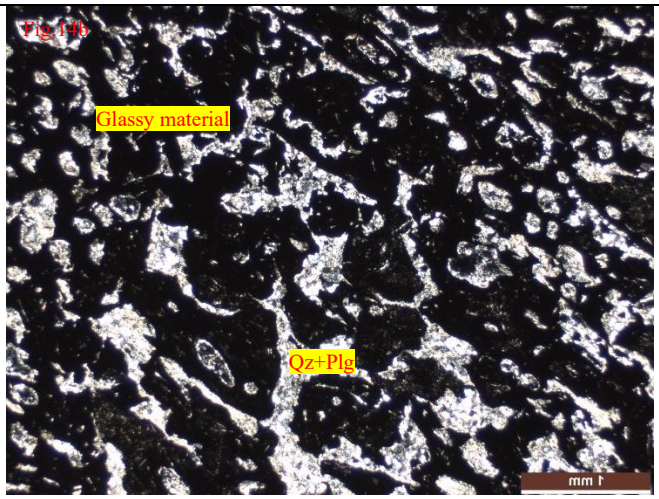


Figure -7.35b: Photomicrograph of tuff showing glassy material with iron oxide under XPL image (sample no. UPCK/BRS-75/24-25).

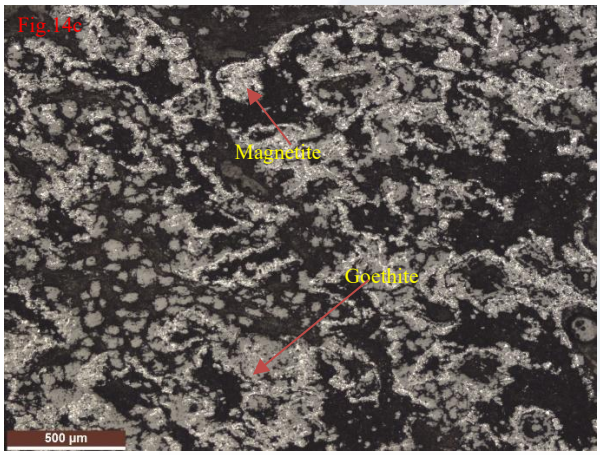


Figure-7.35c: Photomicrograph showing goethite with magnetite under reflected light view (Sample no. UPCK/BRS-7z5/24-25).

7.2.3.15 Petrographic Description of Sample no. UPCK/BRS-29/24-25(Dolerite)

The rock is fine-grained and dark green, composed predominantly of plagioclase and clinopyroxene (augite) with minor magnetite. It exhibits a characteristic ophitic to sub-ophitic texture, with plagioclase laths enclosed by larger augite grains. Plagioclase shows polysynthetic twinning and moderate sericitization, indicating secondary alteration. The mineral assemblage and texture confirm its classification as dolerite are showing in figure-7.36a to 7.36d.



Figure-7.36a: Hand sample of Dolerite (Sample no. UPCK/BRS-29/24-25).

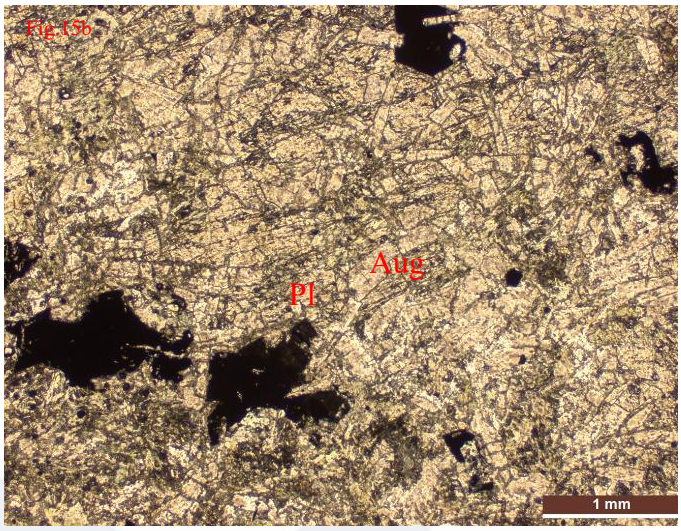


Figure-7.36b: Photomicrograph showing sub-ophitic texture defined by laths of plagioclases enclosing clinopyroxene in dolerite under PPL image (Sample no. UPCK/BRS-29/24-25).

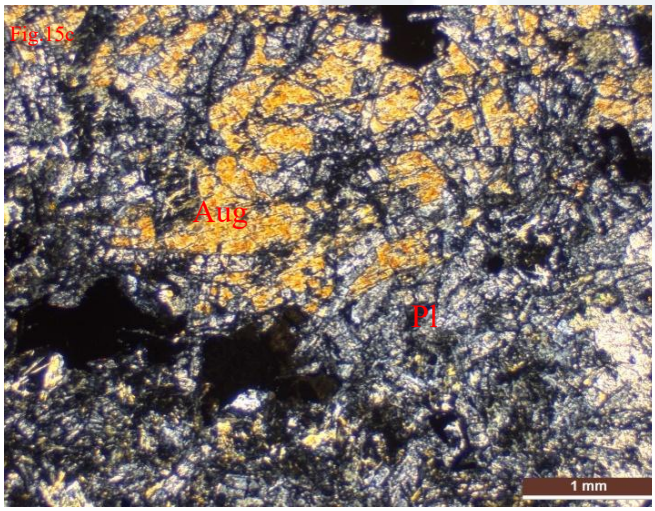


Figure7.36c: Photomicrograph showing sub ophitic texture defined by laths of plagioclases enclosing clinopyroxene in dolerite under XPL image (Sample no. UPCK/BRS-29/24-25).

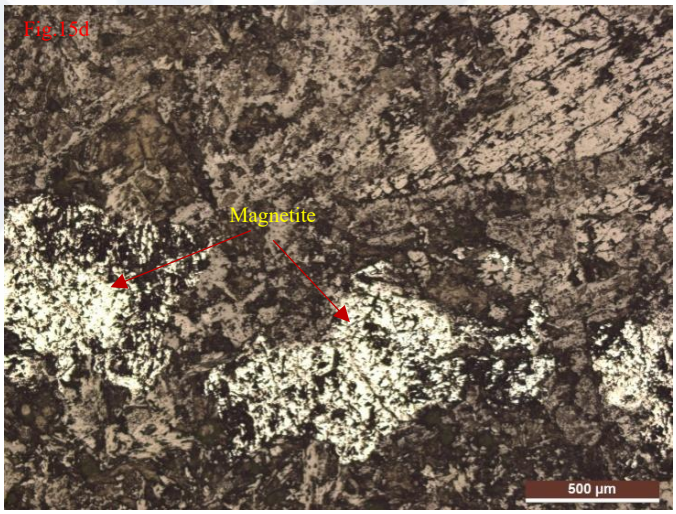


Figure-7.36d: Photomicrograph showing magnetite under reflected light view (Sample no. UPCK/BRS-29/24-25).

7.2.3.16 Petrographic Description of sample no. UPCKB-06/CH/04 (Banded Magnetite Hematite Chert (BMHC))

In hand specimen, sample no. **UPCKB-06/CH/04** shows alternating light-colored siliceous and dark to reddish-brown ferruginous bands (Figure-7.37a). The siliceous bands are fine-grained, massive, and

thicker than the ferruginous bands, possibly reflecting variable influx of silica and iron during deposition.

Petrographically, the BIF exhibits continuous primary banding defined by quartz-rich light bands and hematite–magnetite–goethite-rich dark bands. Quartz occurs as anhedral to subhedral, granulose grains, with elongated grains locally aligned parallel to bedding (Figure-7.37c). Cross-cutting micro-quartz veins indicate post-depositional silicification (Figure-7.37b). Stilpnomelane occurs as platy, fibrous and sheaf-like aggregates, indicating low-grade metamorphic recrystallization under greenschist-facies conditions (Figure-7.37d).

Under reflected light, the ferruginous bands are dominated by hematite with subordinate magnetite and goethite (Figure-7.37e–f). Goethite veins locally crosscut the primary banding, indicating later hydrothermal alteration. Minor sulphide specks occur within the silicate gangue (Figure-7.37g); SEM analysis is recommended for their precise identification.

Overall, the sample records a multi-stage evolution involving primary magnetite precipitation, subsequent martitization to hematite, hydration and oxidation forming goethite, and later hydrothermal quartz–goethite veining.



Figure-7.37a: Hand sample of banded magnetite-quartzite chert/quartzite displaying alternating of ferruginous and siliceous layers/bands defining primary bedding (Sample no. UPCKB-06/CH/04).

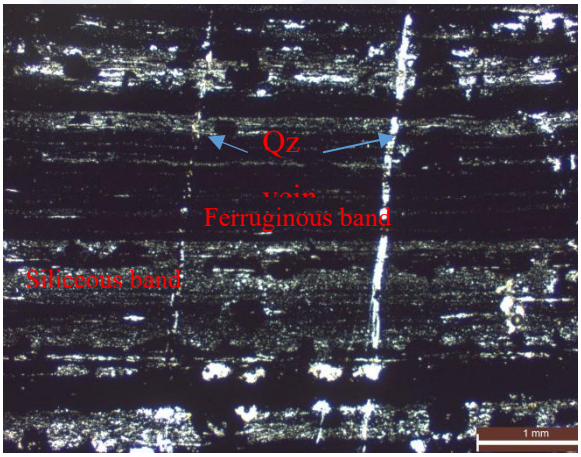


Figure-7.37b: Photomicrograph showing multiple quartz vein (Qtz) cross-cutting the primary banding under PPL (Sample no. UPCKB-06/CH/04).

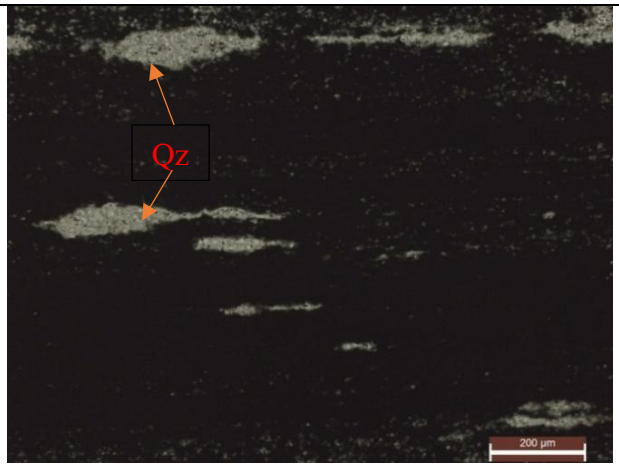


Figure-7.37c: Photomicrograph showing elongated lenticular quartz (Qtz) bands aligned parallel to the primary bedding under PPL view (Sample no. UPCKB-06/CH/04)

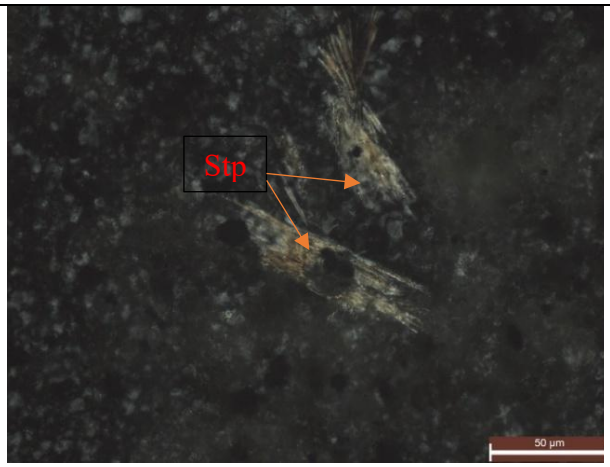


Figure -7.37d: Photomicrograph of BMHC showing fibrous with sheaf-like aggregates of stilpnomelane (Stp) associated with the quartz and iron oxides under the CPL view (Sample no. UPCKB-06/CH/04).

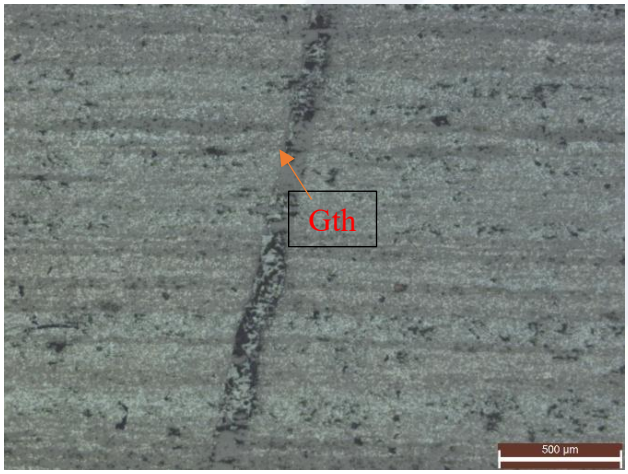


Figure-7.37e: Photomicrograph showing goethite (Gth) veinlet) cross-cutting the primary ferruginous and silicious bands under the reflected light view and silicious bands under the reflected light view (Sample no. UPCKB-06/CH/04).

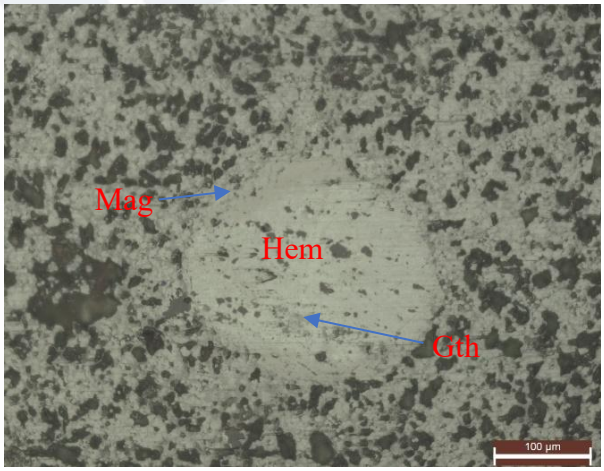
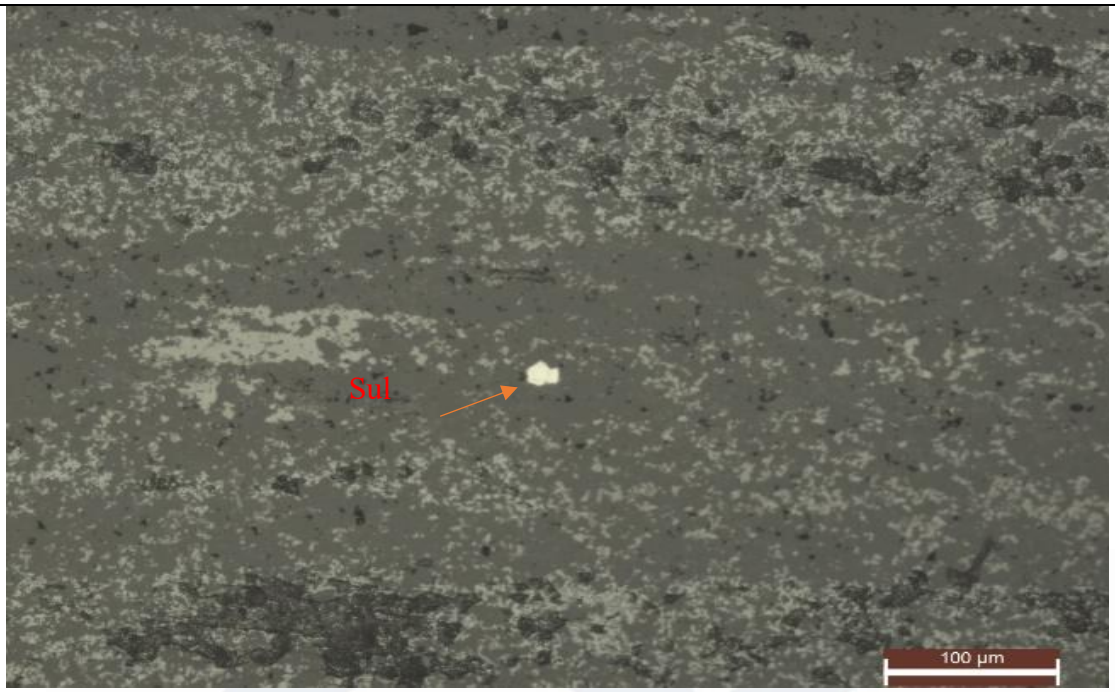


Figure-7.37f: Photomicrograph of BMHC featuring a large magnetite crystal. The grain preserves a paragenetic sequence showing hydrothermal alteration to hematite (martitization), followed by overprinting by surficial goethite under the reflected view (Sample no. UPCKB-06/CH/04).



Figureg-7.37g: Photomicrograph showing a tiny speck of bright phase (sulphide) occurs in the silicate gangue under the reflected light view (Sample no. UPCKB-06/CH/04).

7.2.3.17 Sample no. UPCKB-02/CH/02 (Banded Ferruginous Chert (BFC))

In hand specimen, sample **UPCKB-02/CH/02** is brownish, fine-grained, and exhibits alternating quartz-rich and iron oxide bands (Figure-7.38a). The chert bands are discontinuous and variable in thickness, possibly reflecting diagenetic modification and/or subsequent deformation.Under transmitted light, the ferruginous chert comprises alternating cryptocrystalline quartz-rich chert and hematite–goethite-rich bands, locally cross-cut by ferruginous veins (Figure-7.38b–c). Granular secondary quartz within the ferruginous bands indicates metamorphic recrystallization.

Under reflected light, hematite shows light to bluish gray colour, moderate reflectance, and blood-red internal reflections. It occurs as bladed and platy aggregates, commonly associated with goethite. Goethite exhibits lower reflectance with reddish-orange internal reflections. Specular hematite occurs as needle-shaped and bladed aggregates (Figure- 7.38d), indicating recrystallization and/or hydrothermal alteration.

Overall, the sample represents ferruginous chert affected by recrystallization, oxidation, and later ferruginous veining.

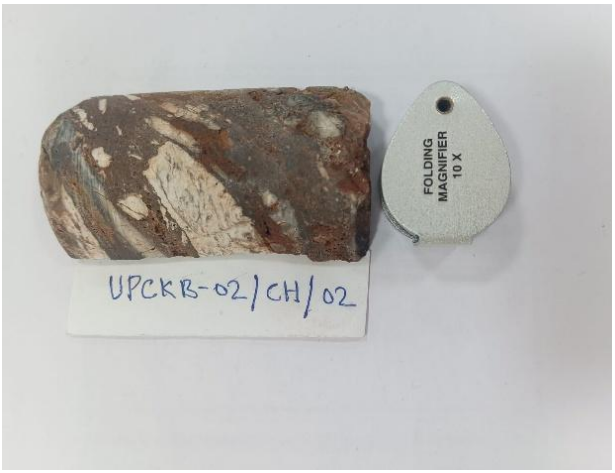


Figure-7.38a: Hand sample of banded ferruginous chert (UPCKB-02/CH/02)

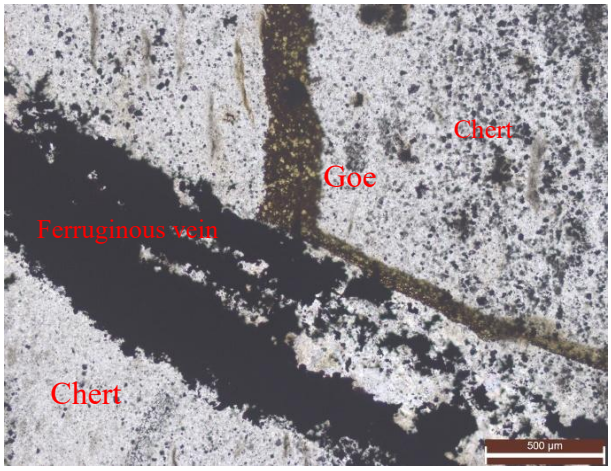


Figure-738b: Photomicrograph showing a ferruginous vein crosscutting the chert band under transmitted light (PPL) (UPCKB-02/CH/02)

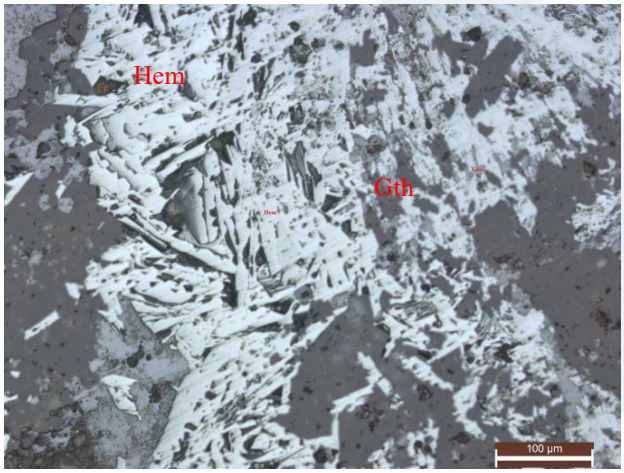


Figure-7.38c: Photomicrograph of BFC showing hematite (Hem) (platy-bladed)-goethite (Gth) within the ferruginous bands under the reflected light (Sample no. UPCKB-02/CH/02).

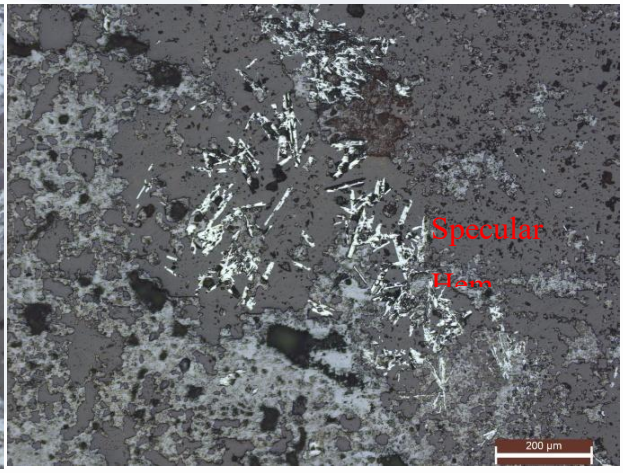


Figure-7.38d: Photomicrograph showing bladed to needle like hematite (also referred to as specularite) occurs interlayered associated between the goethite and quartz bands under reflected light (Sample no. UPCKB-02/CH/02).

7.2.3.18 Sample no. UPJTB-01/CH/05 (Brecciated Ferruginous Chert)

In hand specimen, sample UPJTB-01/CH/05 is fine-grained and brown to dark brown, comprising angular to sub-angular chert and quartz clasts within a fine-grained matrix (Figure-7.39a).Petrographically, the

rock is dominated by iron oxides with brecciated quartz and chert clasts (Figure-7.39b). Quartz occurs as colorless to light-yellow, angular to sub-angular grains, while chert is cryptocrystalline with a mottled texture and disseminated iron oxides (Figure-7.39c). Goethite is the dominant iron oxide and displays bluish-grey colour, low reflectance, reddish-orange internal reflections, and locally colloform texture under reflected light. Pervasive Limonitization of the iron oxides indicates significant supergene/weathering alteration (Figure-7.39d).Overall, the sample represents a brecciated, goethite-rich ferruginous chert affected by intense weathering and Limonitization.



Figure-7.39a: Hand sample of brecciated ferruginous chert (Sample no. UPJTB-01/CH/05).

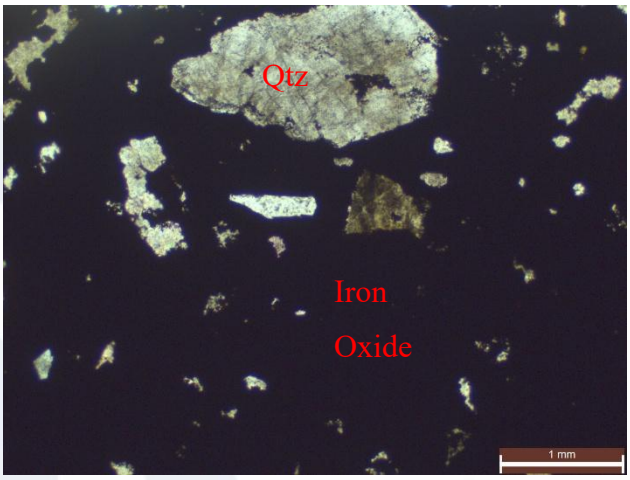


Figure-7.39b: Photomicrograph of brecciated ferruginous chert showing brecciated quartz (Qtz) clasts in darker Iron oxide, under PPL image (Sample no. UPJTB-01/CH/05).

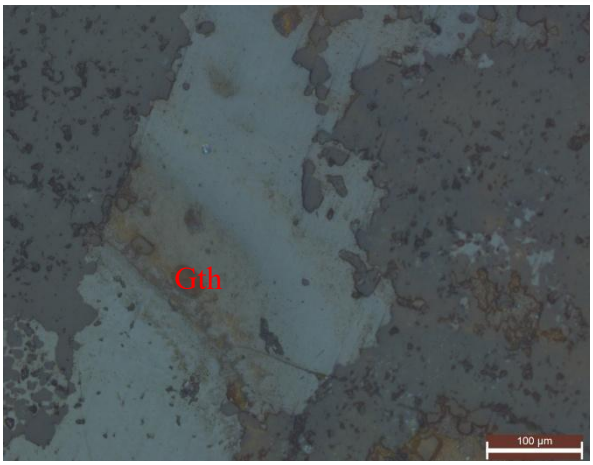


Figure-7.39c: Photomicrograph showing goethite (gth) under reflected light view (Sample no. UPJTB-01/CH/05).

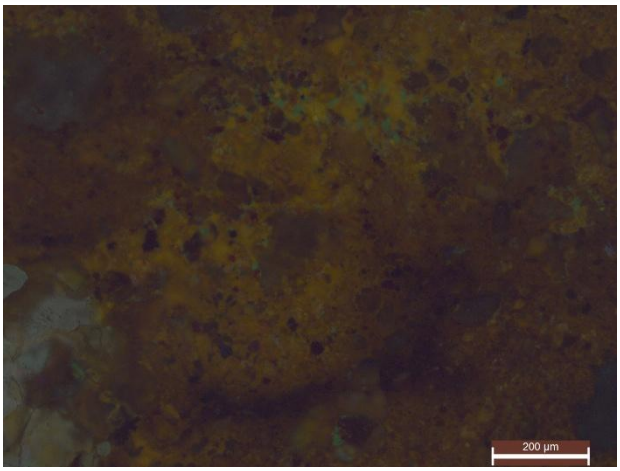


Figure-7.39d: Photomicrograph showing limonitization of iron oxide matrix under reflected light view (Sample no. UPJTB-01/CH/05).

7.2.3.19 Sample no. UPCKB-01/CH/01 (Ferruginous shale)

In hand specimen, sample no. UPCKB-01/CH/01 is a very fine-grained rock, reddish-brown-colored rock (Figure-7.40a). Petrographic study reveals that the rock is composed mainly of quartz and iron oxide (Figure-7.40b & c). Fine-grained quartz occurs as the principal siliceous constituent, while occasional quartz clasts are embedded within the matrix, indicating a clastic component. The iron oxides occur predominantly as hematite, which is disseminated throughout the groundmass, imparting the characteristic ferruginous nature to the rock (Figure-7.40d). The hematite exhibits moderate reflectivity, greyish white colour, weak pleochroism, distinct anisotropy, along with a characteristic blood-red internal reflection.

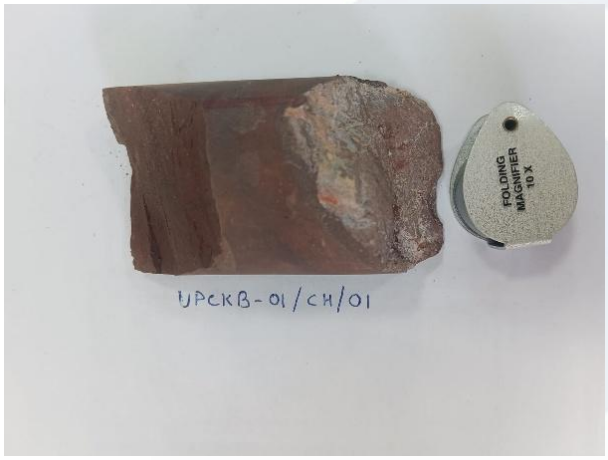


Figure-7.40a: Hand sample of ferruginous shale (Sample no. UPCKB-01/CH/01) showing a very fine-grained quartz and iron oxides

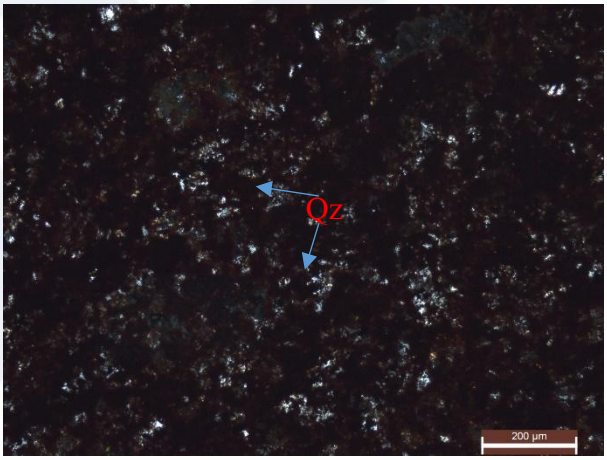


Figure-7.40b: Photomicrograph of Ferruginous showing a very fine-grained quartz and iron oxide under XPL view (Sample no. UPCKB-01/CH/01).

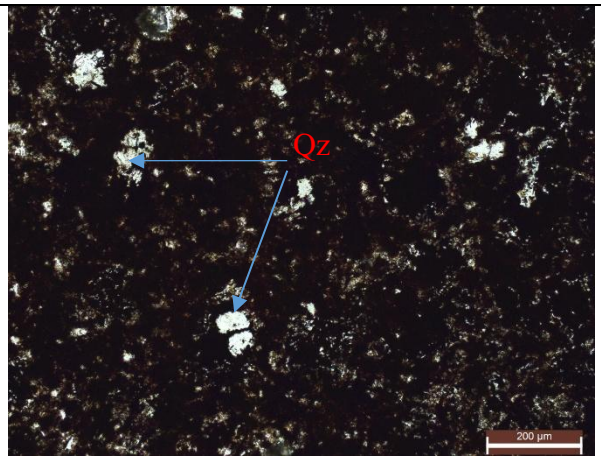


Figure-7.40c: Photomicrograph of ferruginous showing a very fine-grained quartz with few quartz clast and iron oxide under XPL view (Sample no. UPCKB-01/CH/01).

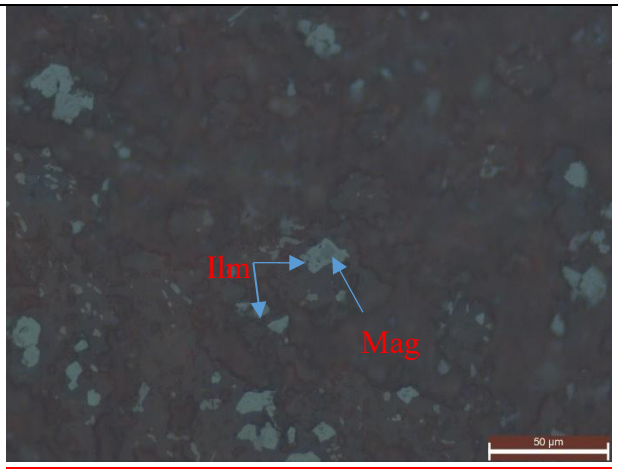


Figure-7.40d: Photomicrograph of ilmenite (Ilm) and magnetite (Mag) under reflected light view (Sample no. UPCKB-01/CH/01).

7.2.3.20 Sample no. UPCKB-05/CH/03 (Meta-dolerite)

In hand specimen, sample UPCKB-05/CH/03 is medium- to coarse-grained and dark green, consisting mainly of plagioclase and pyroxene laths (Figure-7.41a).

Petrographically, the rock comprises plagioclase, clinopyroxene, orthopyroxene, chlorite, titanite and minor opaques, with a well-developed sub-ophitic texture (Figure-7.41b). Plagioclase shows polysynthetic twinning and sericitization, while pyroxenes are locally altered to chlorite. Quartz–chlorite veins and epidote veinlets crosscut the primary assemblage, indicating successive low-temperature hydrothermal alteration and silicification (Figure-7.41c–d). Titanite occurs as elongated, lozenge-shaped crystals.

Under reflected light, the opaque minerals are mainly chalcopyrite, pyrite and ilmenite, with skeletal chalcopyrite and subhedral to euhedral pyrite locally preserved (Figure-7.41e).



Figure-7.41a: Hand sample of meta-dolerite (Sample no. UPCKB-05/CH/03).

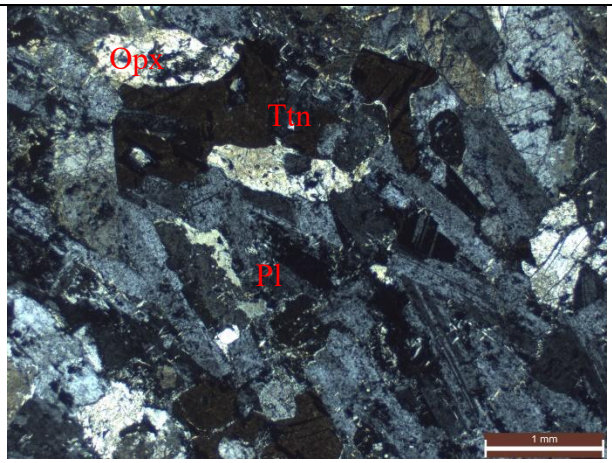


Figure-7.41b. Photomicrograph of meta-dolerite showing sub-ophitic texture under XPL view (Sample no. UPCKB-05/CH/03).

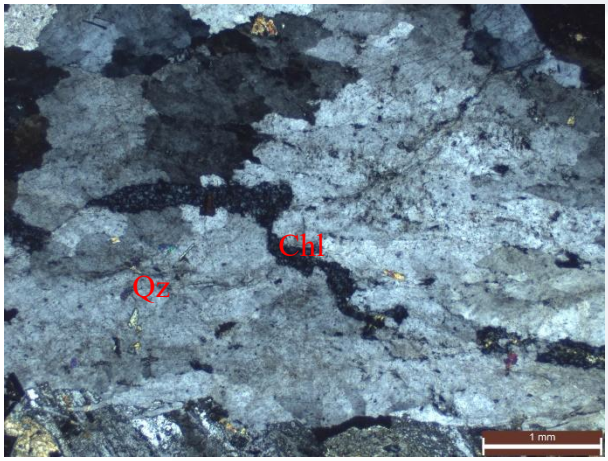


Figure-7.41c: Photomicrograph of meta-dolerite showing quartz-chlorite (Qtz-Chl) vein under XPL (Sample no. UPCKB-05/CH/03).

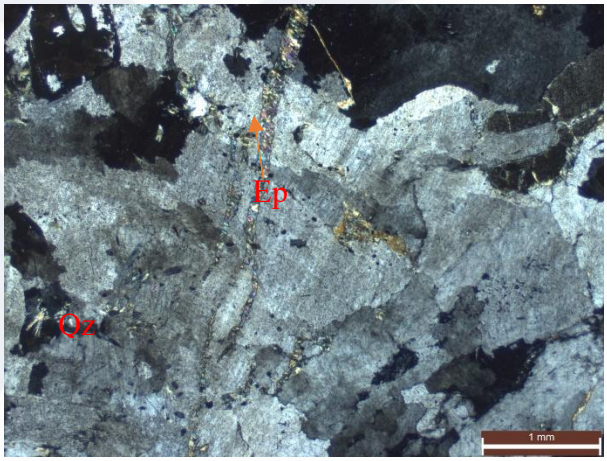


Figure-7.41d: Photomicrograph of meta-dolerite showing the trails of epidote veins under XPL view (Sample no. UPCKB-05/CH/03).

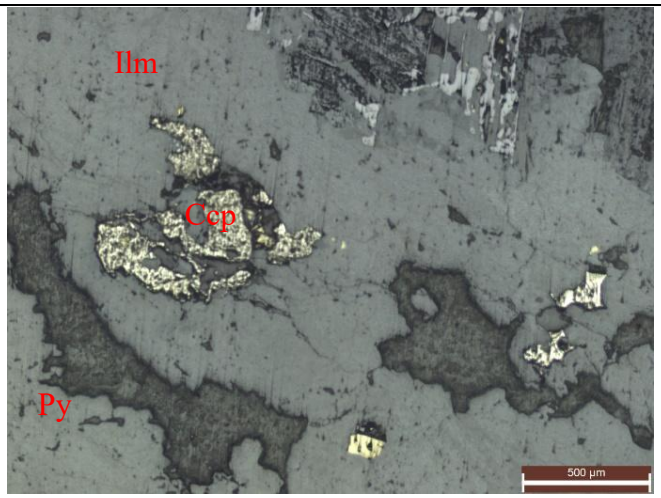


Figure-7.41e: Photomicrograph of meta-dolerite showing Chalcopyrite (Ccp), pyrite (Py) and ilmenite (Ilm) under reflected light view (Sample no. UPCKB-05/CH/03).

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

The **Son–Narmada North Fault (SNNF)** and **Son–Narmada South Fault (SNSF)**, both trending **ENE–WSW**, demarcate the northern and southern boundaries of the **Mahakoshal Fold Belt**, respectively. The **SNNF** separates the Mahakoshal Group of rocks from the Vindhyan Supergroup in the north, whereas the **SNSF** separates the Mahakoshal Group from the **Dudhi Granitoid Complex (DGC)** in the south.

The rocks of the investigated area have undergone **polyphase deformation**, which has largely obliterated or modified many of the earlier-formed major structures. As a result, the structural elements preserved in the area represent both original depositional features and later tectonic modifications.

The structures observed in the investigated area may broadly be classified into two categories:

1. Primary or non-diastrophic structures, which are related to the original depositional or syn-sedimentary processes.

2. Secondary or diastrophic structures, which developed due to tectonic deformation after deposition and lithification of the rocks.

7.3.1 Non-diastrophic structures / primary structures

7.3.1.1 Detailed Structural Disposition

The structural elements observed in the area can be divided into planar structures, linear structure and joints, etc.

7.3.1.1.1 Primary Bedding/ Banding (So)

Primary **bedding/banding (S_0)** is well preserved in the **Banded Iron Formation (BIF), phyllite, and sandstone**, where it is expressed by **colour and compositional banding**. The general trend of bedding ranges from **E–W to ENE–WSW**, with **steep to sub-vertical dips towards either side**.

In the BIF, primary banding is defined by alternating **ferruginous layers composed predominantly of hematite–magnetite** and **siliceous layers comprising chert–jasper–quartzite** (**Figure-7.42**). In phyllite, thin compositional bands are locally observed, with individual band thicknesses ranging from a few **millimetres to less than 1 cm**. These bands are defined by alternating **quartz–feldspar-rich layers and mafic/phyllosilicate-rich layers**.

7.3.1.1.2 Cross Bedding

Minor cross-laminations/crossbedding are observed in sandstone and gritty sandstone exposed in and around the Jogail area. These structures represent primary sedimentary features and indicate original depositional conditions.

7.3.2 Diastrophic structures / secondary structures

The rocks of the Mahakoshal Group have undergone polyphase deformation. Although three phases of deformation are reported from the Mahakoshal Belt, only two phases of deformation are clearly marked in the present investigation area.

7.3.2.1 Foliation

Foliation is well developed in the metasedimentary rocks of the study area, particularly in phyllite and banded haematite-chert/jasper (BHC&J) and banded magnetite-chert/jasper (BMC&J) units. It is expressed by the preferred alignment of micaceous and other constituent minerals and by the planar

arrangement of alternating mineralogical bands. The foliation generally follows the regional structural trend of the Mahakoshal Group and shows local variations in strike and dip due to folding, shearing and deformation. Near iron-rich zones, the foliation is locally defined by the orientation of iron-oxide-rich bands and associated siliceous/metasedimentary layers.

7.3.2.2 Joints

Two prominent sets of joints are observed in BIF and phyllite. The first joint set (J_1) trends approximately N50°E, whereas the second joint set (J_2) trends around N70°W. Both joint sets show steep to nearly vertical dips.

7.3.2.3 Folds

The primary bedding surface **(S_0)** was tightly folded to form **F_1 folds** during the **D_1 deformation phase**. Subsequently, the **S_1 foliation** was folded during the **D_2 deformation phase**, forming relatively **open F_2 folds** and resulting in a **Type-I fold interference pattern**.

The **Son–Narmada North Fault (SNNF)**, trending **ENE–WSW**, occurs in the northern part of the investigation area. In addition to this major fault, several **sympathetic faults** have been observed southeast of **Karwaniya** and east of **Chakdaiya**

Slickensides are observed on fault surfaces within phyllite northwest of **Bijaura**, indicating movement along the fault surfaces (**Figure. 7.42**). These fault surfaces generally trend approximately **N70°E**. Another well-exposed fault surface occurs northeast of **Jharpiya**, trending **N70°E** and dipping approximately **45° towards the southeast**.

In the western part of **Bijaura**, the occurrence of **white-coloured fault gouge** within phyllite, together with **brecciated chert–jasper–quartzite–hematite–magnetite bodies**, indicates significant faulting and associated brittle deformation. The fault gouge generally trends **N65°E–N75°E**. Similar **brecciated chert–jasper–quartzite–hematite–magnetite bodies** and white fault gouge are also observed within phyllite **northwest of Bijaura**.



Figure No -7.42: Field exposure showing folded and deformed bedded/foliated rocks, reflecting local structural control in block A1.

In block A1 structural fabric analysis indicates a **strongly developed and regionally consistent S_1 foliation**. The rose diagram, based on **373 measurements**, shows a dominant **70°–90° strike sector**, with a mean resultant direction of **073°–253°** and a high resultant length of **0.94**, indicating strong directional clustering. S_1 dips range from **30°–88°**, with a mean dip of **70.4°**, indicating a predominantly steeply dipping **ENE–WSW-trending structural fabric** is illustrated in Figure-7.43.

Overall, the structural data suggest a **polyphase deformation history**, comprising development of a strong S_1 fabric followed by folding and S_2 development. These structures may influence **fluid migration and mineralization**, particularly along foliation planes, fold hinges, axial-planar structures, lithological contacts and associated shear/fracture zones.

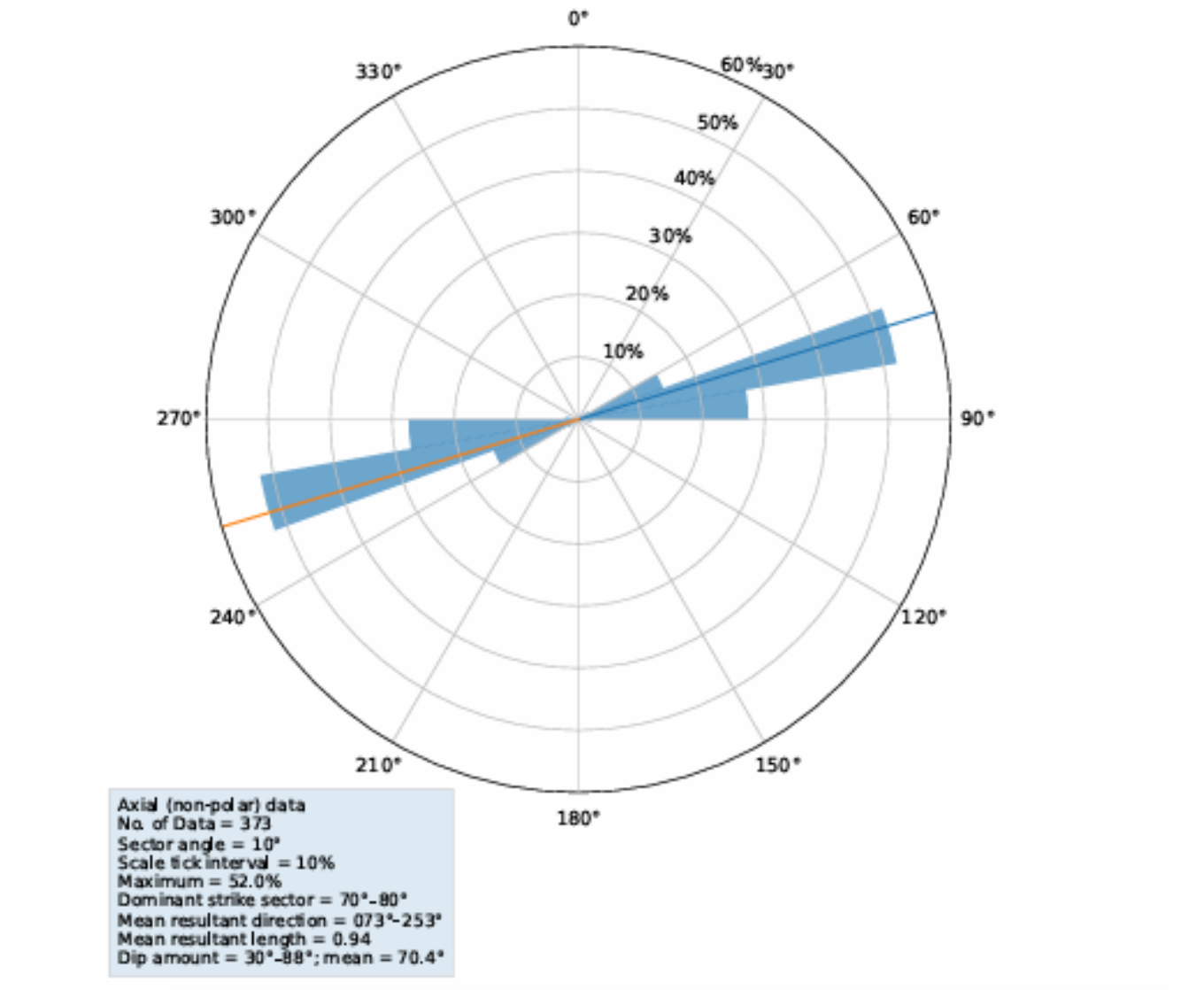


Figure-7.43: Rose diagram showing the dominant ENE–WSW (073°–253°) structural trend of s_1 foliation in block A1.

In Block A2 the rose diagram in Figure-7.44 of 118 bedding measurements shows a strong ENE–WSW preferred orientation, with a dominant strike sector of 70°–80° and a mean resultant direction of 075°–255°. The mean resultant length of 0.73 indicates good directional consistency, while the mean dip of 71.5° indicates that the bedding planes are generally steeply dipping.

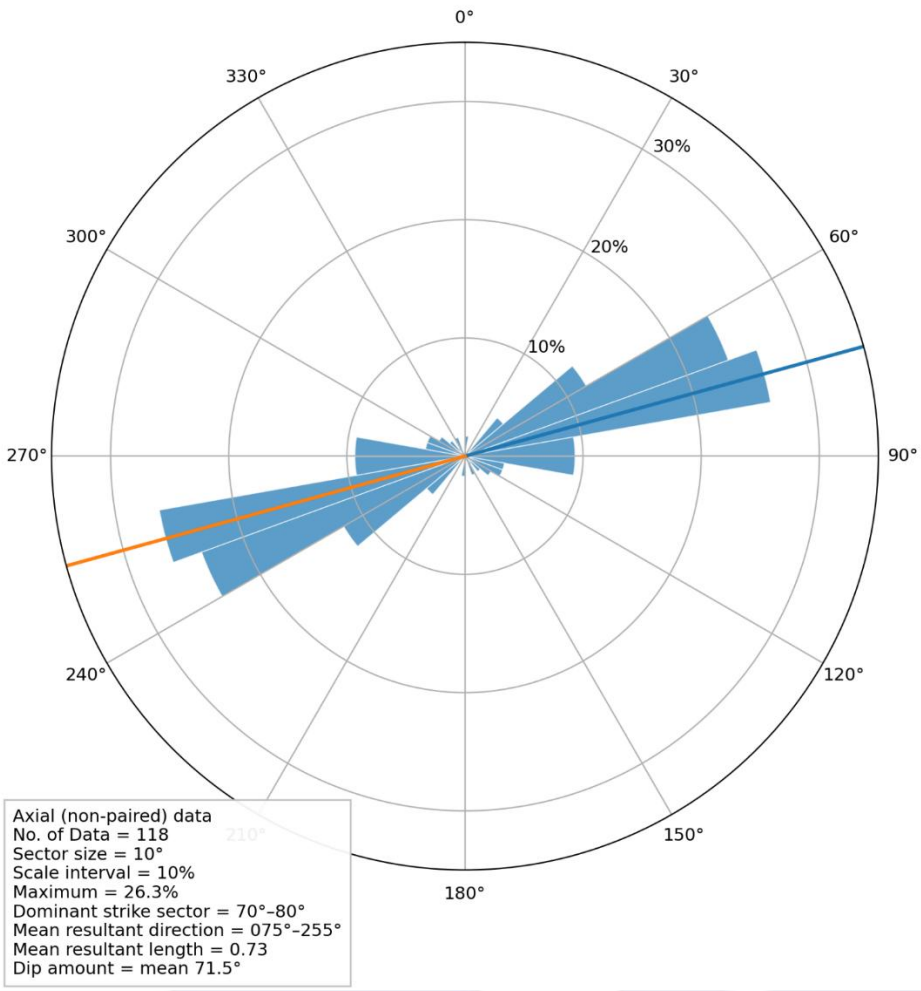


Figure-7.44: Rose diagram showing the dominant ENE–WSW (075°–255°) structural trend of s_1 foliation in block A2

7.3.3 Detailed structural disposition and its relationship with mineralization

The study area is predominantly represented by lithounits of the Agori Formation of the Mahakoshal Group, comprising Banded Hematite Chert and Jasper (BHC&J), Banded Magnetite Chert and Jasper, Banded Hematite-Magnetite Chert, ferruginous quartzite-jasper-chert, phyllite, and ferruginous phyllite, which constitute the principal host rocks for the iron ore mineralization. The major BIF zone of Block A1 comprises four parallel and discontinuous BHC&J bands interbedded with phyllite, massive iron ore, tuff with hematite, felsic tuff, and carbonated metabasalt. The distribution, continuity, and thickness of the iron ore mineralization are primarily controlled by the lithological and structural disposition of the BIF bands, with local effects of folding, fracturing, brecciation, faulting, and shearing. The proximity of the Son–

Narmada North Fault/Shear Zone has resulted in local structural disturbance and weathering of the mineralized zones. Metamorphism and deformation have further influenced the recrystallization and concentration of iron minerals, mainly hematite and magnetite. Thus, the lithological, structural, and metamorphic characteristics collectively control the geometry, continuity, thickness, and grade distribution of the iron ore mineralization.

7.3.3.1 Mineralogy of Ore Zones and Ore Textures

The ore zones are predominantly hosted by Banded Iron Formation (BIF) comprising Banded Hematite Chert and Jasper (BHC&J), Banded Magnetite Chert and Jasper (BMC&J), Banded Hematite–Magnetite Chert (BHMC), and Banded Hematite Quartzite (BHQ). In Block A1, the BIF occurs as parallel, discontinuous bands interbedded with phyllite, with hematite and magnetite constituting the principal iron-bearing minerals. The BIF exhibits well-developed primary compositional banding (S_0), defined by alternating ferruginous and siliceous layers, with hematite-rich layers generally ranging from less than 2 mm to about 4.5 cm in thickness and locally containing magnetite. Shear fabrics and boudinage structures are locally developed within the siliceous layers, reflecting structural deformation of the BIF. Limonitization is commonly observed along fractures and S_0 banding surfaces, indicating secondary oxidation and weathering of iron-bearing minerals. In Block A2, the mineralization is represented mainly by massive iron ore, with subordinate BH/MC&J bands and lateritic capping. The ore textures and mineral assemblages indicate that the iron mineralization has been influenced by primary BIF banding, structural deformation, and subsequent oxidation and weathering processes.

7.4 A discussion on the type of 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.

The mineralisation in the **A1 Chakdiya and A2 Jorba Blocks, Sonbhadra District, Uttar Pradesh**, is associated with the **Mahakoshal Group, Agori Formation**, and occurs within an iron-rich banded volcano-sedimentary sequence. The principal mineralised lithologies include **BHC&J, BMC&J,**

Massive/Oxidised Iron Ore (MIO), BH/MC&J, ferruginous phyllite, hematite-bearing tuff and brecciated quartzite with iron matrix. The principal ore minerals are **hematite, magnetite, martitized magnetite and goethite**, associated predominantly with quartz, with minor clay minerals and traces of pyrite.

The mineralisation is predominantly **stratiform to stratabound and lithologically controlled**, with local modification by **folding, shearing, fracturing, brecciation and oxidation**. In **A1**, BHC&J and BMC&J horizons show appreciable strike continuity and broadly follow the **ENE–WSW structural trend**, with evidence of down-dip persistence from scout drilling. In **A2**, mineralisation is comparatively heterogeneous and occurs mainly as **MIO and associated iron-bearing lithologies**, including hematite-bearing tuff and brecciated quartzite with iron matrix. Associated **TiO_2 and V_2O_5 mineralisation** has also been identified at the adopted cut-offs of **1.50% TiO_2 and 500 ppm V_2O_5**, respectively.

The investigation was designed in accordance with the objectives of **G4 (Reconnaissance) stage exploration**, comprising **1:12,500 scale geological mapping, bedrock sampling, channel sampling and limited scout diamond drilling**. The programme was aimed at establishing the geological framework, identifying prospective mineralised zones and assessing their preliminary continuity and grade characteristics.

A total of **91 bedrock samples and 150 channel samples** were collected. Bedrock sampling was undertaken at approximately **100–300 m spacing**, subject to outcrop availability and accessibility, while channel samples were collected across representative mineralised bands to assess grade and thickness variation.

Limited **scout diamond drilling** was undertaken to test the subsurface continuity of the mapped mineralised horizons. A total of **8 inclined boreholes—6 in A1 and 2 in A2**—were drilled for an aggregate depth of **700.10 m**, with individual hole depths of approximately **53–120 m**. Drilling confirmed the subsurface persistence of **BHC&J/BMC&J mineralisation in A1** and **MIO-associated iron mineralisation in A2**. Mineralised intersections were encountered from near surface to approximately **116 m down-hole in A1** and **78 m down-hole in A2**. Based on the exploration data generated during the present investigation and the resultant resource assessment, the identified mineralisation has been classified under the UNFC system as Category 334 – Reconnaissance Inferred Mineral Resource,

reflecting the level of geological confidence established from the reconnaissance-stage exploration data and the present stage of exploration.

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

The extent and variability of mineralisation in the **Chakdiya (A1) and Jorba (A2) Blocks** have been established from surface geological mapping and borehole intersections. The mineralisation shows variation in **strike length, plan width, thickness, and downhole continuity**.

Block A1 – Chakdiya: The mineralisation is principally represented by **BHC&J and BMC&J**, generally following an **ENE–WSW trend**. The BHC&J bands have mapped lengths of **1,631–4,530 m**, plan widths of **18–40 m** and measured thicknesses of **10.67–23.28 m**, with strikes of **N65°E–N75°E**. BMC&J bands have lengths of **1,425–3,034 m**, widths of **15–29 m** and measured thicknesses of **16.98–35.89 m**, with strikes of **N70°E–N75°E**. Borehole intersections show mineralisation from **surface to 116 m downhole**. The top and bottom of the identified mineralised envelope are **10–116 m in UPCKB-01, 0–65 m in UPCKB-02, 0–97 m in UPCKB-03, 19–77 m in UPCKB-04, 9–59 m in UPCKB-05 and 8–30 m in UPCKB-06**. The mineralisation occurs as multiple BHC&J/BMC&J bands separated locally by barren or weakly mineralised intervals, indicating variable down-hole continuity.

Block A2 – Jorba: The mineralisation comprises **MIO, BH/MC&J, hematite-bearing tuff and brecciated quartzite with iron matrix**. MIO bands have mapped lengths of **135–800 m**, plan widths of **30–58 m** and measured thicknesses of **8.25–17.46 m**, with strikes generally between **N68°E and N88°E**. BH/MC&J bands range from **147–290 m in length** and **37–70 m in width**, while the BQ with iron matrix body is about **1,085 m long and 60 m wide**, striking approximately **N72°E**. Borehole UPJTB-01 records mineralisation from **0–42 m down-hole**, comprising BQ with iron matrix and MIO, whereas UPJTB-02 records mineralisation from **10–78 m**, comprising MIO and hematite-bearing tuff. Thus, the A2

mineralisation extends from near surface to approximately **78 m down-hole**, with variable internal thickness and lithological continuity.

Details of Boreholes Drilled in Chakdiya Kushniya& Jorba Block', Sonbhadra, Uttar Pradesh during FS: 2024-25

Borehole No.	Total Drilling Depth (m)	Mineralized Zone As per Guideline			Rock Type	Strike	Core Recovery (%)	Rock Formation	Stratigraphy
UPCKB-01	117	10	15	5.00	BHC&J	N70°E	95.27	Agori Formation	Mahakoshal group
		22	26	4.00	BHC&J				
		28	32	4.00	BHC&J				
		35	37	2.00	BHC&J				
		42	43	1.00	BHC&J				
		47	48	1.00	BHC&J				
		75	78	3.00	BHC&J				
		79	85	6.00	BHC&J				
		86	88	2.00	BHC&J				
		89	91	2.00	BHC&J				
		93	102	9.00	BHC&J				
		103	105	2.00	BHC&J				
		108	109	1.00	BHC&J				
		111	116	5.00	BHC&J				
UPCKB-02	120	0	5	5.00	BHC&J	N75°E	92.02		
		5	9.2	4.20	BHC&J				
		10	10.8	0.80	BHC&J				
		13.8	15	1.20	BHC&J				
		19	20	1.00	BHC&J				
		22	24	2.00	BHC&J				
		49	52	3.00	BHC&J				
		53	55	2.00	BHC&J				
		57.45	59.45	2.00	BHC&J				
		60	65	5.00	BHC&J				
UPCKB-03	97	0	5	5.00	BMC&J	N70°E	91.02		
		5	10	5.00	BMC&J				
		10	15	5.00	BMC&J				
		15	20	5.00	BMC&J				
		20	25	5.00	BMC&J				
		25	30	5.00	BMC&J				
		30	35	5.00	BMC&J				
		35	38	3.00	BMC&J				
		56	60	4.00	BMC&J				
		60	65	5.00	BMC&J				

		65	68	3.00	BMC&J				
		79	83	4.00	BMC&J				
		92	95	3.00	BMC&J				
		95	97	2.00	BHC&J				
UPCKB-04	80	19	20	1.00	BMC&J	N75°E	95.56		
		23	25	2.00	BMC&J				
		25	30	5.00	BMC&J				
		46	50	4.00	BMC&J				
		50	55	5.00	BMC&J				
		55	60	5.00	BMC&J				
		60	65	5.00	BMC&J				
		65	70	5.00	BMC&J				
		72	77	5.00	BMC&J				
UPCKB-05	100	9	10	1.00	BHC&J	N70°E	91.73		
		21	24	3.00	BHC&J				
		25	30	5.00	BHC&J				
		30	35	5.00	BHC&J				
		35	40	5.00	BHC&J				
		40	45	5.00	BHC&J				
		45	50	5.00	BHC&J				
		50	55	5.00	BMC&J				
		55	59	4.00	BMC&J				
UPCKB-06	53.1	8	9	1.00	BMC&J	N75°E	92.58		
		15	20	5.00	BMC&J				
		20	25	5.00	BMC&J				
		25	29	4.00	BMC&J				
UPJTB-01	53	0	5	5.00	BQ with Iron Matrix	N68°	91.08		
		5	10	5.00	BQ with Iron Matrix				
		10	15	5.00	BQ with Iron Matrix				
		15	20	5.00	BQ with Iron Matrix				
		20	25	5.00	MIO				
		37	42	5.00	MIO				
UPJTB-02	80	10	14	4.00	Tuff with hematite	N135°	91.16		
		22	22.5	0.50	Felsic Tuff				
		33	37	5.00	MIO				

		37	41	4.00	MIO				
		45	46	1.00	MIO				
		46	48.25	2.50	Tuff with hematite				
		49	50	1.00	Tuff with hematite				
		50	51	1.00	Tuff with hematite				
		51	53.14	2.14	Tuff with hematite				
		56.84	60	3.16	Tuff with hematite				
		72.5	74	1.50	Tuff with hematite				
		75	76.5	1.50	Tuff with hematite				
		76.5	78	1.50	Tuff with hematite				
Total Drilling Depth	700.1			351.00					

CHAPTER 8: 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 (if more than one agency is involved details to be given separately for each agency)

Several geological, geochemical and geophysical investigations have been carried out in the Mahakoshal Group of Sonbhadra district, Uttar Pradesh, mainly for iron ore, gold and base-metal mineralisation. A.P. Tiwari (1965–66) carried out geological mapping in Toposheet No. 63L/14 and reported banded iron ore associated with jasper and chert, with Fe values of 37.94–49.00%. A.K. Dey (1967–69) investigated the Bargawan iron ore occurrence and estimated about 6.0 million tonnes of possible low-grade iron ore resource. Subsequent geophysical investigations (2009–12) and National Geochemical Mapping by Sarkar et al. (2013–14) delineated significant gravity, magnetic and geochemical anomalies associated with the Mahakoshal Group. Gold exploration by Dwivedi et al. (1998–2000) in the Sona Pahari area identified mineralisation controlled mainly by shear zones, fold closures and lithological contacts, while sporadic base-metal mineralisation has also been reported from the belt. Modak et al. (2014–15) carried out G4-stage mapping in the Bharhari area and delineated five sub-parallel BHC/BHJ bands over a cumulative strike length of about 20 km. Detailed exploration by M.R. Shrivastav and S. Ahmad (2017–18) in Block-A, Bharhari, involving mapping, pitting, trenching and 750 m drilling, estimated 14.89 Mt @ 34.73% Fe at 30% cut-off and 8.41 Mt @ 38.34% Fe at 35% cut-off. Subsequently, Mukesh Srivastava et al. (2019–20) carried out G3-stage exploration in Block-B, Bharhari, including 461.30 m drilling, and estimated 10.77 Mt @ 34.50% Fe at 30% cut-off and 5.03 Mt @ 39.51% Fe at 35% cut-off. Overall, previous investigations have established significant iron ore potential in the Bharhari–Bijaura–Karwaniya–Jorba sector, mainly associated with BHC/BHJ, BHQ/BMQ, ferruginous phyllite, brecciated chert-jasper-quartzite and gossanous zones, with mineralisation broadly controlled by the regional ENE–WSW to WNW–ENE structural trend of the Mahakoshal belt.

8.2 Brief details of the exploration carried out (to be given separately for each agency)

Table-8.1: Chronology and scope of previous exploration activities in the study area.

Agency / Investigator	Field Season	Area / Location	Nature & Scale of Work	Brief Details of Exploration Carried Out
A.P. Tiwari	1965–66	Parts of Toposheet No. 63L/14, Sonbhadra, Uttar Pradesh	Systematic geological mapping; excavation of four pits of about 3.5 m^3 each	Iron ore occurred as bands associated with jasper and chert. Mineralisation was mainly represented by goethite, with hematite occurring predominantly along ridge tops. Pit samples assayed **37.94–49.00% Fe** and **250–1500 ppm Mn**.
A.K. Dey	1967–68 & 1968–69	Bargawan area, Sonbhadra (then Mirzapur), Uttar Pradesh	Preliminary investigation followed by assessment of quality and quantity of iron ore	Iron ore occurred as **banded siliceous hematite-quartzite-jasper** containing mainly siliceous hematite, limonite and goethite with rare magnetite. About **70% samples contained <35% Fe_2O_3**.

				Approximately **6 million tonnes** of possible low-grade iron ore resource was estimated over **0.37 km²**.
Radhakrishnan & Viswanathan		Western extension of Mahakoshal belt, Sidhi district, Madhya Pradesh	Geological and geochemical investigation for base-metal mineralisation	Disseminated pyrite, chalcopyrite and pyrrhotite associated with quartz veins and basic intrusive were reported. Geochemical anomalies of up to **4000 ppm Cu** were recorded.
Dwivedi et al.	1998–99 & 1999–2000	Sona Pahari area, Sonbhadra, Uttar Pradesh	Gold exploration involving surface trenching and sub-surface drilling	Gold mineralisation was identified within the **phyllite-quartzite-tuff sequence with greywacke** of the Parsoi Formation. Mineralisation is mainly controlled by **shear zones, fold closures and locally lithological contacts**, with quartz and quartz-carbonate veins and basic bodies.

Geophysical Mapping Programme by GSI	2009–12	Parts of Toposheets 63L/14 & 63L/15	Regional gravity and magnetic geophysical mapping	A gravity high/closure of about **–20m Gal** was identified around Jungel. The anomaly was interpreted in relation to relatively heavier lithounits of the Agori and Parsoi Formations, including BIF bands, quartz veins/reefs and dolerite dykes. Magnetic anomalies generally ranged from about **100 nT to –150 nT**.
Sarkar et al. – NGCM	2013–14	Toposheet No. 63L/14 and adjoining 63L/15	National Geochemical Mapping	Higher **Fe_2O_3 (>14%)** values were recorded over Mahakoshal Group rocks and attributed mainly to Banded Hematite Quartzite and Banded Hematite Jasper. Anomalous **Cr, Cu, Ni, Pb and V** values were also reported.
Modak et al.	2014–15	Bharhari–Bijaura area,	**G4-stage large-scale geological mapping on**	Five sub-parallel BHC/BHJ bands were delineated over about **20**

		Sonbhadra, Uttar Pradesh	**1:12,500 scale** under "Resource Evaluation of Potentiality of Iron in Mahakoshal Group, Bharhari Area"	**km cumulative strike length**, with individual widths of **2–10 m**. Fe_2O_3 values ranged from **32.79–64.18%**, with **14 samples >60% Fe_2O_3**.
M.R. Shrivastav & S. Ahmad	2017–18	Block 'A', Bharhari area, Sonbhadra	Detailed iron ore investigation; **1.50 km² mapping**, 50 m³ pitting/trenching, 50 BRS and **750 m drilling**	BHC/BHJ band traced for about **2.62 km**, with widths of **8–75 m**. A total of **441 core samples** from SBE-1 to SBE-8 were analyzed. Estimated resources: **14.89 Mt 34.73% Fe at 30% cut-off** and **8.41 Mt @ 38.34% Fe at 35% cut-off**.
Mukesh Srivastava et al.	2019–20	Block 'B', Bharhari area, Sonbhadra	Preliminary iron ore exploration; **2.1 km² mapping on 1:4,000 scale** and G3-stage drilling	Four boreholes (UPSBB-1 to UPSBB-4) were drilled for **461.30 m**. Based on UPSBB-1, 2 & 3, resources of **10.77 Mt @ 34.50% Fe at 30% cut-off** and **5.03 Mt @ 39.51% Fe at 35% cut-**

				off were estimated over 1283 m strike length.

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

No reserves or resources were estimated during the previous exploration campaign.

CHAPTER 9: AERIAL OR GROUND GEOPHYSICAL OR GEOCHEMICAL DATA

No Aerial or ground geophysical was carried out by GeoExpOre in the current study. Certain Geophysical and Geochemical studies were carried out previously by different agencies, their details are as below.

9.1 Previous Geophysical Studies

Geophysical mapping was carried out by Bhattacharya et al. during F.S. 2009–10 and 2010–12 in parts of Allahabad, Mirzapur and Sonbhadra districts of Uttar Pradesh, and Rewa and Sidhi districts of Madhya Pradesh.

The **Bouguer Anomaly Map** shows in Figure-9.1 a prominent high gravity closure of about **–20 mGal (H1)** in the surrounding areas of **Jungel**, falling in parts of Survey of India Toposheet No. **63L/14**. This gravity high has been attributed to the presence of comparatively heavier lithounits of the **Agori and Parsoi Formations of the Mahakoshal Group**. These lithounits mainly comprise **WNW–ESE trending banded hematite chert/jasper bands, quartz veins and quartz reefs**, which are traversed by a large number of **E–W trending dolerite dykes**.

The strong and broad gravity gradients observed to the **north and south of the H1 gravity closure** are interpreted to define the boundary of the Mahakoshal rocks. These gradients separate the **Mahakoshal Group** from the **Vindhyan rocks in the north** and the **Dudhi Granitoid Complex in the south**.

The **magnetic total field anomaly** over the area generally shows gentle variations with widely spaced contours, except in the southern part of **Toposheet No. 63L/14**, where relatively stronger magnetic variations have been recorded. The gradients observed in the Bouguer anomaly map are also reflected in the magnetic total field anomaly map, showing a close correlation between the gravity and magnetic signatures. The strong gravity gradients observed to the **north and south of Jogail**, west of **Obra**, are also prominently replicated on the magnetic anomaly map, further supporting the geophysical expression of the Mahakoshal lithological boundary and associated structural features.

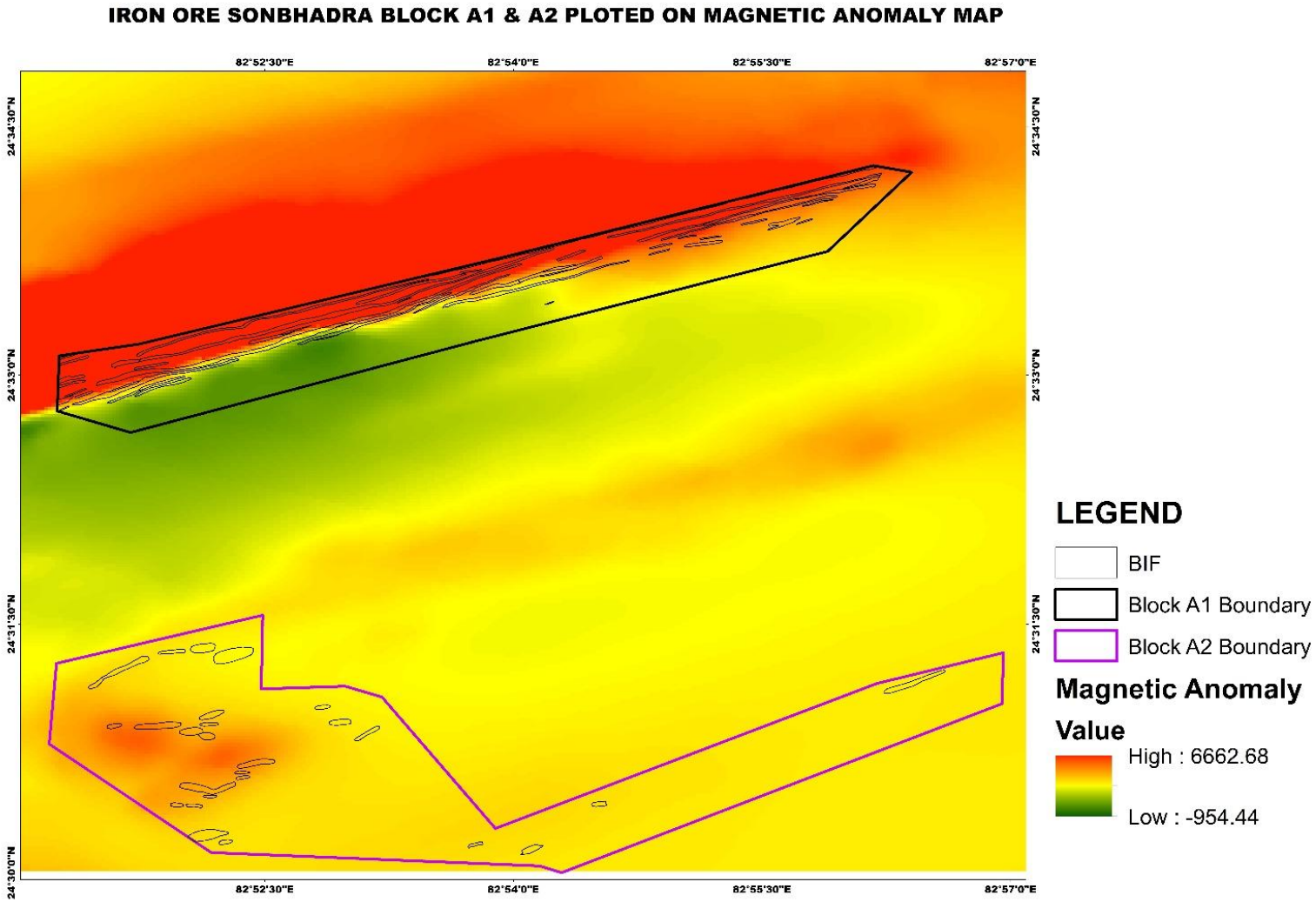


Figure-9.1: Spatial distribution of magnetic anomalies with BIF and block boundaries in blocks A1 and A2, Sonbhadra (source: NGDR)

9.2 Previous Geochemical Investigations

As the present investigation is being carried out at the **Reconnaissance Stage (G-4)**, no previous geochemical investigation data are available within the investigated blocks. Therefore, for preliminary interpretation and assessment, the available geochemical information from the **adjoining Bharhari auctioned blocks** has been considered as a reference.

The geochemical characteristics observed in the adjoining blocks have been used to support the interpretation of the mineral potential of the present investigation area. Near GeoExpOre's investigated area Large-scale mapping in **Block 'C'** was carried out by **Modak et al. during F.S. 2014–15** under the project entitled "Resource Evaluation of Post Mahakoshal Group, Bharhari Area, Sonbhadra District, Uttar Pradesh." The investigated area falls in **Survey of India Toposheet Nos. 63L/14 and 63L/15**. During this investigation, an area of about **138 sq. km** was covered by large-scale geological mapping on **1:12,500 scale**. A total of **327 bedrock samples** were analysed, and **26 cu. m of excavation** was carried out through **four trenches**.

The chemical analysis of bedrock samples collected from the **banded hematite chert/jasper bands** indicated **Fe_2O_3 values ranging from 13.07% to 82.15%**, with an average of **40.64% Fe_2O_3**. Out of the total bedrock samples, **107 samples showed Fe_2O_3 values greater than 43%**, equivalent to **more than 30% Fe**, whereas **68 samples showed Fe_2O_3 values greater than 50%**, equivalent to **more than 35% Fe**.

Subsequently, Mukesh Srivastava et al. during F.S. 2017–18 carried out **preliminary exploration at G-3 stage** for iron ore in **the extended Block 'A', Bharhari area**. The work involved detailed geological mapping over **1.61 sq. km** on 1:2,000 scale, 51 cu. m of pitting/trenching, collection of **50 bedrock samples**, and **822.70 m of drilling** in **eight boreholes**. The analytical results indicate that, at **30% Fe cut-off**, the iron values range from **29.99% to 49.87% Fe**. The associated **SiO_2 content varies from 24.04% to 71.71%**, while **Al_2O_3 ranges from 0.12% to 8.51%**.

Based on the chemical analytical results, the total estimated iron ore resource in extended **Block 'A'** was assessed as **14.89 million tonnes** with an average grade of **34.73% Fe at 30% Fe cut-off**. At **35% Fe cut-off**, the estimated resource was **8.41 million tonnes** with an average grade of **38.34% Fe**. The resource falls under the **333 categories of UNFC classification**.

Further, **Mukesh Srivastava et al. during F.S. 2019–20** carried out **preliminary exploration at G-3 stage** for iron ore in **Block 'B', Bharhari area, Sonbhadra district, Uttar Pradesh**. The investigation included detailed geological mapping over **2.1 sq. km** on **1:4,000 scale**, **79 cu. m of pitting/trenching**, and **461.30 m of drilling** in the western part of the block through **four boreholes**, namely **UPSBB-1 to UPSBB-4**. Borehole **UPSBB-4** could be drilled only up to a depth of **43.50 m**, and the BIF band could not be intersected. Further drilling of this borehole was stopped as per the relevant departmental order dated **29.05.2020**.

Based on the chemical results, the total estimated iron ore resource in **Block 'B', Bharhari area** was assessed as **10.77 million tonnes** with an average grade of **34.50% Fe at 30% Fe cut-off**. At **35% Fe cut-off**, the estimated resource was **5.03 million tonnes** with an average grade of **39.51% Fe**. This resource also falls under the **333 categories of UNFC classification**. The resource estimation was carried out for a strike length of **1283 m** only within the detailed mapping block, although the total exposed strike length of the BIF band in Block 'B' is about **3.12 km**.

CHAPTER 10: 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.

During **FS 2024–25**, systematic exploration was carried out in **Blocks A1 and A2** through geological mapping, bedrock sampling, channel sampling, and scout diamond core drilling. Large-scale geological mapping covering an area of **18.56 sq. km** was completed at a scale of **1:12,500**.

A total of **150 channel samples (CH)** were collected from exposed iron-bearing formations and other prospective lithological units. Based on geological mapping, bedrock-sampling results and favourable surface geological indications, **13 channel sections** were established across selected mineralised bands, comprising **11 sections in Block A1** across BHC&J and BMC&J bands and **2 sections in Block A2** across massive iron-ore bands. The channel sections were generally spaced at approximately **1,000 m along strike**, wherever suitable exposures were available, while individual samples were collected continuously across the mineralised bands. Sampling was oriented, as far as practicable, **across the strike** to obtain representative information on thickness and grade variation.

The scout diamond core drilling covered mineralised BIF zones having an approximate **strike extent of 1,100–1,400 m** within the investigated portions of Blocks A1 and A2. A total of **eight scout boreholes**, comprising **six boreholes in Block A1 (UPCKB-01 to UPCKB-06)** and **two boreholes in Block A2 (UPJTB-01 and UPJTB-02)**, were completed for a cumulative drilled length of **700.10 m**. The boreholes were positioned across selected mineralised bands to obtain first-stage information on their **subsurface continuity, thickness, dip and grade distribution**. A total of **309 core samples** were collected from the drilled intervals and subjected to chemical analysis.

The distribution of **bedrock-sampling points, channel sections and scout boreholes** was planned with consideration of geological continuity, surface exposure, lithological disposition, structural characteristics and analytical response. The **geographical coordinates, sample numbers, sampling locations and borehole collar details** are provided in the respective sample-location and drilling tables, while their spatial distribution is shown in the corresponding **geological and exploration plans**. No systematic pitting or trenching was undertaken during the investigation, as the exposed mineralised zones were evaluated through **geological mapping and channel sampling**, supplemented by scout drilling for preliminary subsurface assessment.

10.1.1 Channel sampling

In **Block A1**, a total of **11 channel sections** were executed, comprising **9 channels across two promising Banded Hematite Chert and Jasper (BHC&J) bands** and **2 channels across one promising Banded Magnetite Chert and Jasper (BMC&J) band**. The channel sections were established at an approximate **spacing of 1,000 m along strike**, depending on the continuity and accessibility of the exposed mineralized bands. The channels were laid **across the strike of the BIF bands** to obtain representative samples across their exposed widths. A total of **110 channel samples** were collected from Block A1, comprising **63 samples from BHC&J-1, 30 samples from BHC&J-2, and 17 samples from BMC&J-3** (Table 10.2). The BHC&J-1 band has an approximate strike length of **4,530 m** and an exposed width of about **40 m**, whereas BHC&J-2 extends for approximately **4,405 m** with an exposed width of about **28 m**. The BMC&J-3 band extends for approximately **1,835 m** with an exposed width of about **15 m**.

The analytical results indicate **variable but significant iron enrichment** within the BIF bands. The Fe content in **BHC&J-1** ranges from **15.78% to 50.04%**, with an average of **37.48% Fe**; in **BHC&J-2**, it ranges from **12.50% to 52.62%**, with an average of **38.85% Fe**; and in **BMC&J-3**, it ranges from **21.29% to 52.09%**, with an average of **39.30% Fe**. The overall statistical evaluation of the **110 channel samples from Block A1** shows an average Fe content of **39.13%**, ranging from **12.50% to 53.60% Fe**, with an average **Fe_2O_3 content of 55.95%**. The variation in Fe content reflects the heterogeneous nature of the BIF, resulting from alternating ferruginous and siliceous layers. The distribution of Fe, Fe_2O_3 and Al_2O_3 in the channel samples is illustrated in **Figure 10.3**, while the detailed channel-sample analytical results and geographic coordinates are presented in the corresponding analytical table.

In **Block A2**, **2 channel sections** were executed across two consecutive promising **Massive Iron Ore (MIO) bands**, with **one channel section across each band**. A total of **40 channel samples** were collected, comprising **20 samples from MIO-1/A2 and 20 samples from MIO-2/A2** (Table 10.3). MIO-1/A2 has an approximate strike length of **800 m** and an exposed width of about **48 m**, whereas MIO-2/A2 extends for approximately **600 m** with an exposed width of about **45 m**.

The channel-sample results from Block A2 indicate comparatively higher and more consistent iron enrichment than that observed in the BIF-hosted mineralization of Block A1. The Fe content ranges from approximately **41.87% to 55.76%**, with an overall average of **50.17% Fe** for the 40 channel samples. The corresponding average **Fe_2O_3 content is 71.72%**. The relatively high Fe and Fe_2O_3 contents indicate substantial enrichment of iron oxides within the massive iron-ore bands. The variation in **Fe, Fe_2O_3 and Al_2O_3** contents is shown in **Figure 10.4**, and the detailed analytical results are presented in the corresponding Table-10.1 to 10.8.

Thus, a total of **13 channel sections** were executed across Blocks A1 and A2, are represented in Plate 6a & 6b from which **150 channel samples** were collected, comprising **110 samples from Block A1 and 40 samples from Block A2**. The channel locations and their distribution over the geological maps are shown in **Figures 10.1 and 10.2**, while the corresponding geochemical variation plots are presented in **Figures 10.3 and 10.4**.

PLATE - 6a

MINERALIZED ZONES OVER GEOLOGICAL MAP WITH SAMPLE VALUES OF BLOCK A1 SONBHADRA, ON SCALE 1:12,500

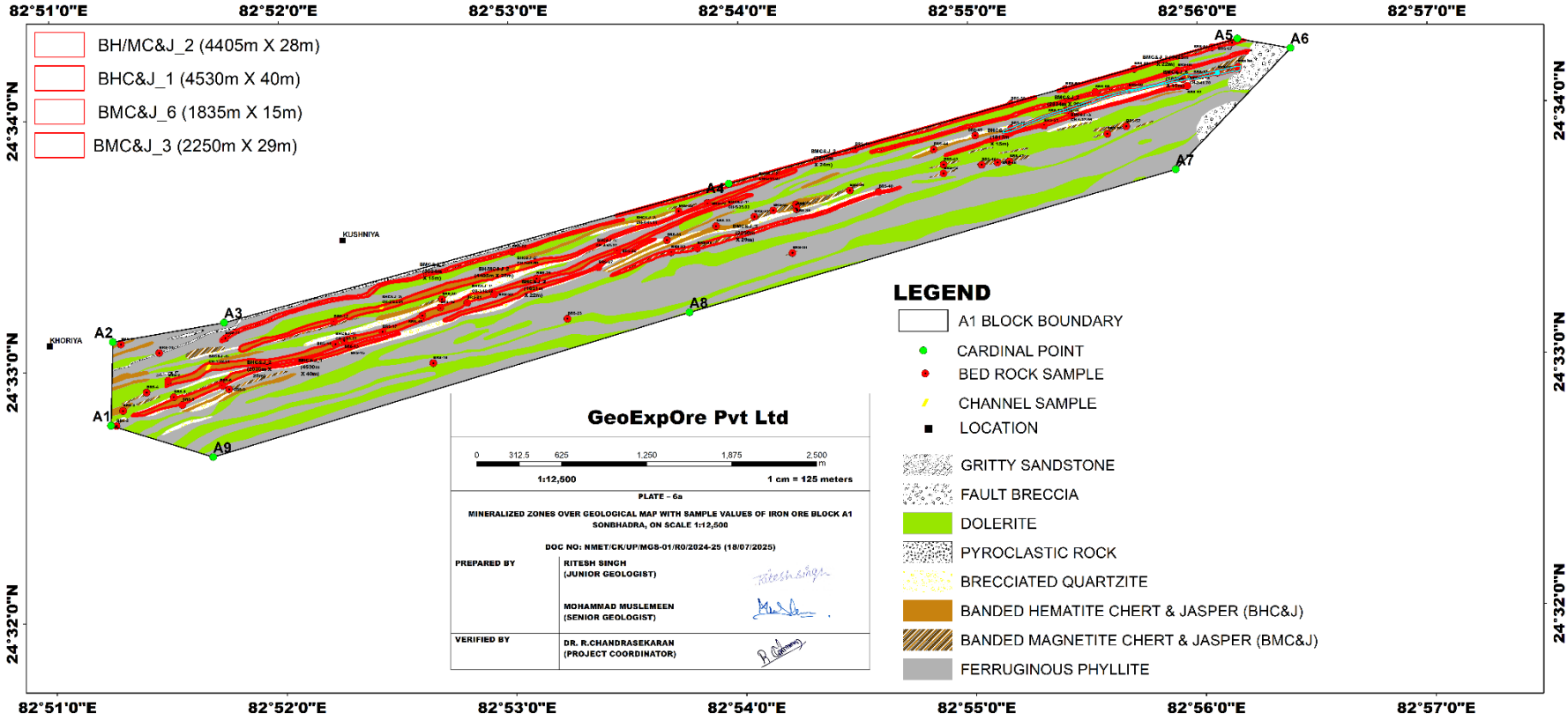
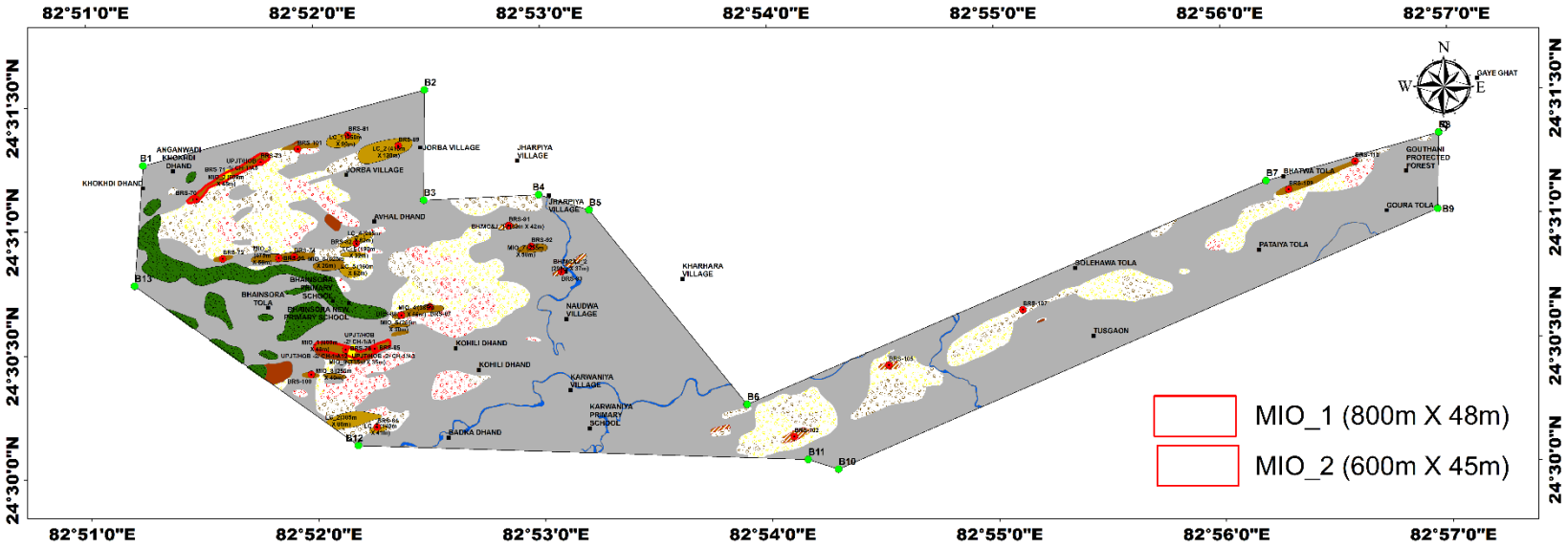


PLATE - 6b

MINERALIZED ZONE OVER GEOLOGICAL MAP WITH SAMPLE VALUES OF BLOCK A2, SONBHADRA SCALE 1:12,500



GeoExpOre Pvt Ltd

0 310 620 1,240 1,860 2,480 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 3b

SAMPLE LOCATIONS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500

DOC NO: NMET/JT/UP/GCM-01/R0/2024-25 (19/07/2024)

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VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

- CARDINAL POINTS
- A2 BLOCK BOUNADRY
- BED ROCK SAMPLE
- CHANNEL SAMPLE
- NALA
- LOCATION
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

Agori Formation — **Mahakoshal Group**

Table-10.1: Channel sample-wise Fe T assay results with geographic coordinates of block A1 & A2 in mineralized channel bands.

S.No.	Channel ID/Fe%	Latitude	Longitude	Fe (T)
1	BHC&J -1/ CH-1/32.51	24.55022	82.86125	32.51
2	BHC&J -1/ CH-2/33.27	24.55162	82.87048	33.27
3	BHC&J -1/ CH-3/42.62	24.55465	82.88041	42.62
4	BHC&J -1/ CH-4/43.37	24.55755	82.89098	43.37
5	BHC&J -1/ CH-5/35.63	24.56054	82.89879	35.63
6	BHC&J -2/ CH-2/23.91	24.55404	82.87381	23.91
7	BHC&J -2/ CH-3/48.50	24.55647	82.88371	48.50
8	BHC&J -2/ CH-4/41.11	24.55906	82.89233	41.11
9	BHC&J -2/ CH-5/41.87	24.56184	82.90134	41.87
10	BMC&J -6/ CH-1/37.96	24.56655	82.92405	37.96
11	BMC&J -6/ CH-2/40.70	24.56854	82.93236	40.70
12	MIO -1/ CH-1/49.99	24.52032	82.86021	49.99
13	MIO -2/ CH-1/50.35	24.50812	82.86924	50.35

Table-10.2: Summary of mineralised band dimensions, channel sampling and sample collection in block A1.

Band I.D	Lithology	Length	Width	No. of. Channels	Total no sample collected
UPCK/BHC&J -1/A1	Banded Hematite chert and Jasper	**4530**	**40**	**5**	**63**
UPCK/BHC&J -2/A1	Banded Hematite chert and Jasper	**4405**	**28**	**4**	**30**
UPCK/BMC&J -3/A1	Banded Magnetite chert and Jasper	**1835**	**15**	**2**	**17**
				Total	**110**

Table-10.4: Channel sample intervals, lithology and Fe% assay results of BHC&J & BMC&J mineralisation in block A1.

CHANNEL -BHC&J -1/CH-1						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
1	UPCK/BHC&J -1/ CH-1/A1	0.00	2.00	2.00	BHC&J	**15.78**
2	UPCK/BHC&J -1/ CH-1/A2	2.00	4.00	2.00	BHC&J	**13.83**
3	UPCK/BHC&J -1/ CH-1/A3	4.00	6.00	2.00	BHC&J	**17.54**
4	UPCK/BHC&J -1/ CH-1/A4	6.00	8.00	2.00	BHC&J	**26.46**
5	UPCK/BHC&J -1/ CH-1/A5	8.00	10.00	2.00	BHC&J	**32.72**
6	UPCK/BHC&J -1/ CH-1/A6	10.00	12.00	2.00	BHC&J	**31.52**
7	UPCK/BHC&J -1/ CH-1/A7	12.00	14.00	2.00	BHC&J	**38.93**
8	UPCK/BHC&J -1/ CH-1/A8	14.00	16.00	2.00	BHC&J	**33.38**
9	UPCK/BHC&J -1/ CH-1/A9	16.00	18.00	2.00	BHC&J	**45.34**
10	UPCK/BHC&J -1/ CH-1/A10	18.00	20.00	2.00	BHC&J	**50.04**
11	UPCK/BHC&J -1/ CH-1/A11	20.00	22.00	2.00	BHC&J	**39.08**
12	UPCK/BHC&J -1/ CH-1/A12	22.00	24.00	2.00	BHC&J	**45.46**
Weighted Average						**32.51**
CHANNEL- BHC&J -1/CH-2						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
13	UPCK/BHC&J -1/ CH-2/B1	0.00	2.00	2.00	BHC&J	**38.49**
14	UPCK/BHC&J -1/ CH-2/B2	2.00	4.00	2.00	BHC&J	**37.95**
15	UPCK/BHC&J -1/ CH-2/B3	4.00	6.00	2.00	BHC&J	**40.40**
16	UPCK/BHC&J -1/ CH-2/B4	6.00	8.00	2.00	BHC&J	**37.74**
17	UPCK/BHC&J -1/ CH-2/B5	8.00	10.00	2.00	BHC&J	**33.17**
18	UPCK/BHC&J -1/ CH-2/B6	10.00	12.00	2.00	BHC&J	**33.56**
19	UPCK/BHC&J -1/ CH-2/B7	12.00	14.00	2.00	BHC&J	**31.98**
20	UPCK/BHC&J -1/ CH-2/B8	14.00	16.00	2.00	BHC&J	**19.11**
21	UPCK/BHC&J -1/ CH-2/B9	16.00	18.00	2.00	BHC&J	**22.14**
22	UPCK/BHC&J -1/ CH-2/B10	18.00	20.00	2.00	BHC&J	**25.04**
23	UPCK/BHC&J -1/ CH-2/B11	20.00	22.00	2.00	BHC&J	**30.92**
24	UPCK/BHC&J -1/ CH-2/B12	22.00	24.00	2.00	BHC&J	**34.66**
25	UPCK/BHC&J -1/ CH-2/B13	24.00	26.00	2.00	BHC&J	**46.55**
26	UPCK/BHC&J -1/ CH-2/B14	26.00	28.00	2.00	BHC&J	**34.04**

Weighted Average	33.27

CHANNEL- BHC&J -1/CH-3						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
27	UPCK/BHC&J -1/ CH-3/C1	0.00	2.00	2.00	BHC&J	**39.18**
28	UPCK/BHC&J -1/ CH-3/C2	2.00	4.00	2.00	BHC&J	**40.67**
29	UPCK/BHC&J -1/ CH-3/C3	4.00	6.00	2.00	BHC&J	**41.72**
30	UPCK/BHC&J -1/ CH-3/C4	6.00	8.00	2.00	BHC&J	**37.59**
31	UPCK/BHC&J -1/ CH-3/C5	8.00	10.00	2.00	BHC&J	**49.92**
32	UPCK/BHC&J -1/ CH-3/C6	10.00	12.00	2.00	BHC&J	**53.60**
33	UPCK/BHC&J -1/ CH-3/C7	12.00	14.00	2.00	BHC&J	**35.61**
34	UPCK/BHC&J -1/ CH-3/C8	14.00	16.00	2.00	BHC&J	**41.99**
35	UPCK/BHC&J -1/ CH-3/C9	16.00	18.00	2.00	BHC&J	**42.06**
36	UPCK/BHC&J -1/ CH-3/C10	18.00	20.00	2.00	BHC&J	**45.09**
37	UPCK/BHC&J -1/ CH-3/C11	20.00	22.00	2.00	BHC&J	**39.97**
38	UPCK/BHC&J -1/ CH-3/C12	22.00	24.00	2.00	BHC&J	**39.14**
39	UPCK/BHC&J -1/ CH-3/C13	24.00	26.00	2.00	BHC&J	**41.15**
40	UPCK/BHC&J -1/ CH-3/C14	26.00	28.00	2.00	BHC&J	**40.71**
41	UPCK/BHC&J -1/ CH-3/C15	28.00	30.00	2.00	BHC&J	**44.50**
42	UPCK/BHC&J -1/ CH-3/C16	30.00	32.00	2.00	BHC&J	**46.09**
43	UPCK/BHC&J -1/ CH-3/C17	32.00	34.00	2.00	BHC&J	**45.42**
Weighted Average						**42.61**

CHANNEL- BHC&J -1/CH-4						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
44	UPCK/BHC&J -1/ CH-4/D1	0.00	2.00	2.00	BHC&J	**46.14**
45	UPCK/BHC&J -1/ CH-4/D2	2.00	4.00	2.00	BHC&J	**45.37**
46	UPCK/BHC&J -1/ CH-4/D3	4.00	6.00	2.00	BHC&J	**43.63**
47	UPCK/BHC&J -1/ CH-4/D4	6.00	8.00	2.00	BHC&J	**45.58**
48	UPCK/BHC&J -1/ CH-4/D5	8.00	10.00	2.00	BHC&J	**44.77**
49	UPCK/BHC&J -1/ CH-4/D6	10.00	12.00	2.00	BHC&J	**44.80**
50	UPCK/BHC&J -1/ CH-4/D7	12.00	14.00	2.00	BHC&J	**37.59**
51	UPCK/BHC&J -1/ CH-4/D8	14.00	16.00	2.00	BHC&J	**39.71**
52	UPCK/BHC&J -1/ CH-4/D9	16.00	18.00	2.00	BHC&J	**43.97**
53	UPCK/BHC&J -1/ CH-4/D10	18.00	20.00	2.00	BHC&J	**42.05**

Weighted Average	43.36

CHANNEL- BHC&J -1/CH-5						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
54	UPCK/BHC&J -1/ CH-5/E1	0.00	2.00	2.00	BHC&J	**32.93**
55	UPCK/BHC&J -1/ CH-5/E2	2.00	4.00	2.00	BHC&J	**35.85**
56	UPCK/BHC&J -1/ CH-5/E3	4.00	6.00	2.00	BHC&J	**36.45**
57	UPCK/BHC&J -1/ CH-5/E4	6.00	8.00	2.00	BHC&J	**38.88**
58	UPCK/BHC&J -1/ CH-5/E5	8.00	10.00	2.00	BHC&J	**39.83**
59	UPCK/BHC&J -1/ CH-5/E6	10.00	12.00	2.00	BHC&J	**39.68**
60	UPCK/BHC&J -1/ CH-5/E7	12.00	14.00	2.00	BHC&J	**24.82**
61	UPCK/BHC&J -1/ CH-5/E8	14.00	16.00	2.00	BHC&J	**33.52**
62	UPCK/BHC&J -1/ CH-5/E9	16.00	18.00	2.00	BHC&J	**33.37**
63	UPCK/BHC&J -1/ CH-5/E10	18.00	20.00	2.00	BHC&J	**40.98**
Weighted Average						**35.63**
CHANNEL- BHC&J -2/CH-2						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
64	UPCK/BHC&J -2/ CH-2/B2	0.00	4.00	4.00	BHC&J	**12.50**
65	UPCK/BHC&J -2/ CH-2/B4	4.00	8.00	4.00	BHC&J	**22.10**
66	UPCK/BHC&J -2/ CH-2/B6	8.00	12.00	4.00	BHC&J	**26.96**
67	UPCK/BHC&J -2/ CH-2/B8	12.00	16.00	4.00	BHC&J	**25.76**
68	UPCK/BHC&J -2/ CH-2/B10	16.00	20.00	4.00	BHC&J	**32.24**
Weighted Average						**23.91**

CHANNEL- BHC&J -2/CH-3						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
69	UPCK/BHC&J -2/ CH-3/C1	0.00	2.00	2.00	BHC&J	**47.91**
70	UPCK/BHC&J -2/ CH-3/C2	2.00	4.00	2.00	BHC&J	**47.57**
71	UPCK/BHC&J -2/ CH-3/C3	4.00	6.00	2.00	BHC&J	**45.69**
72	UPCK/BHC&J -2/ CH-3/C4	6.00	8.00	2.00	BHC&J	**47.20**
73	UPCK/BHC&J -2/ CH-3/C5	8.00	10.00	2.00	BHC&J	**51.15**

74	UPCK/BHC&J -2/ CH-3/C6	10.00	12.00	2.00	BHC&J	**51.15**
75	UPCK/BHC&J -2/ CH-3/C7	12.00	14.00	2.00	BHC&J	**46.48**
76	UPCK/BHC&J -2/ CH-3/C8	14.00	16.00	2.00	BHC&J	**45.85**
77	UPCK/BHC&J -2/ CH-3/C9	16.00	18.00	2.00	BHC&J	**51.26**
78	UPCK/BHC&J -2/ CH-3/C10	18.00	20.00	2.00	BHC&J	**51.27**
79	UPCK/BHC&J -2/ CH-3/C11	20.00	22.00	2.00	BHC&J	**52.05**
80	UPCK/BHC&J -2/ CH-3/C12	22.00	24.00	2.00	BHC&J	**47.02**
81	UPCK/BHC&J -2/ CH-3/C13	24.00	26.00	2.00	BHC&J	**52.62**
82	UPCK/BHC&J -2/ CH-3/C14	26.00	28.00	2.00	BHC&J	**43.67**
83	UPCK/BHC&J -2/ CH-3/C15	28.00	30.00	2.00	BHC&J	**46.60**
Weighted Average						**48.50**
CHANNEL- BHC&J -2/CH-4						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
84	UPCK/BHC&J -2/ CH-4/D2	0.00	4.00	4.00	BHC&J	**42.91**
85	UPCK/BHC&J -2/ CH-4/D4	4.00	8.00	4.00	BHC&J	**40.00**
86	UPCK/BHC&J -2/ CH-4/D6	8.00	12.00	4.00	BHC&J	**40.30**
87	UPCK/BHC&J -2/ CH-4/D8	12.00	16.00	4.00	BHC&J	**41.99**
88	UPCK/BHC&J -2/ CH-4/D10	16.00	20.00	4.00	BHC&J	**40.35**
Weighted Average						**41.11**

CHANNEL- BHC&J -2/CH-5						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
89	UPCK/BHC&J -2/ CH-5/E2	0.00	4.00	4.00	BHC&J	**41.39**
90	UPCK/BHC&J -2/ CH-5/E4	4.00	8.00	4.00	BHC&J	**40.92**
91	UPCK/BHC&J -2/ CH-5/E6	8.00	12.00	4.00	BHC&J	**44.40**
92	UPCK/BHC&J -2/ CH-5/E8	12.00	16.00	4.00	BHC&J	**34.94**
93	UPCK/BHC&J -2/ CH-5/E10	16.00	20.00	4.00	BHC&J	**47.70**
Weighted Average						**41.87**

CHANNEL- BMC&J -3/CH-1						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
94	UPCK/BMC&J -6/ CH-1/A1	0.00	2.00	2.00	BMC&J	**52.09**
95	UPCK/BMC&J -6/ CH-1/A2	2.00	4.00	2.00	BMC&J	**43.23**
96	UPCK/BMC&J -6/ CH-1/A3	4.00	6.00	2.00	BMC&J	**33.55**
97	UPCK/BMC&J -6/ CH-1/A4	6.00	8.00	2.00	BMC&J	**45.97**

98	UPCK/BMC&J -6/ CH-1/A5	8.00	10.00	2.00	BMC&J	**27.96**
99	UPCK/BMC&J -6/ CH-1/A6	10.00	12.00	2.00	BMC&J	**21.29**
100	UPCK/BMC&J -6/ CH-1/A7	12.00	14.00	2.00	BMC&J	**41.56**
Weighted Average						**37.95**

CHANNEL- BMC&J -3/CH-2						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
101	UPCK/BMC&J -6/ CH-2/B1	0.00	2.00	2.00	BMC&J	**50.84**
102	UPCK/BMC&J -6/ CH-2/B2	2.00	4.00	2.00	BMC&J	**35.89**
103	UPCK/BMC&J -6/ CH-2/B3	4.00	6.00	2.00	BMC&J	**42.16**
104	UPCK/BMC&J -6/ CH-2/B4	6.00	8.00	2.00	BMC&J	**36.15**
105	UPCK/BMC&J -6/ CH-2/B5	8.00	10.00	2.00	BMC&J	**34.29**
106	UPCK/BMC&J -6/ CH-2/B6	10.00	12.00	2.00	BMC&J	**37.76**
107	UPCK/BMC&J -6/ CH-2/B7	12.00	14.00	2.00	BMC&J	**36.45**
108	UPCK/BMC&J -6/ CH-2/B8	14.00	16.00	2.00	BMC&J	**44.46**
109	UPCK/BMC&J -6/ CH-2/B9	16.00	18.00	2.00	BMC&J	**50.06**
110	UPCK/BMC&J -6/ CH-2/B10	18.00	20.00	2.00	BMC&J	**38.91**
Weighted Average						**40.70**

Note:- In Block A1 During channel sampling, the BHC&J and BMC&J bands in Block A1 were observed to occur more commonly as discontinuous lenses. However, as per the review and TCC recommendations, these occurrences have been correlated along with the strike and considered as the same discontinuous bands; accordingly, the band nomenclature has been updated. BMC&J-6 has been renamed BMC&J-3. Since the channel samples had already been analyzed prior to this nomenclature revision, the original sample IDs have been retained as BMC&J-6 for Channel-1 and Channel-2.

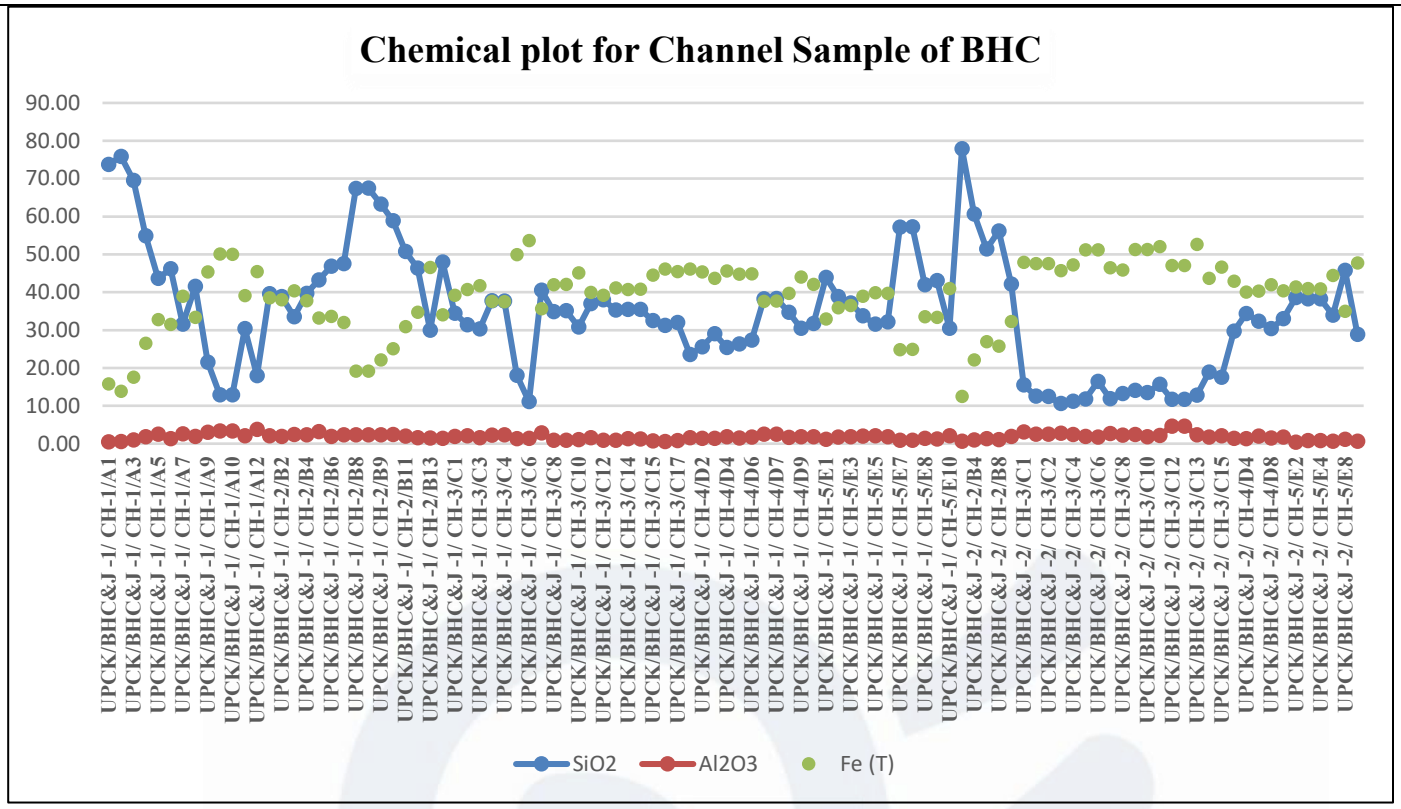


Figure-10.2: Geochemical variation of SiO_2, Al_2O_3 and total Fe (Fe T) in BHC&J channel samples, block A1.

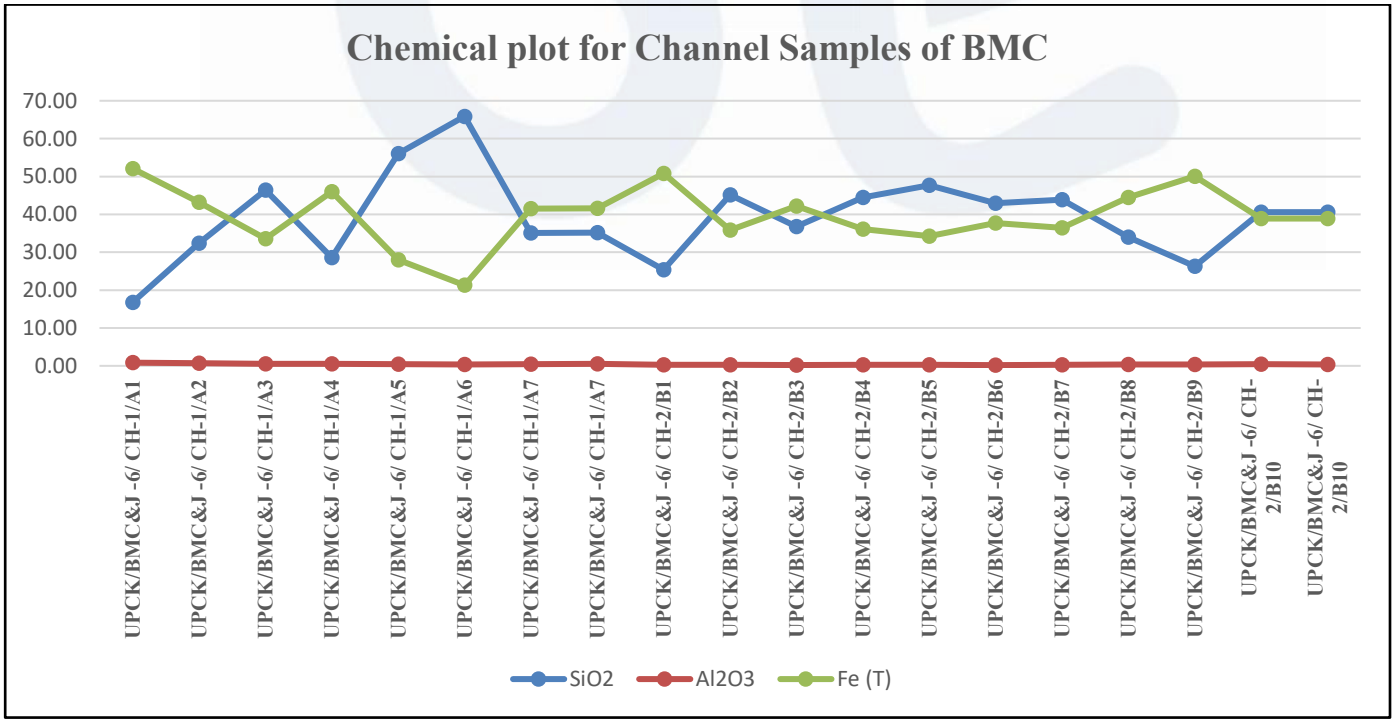


Figure-10.3: Geochemical variation of SiO_2, Al_2O_3 and total Fe (Fe T) in BMC&J channel samples, block A1.

Table-10.5: Statistical summary of major and minor oxide concentrations in channel samples from block A1.

Sample Type		Al2O3 %	CaO %	Fe (T)%	Fe2O3 %	K2O %	MgO %	MnO %	Na2O %	SO3 %	SiO2 %	TiO2 %	P2O5 %	LOI %
Channel (110 nos. sample)	Max.	4.64	1.48	53.60	76.64	0.47	0.26	10.45	0.08	0.05	77.86	0.55	1.76	10.04
	Min.	0.22	0.05	12.50	17.88	0.05	0.05	0.05	0.08	0.05	10.58	0.05	0.09	0.34
	Avg.	1.55	0.28	39.13	55.95	0.08	0.06	1.10	0.08	0.05	35.55	0.14	0.75	4.39

Table-10.7: Statistical analysis of geochemical channel data and its interpretation of anomalous zones in block A1

Statistical parameter	Al2O3 %	CaO %	Fe (T) %	Fe2O3 %	K2O %	MgO %	MnO %	Na2O %	SO3 %	SiO2 %	TiO2 %	P2O5 %	LOI %
Mean	1.55	0.28	39.13	55.95	0.08	0.06	1.10	0.08	0.05	35.55	0.14	0.75	4.39
Standard Error	0.08	0.03	0.84	1.20	0.01	0.00	0.22	0.00	0.00	1.43	0.01	0.04	0.23
Median	1.56	0.12	40.37	57.72	0.05	0.05	0.13	0.08	0.05	34.37	0.14	0.73	4.37
Mode	2.52	0.08	41.99	60.04	0.05	0.05	0.05	0.08	0.05	#N/A	0.05	1.10	5.91
Standard Deviation	0.85	0.33	8.80	12.58	0.07	0.03	2.28	0.00	0.00	15.01	0.09	0.42	2.40
Sample Variance	0.73	0.11	77.41	158.22	0.00	0.00	5.22	0.00	0.00	225.36	0.01	0.18	5.78
Kurtosis	0.53	3.34	0.80	0.80	11.58	36.08	8.33	-2.04	-2.04	0.37	5.88	-0.43	-0.94
Skewness	0.52	2.05	-0.93	-0.93	3.15	5.61	2.93	-1.01	1.01	0.53	1.91	0.50	0.11
Range	4.42	1.43	41.10	58.76	0.42	0.21	10.40	0.00	0.00	67.28	0.50	1.66	9.70
Minimum	0.22	0.05	12.50	17.88	0.05	0.05	0.05	0.08	0.05	10.58	0.05	0.09	0.34
Maximum	4.64	1.48	53.60	76.64	0.47	0.26	10.45	0.08	0.05	77.86	0.55	1.76	10.04
Sum	170.95	30.34	4304.70	6154.51	8.65	6.36	120.90	8.80	5.50	3910.35	15.29	82.95	482.93
Count	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00	110.00
Confidence Level (95.0%)	0.16	0.06	1.66	2.38	0.01	0.01	0.43	0.00	0.00	2.84	0.02	0.08	0.45

Table-10.3: Summary of mineralised band dimensions, channel sampling and sample collection in block A2.

Band I.D	Lithology	Length	Width	No. of. Channels	Total no sample collected
UPJT/MIO-1/A2	Massive Iron Ore	**800**	**48**	**1**	**20**
UPJT/MIO-2/A2	Massive Iron Ore	**600**	**45**	**1**	**20**
				Total	**40**

Table 10.5: Channel sample intervals, lithology and Fe% assay results of Massive Iron Ore mineralisation in block A2.

CHANNEL- HOB -1/ CH-1						
S.No.	**Sample No.**	**From (m)**	**To (m)**	**Sample Length (m)**	**Lithology**	**Fe%**
111	UPJT/HOB -1/ CH-1/A1	0.00	2.00	2.00	Massive Iron Ore	**46.84**
112	UPJT/HOB -1/ CH-1/A2	2.00	4.00	2.00	Massive Iron Ore	**51.44**
113	UPJT/HOB -1/ CH-1/A3	4.00	6.00	2.00	Massive Iron Ore	**50.41**
114	UPJT/HOB -1/ CH-1/A4	6.00	8.00	2.00	Massive Iron Ore	**51.55**
115	UPJT/HOB -1/ CH-1/A5	8.00	10.00	2.00	Massive Iron Ore	**49.71**
116	UPJT/HOB -1/ CH-1/A6	10.00	12.00	2.00	Massive Iron Ore	**47.24**
117	UPJT/HOB -1/ CH-1/A7	12.00	14.00	2.00	Massive Iron Ore	**52.58**
118	UPJT/HOB -1/ CH-1/A8	14.00	16.00	2.00	Massive Iron Ore	**51.16**
119	UPJT/HOB -1/ CH-1/A9	16.00	18.00	2.00	Massive Iron Ore	**41.87**
120	UPJT/HOB -1/ CH-1/A10	18.00	20.00	2.00	Massive Iron Ore	**51.13**
121	UPJT/HOB -1/ CH-1/A11	20.00	22.00	2.00	Massive Iron Ore	**53.66**
122	UPJT/HOB -1/ CH-1/A12	22.00	24.00	2.00	Massive Iron Ore	**51.50**
123	UPJT/HOB -1/ CH-1/A13	24.00	26.00	2.00	Massive Iron Ore	**50.72**
124	UPJT/HOB -1/ CH-1/A14	26.00	28.00	2.00	Massive Iron Ore	**52.73**
125	UPJT/HOB -1/ CH-1/A15	28.00	30.00	2.00	Massive Iron Ore	**50.10**
126	UPJT/HOB -1/ CH-1/A16	30.00	32.00	2.00	Massive Iron Ore	**51.75**
127	UPJT/HOB -1/ CH-1/A17	32.00	34.00	2.00	Massive Iron Ore	**49.54**
128	UPJT/HOB -1/ CH-1/A18	34.00	36.00	2.00	Massive Iron Ore	**48.48**
129	UPJT/HOB -1/ CH-1/A19	36.00	38.00	2.00	Massive Iron Ore	**47.42**
130	UPJT/HOB -1/ CH-1/A20	38.00	40.00	2.00	Massive Iron Ore	**49.89**
Weighted Average						**49.99**

CHANNEL- HOB -2/ CH-1

S.No.	Sample No.	From (m)	To (m)	Sample Length (m)	Lithology	Fe%
131	UPJT/HOB -2/ CH-1/A1	0.00	2.00	2.00	Massive Iron Ore	**49.70**
132	UPJT/HOB -2/ CH-1/A2	2.00	4.00	2.00	Massive Iron Ore	**55.76**
133	UPJT/HOB -2/ CH-1/A3	4.00	6.00	2.00	Massive Iron Ore	**52.21**
134	UPJT/HOB -2/ CH-1/A4	6.00	8.00	2.00	Massive Iron Ore	**52.83**
135	UPJT/HOB -2/ CH-1/A5	8.00	10.00	2.00	Massive Iron Ore	**51.20**
136	UPJT/HOB -2/ CH-1/A6	10.00	12.00	2.00	Massive Iron Ore	**50.98**
137	UPJT/HOB -2/ CH-1/A7	12.00	14.00	2.00	Massive Iron Ore	**53.59**
138	UPJT/HOB -2/ CH-1/A8	14.00	16.00	2.00	Massive Iron Ore	**47.82**
139	UPJT/HOB -2/ CH-1/A9	16.00	18.00	2.00	Massive Iron Ore	**50.35**
140	UPJT/HOB -2/ CH-1/A10	18.00	20.00	2.00	Massive Iron Ore	**50.03**
141	UPJT/HOB -2/ CH-1/A11	20.00	22.00	2.00	Massive Iron Ore	**51.06**
142	UPJT/HOB -2/ CH-1/A12	22.00	24.00	2.00	Massive Iron Ore	**49.27**
143	UPJT/HOB -2/ CH-1/A13	24.00	26.00	2.00	Massive Iron Ore	**48.78**
144	UPJT/HOB -2/ CH-1/A14	26.00	28.00	2.00	Massive Iron Ore	**50.30**
145	UPJT/HOB -2/ CH-1/A15	28.00	30.00	2.00	Massive Iron Ore	**49.77**
146	UPJT/HOB -2/ CH-1/A16	30.00	32.00	2.00	Massive Iron Ore	**49.67**
147	UPJT/HOB -2/ CH-1/A17	32.00	34.00	2.00	Massive Iron Ore	**48.85**
148	UPJT/HOB -2/ CH-1/A18	34.00	36.00	2.00	Massive Iron Ore	**45.52**
149	UPJT/HOB -2/ CH-1/A19	36.00	38.00	2.00	Massive Iron Ore	**46.88**
150	UPJT/HOB -2/ CH-1/A20	38.00	40.00	2.00	Massive Iron Ore	**52.36**
Weighted Average						50.35

Note:- In Block A2, HOB-1 and HOB-2 have also been renamed as Massive Iron Ore (MIO-1) and Massive Iron Ore (MIO-2), respectively, follows the revised band nomenclature.

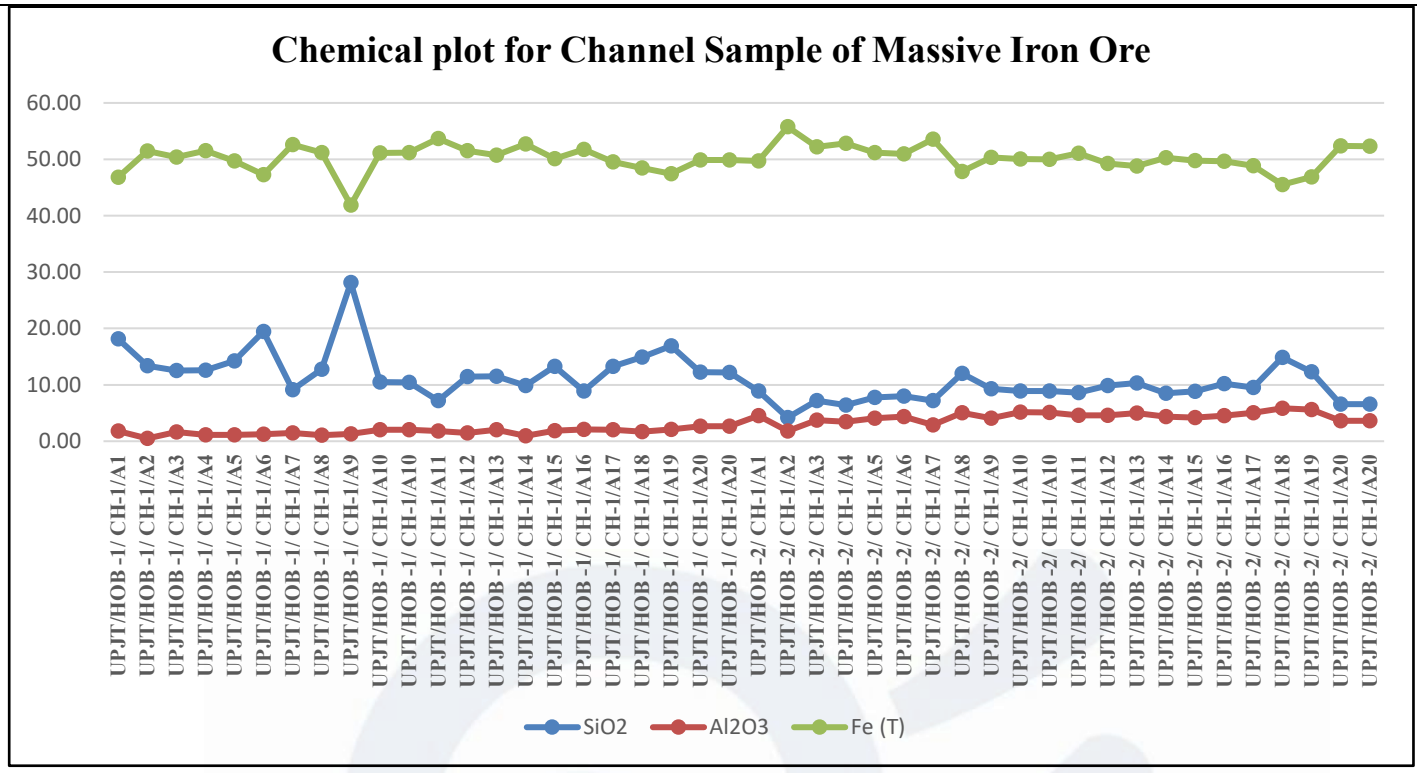


Figure-10.4: Geochemical variation of SiO_2, Al_2O_3 and Total Fe (Fe T) in massive iron ore channel samples, block A2.

Table-10.6: Statistical summary of major and minor oxide concentrations in channel samples from block A2.

Sample Type		Al2O3 %	CaO %	Fe (T)%	Fe2O3 %	K2O %	MgO %	MnO %	Na2O %	SO3 %	SiO2 %	TiO2 %	P2O5 %	LOI %
Channel (40 nos. sample)	Max.	5.84	0.15	55.76	79.72	0.43	0.14	0.46	0.00	0.00	28.13	3.20	2.31	11.30
	Min.	0.49	0.09	41.87	59.87	0.05	0.05	0.05	0.00	0.00	4.18	0.17	1.10	8.14
	Avg.	2.97	0.12	50.10	71.63	0.15	0.08	0.18	0.00	0.00	11.48	1.40	1.72	10.34

Table-10.8: Statistical analysis of geochemical channel data and its interpretation of anomalous zones in block A2

Statistical parameter	Al2O3 %	CaO %	Fe (T) %	Fe2O3 %	K2O %	MgO %	MnO %	Na2O %	SO3 %	SiO2 %	TiO2 %	P2O5 %	LOI %
Mean	2.96	0.11	50.17	71.72	0.09	0.06	0.14	0.08	0.05	11.25	1.35	1.73	10.38
Standard Error	0.25	0.00	0.39	0.56	0.01	0.00	0.02	0.00	0.00	0.67	0.18	0.05	0.10
Median	2.38	0.11	50.32	71.95	0.05	0.05	0.10	0.08	0.05	10.27	0.68	1.68	10.40
Mode	#N/A	0.10	#N/A	#N/A	0.05	0.05	0.05	0.08	0.05	#N/A	#N/A	1.90	10.32
Standard Deviation	1.57	0.02	2.47	3.54	0.08	0.02	0.11	0.00	0.00	4.27	1.14	0.34	0.65
Sample Variance	2.46	0.00	6.13	12.52	0.01	0.00	0.01	0.00	0.00	18.22	1.30	0.12	0.42
Kurtosis	-1.42	-0.39	2.39	2.39	9.56	8.22	0.79	-2.11	-2.11	5.26	-1.80	-1.26	2.31
Skewness	0.24	0.66	-0.84	-0.84	2.72	2.60	1.27	-1.04	-1.04	1.76	0.23	0.15	-1.17
Range	5.35	0.06	13.89	19.85	0.38	0.09	0.41	0.00	0.00	23.94	3.15	1.21	3.16
Minimum	0.49	0.09	41.87	59.87	0.05	0.05	0.05	0.08	0.05	4.18	0.05	1.10	8.14
Maximum	5.84	0.15	55.76	79.72	0.43	0.14	0.46	0.08	0.05	28.13	3.20	2.31	11.30
Sum	118.44	4.57	2006.65	2868.94	3.72	2.40	5.67	3.20	2.00	449.95	53.88	69.02	415.01
Count	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Confidence Level (95.0%)	0.50	0.01	0.79	1.13	0.02	0.01	0.03	0.00	0.00	1.37	0.36	0.11	0.21

10.1.2 Drilling

As per the **Minerals (Evidence of Mineral Contents) Rules, 2021**, G4-stage exploration represents a **reconnaissance-level investigation** aimed at establishing the broad geological continuity and mineral potential through geological mapping, surface sampling and, where warranted, scout drilling. Accordingly, the present drilling programme was undertaken to investigate the **subsurface occurrence and continuity of the identified mineralised BIF zones**. The boreholes were wide-spaced and irregularly distributed, with variable separation between adjacent holes, consistent with the reconnaissance nature of G4-stage exploration.

A total of **eight inclined boreholes**, comprising **UPCKB-01 to UPCKB-06 in Chakdiya (Block A1)** and **UPJTB-01 to UPJTB-02 in Jorba (Block A2)**, were completed with an aggregate drilled length of **700.10 m** against the proposed programme of approximately 700 m. The boreholes were located at selected prospective sites based on the geological mapping and surface sampling results to obtain information on the **subsurface continuity, thickness, dip and grade characteristics** of the mineralised BIF zones. The drilling results, together with the geological mapping and surface sampling data, provide a reconnaissance-level understanding of the mineralised zones within the investigated areas.

The boreholes were drilled at an inclination of **50°**, with their orientations selected considering the mapped strike and dip of the mineralized bands to obtain effective intersections of the iron-bearing horizons. The **borehole-wise collar coordinates, azimuths, inclinations and drilled depths** are provided in the relevant drilling table.

The drilling was undertaken to establish the **broad subsurface continuity, geometry, thickness and grade characteristics** of the iron-bearing zones at the **G4 exploration stage**. The drilling results were integrated with geological mapping, bedrock sampling and channel-sampling data to assess the mineral potential of the investigated blocks. Drill cores were systematically logged, and sampling intervals were selected based on lithology, mineralization and geological contacts. Mineralized and representative host-rock intervals were predominantly sampled at **1 m intervals** for chemical analysis.

Considering the reconnaissance nature of the investigation and the wide-spaced scout drilling adopted at the G4 stage, the available exploration data provide a preliminary assessment of the **extent and mineral potential** of the identified iron-bearing zones. The mineral potential evaluated at this stage corresponds to the **UNFC 334 (Reconnaissance Mineral Resource)** category, subject to the applicable resource-estimation

criteria. Further systematic exploration at closer spacing would be required to establish the continuity, geometry, grade distribution and confidence level necessary for advancement to higher exploration stages.

10.1.3 Discussion of Results of Chemical Analysis of Samples

Block A1

In **Block A1**, the major linear **Banded Iron Formation (BIF)** zone comprises five sub-parallel BIF bands interbedded with phyllite. Based on geological mapping and bedrock sampling, **nine channel samples** were collected across two **BHC&J** bands and **two channel samples** across one **BMC&J** band. The channel-sample analytical results indicate that Fe content in **BHC&J-1** ranges from **15.78% to 50.04%**, with an average of **37.48% Fe**; in **BHC&J-2**, from **12.50% to 52.62%**, with an average of **38.85% Fe**; and in **BMC&J-3**, from **21.29% to 52.09%**, with an average of **39.30% Fe**. Are given below plate-4a & 4b. These results indicate encouraging iron mineralization and provide the basis for detailed subsurface investigation through drilling.

Based on the results of **geological mapping, bedrock sampling and encouraging channel-sampling results**, a systematic drilling programme was undertaken in **Block A1**. A total of **six boreholes (UPCKB-01 to UPCKB-06)** were completed to investigate the subsurface continuity and mineralisation characteristics of the identified BIF bands. **UPCKB-01, UPCKB-02 and UPCKB-05** predominantly intersected **BHC&J**, while **UPCKB-03, UPCKB-04, UPCKB-05 and UPCKB-06** predominantly intersected **BMC&J**. Borehole **UPCKB-05** intersected both **BHC&J and BMC&J**, representing an overlap between the two BIF types.

A total of **248 core samples** were collected from the drilled intervals and subjected to chemical analysis. The sampling covered the mineralised BHC&J and BMC&J intersections encountered in the six boreholes, providing analytical data for evaluating their **iron content, thickness and subsurface continuity**.

The analytical results from the six boreholes indicate significant iron mineralization within the BHC&J zones investigated. In addition to BMC&J mineralisation, the analytical results indicate the presence of **magnetite-bearing mineralisation in Block A1**. The grade-tonnage assessment for BMC&J mineralisation indicates **20.84 Mt at** a weighted average grade of **31.62%** Fe at a **≥15%** Fe cut-off, **11.74 Mt** at **35.68%** Fe at a **≥30%** Fe cut-off, and **1.67 Mt** at **45.83%** Fe at a **≥35%** Fe cut-off. These results demonstrate a progressive

decrease in tonnage with increasing Fe cut-off, accompanied by an increase in the corresponding weighted average Fe grade.

At a **30% Fe** cut-off grade, the thickness of mineralized intervals ranges from 0.97 m to 13.58 m, with a weighted average grade of 34.80% Fe. At a **35% Fe** cut-off grade, the thickness ranges from 0.97 m to 5.82 m, with a weighted average grade of 41.88% Fe. Based on these results, the estimated Mineral Resource for Block A1 (Kushniya Block), as reported for FS 2024–25, is 5.20 Mt at an average grade of 34.80% Fe at a 30% Fe cut-off grade, and 1.29 Mt at an average grade of 41.88% Fe at a 35% Fe cut-off grade.

The chemical analyses also indicate associated **TiO_2 and V_2O_5 mineralization** within the mineralized zones. At a **1.50% TiO_2 cut-off grade**, the thickness of mineralized intervals ranges from **0.97 m to 11.64 m**, corresponding to an estimated resource of **11.66 Mt at a weighted average grade of 2.28% TiO_2**. Similarly, at a **500-ppm V_2O_5 cut-off grade**, the thickness of mineralized intervals ranges from **0.97 m to 7.76 m**, with an estimated resource of **4.47 Mt at a weighted average grade of 894.72 ppm V_2O_5**.

Block A2

In **Block A2**, geological mapping and analytical investigations identified two prominent **Massive Iron Ore (MIO)** bands. Based on geological mapping and bedrock sampling, two channel samples were collected across the two MIO bands. The channel-sample analytical results indicate that Fe content in **MIO Band-1** ranges from **41.87% to 53.66%**, with an average of **49.99% Fe**, whereas in **MIO Band-2**, Fe content ranges from **47.84% to 53.59%**, with an average of **50.35% Fe**. The high Fe contents obtained from the channel samples indicate encouraging iron mineralization and provided the basis for detailed subsurface investigation through drilling.

Based on geological mapping, bedrock sampling, and encouraging channel-sample results, a systematic drilling programme was undertaken in Block A2. A total of **two boreholes (UPJTB-01 and UPJTB-02)** were drilled across the massive iron ore bands in the western part of the block. A total of **61 core samples** were collected and subjected to chemical analysis. The analytical results provided information on the **thickness, continuity, and grade distribution** of the mineralized zones.

The analytical results from boreholes **UPJTB-01 and UPJTB-02** indicate significant iron mineralization in Block A2. At a **30% Fe cut-off grade**, the thickness of mineralized intervals ranges from **0.49 m to 7.76 m**, with a weighted average grade of **39.86% Fe**. At a **35% Fe cut-off grade**, the thickness ranges from **0.49 m**

to 4.85 m, with a weighted average grade of **45.36% Fe**. Based on these results, the estimated **Mineral Resource for Block A2 (Jorba Block), as reported for FS 2024–25**, is **3.47 Mt at an average grade of 39.86% Fe at a 30% Fe cut-off grade**, and **1.93 Mt at an average grade of 45.36% Fe at a 35% Fe cut-off grade**.

In addition to iron mineralization, the chemical analyses indicate associated **TiO_2 and V_2O_5 mineralization** in Block A2. At a **1.50% TiO_2 cut-off grade**, the thickness of TiO_2-bearing mineralized intervals ranges from **1.40 m to 12.61 m**, corresponding to an estimated resource of **8.01 Mt at a weighted average grade of 5.94% TiO_2**. Similarly, at a **500-ppm V_2O_5 cut-off grade**, the thickness of V_2O_5-bearing mineralized intervals ranges from **1.40 m to 12.61 m**, with an estimated resource of **8.01 Mt at a weighted average grade of 1,089.63 ppm V_2O_5**.

Precious and base metal investigation

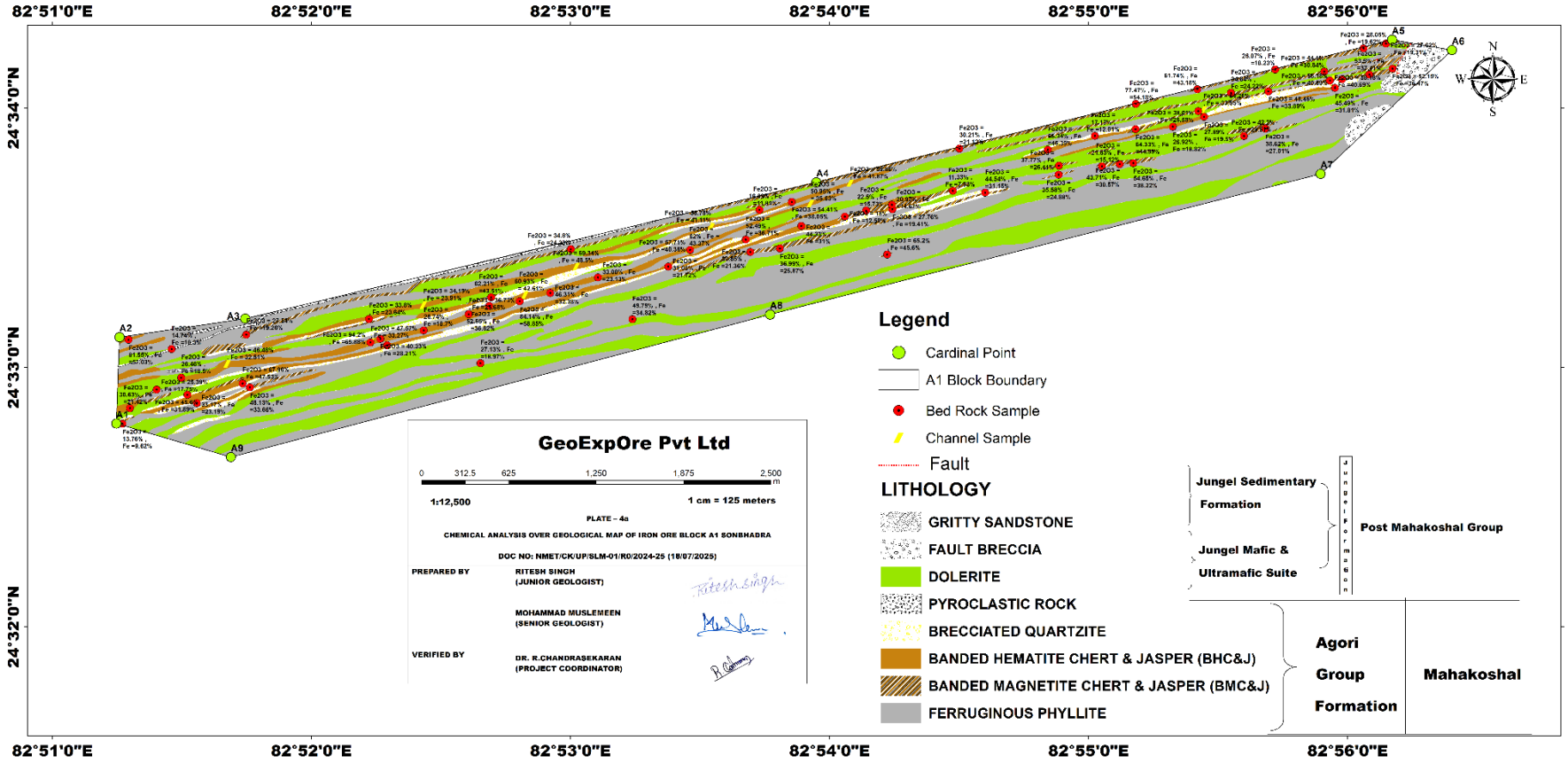
Minor **sulphide grains, mainly sphalerite**, were observed locally within dolerite intrusive bodies exposed north of **Chakdiya**, around **Murgidand village**, and northeast of **Karwaniya**. Accordingly, **ten bedrock/core samples** collected from dolerite, pyroclastic rock, metabasalt, BIF, and brecciated quartzite were analyzed for **precious metals by fire-assay method** (Annexure-V). In addition, **four bedrock samples and six core samples** collected from dolerite, quartz veins, tuff, and BIF were analyzed for **gold and associated precious/base metals** (Annexure-IV). The analytical results were **not significant and do not indicate appreciable precious- or base-metal enrichment** within the investigated lithologies.

10.2 Data spacing for reporting exploration results

The current borehole spacing of approximately 1100 m to 1,400 m, considering the strike length of the explored mineralized bands, was adopted for the present investigation has provided Reconnaissance understanding of the deposit's geometry as per sanctioned order.

PLATE - 4a

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A1 SONBHADRA



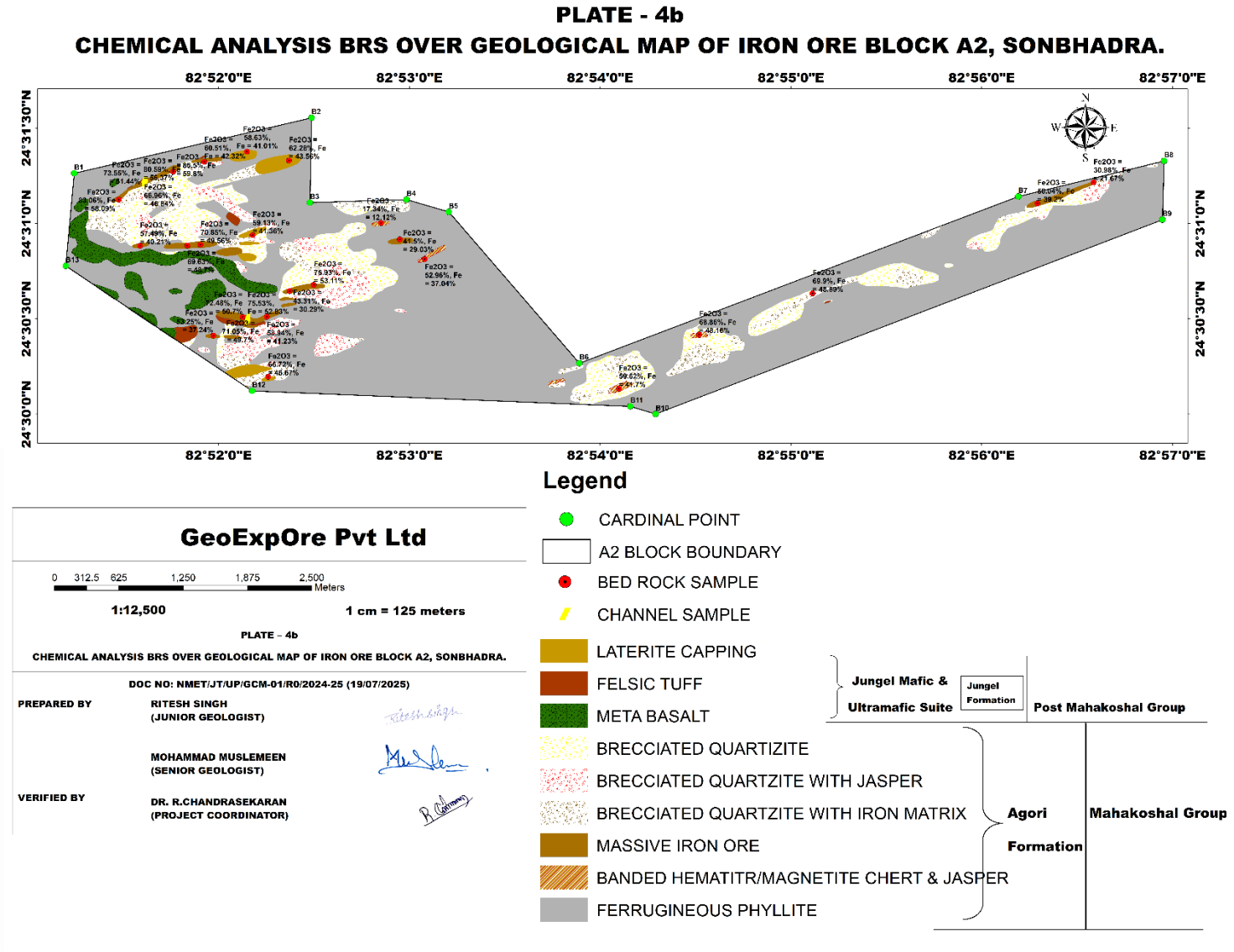


Figure-10.5: Chemical analysis BRS over geological map of iron ore block A1& A2 sonbhadra, on scale 1:12500

CHAPTER 11: 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.

A **Differential Global Positioning System (DGPS) survey** was carried out in the **A1 Chakdiya (Kushniya) Block and A2 Jorba Block, Sonbhadra District, Uttar Pradesh**, to establish accurate ground control for the drilling programme. A total of **nine DGPS points** were established, comprising **one base station and eight borehole collar-fixation points** showed in Figure-11.1 to 11.3. The borehole collar locations were fixed using DGPS, and their **latitude, longitude, easting, northing and elevation (RL)** were recorded for subsequent geological interpretation and resource evaluation.

The DGPS survey provided positional control for all **eight boreholes**, comprising **UPCKB-01 to UPCKB-06 in Block A1** and **UPJTB-01 to UPJTB-02 in Block A2**. The recorded collar elevations range from approximately **280.421 m to 415.390 m above mean sea level**. The detailed geographic coordinates and elevations of the borehole collar points are presented in the relevant **DGPS location Table-11.2**.

The drilling programme comprised **inclined boreholes drilled at an inclination of 50°**. Boreholes **UPCKB-01 to UPCKB-06** were drilled with an azimuth of approximately **N15°W**, whereas **UPJTB-01 and UPJTB-02** were drilled with azimuths of approximately **N30°W & N02°W**, as recorded in the borehole drilling details. The borehole orientations were selected considering the mapped disposition of the mineralized bands to obtain effective intersections of the subsurface iron-bearing horizons.

The **collar RL, bottom RL and total drilled depth** were recorded for each borehole given in Table-11.2. The individual drilled depths range from **53.00 m to 120.00 m**, with a cumulative drilling depth of **700.10 m**. The collar and bottom RLs were used to establish the vertical position and subsurface geometry of the

intersected lithological and mineralized horizons are illustrated on Plate-5a & 5b.

Table-11.1: DGPS survey coordinates, UTM position and elevation of base station and borehole locations

Point name	code	Original Latitude	Original Longitude	Original Altitude	Antenna Height (m)	Northing (mts)	Easting (mts)	Elevation (m)
1	Base Station	N24° 32' 56.4585"	E82° 53' 07.1499"	238.686	1.44	2716317.67	690958.29	298.004
2	UPCKB-01	N24°33'03.3809"	E82°52'14.2664"	317.941	1.44	2716510.79	689467.17	377.656
3	UPCKB-02	N24°33'16.4958"	E82°53'03.3443"	289.145	1.44	2716932.70	690842.76	348.472
4	UPCKB-03	N24°33'26.4735"	E82°53'39.0172"	308.253	2.07	2717254.73	691842.57	415.390
5	UPCKB-04	N24°33'09.2571"	E82°52'12.3878"	304.323	1.44	2716690.87	689411.85	363.651
6	UPCKB-05	N24°33'22.6162"	E82°53'01.6135"	334.233	1.44	2717121.80	690791.34	393.569
7	UPCKB-06	N24°34'05.5200"	E82°55'55.8480"	251.232	1.44	2718509.26	695676.09	309.796
8	UPJTB-01	N24°31'14.4911"	E82°51'42.9014"	240.076	1.44	2713148.66	688629.74	299.304
9	UPJTB-02	N24°30'28.5065"	E82°52'08.5887"	221.22	1.44	2711743.64	689371.95	280.421

Table-11.2: Summary of borehole coordinates, orientation, elevation and drilling details in the study area of block A1 & A2.

Details of Boreholes Drilled in Chakdiya Kushniya& Jorba Block's, Sonbhadra, Uttar Pradesh during FS: 2024-25									
S.No.	**Borehole No.**	**Coordinate**	**Azimuth**	**BH Angle**	**Collor RL(m)**	**Bottom RL(m)**	**Date of Commencement**	**Date of Closing**	**Total Drilling Depth(m)**
1	UPCKB-01	N24°33'03.3809" E82°52'14.2664"	N15º W	50º	377.656	288.034	8/16/2025	9/23/2025	117.00
2	UPCKB-02	N24°33'16.4958" E82°53'03.3443"	N15º W	50º	348.472	256.552	11/4/2025	12/1/2025	120.00
3	UPCKB-03	N24°33'26.4735" E82°53'39.0172"	N15º W	50º	415.390	341.088	3/31/2025	4/22/2026	97.00
4	UPCKB-04	N24°33'09.2571" E82°52'12.3878"	N15º W	50º	363.651	302.371	9/26/2025	10/28/2025	80.00
5	UPCKB-05	N24°33'22.6162" E82°53'01.6135"	N15º W	50º	393.569	316.969	12/7/2025	1/9/2026	100.00
6	UPCKB-06	N24°34'05.5200" E82°55'55.8480"	N15º W	50º	309.7964	269.122	13-Jul-25	7/27/2025	53.10
7	UPJTB-01	N24°31'14.4911" E82°51'42.9014"	N30º W	50º	299.304	258.706	1/15/2026	28-01-206	53.00
8	UPJTB-02	N24°30'28.5065" E82°52'08.5887"	N02º W	50º	280.421	219.141	2/2/2026	2/14/2026	80.00
Total Drilling Depth									**700.10**



Figure-11.1: Field photographs showing DGPS survey and georeferencing of the base station and eight borehole locations.

11.2 Quality and adequacy of topographic control.

Topographic control in the investigated area was established through **DGPS survey**. A total of **nine DGPS points**, comprising **one base station and eight borehole collar points**, were established in the Chakdiya (A1) and Jorba (A2) Blocks. The geographical coordinates and elevations of the borehole collar points are presented in **Table 11.1**.

The established DGPS control provided reliable **horizontal and vertical reference** for borehole positioning, geological mapping, preparation of geological sections, and correlation of mineralized intersections with surface topography. The recorded collar elevations range from approximately **280.42 m to 415.39 m**, providing adequate elevation control over the investigated area.

Considering the **G4 stage of exploration**, the available topographic control is considered **adequate and reliable for the present investigation**, particularly for correlating surface geological observations with borehole data and interpreting the subsurface continuity of the mineralized zones. The established DGPS control can also be utilized for subsequent detailed exploration and mineral resource evaluation.

CHAPTER 12: SAMPLING TECHNIQUE

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

Systematic sampling was undertaken during the investigation through **bedrock sampling (BRS), channel sampling and drill-core sampling** to assess the lithological characteristics, continuity, thickness and grade distribution of the iron-bearing BIF zones. The sampling programme was designed considering the geological setting, surface exposure, nature of mineralisation and **G4 stage of exploration**, with appropriate measures adopted to obtain representative samples.

A total of **550 (91 bedrock samples (BRS), 150 channel samples and 309 drill-core samples)** were collected and subjected to chemical analysis.

In addition, 20 samples were selected for bulk-density determination, 10 samples for fire-assay analysis and 10 samples for AAS analysis. For mineralogical and petrographic characterization, 10 samples each were selected for thin-section, polished-section and ore-microscopic studies. An external check programme comprising 56 samples, representing approximately 10.00% of the 550 primary analytical samples, was undertaken to assess the accuracy and reproducibility of the analytical results.

The samples were submitted to **Shiva Analytical Laboratory, Bengaluru; GSI, Bengaluru; and SGS, Bhubaneswar** for chemical, mineralogical and petrographic investigations. Statistical evaluation of the primary and external check samples yielded an **R^2 value of 97.87%**, indicating a **very strong correlation and good reproducibility** of the analytical results. The systematic sampling, representative channel and core sampling, and external check analysis collectively provide an **adequate and reliable dataset** for evaluating the iron-ore potential of the investigated area.

12.1.1 Bed rock sampling

A total of **91 bedrock samples** were collected from exposed iron-bearing and associated mineralized lithounits in Blocks A1 and A2. In **Block A1**, 67 BRS samples were collected, including **30 samples from Banded Hematite Chert and Jasper (BHC&J), 31 samples from Banded Magnetite Chert and Jasper (BMC&J)**, and the remaining samples from other mineralized lithounits. In **Block A2**, 24 BRS samples were collected from **massive-oxidised iron ore, BH/MC&J, lateritic cappings and brecciated chert–jasper bodies with ferruginous matrix** which Plate-3a & 3b.

Samples were collected from representative, fresh to moderately weathered exposures, with care taken to avoid selective sampling of visually high-grade material. The sampling locations were selected to represent are showed Figure-12.1 to 12.4. variations in lithology, mineralisation and surface expression of the iron-bearing horizons. BRS data were primarily used for **initial assessment of grade variability and delineation of prospective zones** for subsequent channel sampling and drilling.

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PLATE - 3a

SAMPLE LOCATIONS MAP OF IRON ORE BLOCK A1 SONBHADRA, ON SCALE 1:12,500

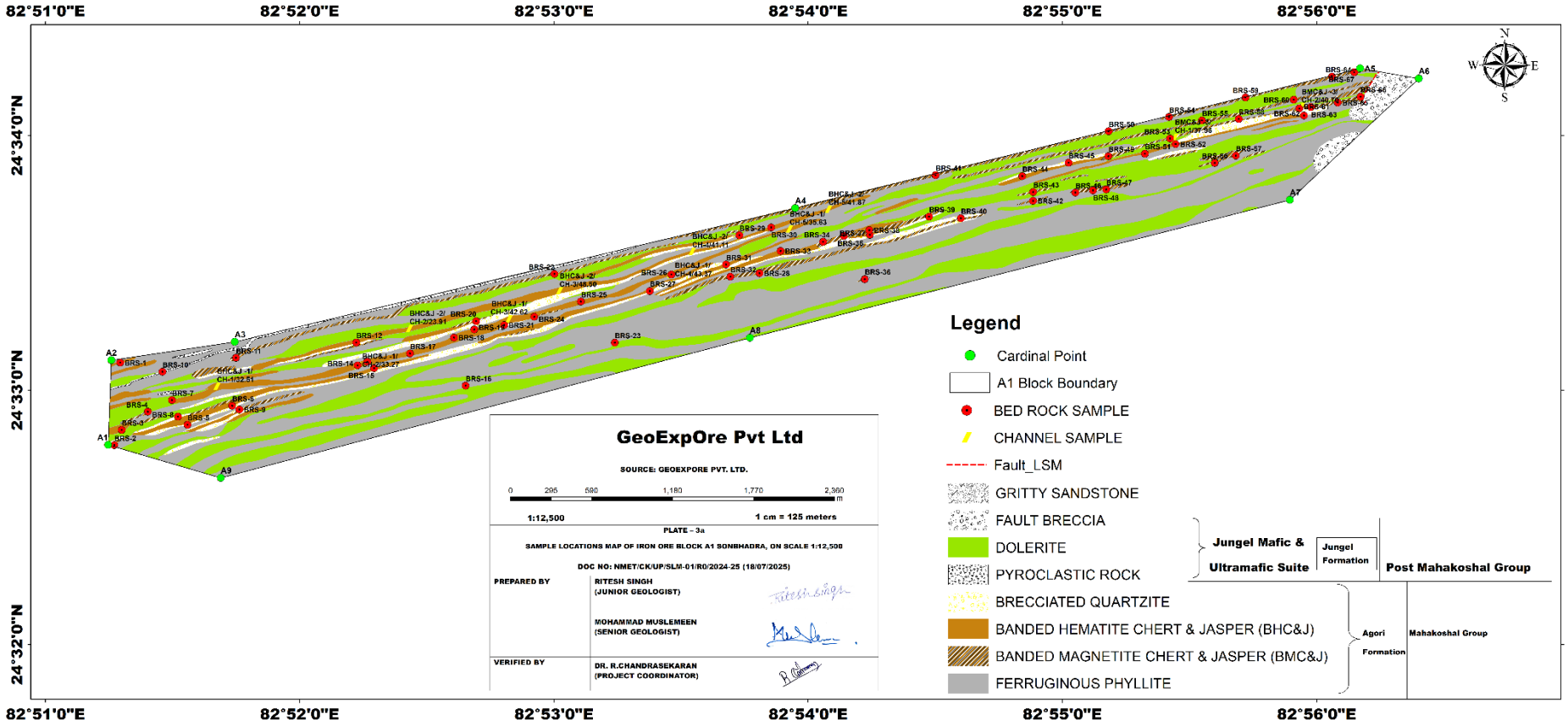
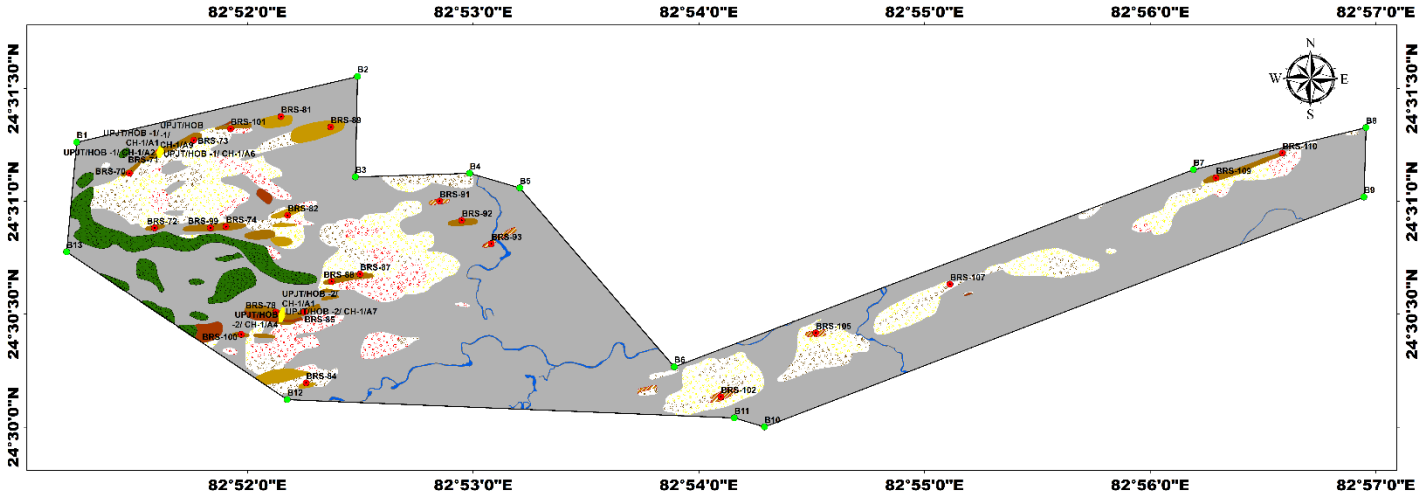


PLATE - 3b

SAMPLE LOCATIONS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500



GeoExpOre Pvt Ltd

0 310 620 1,240 1,860 2,480 Meters

1:12,500 1 cm = 125 meters

PLATE – 3b

SAMPLE LOCATIONS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500

DOC NO: NMET/JT/UP/GCM-01/R0/2024-25 (19/07/2024)

PREPARED BY	RITESH SINGH (JUNIOR GEOLOGIST)	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)	

Legend

- CARDINAL POINTS
- A2 BLOCK BOUNADRY
- BED ROCK SAMPLE
- CHANNEL SAMPLE
- NALA
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT

Jungel Mafic & Ultramafic Suite — Jungel Formation — Post Mahakoshal Group

- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Agori Formation — Mahakoshal Group

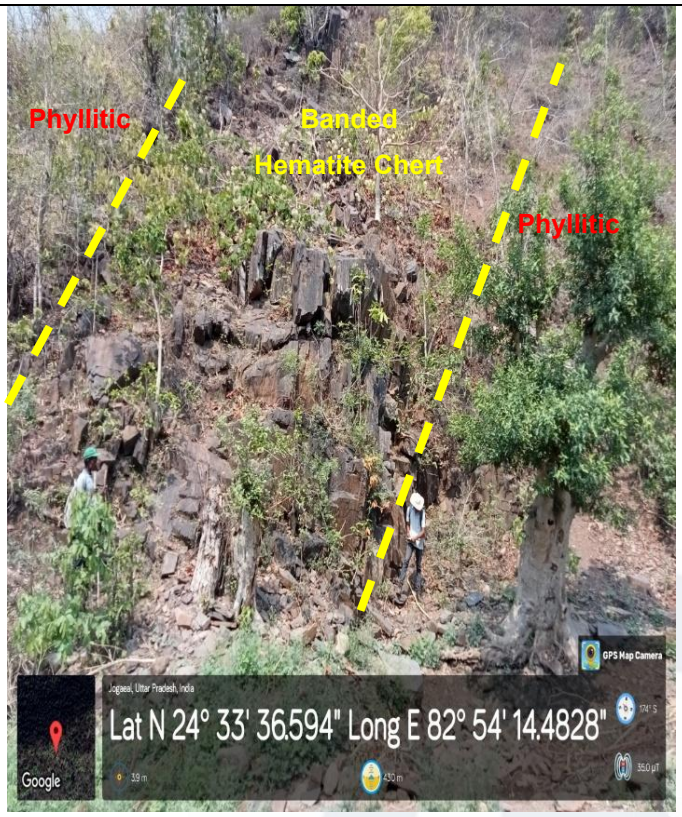


Figure-12.1: Field exposure showing a continuous banded hematite–chert (BHC) band intercalated with phyllite.



Figure-12.2 Field Exposure showing the Strike continuity of the banded magnetite–chert–jasper (BMCJ) band along strike.

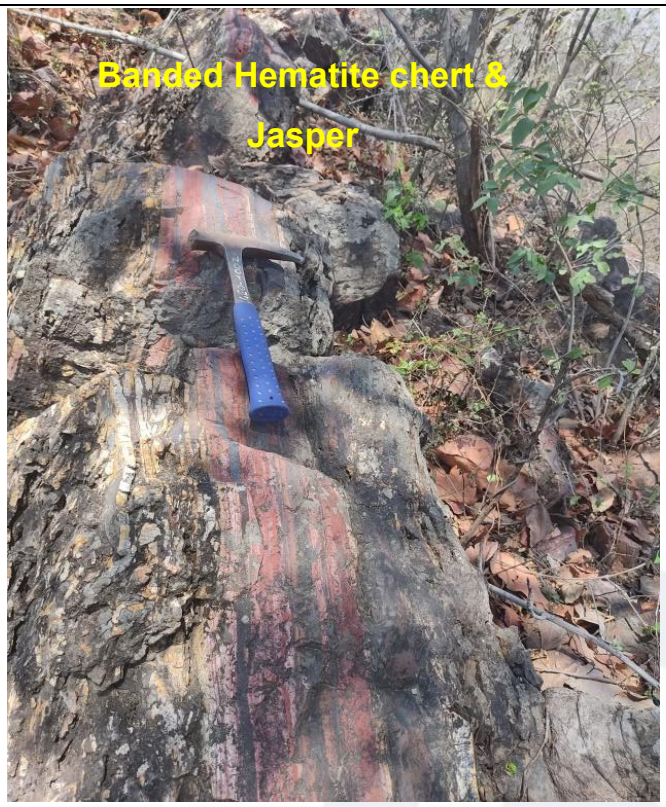


Figure-12.3 Field exposure showing the lateral continuity of the banded hematite–chert–jasper (BHCJ) band along strike.



Figure-12.4 Field exposure showing alternating magnetite–chert and jasper bands within the BMCJ unit.

12.1.2 Channel sampling

A total of **150 channel samples** were collected from exposed BIF and associated mineralized zones. Channel sections were established across the **strike and width of the exposed mineralized bands**, generally in an orientation perpendicular to strike, to provide representative information on grade variation and apparent thickness are showed on Plate 6a & 6b.

The channel cuts were maintained at approximately **10 cm width and 2 cm depth**, with individual channel lengths depending on the continuity of the exposed mineralized horizon and extending up to approximately **40 m**. Samples were collected at approximately **2 m intervals**, with about **2 kg of material** collected from each interval. The complete exposed lithological succession was included within the channel wherever practicable, including ferruginous, siliceous and phyllitic components, thereby minimizing selective sampling and improving representativeness in Figure-15.5.

In **Block A1**, 11 channel sections were established across selected BHC&J and BMC&J bands, while **two channel sections** were established across prospective massive iron-ore bands in **Block A2**. The channel sections were distributed along the identified mineralized trends, with the prospective mineralized bands having an overall strike continuity of approximately **1,000 m** in the investigated sectors.

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PLATE - 4a

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A1 SONBHADRA

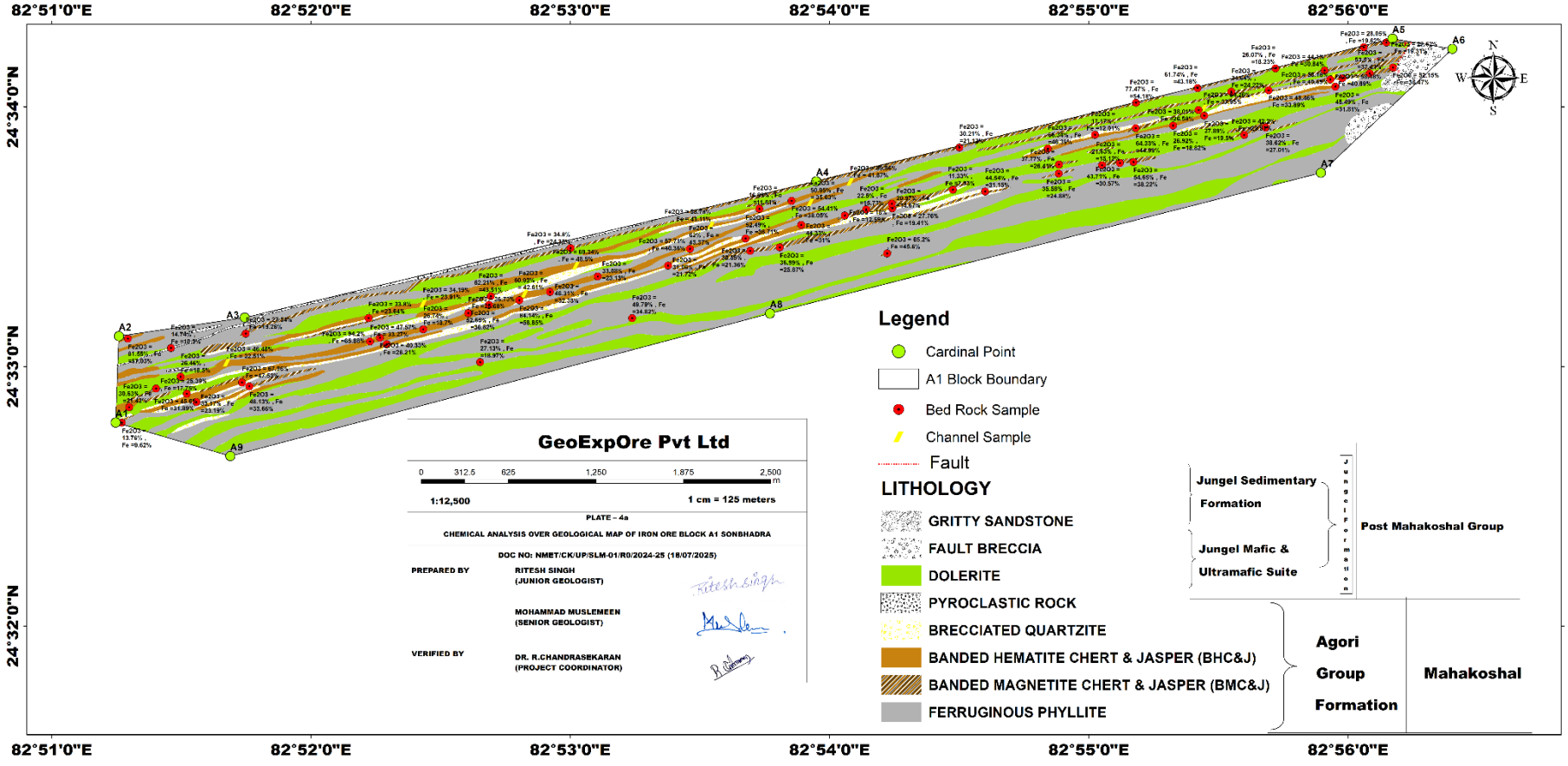
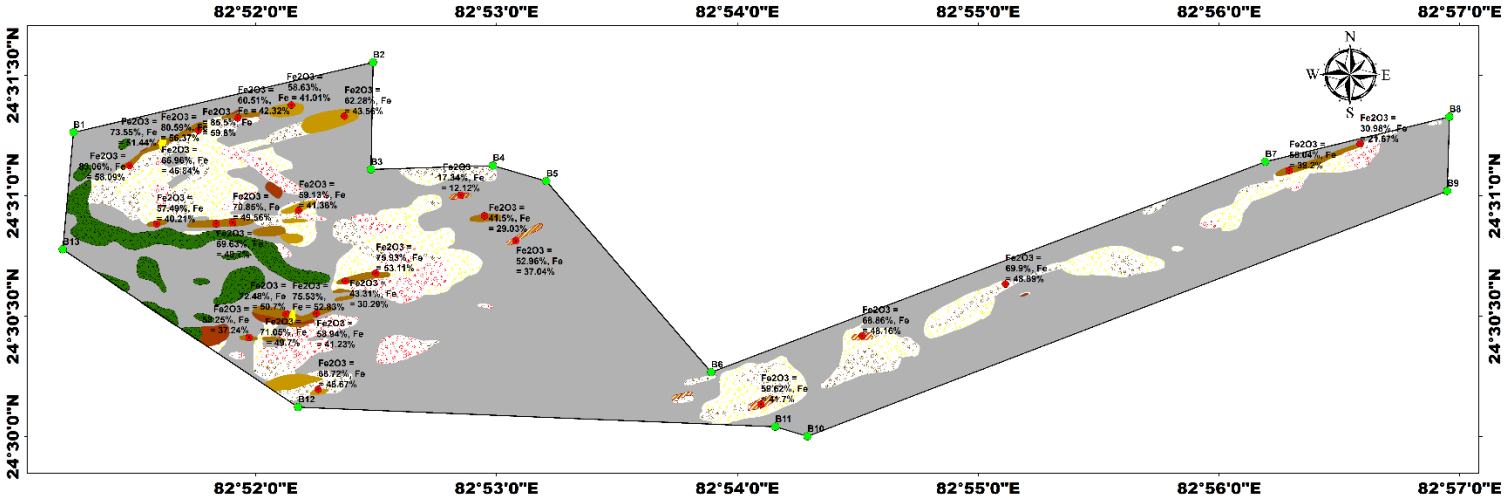


PLATE - 4b

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA.



GeoExpOre Pvt Ltd

0 312.5 625 1,250 1,875 2,500 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 4b

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA.

DOC NO: NMET/JT/UP/GCM-01/R0/2024-25 (19/07/2025)

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	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

- CARDINAL POINT
- A2 BLOCK BOUNDARY
- BED ROCK SAMPLE
- CHANNEL SAMPLE
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

Agori Formation — **Mahakoshal Group**



Figure-12.5: Field photographs showing channel sampling across the banded hematite–chert–jasper (BHCJ) band, with representative channel cut across the mineralised zone.

12.1.3 Core sampling

A total of **309 drill-core samples** were collected from mineralized intervals intersected in **eight boreholes**, comprising six boreholes in Block A1 (**UPCKB-01 to UPCKB-06**) and two boreholes in Block A2 (**UPJTB-01 and UPJTB-02**) are shown in Plate 5a & 5b.

Prior to sampling, the drill cores were systematically logged for **lithology, mineralisation, alteration, weathering, structural features and core recovery**. In Figure-12.6 & 12.7 are Sampling intervals were selected with due consideration to lithological contacts, mineralisation boundaries and changes in mineralogical or textural characteristics. Mineralized intervals were generally sampled at **1 m intervals**, while sample boundaries were adjusted where required to coincide with significant lithological or mineralisation contacts.

The selected core intervals were **longitudinally split into two equal halves**. One half was retained as a permanent geological record at the **GSI Core Library, Lucknow**, while the other half was submitted for sample preparation and chemical analysis. This procedure ensured preservation of representative core material for **future verification, re-sampling and additional investigations**.

PLATE - 5a

BOREHOLE LOCATIONS MAP OF IRON ORE BLOCK A1 SONBHADRA, ON SCALE 1:12,500

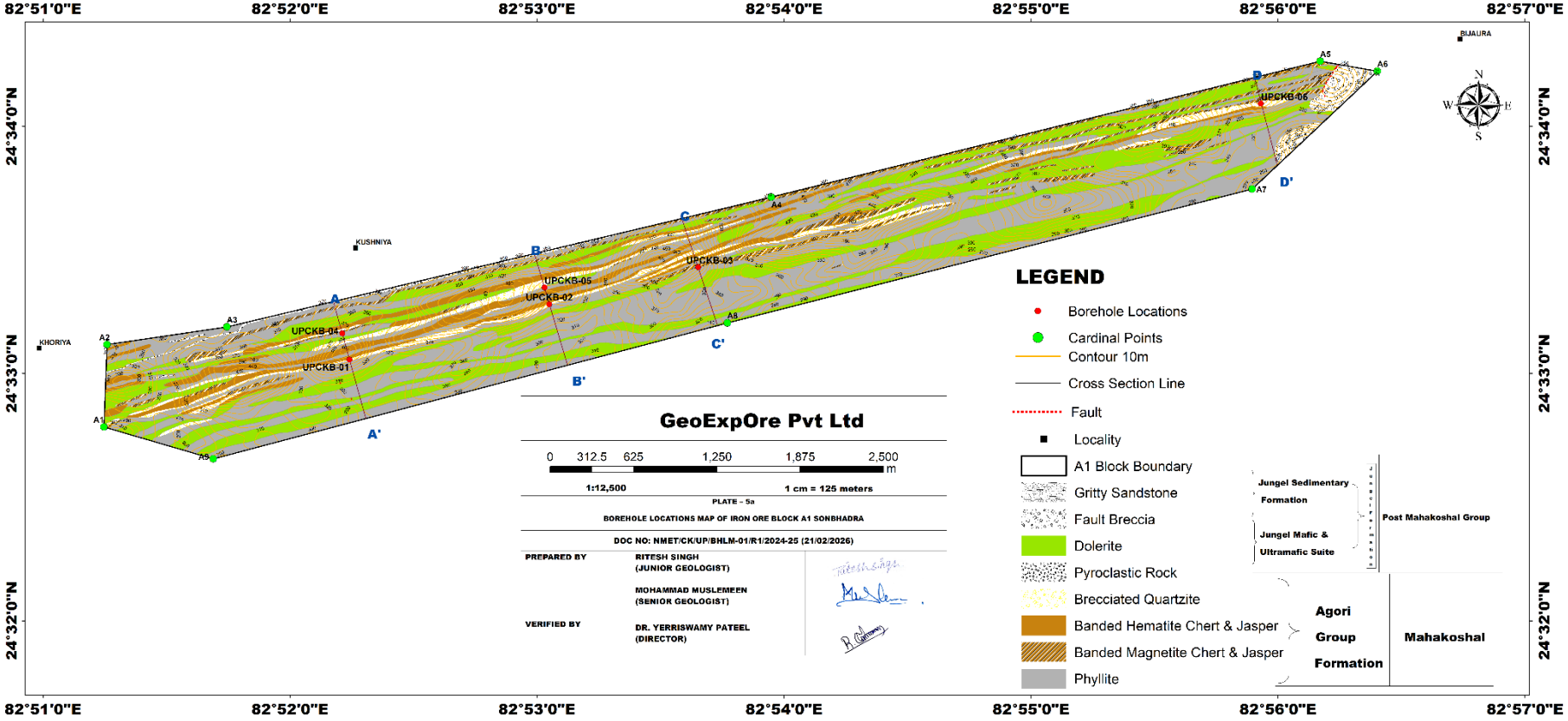
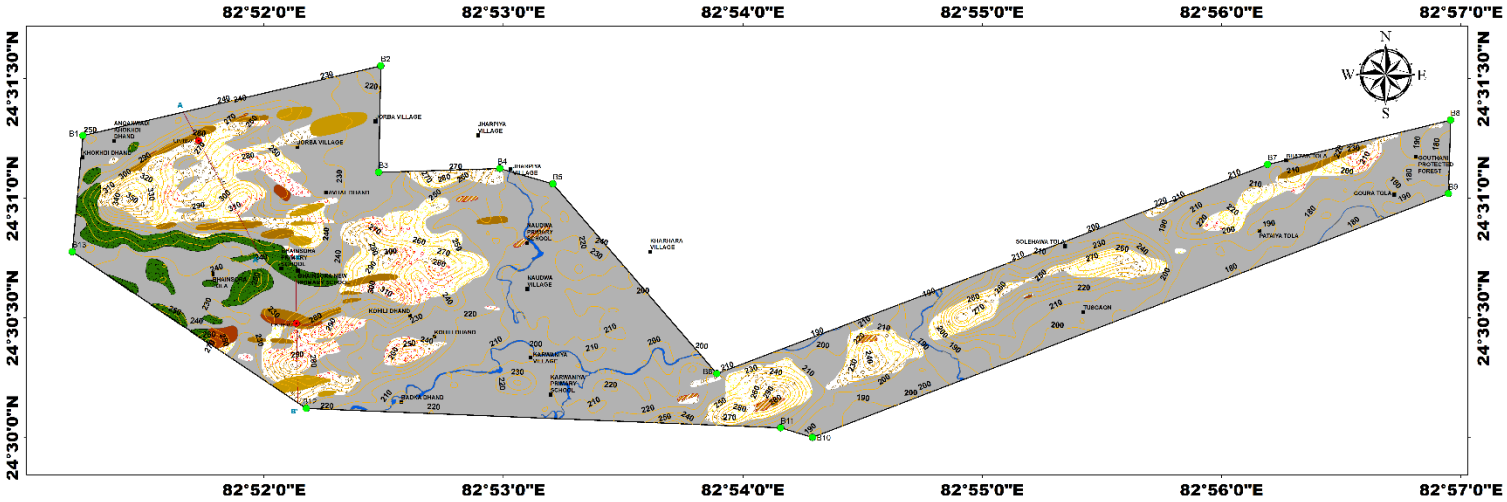


PLATE - 5b

BOREHOLE LOCATIONS MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500



GeoExpOre Pvt Ltd

0 312.5 625 1,250 1,875 2,500 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 5b

BOREHOLE LOCATIONS MAP OF IRON ORE BLOCK A2, SONBHADRA 1:12,500

DOC NO: NMET/UP/JT/BHLM-01/R1/2024-25 (21/02/2026)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. YERRISWAMY PATEEL (DIRECTOR)**	

Legend

- CARDINAL POINTS
- BOREHOLE POINTS
- CONTOUR
- A2 BLOCK BOUNDARY
- CROSS SECTION
- LOCATION
- NALA
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

Agori Formation — **Mahakoshal Group**



Figure-12.6: Representative magnetite-rich drill core showing massive dark grey to steel-grey mineralisation from borehole UPCKB-06.



Figure-12.7: Representative drill core showing banded magnetite mineralisation with alternating dark grey and siliceous bands from Borehole UPCKB-04.

12.1.4 External check sampling

To assess analytical reproducibility, approximately 10% of the primary bedrock, channel and drill-core samples were selected for external check analysis. A total of 56 check samples were analyzed independently at SGS, Bhubaneswar. The check samples covered a range of Fe grades and were compared with the corresponding primary results. The paired dataset shows a strong correlation ($R^2 = 97.87\%$). The correlation coefficient is used as evidence of consistency between the datasets; it is not, by itself, a complete demonstration of analytical accuracy or absence of systematic bias.

CHAPTER 13: DRILLING TECHNIQUE AND DRILL SAMPLING EMPLOYED

13.1 Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g. core diameter, triple or standard tube).

Diamond core drilling was carried out using **NQ-size core drilling equipment**, yielding a nominal core diameter of **47.6 mm**. Drilling was conducted at an inclination of approximately **50° from horizontal**. The core was retrieved systematically on a **run-wise basis** using the appropriate NQ core barrel (standard/triple-tube, as applicable). Each core run was carefully measured and examined, and the **physical appearance, lithology, weathering, fracturing, alteration, mineralization, Rock Quality Designation (RQD), Core Dip and other relevant geological characteristics** were recorded systematically during core logging.

13.2 Whether core and chip sample recoveries have been properly recorded and results assessed.

Core recovery was **systematically recorded for each drill run** during the drilling programme. Detailed borehole-wise and run-wise geological logs, including **run length, core recovery, RQD, lithology, grain size, colour, mineralogy, alteration, structural features, TRC and other relevant geological observations**, were maintained for all boreholes. The summarized lithologs and detailed borehole logs are provided in the relevant **Annexures**.

The recorded **core recovery and RQD data were reviewed in relation to lithology, weathering, fracturing and mineralized intervals** to assess the quality and representativeness of the recovered core. The recovery data were also considered during geological interpretation and correlation of the mineralized zones between boreholes.

No chip-sample drilling was undertaken during the investigation; therefore, chip-sample recovery is not applicable. The systematic recording and assessment of core recovery provide adequate information on the quality and continuity of the recovered drill core and support the reliability of the geological interpretation and sampling of the mineralized intervals.

13.3 Measures taken to maximize sample recovery and ensure representative nature of the samples.

Diamond core drilling was carried out in accordance with the **NMET guidelines and prescribed drilling procedures** with the objective of achieving high core recovery and minimizing core loss. The drilling and core retrieval operations were systematically monitored, and individual core runs were carefully measured and recorded to ensure accurate determination of core recovery. Proper handling, orientation, preservation, labelling, and storage of the recovered drill cores were maintained throughout the drilling programme.

A total of **700.10 m of diamond core drilling** was completed through **eight boreholes** in Blocks **A1 and A2**. Out of the total drilled length, **645.70 m of drill core was recovered**, resulting in an overall **core recovery of 92.23%**. The achieved core recovery is **greater than the minimum 90% recovery prescribed under the NMET guidelines**, thereby meeting the prescribed drilling and core recovery requirements.

The recovered drill cores were systematically logged for **lithology, mineralization, alteration, grain size, colour, structural features, degree of weathering, and other relevant geological characteristics** prior to sampling. Core runs were carefully examined, and geological contacts and mineralized intervals were identified during detailed core logging.

To ensure representative sampling of the intersected mineralized zones, the cores were systematically sampled at **1.0 m intervals**, wherever applicable, while giving due consideration to lithological contacts, changes in mineralization, and geological boundaries. A total of **309 core samples (CS)** were collected from the drilled boreholes for chemical analysis, covarying approximately **350 m of cumulative Fe-mineralized intersections**.

The systematic measurement of core recovery on a run-wise basis, coupled with detailed geological logging, proper core handling, and regular-interval sampling, helped minimize sampling bias and ensured that the collected samples were representative of the intersected **Fe-mineralized zones**. The high overall core recovery of **92.23%** further indicates the effectiveness of the drilling programme and provides a reliable basis for geological interpretation, grade evaluation, and resource estimation.

13.4 Whether a relationship exists between sample recovery and grade and whether sample bias could have occurred due to preferential loss or gain of fine or coarse material.

The relationship between **core recovery and Fe grade** was examined to assess whether variations in recovery could have introduced sampling bias. The comparison does not indicate any **consistent or systematic relationship** between core recovery and Fe grade. Intervals with relatively lower recovery do not consistently correspond to either higher or lower Fe grades than intervals with higher recovery.

The observed recovery data do not indicate significant **preferential loss or gain of fine or coarse material** that could materially affect the analytical results. The overall **core recovery of 92.23%**, based on **645.70 m recovered from 700.10 m drilled**, further supports the adequacy of core recovery for geological logging and representative sampling.

Where calculated, the statistical correlation/R^2 between core recovery and Fe grade may also be used to quantify the relationship. A low or negligible correlation would further demonstrate that variations in recovery have not systematically influenced Fe grades. Based on the available recovery and assay data, **no significant recovery-related sampling bias is evident**, and the assay results are considered representative of the sampled mineralized intervals.

13.5 Logging: -Whether core and chip samples have been logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.

The **drill cores were systematically logged** to an appropriate level of detail considering the **G4 stage of exploration**. The logging was carried out on a run-wise basis and included **lithology, mineralization, alteration, weathering, colour, grain size, mineralogy, structural features, lithological contacts, core recovery and RQD**, along with the nature, thickness and distribution of mineralized intervals.

The principal mineralized lithounits identified during core logging include **Banded Hematite Chert and Jasper (BHC&J), Banded Magnetite Chert and Jasper (BMC&J), Massive Iron Ore, Ferruginous Phyllite, Tuff with Hematite and Tuff with Phyllite**. The Fe-bearing intervals were delineated based on geological characteristics and subsequently supported by chemical analytical results. Associated **TiO_2 and V_2O_5 mineralization** was also identified from the analytical data.

The **Fe grade thresholds of ≥30% for BHC&J and Massive Iron Ore and ≥15% for BMC&J** are analytical criteria used for evaluation of the mineralized intervals and are not considered as parameters of geological logging.

The systematic recording of **lithological and mineralized boundaries, mineralogical and textural characteristics, structural features, alteration, weathering, core recovery and RQD**, together with systematic sampling and chemical analysis, provides an adequate geological database for **interpretation and Reconnaissance Resource assessment** at the present G4 stage.

The logged geological and analytical information also provides a sound basis for **planning subsequent G3-level exploration** and for further evaluation of the mining and metallurgical characteristics of the mineralized material as additional exploration data become available. The classification of the iron ore as **siliceous hematite iron ore may be stated separately with reference to the applicable IBM specifications/classification criteria**, where adequately supported by the relevant analytical and mineralogical data.

13.5.1 Lithological log of borehole UPCKB-01

The lithological log of **UPCKB-01** represents a **117 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **377.656 m**. The borehole intersects a heterogeneous sequence comprising **Banded Hematite Chert & Jasper (BHC&J), Ferruginous Phyllite, Felsic Tuff, Dolerite and Brecciated Quartzite (Figure-13.1)**. The upper portion is dominated by brecciated quartzite and BHC&J intercalated with ferruginous phyllite and felsic tuff, followed by a prominent **dolerite interval from approximately 56 to 75 m**. The deeper section comprises alternating BHC&J, ferruginous phyllite and felsic tuff, with BHC&J forming the principal Fe-bearing lithology. At a **≥30% Fe cut-off**, the borehole defines a **11 m mineralized interval with an average Fe % grade of 34.12%**, indicating significant Fe enrichment within the BHC&J-dominated sequence. The identified Fe-bearing horizons and associated lithological variations provide important geological control for interpretation of mineralisation continuity and subsequent resource estimation.

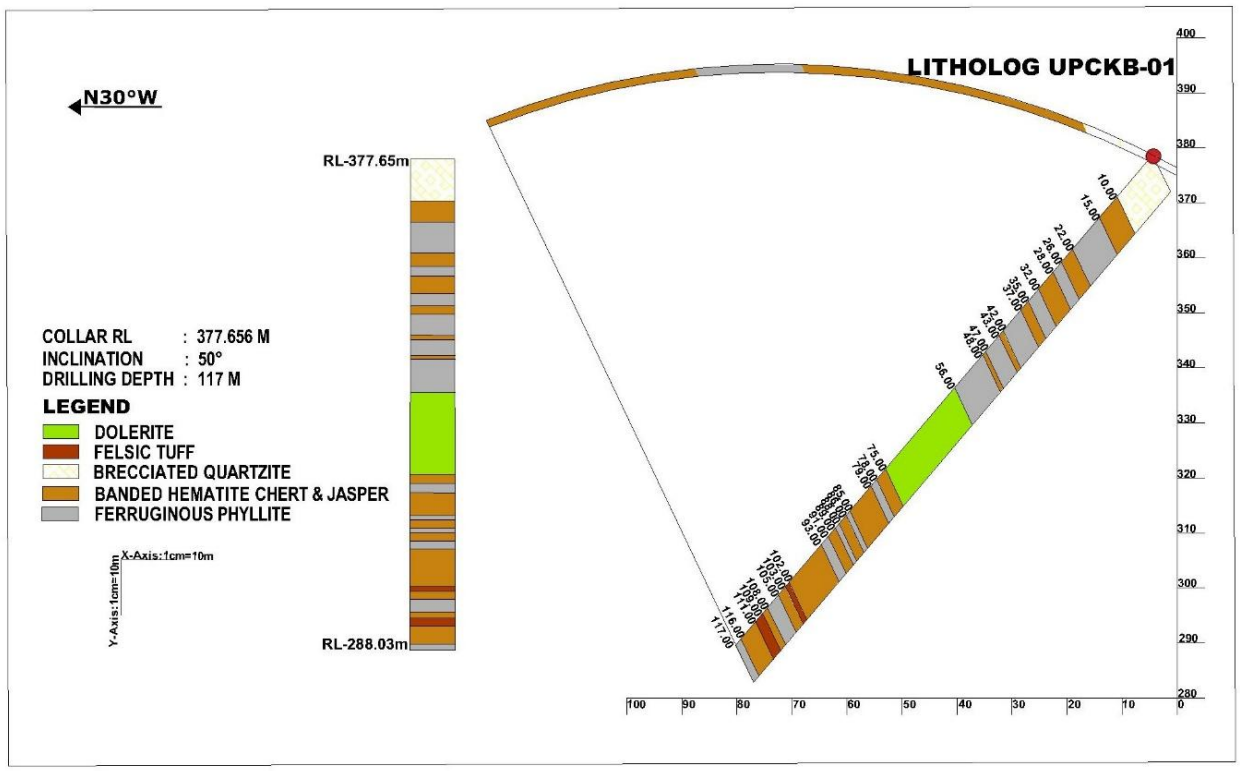


Figure-13.1: Lithological log of borehole UPCKB-01.

13.5.2 Lithological log of borehole UPCKB-02.

The lithological log of **UPCKB-02** represents a **120 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **348.472 m**. The borehole predominantly intersects **Dolerite, Banded Hematite Chert & Jasper (BHC&J), Banded Hematite Chert & Phyllite, and Ferruginous Phyllite**. The upper section comprises alternating BHC&J and ferruginous phyllite, followed by a significant **dolerite interval from approximately 28 to 48 m** shown in (**Figure-13.2).**The middle section is dominated by interbedded BHC&J, BHC &Phyllite and ferruginous phyllite, with a relatively thick BHC&J sequence extending approximately from **65 to 80 m**. A further dolerite interval occurs from approximately **89 to 120 m**. At a **≥30% Fe cut-off**, the BHC&J defines a **7.2 m mineralized interval with an average Fe grade of 32.85%**, indicating moderate Fe enrichment within the BHC&J horizon. The occurrence of BHC&J interlayered with phyllitic units and its association with dolerite provides important geological control for interpretation of the Fe-mineralized horizon and resource estimation.

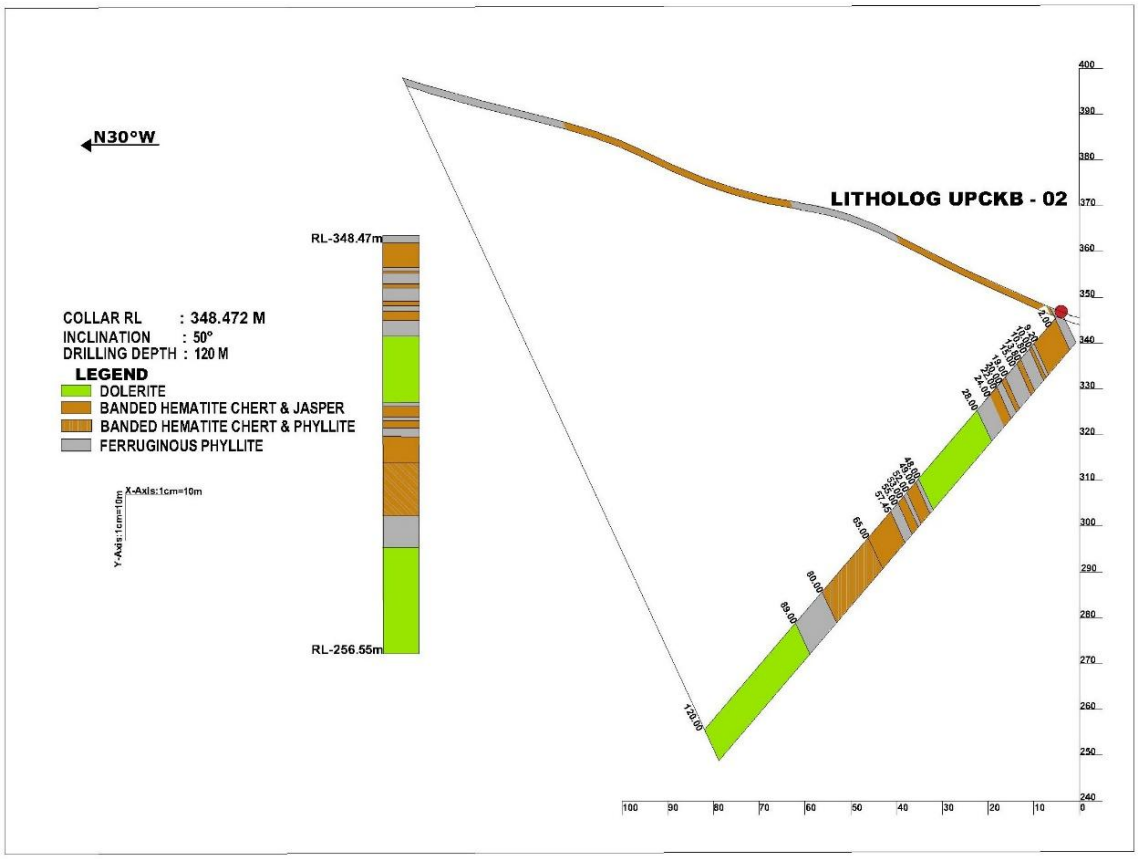


Figure-13.2: Lithological log of borehole UPCKB-02

13.5.3 Lithological log of borehole UPCKB-03.

The lithological log of **UPCKB-03** represents a **97 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **415.390 m**. The borehole intersects a sequence comprising **Banded Hematite Chert & Jasper (BHC&J), Banded Magnetite Chert & Jasper (BMC&J), Banded Hematite with Phyllite, Ferruginous Phyllite (Figure-13.2), Dolerite and Brecciated Quartzite with Hematite**. The upper section is dominated by **BMC&J**, followed by a minor brecciated quartzite with hematite interval and a significant **dolerite zone from approximately 38 to 56 m**. The middle to lower section comprises alternating BHC&J, ferruginous phyllite and Banded Hematite with Phyllite. At a **≥30% Fe cut-off**, a **1.0 m BHC&J interval** records an average Fe grade of **30.44%**. In addition, at a **≥15% Fe cut-off**, a significant **34 m BMC&J mineralized interval** records an average Fe grade of **33.43%**. These intersections demonstrate the presence of both hematite- and magnetite-bearing Fe mineralisation and provide important geological and grade control for interpretation of mineralized horizons and resource estimation.

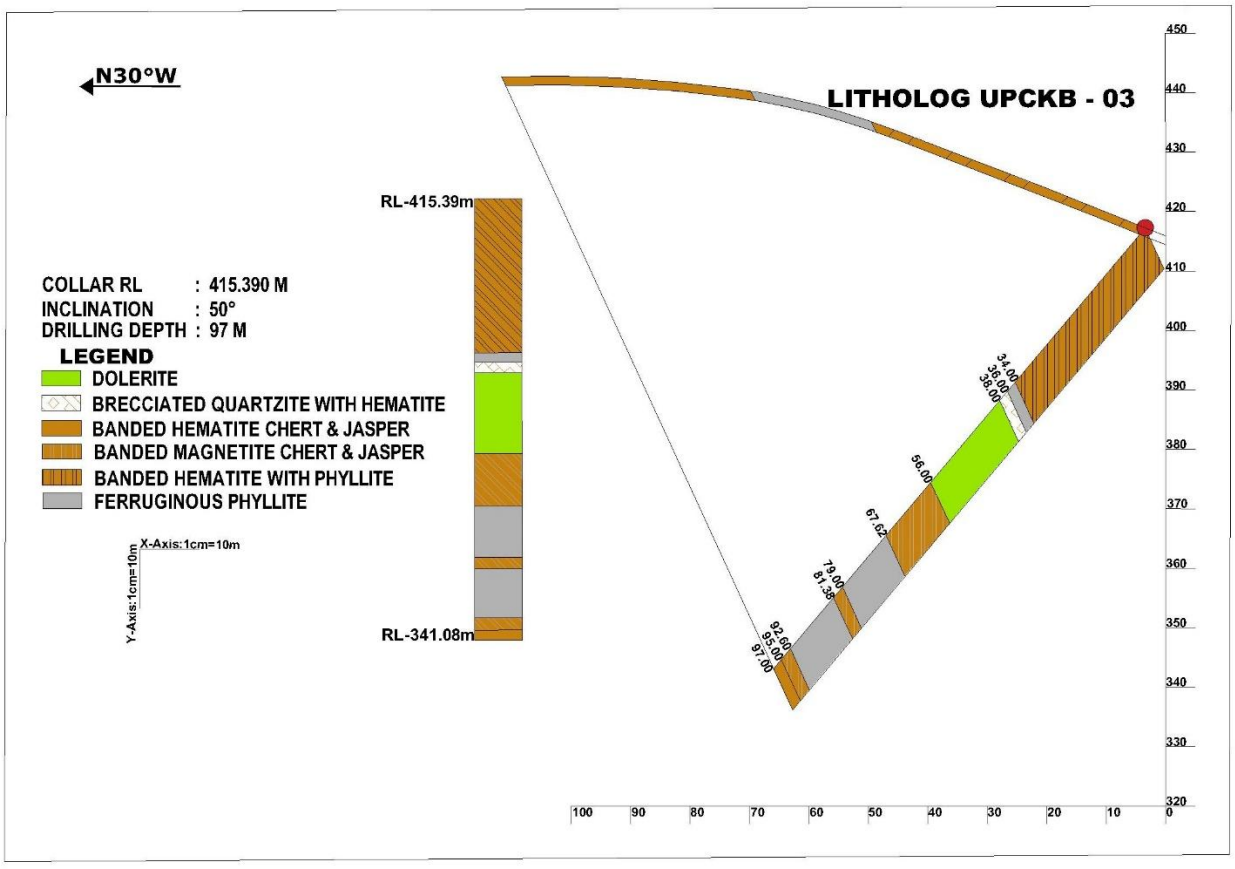


Figure-13.3: Lithological log of borehole UPCKB-03

13.5.4 Lithological log of borehole UPCKB-04.

The lithological log of **UPCKB-04** represents an **80 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **363.651 m**. The borehole intersects **Banded Hematite Chert & Jasper (BHC&J), Banded Magnetite Chert & Jasper (BMC&J), Dolerite, Ferruginous Phyllite and Brecciated Quartzite (Figure-13.4)**. The upper and middle sections are dominated by dolerite with intercalations of ferruginous phyllite and BHC&J, while the lower section is predominantly composed of **BMC&J**,(Figure-13.4) with minor ferruginous phyllite intercalations. At a **≥15% Fe cut-off**, the BMC&J defines a significant **36.5 m mineralized interval with an average Fe grade of 29.06%**, indicating substantial magnetite-bearing Fe mineralisation. The extensive BMC&J interval provides important geological and grade control for interpretation of the mineralized horizon and subsequent resource estimation.

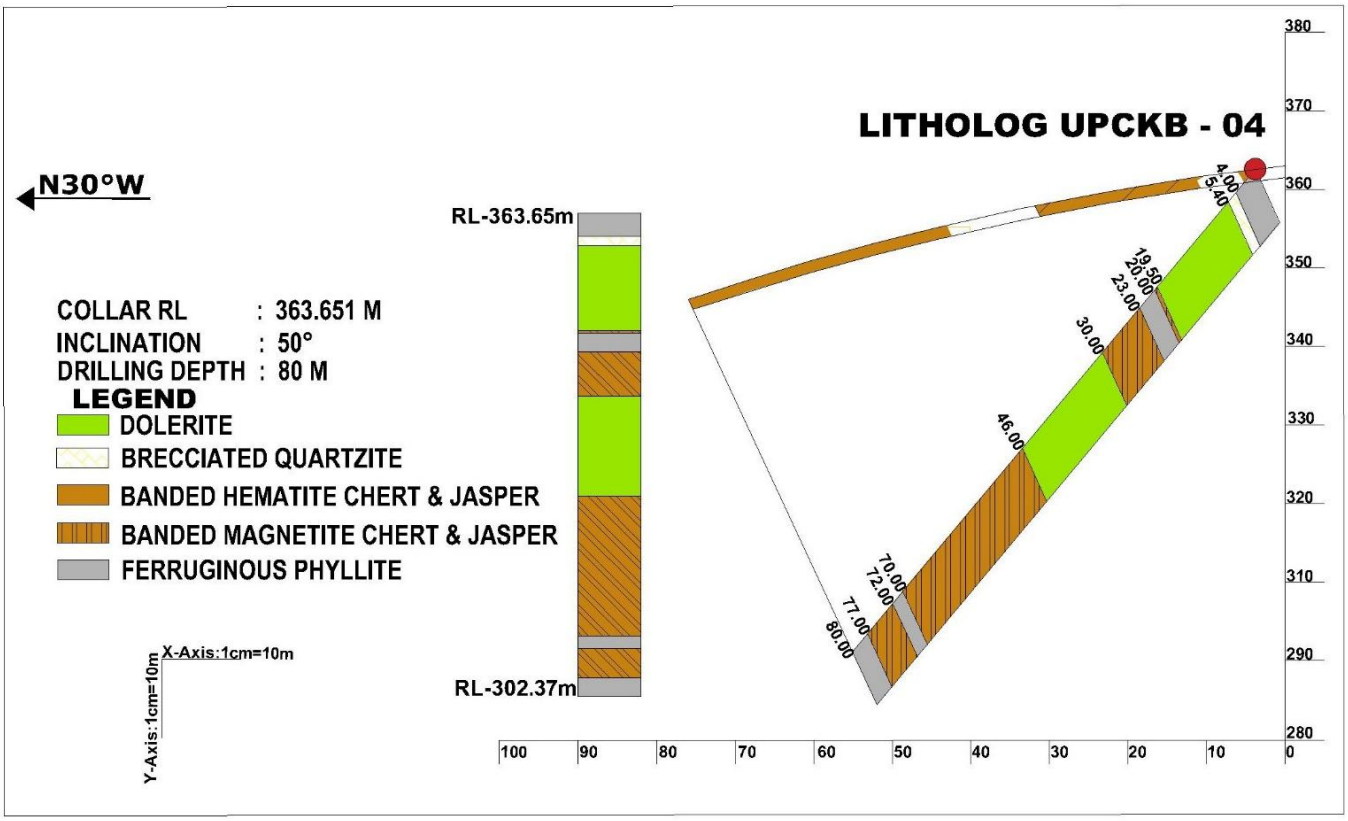


Figure-13.4: Lithological log of borehole UPCKB-04.

13.5.5 Lithological log of borehole UPCKB-05.

The lithological log of **UPCKB-05** represents a **100 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **393.569 m**. The borehole intersects **Dolerite, Banded Hematite Chert & Jasper (BHC&J), Banded Magnetite Chert & Jasper (BMC&J), Felsic Tuff, Ferruginous Phyllite and Brecciated Quartzite**. The upper section comprises brecciated quartzite, felsic tuff and BHC&J with minor ferruginous phyllite, followed by a substantial **BHC&J-dominated interval from approximately 21 to 50 m**. The lower section includes BMC&J intercalated with BHC&J, followed by a prominent dolerite interval extending to the end of the hole. At a **≥30% Fe cut-off**, **BHC&J** (**Figure-13.5**) defines a **5.0m mineralized interval with an average Fe grade of 40.39%**. In addition, at a **≥15% Fe cut-off**, the BMC&J defines an **8.0 m mineralized interval with an average Fe grade of 32.49%**. These intersections confirm the presence of both hematite- and magnetite-bearing Fe mineralisation and provide important geological and grade control for interpretation of the mineralized horizons and resource estimation.

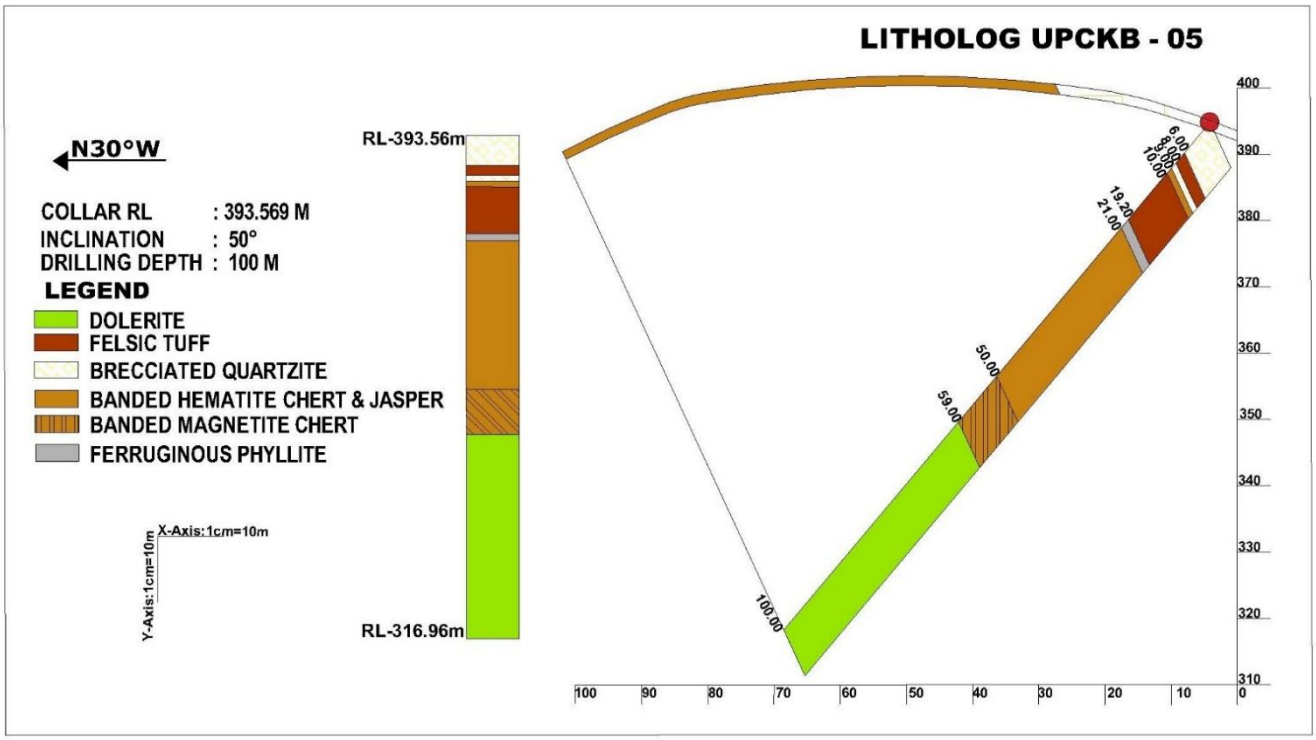


Figure-13.5: Lithological log of borehole UPCKB-05

13.5.6 Lithological log of borehole UPCKB-06.

The lithological log of **UPCKB-06** represents a **53.10 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **309.796 m**. The borehole predominantly intersects **Dolerite and Banded Magnetite Chert & Jasper (BMC&J(Figure-13.6)**. The upper section is dominated by dolerite with minor BMC&J intercalations, while a significant **BMC&J (Figure-13.6) interval occurs approximately from 15 to 30 m**, followed by dolerite extending to the end of the hole. At a **≥15% Fe cut-off**, the BMC&J defines a **17.5 m mineralized interval with an average Fe grade of 29.67%**. This intersection indicates significant magnetite-bearing Fe mineralisation and provides important geological and grade control for interpretation of the mineralized horizon and subsequent resource estimation

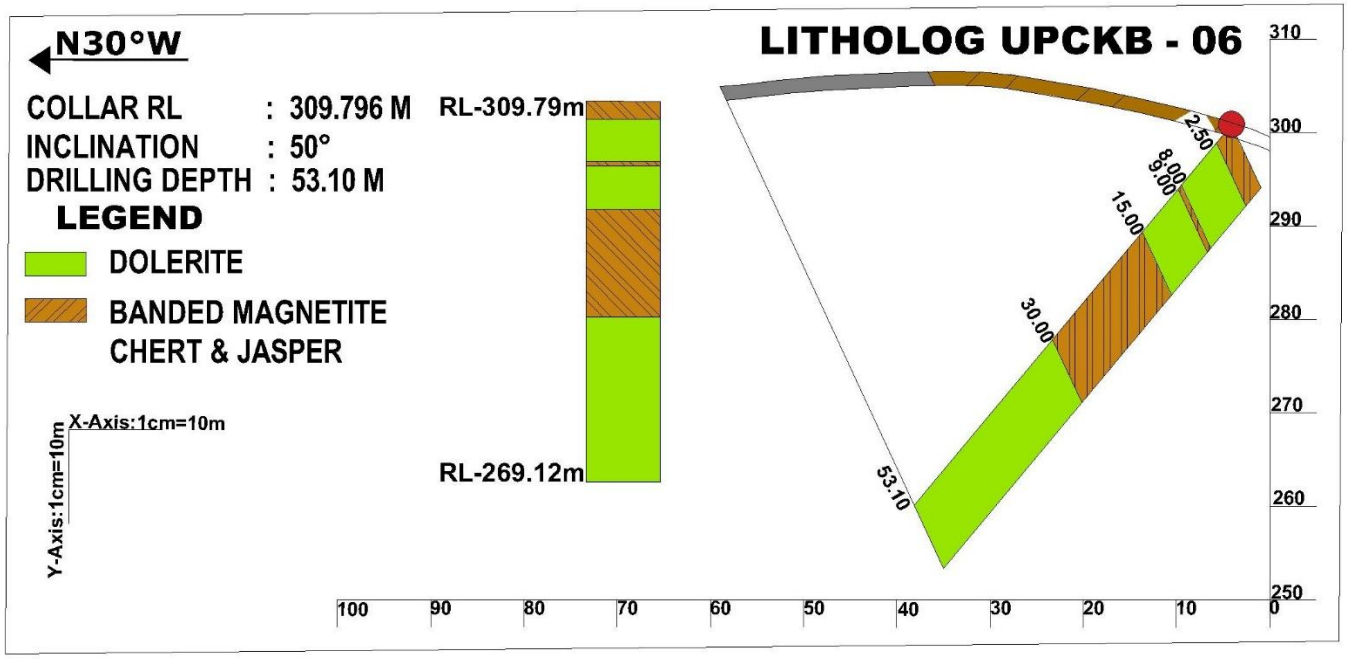


Figure-13.6: Lithological log of borehole UPCKB-06

13.5.7 Lithological log of borehole UPJTB-01

The lithological log of **UPJTB-01** represents a **53 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **299.304 m**. The borehole intersects **Brecciated Quartzite with Iron Matrix, Felsic Tuff, Tuff with Hematite and Massive Iron Ore**. The upper section comprises brecciated quartzite with an iron matrix, followed by a significant **Massive Iron Ore (Figure-13.7)** interval intercalated with **Tuff with Hematite**. At a **≥30% Fe cut-off**, the Massive Iron Ore defines a **13 m mineralized interval with an average Fe % grade of 40.07%**. In addition, at a **≥15% Fe cut-off**, (PIB;2026, 2026)the Tuff with Hematite forms a **5 m mineralized interval with an average Fe % grade of 36.98%**. These intersections indicate significant Fe enrichment and provide important geological and grade control for interpretation of the mineralized zones and subsequent resource estimation.

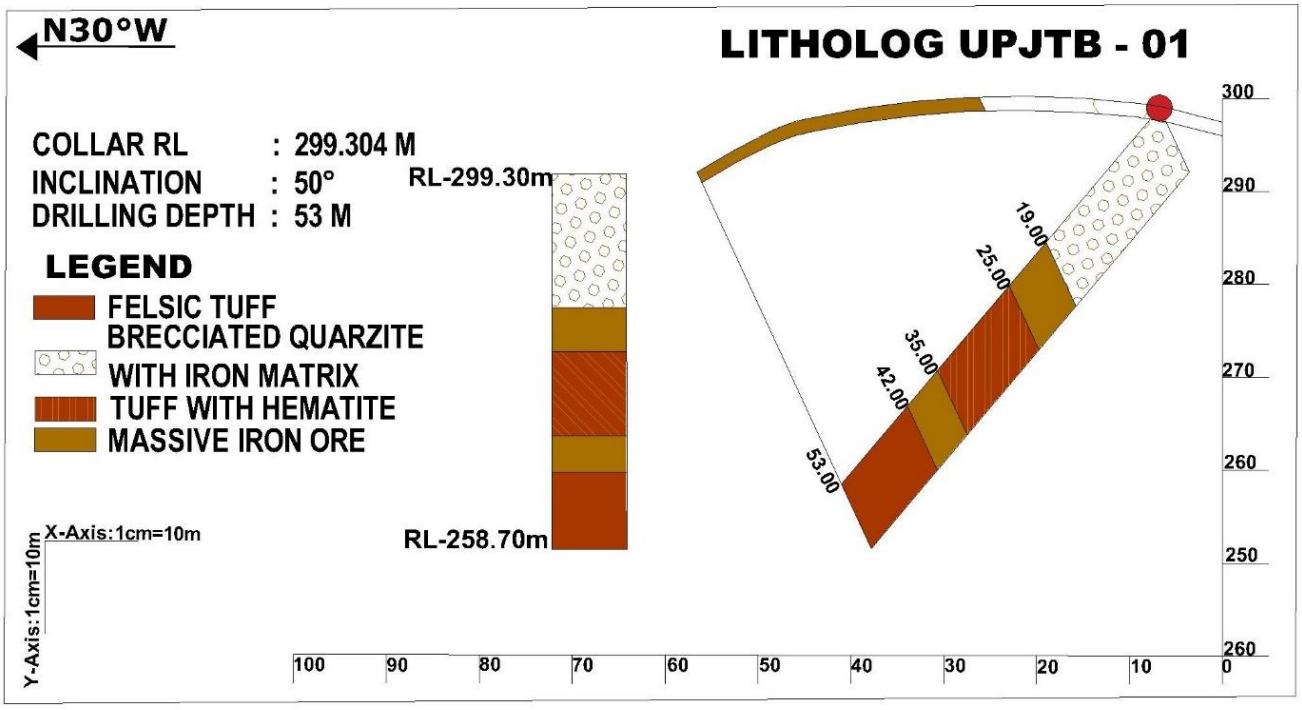


Figure-13.7: Lithological log of borehole UPJTB-01

13.5.8 Lithological log of borehole UPCKB-02.

The lithological log of **UPJTB-02** represents an **80 m deep inclined diamond drill hole drilled at 50°**, with a collar RL of **280.421 m**. The borehole predominantly intersects **Tuff with Hematite (Figure-13.8)**, with intercalations of **Felsic Tuff and Massive Iron Ore**. The upper section is dominated by Tuff with Hematite, followed by a Felsic Tuff interval and a distinct Massive Iron Ore zone, with Tuff with Hematite continuing through the deeper section. At a **≥30% Fe cut-off**,(PIB;2026, 2026) the Massive Iron Ore defines a **5.5 m mineralized interval with an average Fe grade of 35.49%**. In addition, at a **≥15% Fe cut-off**, the Tuff with Hematite constitutes a **3.3 m mineralized interval with an average Fe grade of 32.26%**. These mineralized intersections confirm significant iron enrichment within the drilled sequence and provide geological and grade control for interpretation of the Fe-bearing zones and resource estimation.

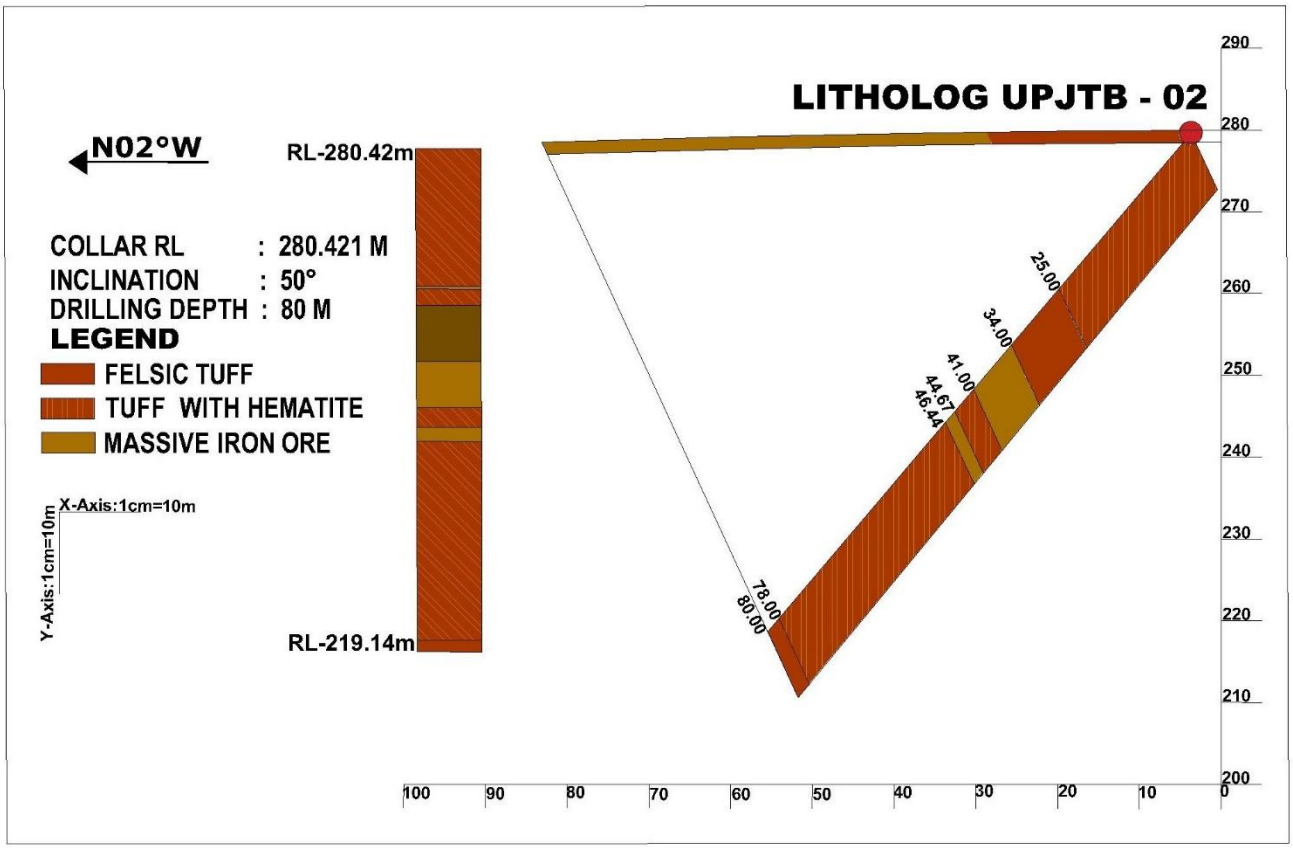


Figure-13.8: Lithological log of borehole UPJTB-02

13.6 Discussion on the analysis results of handheld X-ray fluorescence (XRF), if used in the investigation.

Handheld XRF was not used during the present investigation. Therefore, no handheld XRF analytical results were considered for geological interpretation, grade evaluation, or resource estimation. The assessment was based on laboratory chemical analysis of systematically collected samples.

13.7 Exploration Systematic Drilling

During **FS 2024–25**, systematic scout drilling was undertaken in the **A1 Chakdiya–Kushniya Block** and **A2 Jorba Block** areas of Sonbhadra District, Uttar Pradesh, as part of **G4-stage exploration for iron ore**. The drilling programme was planned based on the results of geological mapping, bedrock sampling, channel sampling and delineation of prospective iron-bearing zones. Considering the geological continuity and strike extent of the mineralized bands, a relatively wide borehole spacing of approximately **1100–1,400 m** was adopted for the scout drilling programme.

In **Block A1**, six inclined boreholes, namely **UPCKB-01, UPCKB-02, UPCKB-03, UPCKB-04, UPCKB-05 and UPCKB-06**, were drilled in sequence. The boreholes were drilled at an inclination of **50°** with an azimuth of **N15°W**. The completed drilling depths were **117.00 m, 120.00 m, 97.00 m, 80.00 m, 100.00 m and 53.10 m**, respectively, giving a cumulative drilling depth of **567.10 m**. The collar elevations ranged from **309.796 m to 415.390 m RL**, the given data showed in Table-13.1. The boreholes were positioned to test the subsurface continuity, thickness, geometry and attitude of the identified **BHC&J and BMC&J mineralized bands**

In **Block A2**, two inclined boreholes, namely **UPJTB-01 and UPJTB-02**, were subsequently drilled at an inclination of **50°**. UPJTB-01 was drilled with an azimuth of **N30°W** to a depth of **53.00 m**, while UPJTB-02 was drilled with an azimuth of **N30°W** & **N02°W** to a depth of **53.00m** & **80.00 m**. **RL** the given data showed in Table-13.2. The cumulative drilling in Block A2 was therefore **133.00 m**. These boreholes were positioned to investigate the subsurface continuity and thickness of the identified **massive iron-ore bands**.

Thus, a total of **eight inclined scout boreholes** were completed in Blocks A1 and A2, with an aggregate drilling depth of **700.10 m**, comprising **567.10 m in Block A1 and 133.00 m in Block A2**. The borehole collar coordinates and reduced levels were established through **DGPS survey**, while the azimuth and inclination were selected considering the interpreted geological strike and dip of the mineralized zones to obtain effective intersections.

The drill cores recovered from each borehole were systematically logged in detail with respect to core recovery, lithology, mineralization, RQD, structural features, textures, ore-zone intersections, type of mineralization, and occurrence of ore minerals. Core logging was carried out run-wise and across lithological contacts, and the observations were systematically recorded in the borehole logging registers and lithology sheets for each borehole. Based on the recorded field and core-logging data, summarized lithologs and transverse geological sections were prepared for all boreholes and are presented in the relevant Annexure VI: Log sheets of core drilling of Block A1 & A2.

Drilling was carried out using **wet diamond core drilling with NQ-size equipment**, producing a nominal core diameter of approximately **47.6 mm**. A maximum core run of **3 m** was maintained during drilling. The recovered cores were sequentially arranged, depth-marked and preserved in core boxes for detailed geological logging and sampling. The overall **core recovery was 92.23%**, indicating satisfactory recovery during the scout drilling programme.

The systematic scout drilling is reflected Figure-13.4 are during Drilling provided Reconnaissance subsurface control on the **continuity, thickness, geometry and grade characteristics** of the identified mineralized zones. The drilling results, integrated with geological mapping, bedrock and channel-sampling data, provide a geological basis for planning **further G3-stage detailed exploration**, wherever warranted by the results.

Table-13.1: Summary of borehole coordinates, orientation, elevation and drilling parameters in block A1, sonbhadra.

Details of Boreholes Drilled in Chakdiya Kushniya& Jorba Block's, Sonbhadra, Uttar Pradesh during FS: 2024-25									
S. No.	Borehole No.	Coordinate	Azimuth	BH Angle	Collor RL(m)	Bottom RL(m)	Date of Commencement	Date of Closing	Total Drilling Depth(m)

1	UPCKB-01	N24°33'03.3809" E82°52'14.2664"	N15º W	50º	377.656	288.034	16-08-2025	23-09-2025	117.00
2	UPCKB-02	N24°33'16.4958" E82°53'03.3443"	N15º W	50º	348.472	256.552	04-11-2025	01-12-2025	120.00
3	UPCKB-03	N24°33'26.4735" E82°53'39.0172"	N15º W	50º	415.390	341.088	31-03-2025	22-04-2026	97.00
4	UPCKB-04	N24°33'09.2571" E82°52'12.3878"	N15º W	50º	363.651	302.371	26-09-2025	28-10-2025	80.00
5	UPCKB-05	N24°33'22.6162" E82°53'01.6135"	N15º W	50º	393.569	316.969	07-12-2025	09-01-2026	100.00
6	UPCKB-06	N24°34'05.5200" E82°55'55.8480"	N15º W	50º	309.796	269.121	13-07-2025	27-07-2025	53.10
Total Drilling Depth									567.10

Table-13.2: Summary of borehole coordinates, orientation, elevation and drilling parameters in block A2, sonbhadra.

Details of Boreholes Drilled in Chakdiya Kushniya& Jorba Block, Sonbhadra, Uttar Pradesh during FS: 2024-25									
S.No.	Borehole No.	Coordinate	Azimuth	BH Angle	Collor RL(m)	Bottom RL(m)	Date of Commencement	Date of Closing	Total Drilling Depth (m)
7	UPJTB-01	N24°31'14.4911" E82°51'42.9014"	N30º W	50º	299.304	258.706	15-01-2026	28-01-206	53.00
8	UPJTB-02	N24°30'28.5065" E82°52'08.5887"	N02º W	50º	280.421	219.141	02-02-2026	14-02-2026	80.00
Total Drilling Depth									**133.00**

Table-13.3: Summary of borehole mineralized, in block A1 & A2, sonbhadra.

Details of Boreholes Drilled in Chakdiya Kushniya& Jorba Block', Sonbhadra, Uttar Pradesh during FS: 2024-25								
Borehole No.	Total Drilling Depth (m)	Rock Type	Mineralized width (m)	Strike	Core Recovery (%)	Core Loss (%)	Rock Formation	Stratigraphy
UPCKB-01	117	BHC&J	9.70	N70°E	95.27	4.73	Agori Formation	Mahakoshal group
UPCKB-02	120	BHC&J	6.79	N75°E	92.02	7.98		

UPCKB-03	97	BMC&J	32.98	N70°E	91.02	8.98		
		BHC&J	1.94					
UPCKB-04	80	BMC&J	35.40	N75°E	95.56	4.44		
UPCKB-05	100	BHC&J	4.85	N70°E	91.73	8.27		
		BMC&J	7.76					
UPCKB-06	53.1	BMC&J	16.97	N75°E	92.58	7.42		
UPJTB-01	53	MIO	12.61	N68°	91.08	8.92		
		Tuff with hematite	4.85					
UPJTB-02	80	Tuff with hematite	2.91	N135°	91.16	8.84		
		MIO	5.82					
Total Drilling Depth	700.1							

13.7.1 Transverse geological section showing subsurface lithological and mineralized horizons in block A1

The transverse sections **A–A′ and B–B′** indicate Figure-20.1 & 20.2 a **steeply dipping, laterally persistent iron-bearing BIF/chert–jasper sequence** interbedded with ferruginous phyllite, dolerite, felsic tuff and brecciated quartzite. Borehole intersections in **UPCKB-01, 02, 04 and 05** confirm the subsurface continuity and structural persistence of the mineralized horizons within **Block A1**.

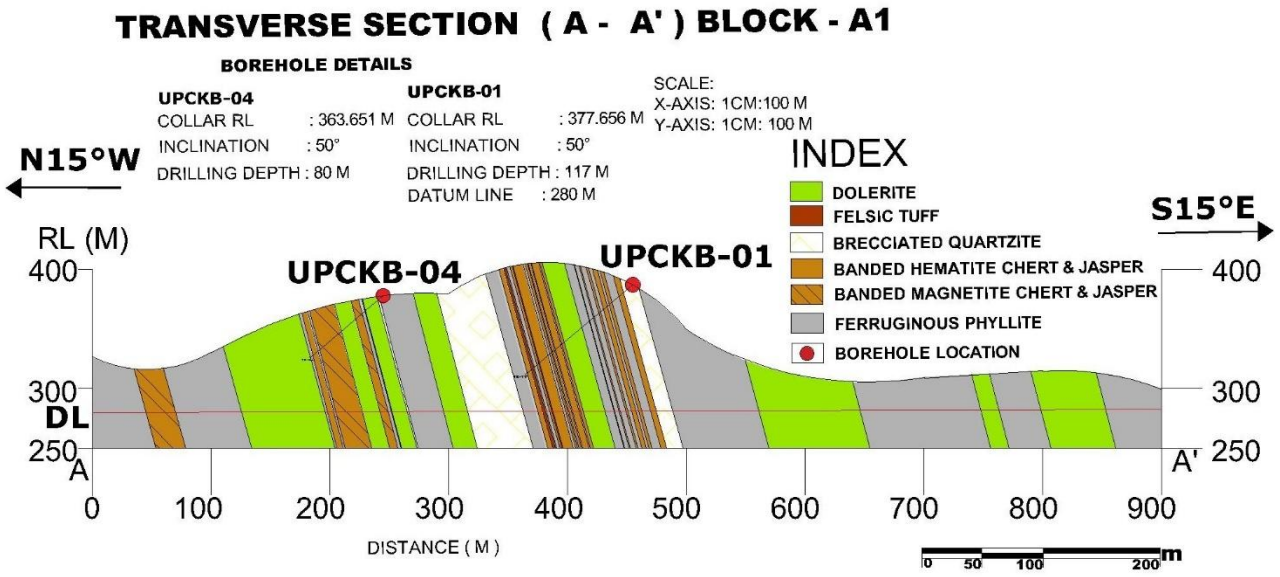


Figure-13.9: Transverse geological section (A–A′) showing the subsurface lithological distribution and borehole intersections in Block-A1.

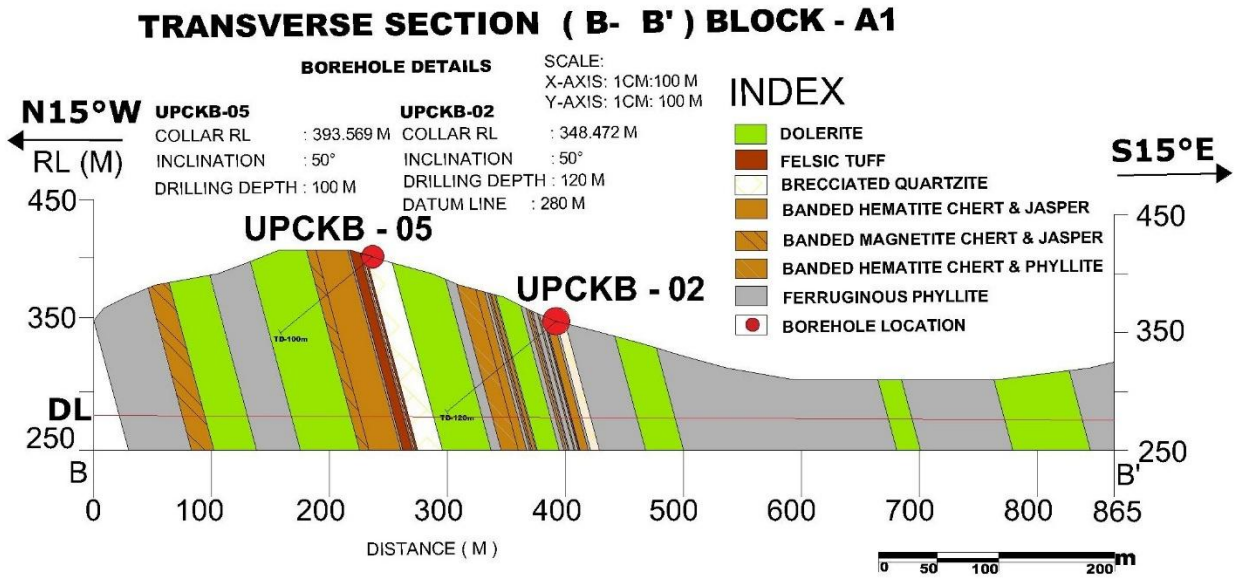


Figure-13.10: Transverse geological section (B-B′) showing the subsurface lithological distribution and borehole intersections in Block-A1.

The transverse section **C–C′ and D–D′ sections** indicate a figure 20.3 & 20.4. a **steeply dipping and structurally controlled BIF–chert–jasper sequence** hosted within ferruginous phyllite, with associated dolerite and brecciated quartzite. Boreholes **UPCKB-03 and UPCKB-06** intersect multiple **hematite- and magnetite-bearing horizons**, confirming their **subsurface continuity and persistence** within Block A1.

Variations in thickness and banding are interpreted to reflect **structural deformation and lithological variation**.

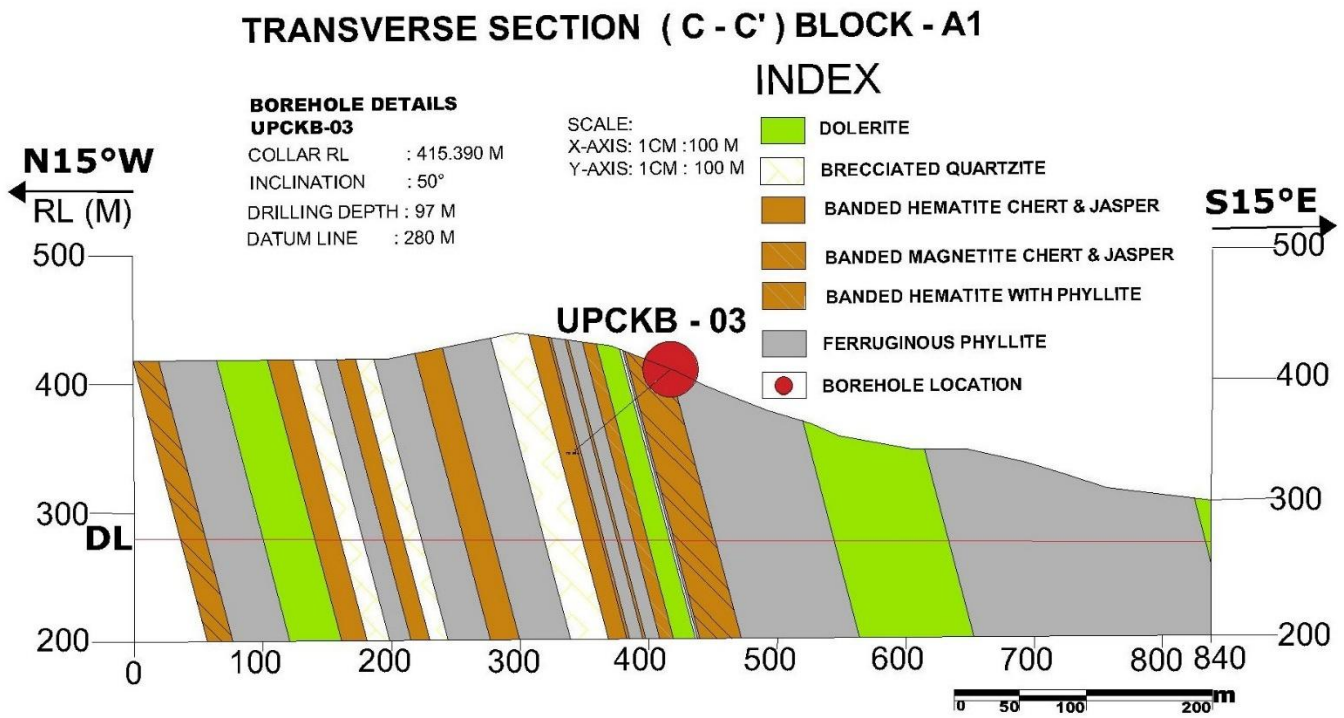


Figure-13.11: Transverse geological section (C-C′) showing the subsurface lithological distribution and borehole intersections in Block-A1.

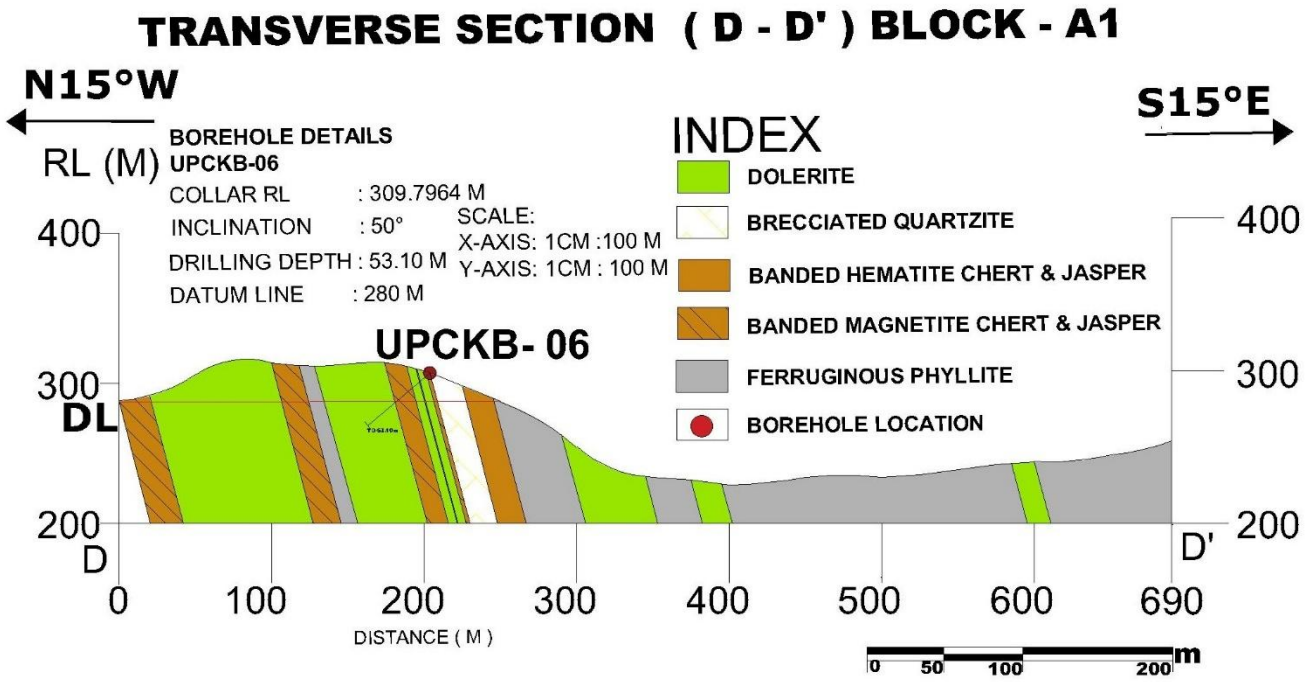


Figure-13.12: Transverse geological section (D-D′) showing the subsurface lithological distribution and borehole intersections in Block-A1.

13.7.2 Transverse geological section showing subsurface lithological and mineralized horizons in block A2.

The transverse section **A–A′ and B–B′ sections** indicate in Figure-20.12 & 20.13 a structurally controlled sequence of **massive iron ore and jasper-bearing brecciated quartzite**, associated with ferruginous phyllite, felsic tuff and carbonated metabasalt. Boreholes **UPJTB-01 and UPJTB-02** intersect iron-rich horizons, demonstrating their **subsurface continuity and persistence**. The variable thickness and distribution of iron-bearing units suggest **structural deformation and lithological variation** within Block A2.

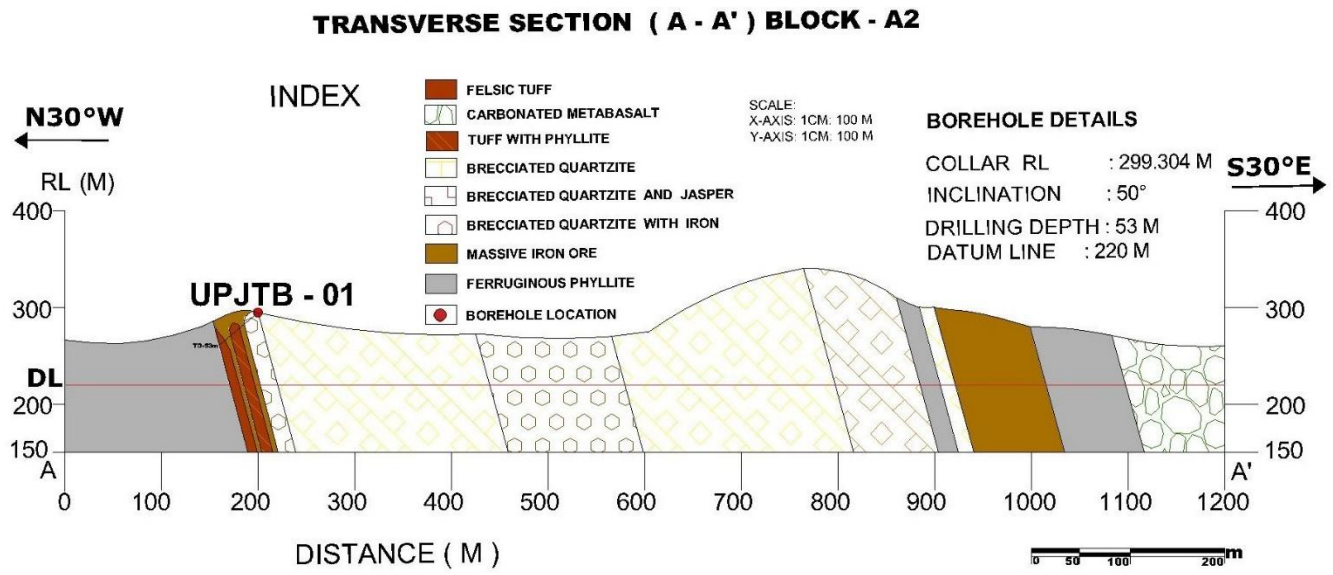


Figure-13.13: Transverse geological section (A-A′) showing the subsurface lithological distribution and borehole intersections in Block-A2.

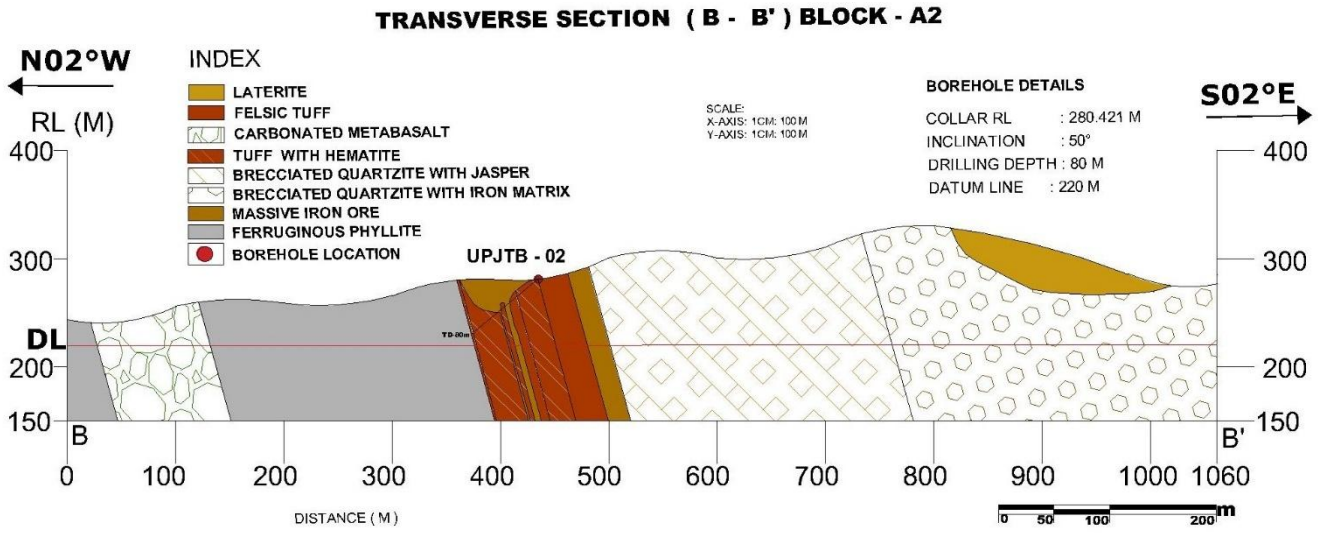


Figure-13.14: Transverse geological section (B-B′) showing the subsurface lithological distribution and borehole intersections in Block-A2.

13.7.3 Stage of exploration as per mineral content Rule

The present investigation is classified as **G-4 (Reconnaissance Survey) under the UNFC framework**, in accordance with the provisions of the **Minerals (Evidence of Mineral Contents) Rules, 2021**. The exploration programme comprised **geological mapping, surface sampling, and limited exploration drilling** to establish the geological setting, nature and preliminary continuity of mineralization. Based on the geological, drilling, sampling and analytical results obtained, the area demonstrates **mineral prospectivity and warrants further systematic exploration at the G-3 (Preliminary Exploration) stage.**

13.7.4 Core recovery percentage

Core recovery was generally satisfactory across the drilled boreholes. The **borehole-wise core recovery ranged from 91.02% to 95.56%**, with the highest recovery recorded in **UPCKB-04 (95.56%)** and the lowest in **UPCKB-03 (91.02%)**. Recovery remained consistently above **90% in all eight boreholes**. Localized reduction in recovery may be attributed to **fractured and brecciated zones** encountered during drilling.

The **overall weighted core recovery was 92.23%**, which is above the **>90% expected core-recovery criterion for iron ore specified in the NMET Drilling Guidelines for NMET-funded projects**. The achieved recovery indicates **satisfactory drilling performance and adequate preservation of drill core** for geological logging, sampling, interpretation and evaluation of the mineralized zones. The borehole-wise core recovery is presented in **Figure 13.15**.

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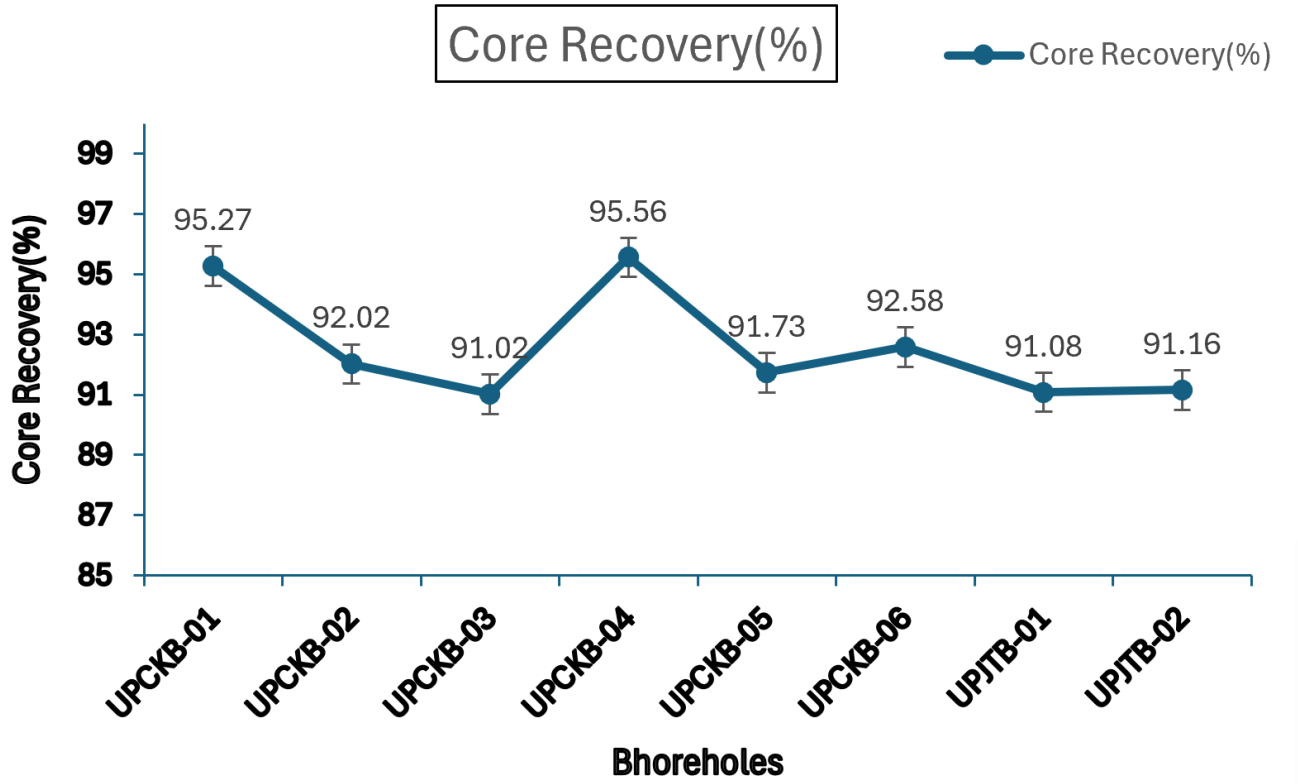


Figure-13.15: Borehole-wise variation in core recovery (%) across blocks A1 and A2.

13.7.5 Drill Core Preservation

The recovered drill cores were systematically preserved in **aluminium core boxes** and labelled with the **borehole number, core box number, run interval, block name and depth sequence**. The left side of each box was marked with the **box number and field season year**, while the front side recorded the **borehole number and corresponding run interval**. The preserved cores were carefully transported to the **GSI Core Library, Northern Region, Lucknow**, for secure storage, future verification, inspection and reference.

As per the applicable **NMEDT requirements**, core recovery was systematically measured on a **run-wise basis**, with recovered core length and percentage recovery recorded in the respective borehole logs. **Core photographs** were also taken and maintained as part of the permanent documentation.

Following **core skeletonization**, one complete borehole and the mineralized portions of seven additional boreholes were retained for long-term preservation. Accordingly, **76 core boxes containing approximately**

350 m of mineralized iron-ore core were submitted to the **GSI Core Library, Lucknow**, and an official **Core Submission Certificate** confirming their submission and preservation was obtained. **Photographic documentation of the core submission and preserved core boxes is presented in Figures 13.16 and 13.17.** This systematic **labelling, documentation, recovery recording and preservation** ensures complete traceability and availability of the drill core for future geological verification and reference.



Figure-13.16: Representative drill core photographs showing lithological variations and associated BHC&J mineralisation intersected in boreholes UPCKB-04, UPCKB-05 and UPCKB-06.



Figure-13.17: Representative drill core photographs showing Banded Hematite–Chert–Jasper (BHC&J) mineralisation intersected in boreholes UPCKB-01, UPCKB-02 and UPCKB-04.








11 Jul 2025 11:57:42 am
27° NE
Unnamed Road
Barganwa
Mirzapur Division
Uttar Pradesh
Altitude:255.9m
Speed:0.0km/h
Index number: 65

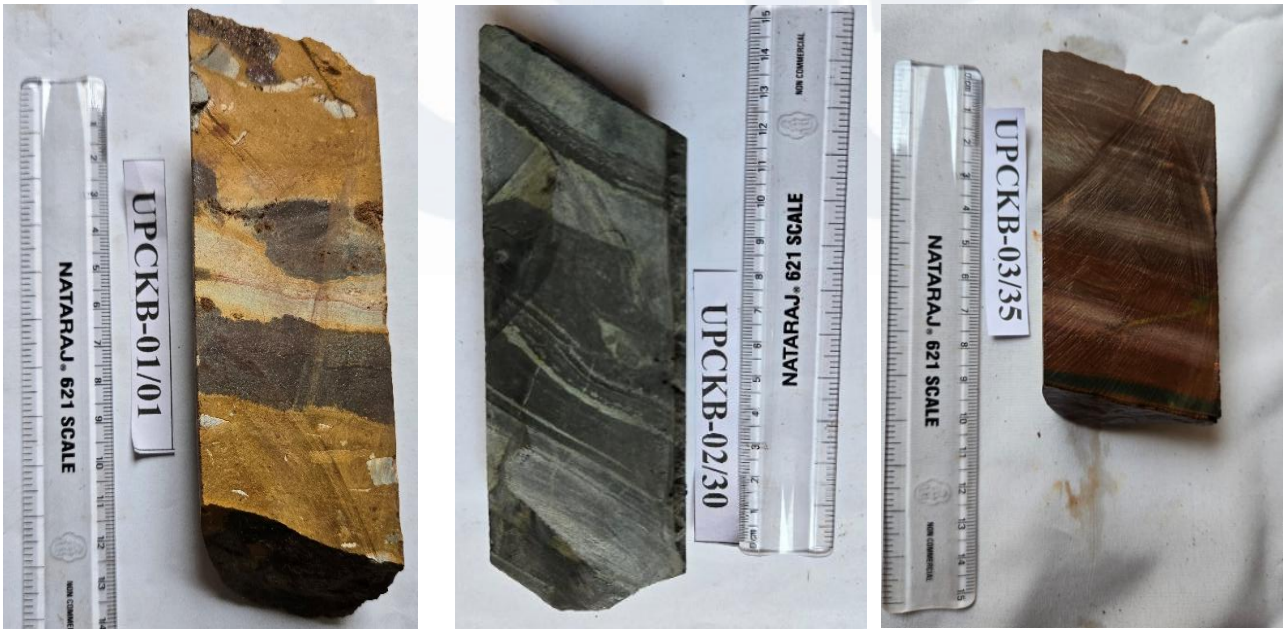


Figure-13.18: Field photographs showing exploratory drilling, core examination and GSI team inspection activities.

CHAPTER 14: SUB-SAMPLING TECHNIQUES AND SAMPLE PREPARATION

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

The drill cores were **longitudinally split into two equal halves using a hydraulic core splitter** to ensure uniform and representative separation. **Half-core samples** were collected for chemical analysis, while the remaining half-core was retained in the **core boxes for future reference and verification**. The selected half-core was subsequently subjected to the prescribed **sample preparation and analytical procedures is illustrated in Figure-14.1.**



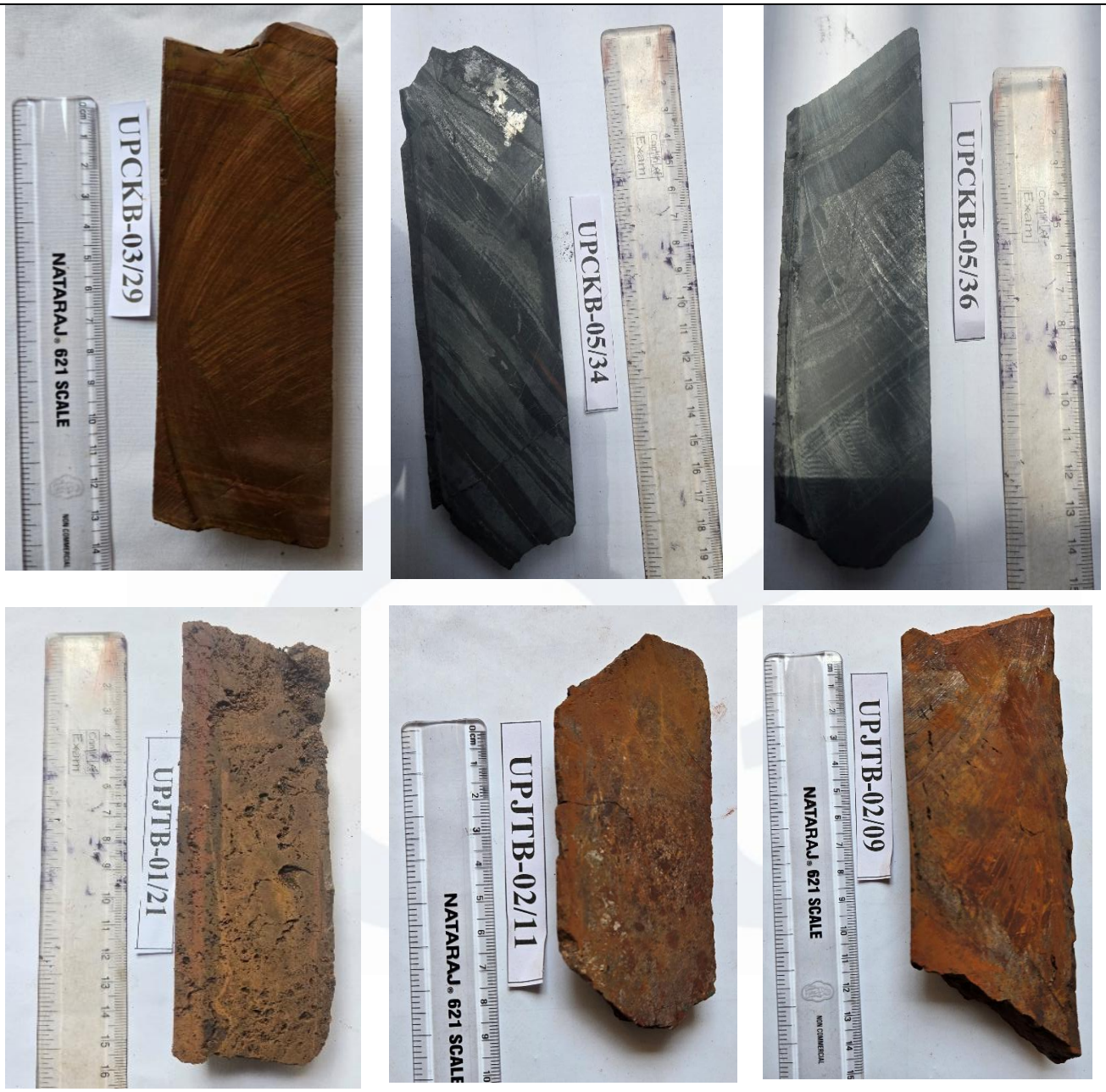


Figure-14.1: Photographs showing representative split-half drill core samples from boreholes UPCKB-01 to UPCKB-06 and UPJTB-01 to UPJTB-02.

14.1.1 If non-core, whether riffled, tube sampled, rotary split, etc., and whether sampled wet or dry.

Not Applicable. The investigation was carried out using diamond drill core, and no non-core samples such as drill cuttings, chips, or rotary drilling samples were used for geological interpretation or assay evaluation. Therefore, procedures relating to riffle splitting, tube sampling, rotary splitting, or wet/dry sampling of non-core material are not applicable to the present investigation.

14.1.2 For all sample types, the nature, quality and appropriateness of the sample preparation technique.

The sample preparation procedures were **appropriate for the nature and type of drill-core samples collected**. The core samples were systematically identified, marked, cut/split, dried, crushed, sieved and pulverized to obtain representative analytical portions. **Riffle splitting and coning and quartering**, wherever applicable, were carried out using standard procedures. Proper cleaning and regular maintenance of equipment, along with trained personnel and appropriate precautions, ensured **representative samples, minimized contamination and material loss, and maintained sample integrity**. The overall sample preparation procedures are considered **adequate and appropriate for the present stage of exploration and subsequent chemical analysis**.

14.2 Quality control procedures adopted for all sub-sampling stages to maximize representation of samples.

The primary core samples have been collected from entire length intersected in the boreholes drilled and the samples have been prepared at shiva lab Bengaluru. The standard sampling procedure in supervision of qualified sampling technician has been adopted to control the quality of samples. Similarly external check samples have also been prepared under the supervision of qualified sampling technician following the standard sampling procedure and analyzed at SGS Bhubaneshwar.

14.3 Measures taken to ensure that the sampling is representative of the in-situ material collected.

All primary **Bedrock (BRS), Channel (CH), and Core (CS) samples** were collected from **fresh, in-situ and representative mineralized exposures**. Mineralized core intervals were systematically **logged, measured, marked with corresponding depth, and sampled** considering lithological contacts and variations in mineralization. Careful examination and proper sample demarcation of the mineralized cores were undertaken prior to sampling to minimize sampling bias and ensure **representative sampling of the in-situ mineralized zones**.

14.4 Whether sample sizes are appropriate to the grain size of the material being sampled.

The sample sizes were considered **appropriate for the grain size and nature of the mineralized material**. Fresh **BRS, channel, and core samples** were collected separately, with approximately **500 g** representative material prepared by **coning and quartering**. The representative portion was subsequently pulverized to **–200 mesh** for chemical analysis. The procedure ensured adequate **homogenization, representativeness, and minimization of sampling bias**.

CHAPTER 15: QUALITY OF ASSAY DATA AND LABORATORY TESTS

15.1 Mineral Prospect

15.1.1 Mineralization

The present G4 exploration was undertaken to investigate Iron ore and associate mineralization occurrences in the (A1 Chakdiya & A2 Jorba Blocks), within banded magnetite chert, banded magnetite chert & jasper, banded hematite chert & jasper and massive iron ore constituting the principal host lithologies.

15.1.2 Surface indication of mineralization

Based on field observations during geological mapping, the iron-bearing **Banded Hematite Chert/Jasper (BHC&J)** and **Banded Magnetite Chert/Jasper (BMC&J)** bands were identified mainly along **hilltops, ridge crests and the northern flank of the central BIF zone**. The occurrence of **rolled boulders and scree material of BHC&J and BMC&J** along hill slopes, together with hard, resistant and linear iron-rich bands interbedded with phyllite on ridge tops, constitutes important surface indications of iron mineralization.

Iron mineralization is also exposed in **rock-profile and road-cut sections**, where BHC&J and BMC&J occur as linear bands associated with phyllite. These field observations provide clear evidence of the **surface expression and distribution of BIF-hosted iron mineralization** within the mapped area and were used to guide subsequent **bedrock sampling, channel sampling and scout drilling**.

15.1.3 Mode of occurrence

The iron mineralization occurs predominantly as **stratiform to stratabound bands**, broadly conformable with the **BHC&J, BMC&J and other BIF units**. It is also associated with **Massive Iron Ore, ferruginous phyllite, tuffaceous horizons and quartz–iron oxide-rich zones**.

The mineralized zones occur as **discontinuous to moderately continuous bands and lenses** with variable thickness and grade. Their distribution is mainly controlled by **primary BIF banding, bedding and local structural features**, including foliation, fractures and shear zones. **Hematite and magnetite** are the principal iron-bearing minerals, with secondary **goethite and limonite** occurring locally in weathered and oxidized zones.

Minor sulphide occurrences were observed locally within **dolerite along fractures, quartz veins and altered zones**; however, analytical results did not indicate significant precious- or base-metal mineralization.

Overall, the mineralization is predominantly **stratiform–stratabound within BIF-related lithologies**, with local structural control and secondary supergene oxidation.

15.1.4 Nature of mineralization

The mineralization is predominantly hosted within Banded Iron Formation (BIF), comprising BHC&J, BMC&J, BHMC, and BHQ, with hematite and magnetite as the principal iron-bearing minerals. The mineralization occurs mainly as alternating ferruginous and siliceous bands, with local development of massive and semi-massive iron-rich zones. In Block A1, the mineralized bands are generally parallel, discontinuous, and steeply dipping at approximately 75°, whereas Block A2 is characterized mainly by massive iron ore with subordinate BH/MC&J bands. The mineralization is locally affected by shearing, fracturing, boudinage, brecciation, and Limonitization, reflecting structural deformation and secondary oxidation. In addition to iron, TiO_2 and V_2O_5 mineralization occurs within the ore zones and represents an encouraging associated mineralization in both blocks.

15.1.5 Details of mineralized zones

The principal mineralized zone comprises a **major linear Banded Iron Formation (BIF) zone consisting of five sub-parallel BIF bands**, trending approximately **N70°E–S70°W** and interbedded with phyllite. The zone extends from approximately **400 m northwest of Bijaura to Khoriya** (Plate–I), with an overall strike extent of about **7 km**. Individual BIF bands have exposed widths ranging from approximately **12 m to 45 m**.

Discrete BIF Occurrences: In addition to the major BIF zone, several discrete bands of **Banded Hematite Jasper (BHJ)** and **Banded Hematite Chert (BHC)** are exposed **northwest of Bharahi, south of**

Murgidand and northeast of Karwaniya. These bands have exposed strike lengths of approximately **100–400 m** and widths ranging from **12 m to 25 m**.

15.1.6 Alteration zones and its relevance with mineralisation

The drill-core photographs show **localized alteration zones associated with fractures, joints, quartz veins and S_0 bedding surfaces**, particularly within the dolerite and BIF-related lithologies. The principal alteration features include **epidotization, actinolite alteration, Limonitization, goethitization, hydrothermal alteration and brecciation**. Epidote veins along fractures are clearly observed in **Figure 15.1**, while actinolite-rich alteration associated with the altered zones is shown in **Figure 15.5**.

Chalcopyrite staining and disseminated sulphide mineralisation occur locally along fractured and quartz-veined zones (**Figures 15.2–15.4**). Figure 15.3 shows visible chalcopyrite associated with the altered zone, whereas Figure 15.4 displays **quartz veins with chalcopyrite and iron-oxide staining**. **Figure 15.6** shows epidotized dolerite associated with quartz and iron-sulphide veins, indicating structurally controlled hydrothermal alteration.

The association of **epidote, actinolite, quartz veining, chalcopyrite and iron-sulphide mineralisation** indicates localized **hydrothermal fluid–rock interaction** along structurally favourable pathways. Limonitization and goethitization represent **secondary oxidation and weathering of primary iron-bearing minerals**, producing secondary iron hydroxides. These alteration zones are therefore useful indicators of **hydrothermal activity, structural controls and associated sulphide mineralisation**, although the principal iron mineralisation remains predominantly **BIF-hosted and stratiform to stratabound**.



Figure-15.1: During core drilling, prominent epidote veins associated with fractures were clearly observed within the dolerite in borehole UPCKB-02.



Figure-15.2: The dolerite intersected in borehole UPCKB-02 exhibits fracture-controlled epidote veining accompanied by disseminated chalcopyrite staining, indicating hydrothermal alteration and associated sulphide mineralization.



Figure-15.3: During core drilling, thick chalcopyrite-rich zones were clearly observed in the core of borehole UPCKB-05.



Figure-15.4: During core drilling, quartz-crystal veins and chalcopyrite staining were observed in the core samples from borehole UPCKB-02



Figure-15.5: The dolerite intersected in borehole UPCKB-01 contains actinolite as an alteration mineral within the core samples.



Figure-15.6: Quartz veins and oxidized iron-sulphide veins associated with epidotization were observed within the dolerite in the core samples from borehole UPCKB-04

15.1.7 Genesis of mineralization/genetic model of mineralization

Banded Iron Formations (BIFs) are chemical-sedimentary deposits characterized by alternating iron-rich and silica-rich layers, formed under specific physicochemical conditions. They are broadly classified into Algoma-type and Lake Superior-type

BIFs. Algoma-type BIFs are commonly associated with volcanic and volcano-sedimentary sequences, whereas Lake Superior-type BIFs are generally associated with Paleoproterozoic sedimentary basins and shallow-marine shelf environments.

The BIFs of the study area occur within the Mahakoshal Group and are associated with phyllite, tuff, tuffaceous phyllite and metabasics rocks. The Mahakoshal Group is considered to represent a Paleoproterozoic volcano-sedimentary/rift-related basin of central India. Considering the lithological association, regional geological setting and geochemical characteristics, the BIFs of the study area show greater affinity towards the Lake Superior-type BIF.

To assess the genetic affinity of the BIF, analytical data from 33 BRS samples, predominantly representing BHC/BHJ, were evaluated using established geochemical discrimination diagrams. In the CaO + MgO–Total Fe–SiO_2 diagram of Lepp and Goldich (1964), the study-area samples plot within the Precambrian BIF field, confirming their broad Precambrian BIF affinity (Figure 15.7).

Further, in the SiO_2–(Al_2O_3 + TiO_2)–Fe_2O_3 ternary diagram after Gross and McLeod (1980), the samples predominantly plot towards the SiO_2–Fe_2O_3 side of the diagram and within the field corresponding to Lake Superior-type BIFs (Figure 15.8). The observed geochemical distribution, together with the Paleoproterozoic geological setting and associated volcano-sedimentary lithologies, supports a Lake Superior-type affinity for the BIFs of the Mahakoshal Group in the study area.

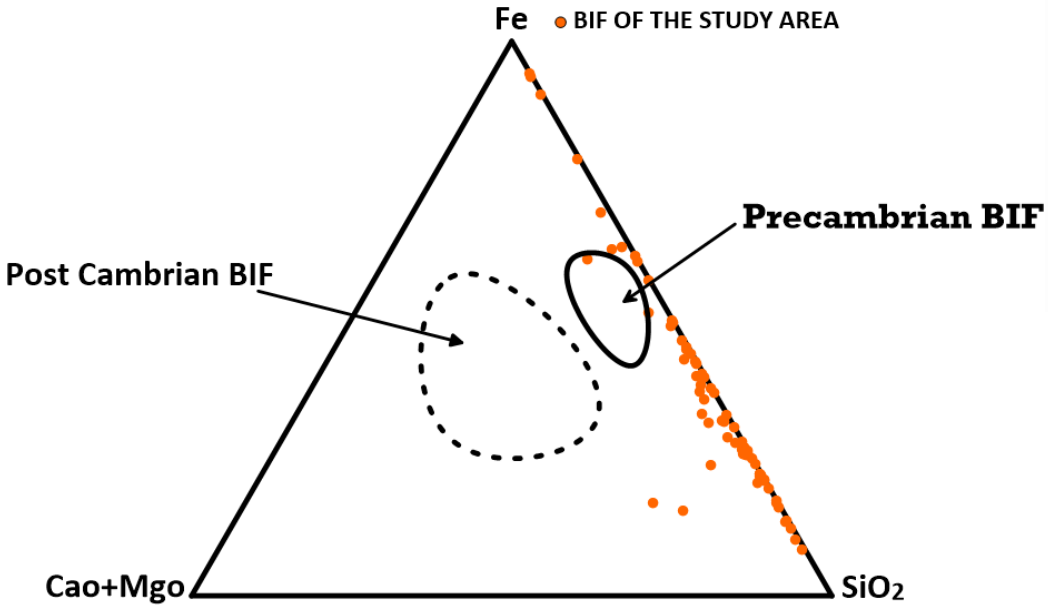


Figure-15.7: CaO+MgO–Total Fe–SiO_2 Ternary diagram showing the classification of BIF from the study area as precambrian and post-cambrian types (after Lepp and Goldich, 1964).

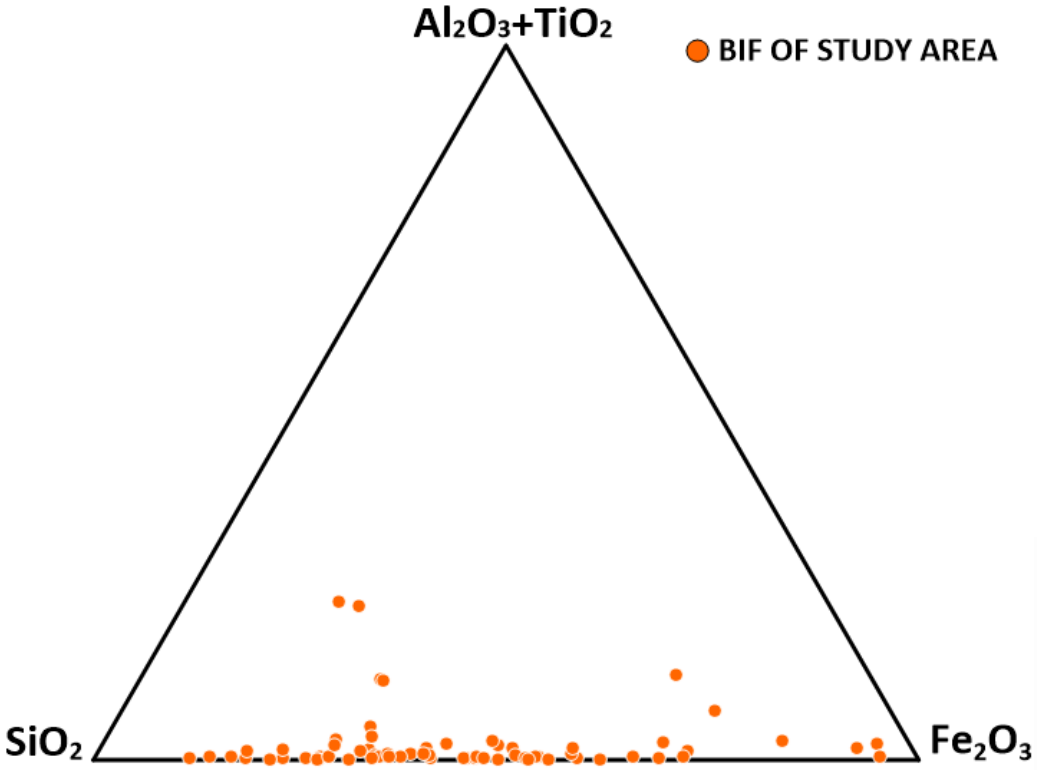


Figure-15.8: SiO_2– (Al_2O_3 + TiO_2)–Fe_2O_3 Ternary diagram showing the geochemical distribution of BIF samples from the study area (after Gross and McLeod, 1980).

The **SiO_2–Fe_2O_3 biplot** after **Maynard (1983)** shows a distinct **inverse relationship between SiO_2 and Fe_2O_3**, with SiO_2 generally decreasing as Fe_2O_3 increases. This trend reflects the **reciprocal variation between silica-rich and iron-rich components** in the BIF. The distribution of samples indicates progressive **Fe enrichment and silica depletion**, consistent with the alternation of **siliceous chert/jasper and ferruginous hematite-rich bands**. The observed trend therefore supports the **BIF-type chemical-sedimentary character** of the studied mineralized horizons (**Figure 15.9**).

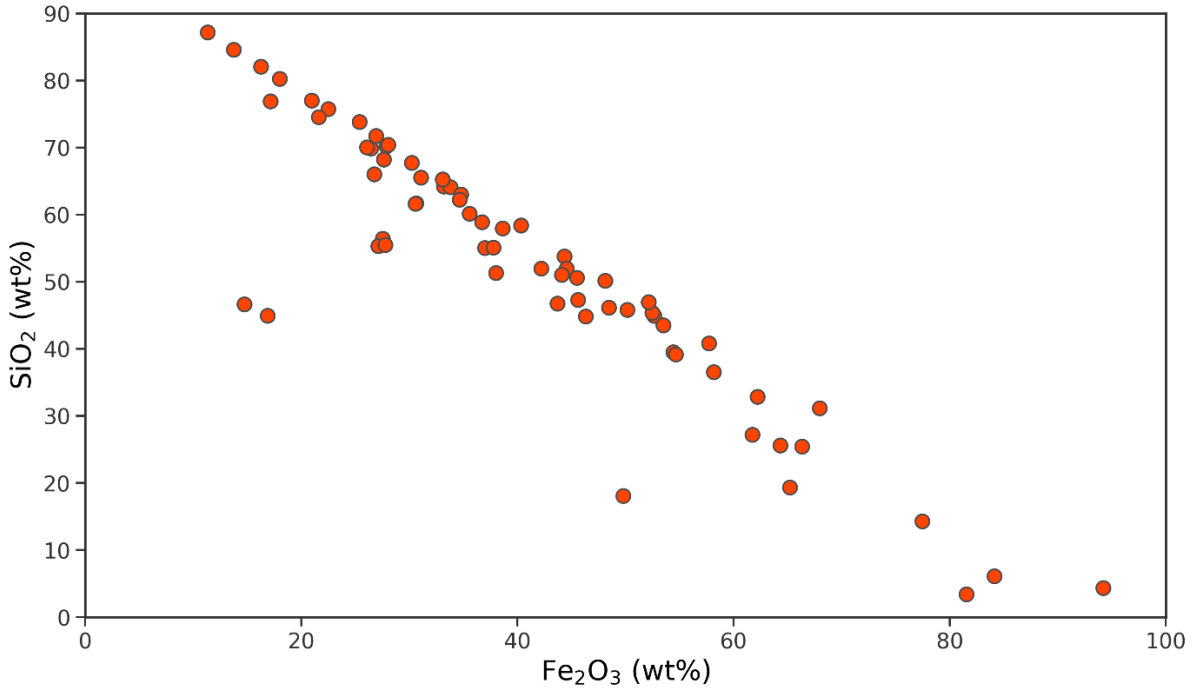


Figure -15.9: SiO_2–Fe_2O_3 Bivariate diagram showing the geochemical relationship of BIF samples from the study area (after Maynard, 1983).

The **Fe–SiO_2–Al_2O_3 ternary diagram** of **67 BRS samples from Block A1** shows that most of the samples are concentrated close to the **Fe–SiO_2 join**, with very low contribution from **Al_2O_3**. This indicates that the samples are mainly composed of ferruginous and siliceous components, represented by hematite/magnetite-rich bands and chert/jasper/quartz-rich bands, respectively.

The plotted samples show a clear variation from **SiO_2-rich composition towards Fe-rich composition**, suggesting alternate enrichment of silica and iron oxides within the BIF. The colour variation of the data points, representing measured Fe%, further indicates that samples with higher Fe content plot towards the **Fe apex**, whereas relatively silica-rich samples plot closer to the **SiO_2 side**.

The limited spread towards the **Al_2O_3 apex** suggests minor argillaceous or tuffaceous input, possibly due to the association of BIF with phyllite, tuffaceous phyllite and other clay-rich interbands. Overall, the plot supports the field and petrographic observation that the investigated samples are dominantly represented by **BIF-type mineralization**, consisting mainly of hematite-rich and silica-rich bands with limited aluminous contamination. In Figure-15.10.

15.1.8 Geochemical classification of dolerite and pyroclastic rocks using TAS diagrams

The **TAS diagrams of Le Bas et al. (1986) and Middlemost (1994)** indicate that the analysed **dolerite and pyroclastic samples are predominantly basaltic to basaltic-andesitic in composition**. In the **Le Bas et al. (1986) classification (Figure 15.12)**, the pyroclastic sample plots within the **basaltic field**, whereas the dolerite plots mainly within the **basalt to basaltic-trachyandesite fields**. The samples occur predominantly within the **subalkaline/tholeiitic domain**, indicating a mafic subalkaline affinity.

In the **Middlemost (1994) classification (Figure 15.13)**, the samples similarly plot within the **basaltic to basaltic-andesite fields**. The consistent distribution in both classification schemes confirms the broadly **mafic and subalkaline litho-chemical character** of the dolerite and associated pyroclastic rocks.

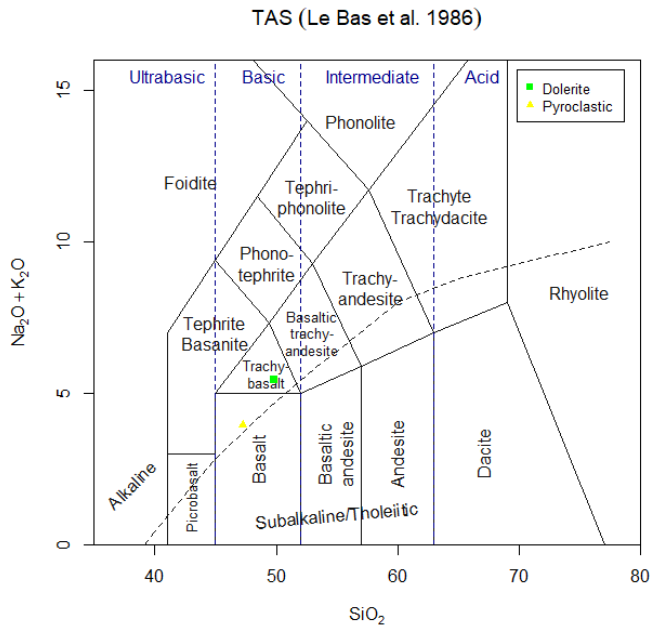


Figure-15.12: TAS diagram showing the classification of dolerite and pyroclastic rock samples from the study area (after Le Bas et al., 1986).

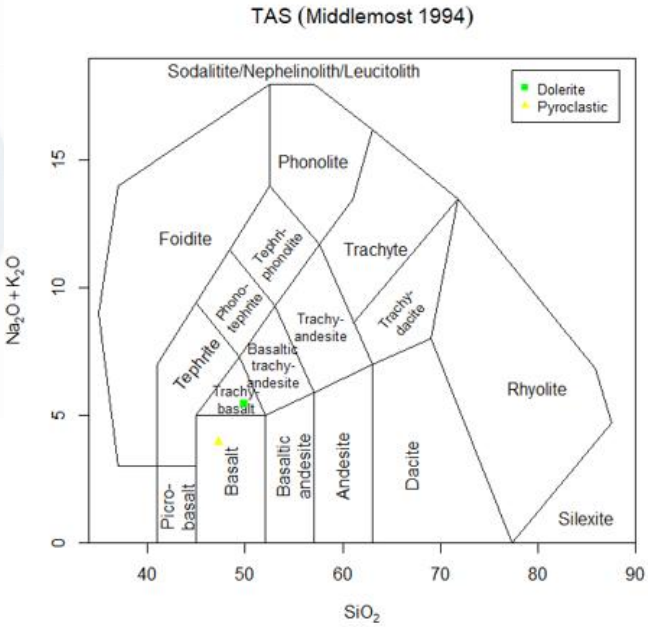


Figure-15.13: TAS diagram showing the classification of dolerite and pyroclastic rock samples from the study area (after Middlemost, 1994).

15.2 Binary and Ternary Plots of geochemical relationships of major oxides

15.2.1 Binary plots of geochemical relationships of major oxides for BRS in Block A1

The **binary geochemical plots of major oxides** presented in **Figure 15.14(a, b &, c)** show the relationships between Fe_2O_3 and selected major oxides in the BRS samples from Block A1. The **Fe_2O_3–SiO_2 plot** shows a distinct inverse relationship, with increasing Fe_2O_3 accompanied by decreasing SiO_2, reflecting progressive **silica depletion and relative iron-oxide enrichment** within the BIF sequence.

The **Fe_2O_3–Al_2O_3 relationship** is generally weak and scattered, with Al_2O_3 remaining relatively low in the high-Fe samples, indicating a limited contribution from **aluminous gangue minerals**. The **Fe_2O_3–TiO_2 relationship** is also weak, although a few samples show relatively elevated TiO_2, possibly reflecting the presence of **Ti-bearing oxide phases**. The **Fe_2O_3–P_2O_5 relationship** is poorly defined, with variable P_2O_5 concentrations suggesting localized phosphate-bearing mineral phases rather than a direct association with Fe enrichment.

Overall, the geochemical relationships indicate that **iron enrichment is predominantly associated with SiO_2 depletion**, whereas the distribution of Al_2O_3, TiO_2 and P_2O_5 is mainly influenced by **gangue mineralogy, accessory phases, lithological variation and localized alteration**.

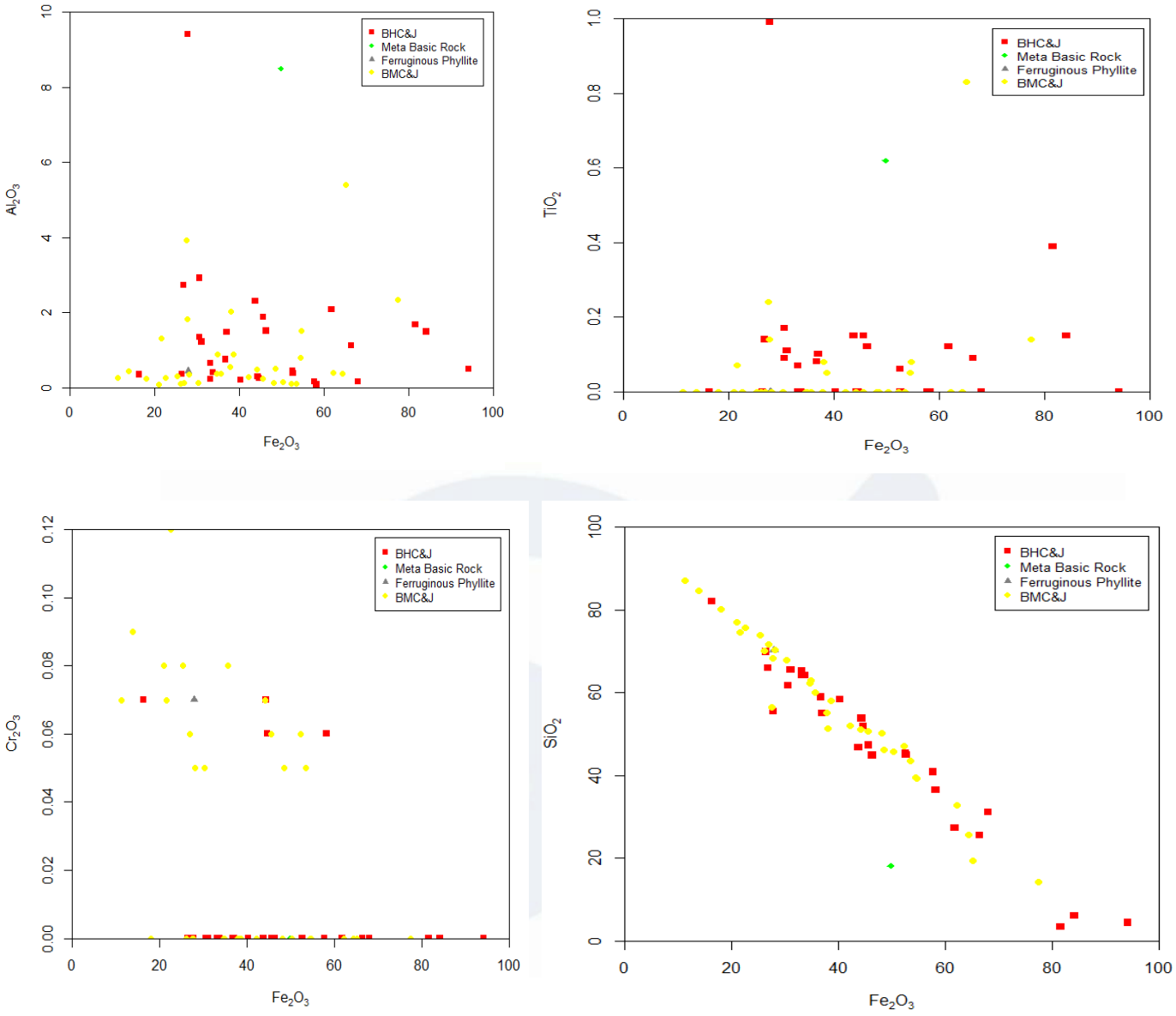


Figure-15.14a: Bivariate plots showing Fe_2O_3 vs TiO_2, Al_2O_3, SiO_2, & Cr_2O_3 geochemical relationships among major oxides in BRS samples from block A1.

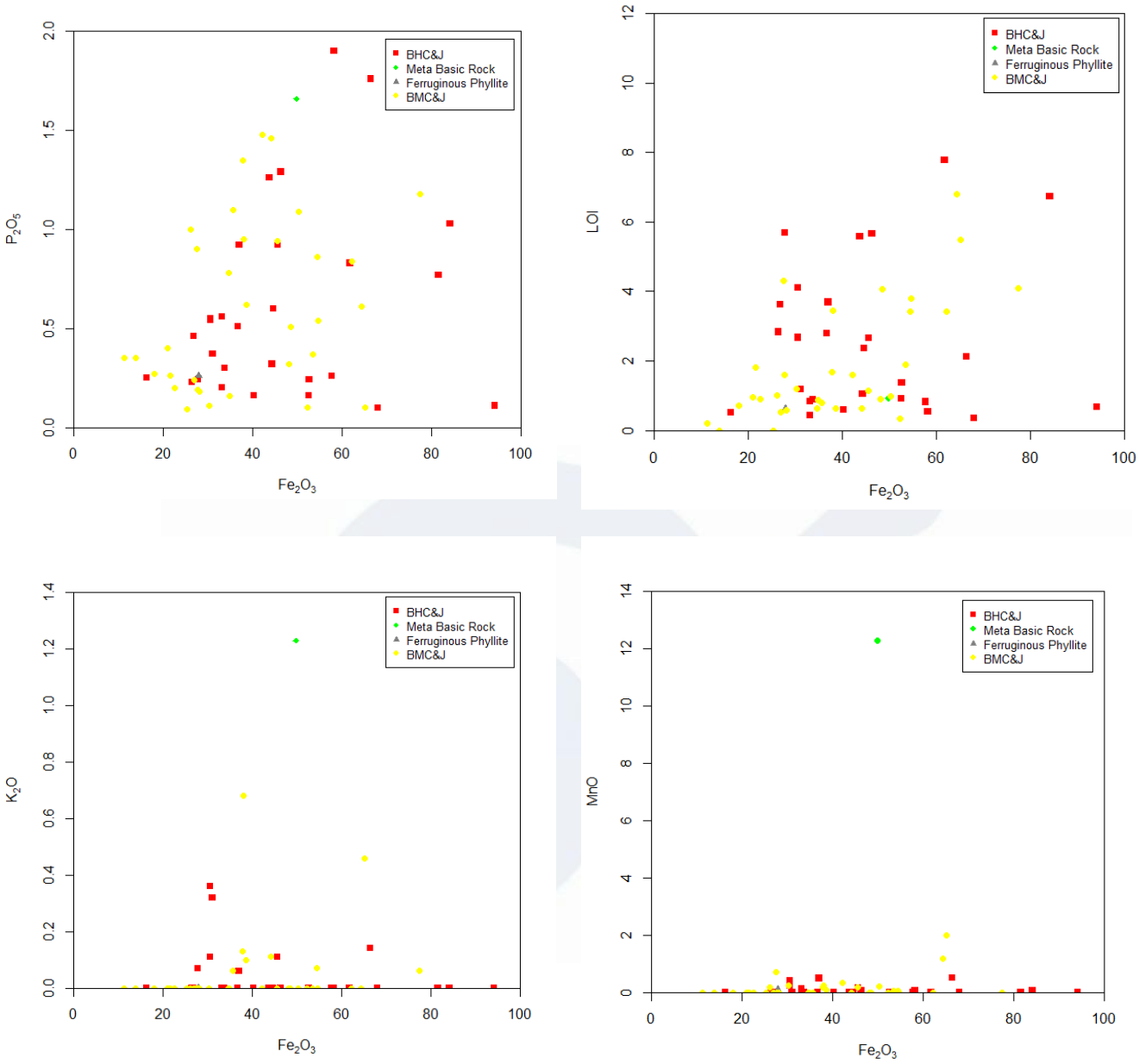


Figure-15.14b Bivariate plots showing Fe_2O_3 vs P_2O_5, LOI, KO_2, & MnO, geochemical relationships among major oxides in BRS samples from block A1.

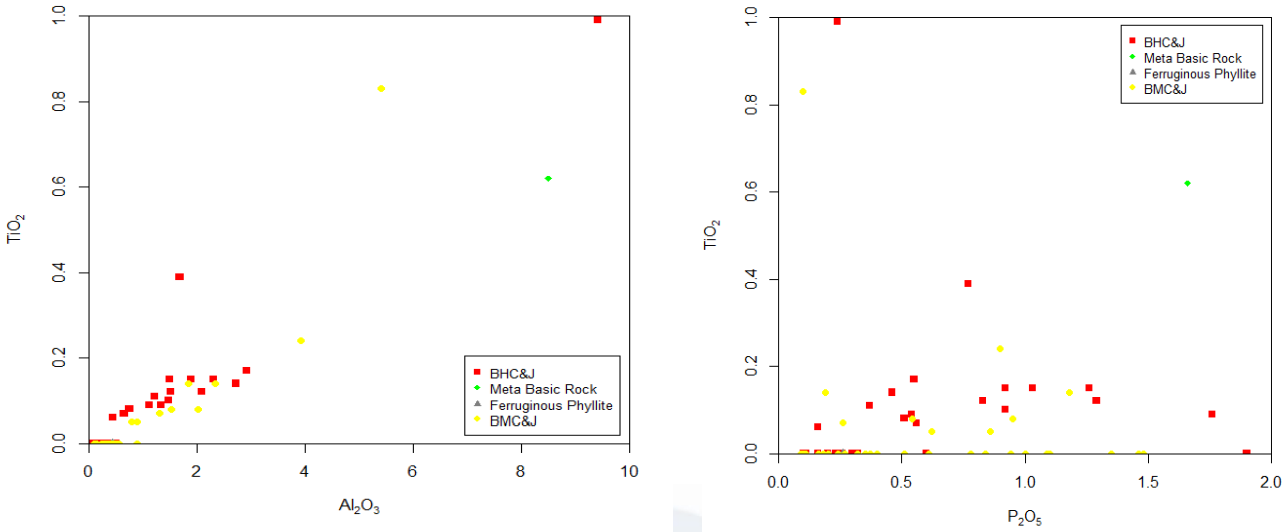


Figure-15.15 Bivariate plots showing TiO_2 vs Al_2O_3 & P_2O_5 geochemical relationships among major oxides in BRS samples from block A1.

15.2.2 Ternary plots of geochemical relationships of major oxides for BRS in Block A1

The **Fe_2O_3–SiO_2–Al_2O_3 ternary diagram** shows in **Figure 15.15** a strong compositional control of the analyzed samples, with most of the data points concentrated along the **Fe_2O_3–SiO_2 join** and close to the Al_2O_3-poor field. This distribution indicates that the analyzed BHC&J and BMC&J samples are predominantly characterized by **variable proportions of iron oxides and silica**, with comparatively low Al_2O_3 contents. The progressive distribution from the SiO_2 apex towards the Fe_2O_3 apex represents increasing **iron enrichment accompanied by silica depletion**, consistent with the development of Fe-rich zones within the BIF sequence.

The **BHC&J and BMC&J** populations largely overlap and follow a similar compositional trend, indicating comparable Fe–Si geochemical control. The **Meta Basic Rock and Ferruginous Phyllite** samples occur as comparatively minor and compositionally distinct populations, reflecting greater contribution from **aluminous and/or mafic silicate components**. Overall, the ternary distribution demonstrates that the principal geochemical variation in the investigated mineralized rocks is governed by the **Fe_2O_3–SiO_2 system**, whereas Al_2O_3 represents a relatively subordinate component, mainly associated with gangue and silicate mineral phases.

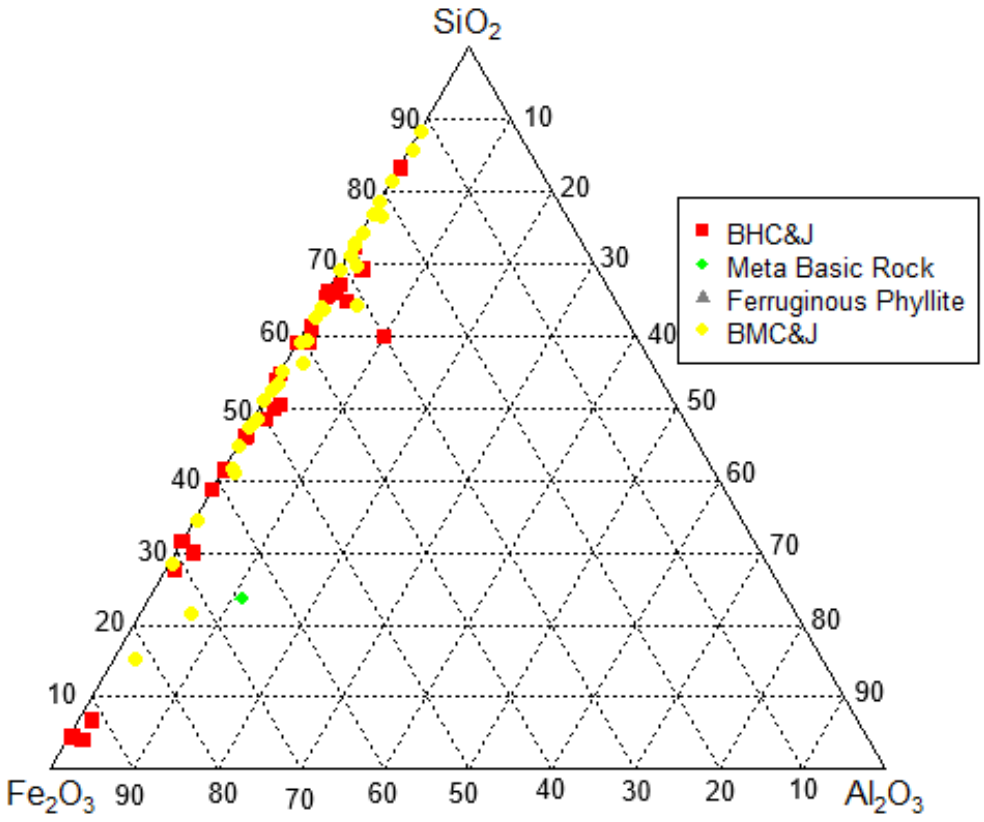


Figure-15.16: Ternary plot showing geochemical relationships among major oxides for BRS samples from block A1.

15.2.3 Binary plots of geochemical relationships of major oxides for BRS in Block A2

The bivariate geochemical plots presented in **Figure 15.16(a, b &, c)** demonstrate distinct **elemental associations, compositional variability, and lithological discrimination** among the Massive Iron Ore, Laterite, and BQ with Iron Matrix populations. The **Fe_2O_3–SiO_2 plot exhibits a pronounced inverse relationship**, wherein increasing Fe_2O_3 is generally accompanied by progressive depletion of SiO_2, indicating **silica dilution and/or residual enrichment of iron during the iron-mineralization and weathering processes**. The Fe_2O_3–Al_2O_3 relationship is relatively dispersed, although several high-Fe_2O_3 samples contain comparatively low Al_2O_3, suggesting **depletion of aluminous gangue during iron enrichment**, while selected samples retain elevated Al_2O_3, probably reflecting localized clayey or aluminous components.

The **Al_2O_3–TiO_2 relationship shows a broadly positive covariation**, particularly within the massive iron ore population, indicating a possible association of Ti with aluminous and/or detrital accessory mineral phases. The Fe_2O_3–TiO_2 distribution is comparatively variable and does not indicate a uniform relationship, suggesting that Ti is likely controlled by **discrete Ti-bearing accessory minerals rather than by the principal iron oxide assemblage**. The **V_2O_5–TiO_2 plots reveal pronounced vanadium anomalies**, with exceptionally elevated V_2O_5 concentrations occurring in selected iron-rich samples; this may indicate a geochemical affinity between V and Ti-bearing oxide phases and warrants mineralogical verification.

The Fe_2O_3–P_2O_5 plot indicates a generally increasing P_2O_5 tendency with increasing Fe_2O_3 in the massive iron ore samples, suggesting **localized phosphorus enrichment within the iron-rich assemblage**. The Fe_2O_3–MnO relationship is predominantly weak and dispersed, with generally low MnO concentrations and one conspicuous Mn-rich BQ with iron-matrix sample representing a **geochemical outlier**. The Fe_2O_3–Cr_2O_3 distribution is similarly variable and lacks a systematic correlation, implying **heterogeneous distribution of Cr-bearing accessory phases** rather than direct incorporation within the principal iron mineral assemblage. The Fe_2O_3–LOI relationship shows relatively elevated LOI values in several iron-rich and lateritic samples, which may reflect **hydrated iron oxides, hydroxides, clay minerals, and supergene weathering products**.

Overall, the geochemical patterns indicate **progressive iron enrichment accompanied by silica and, locally, aluminous gangue depletion**, with localized enrichment of **Ti–V and P-bearing components**. The observed elemental variability further suggests that geochemistry is governed by a combination of **primary lithological controls, mineralogical heterogeneity, supergene alteration, weathering-induced element mobility, and residual concentration processes**.

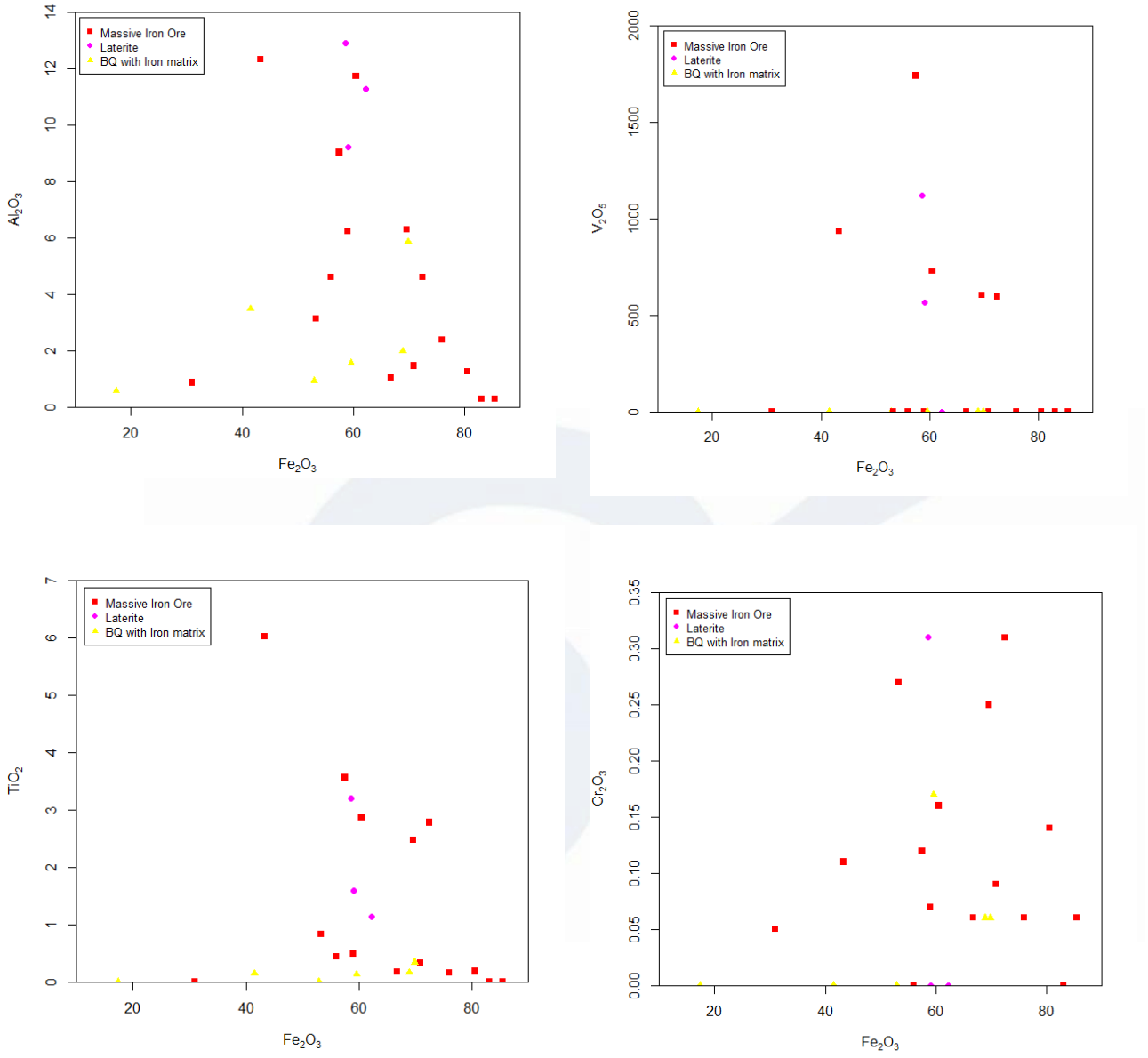


Figure-15.17a: Bivariate plots showing Fe_2O_3 vs Al_2O_3, V_2O_5, TiO_2, & Cr_2O_3 geochemical relationships among major oxides in BRS samples from block A2.

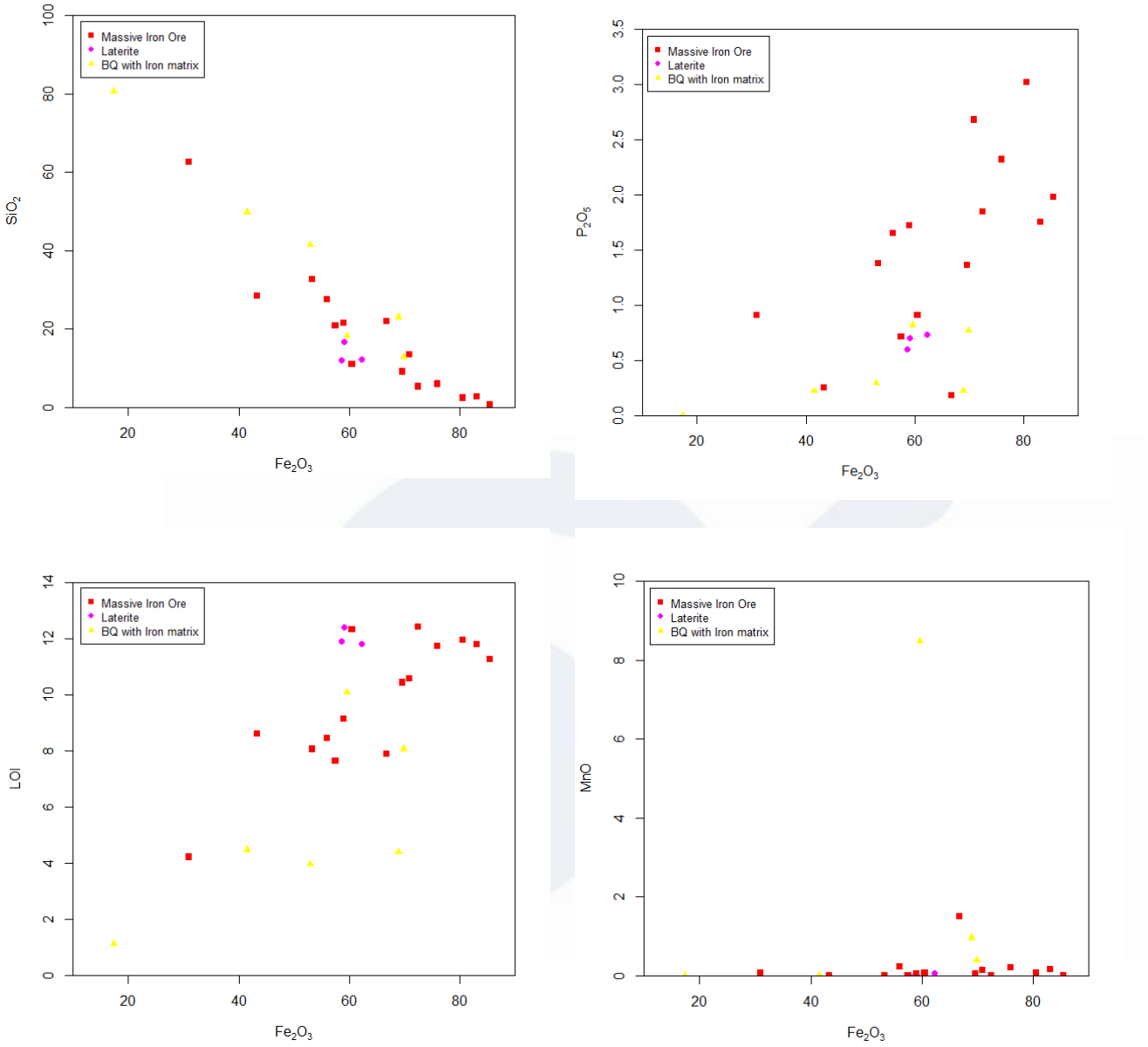


Figure-15.17b: Bivariate plots showing Fe_2O_3 vs SiO_2, P_2O_5, LOI & MnO geochemical relationships among major oxides in BRS samples from block A2.

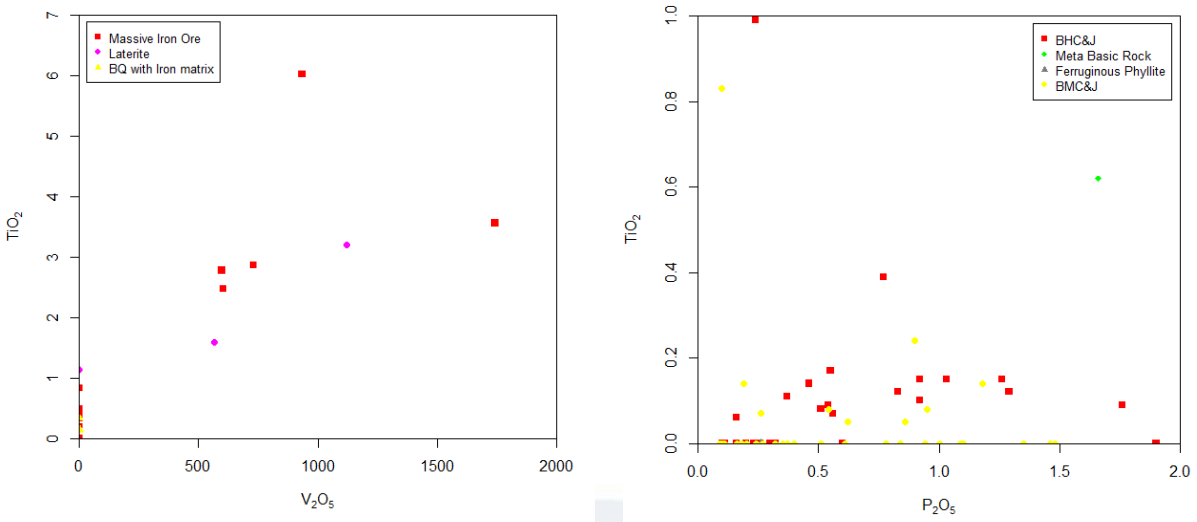


Figure-15.17c: Bivariate plots showing TiO_2 vs V_2O_5 & P_2O_5 geochemical relationships among major oxides in BRS samples from block A2.

15.2.4 Ternary plots of geochemical relationships of major oxides for BRS in Block A2

The **Fe_2O_3–SiO_2–Al_2O_3 ternary diagram** demonstrates **Figure 15.17** a clear compositional demonstrates a clear compositional differentiation among the Massive Iron Ore, Laterite, and BQ with Iron Matrix lithological populations. The **Massive Iron Ore samples are predominantly concentrated toward the Fe_2O_3 apex**, indicating strong iron enrichment and relatively low proportions of SiO_2 and Al_2O_3. This distribution reflects the dominance of iron oxide minerals and the progressive removal or dilution of siliceous and aluminous gangue components during **iron enrichment and supergene modification**.

The **Laterite samples occupy an intermediate compositional field**, showing comparatively greater contributions from both SiO_2 and Al_2O_3, consistent with the incorporation of **siliceous and aluminous weathering products** within the lateritic profile. In contrast, the **BQ with Iron Matrix samples exhibit a wider compositional dispersion toward the SiO_2-rich and, locally, Al_2O_3-influenced fields**, indicating a greater contribution from gangue minerals and comparatively weaker iron enrichment. The progressive distribution from the SiO_2–Al_2O_3-rich field toward the Fe_2O_3 apex indicates a **geochemical differentiation trend from relatively gangue-rich protolith/material toward highly ferruginous ore**, characterized by increasing Fe_2O_3 concentration and concomitant depletion of SiO_2 and Al_2O_3.

The limited overlap between the three populations further suggests **lithological and mineralogical differentiation**, while the scattered BQ with Iron Matrix population indicates variable degrees of iron impregnation and weathering. Overall, the ternary relationship supports a model of **residual ferruginous enrichment involving preferential concentration of iron oxides and relative depletion of silica and alumina**, producing a progressive compositional transition from BQ with iron matrix through lateritic material to massive iron ore.

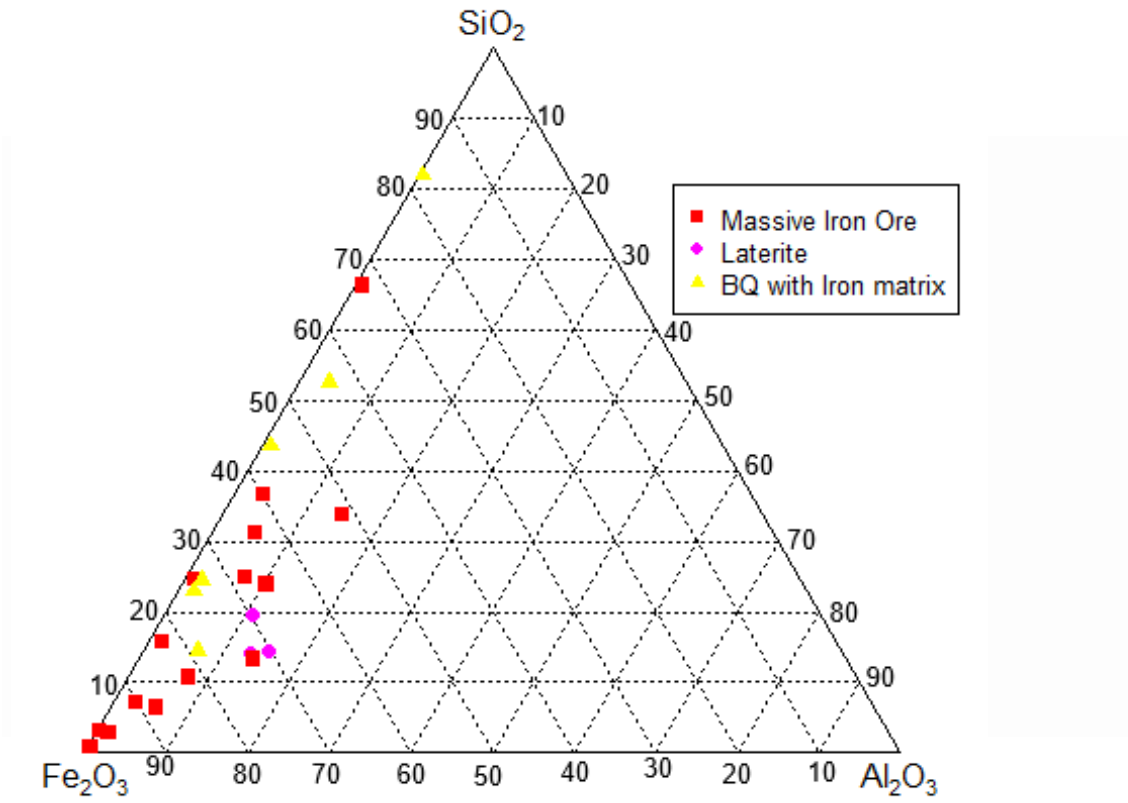
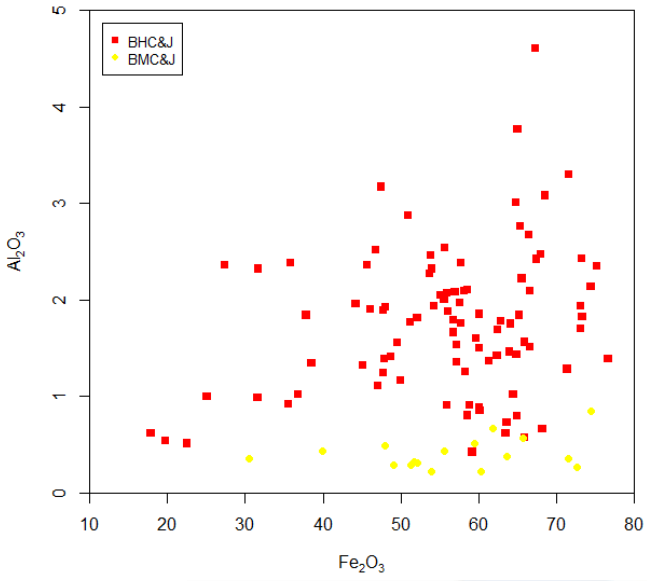


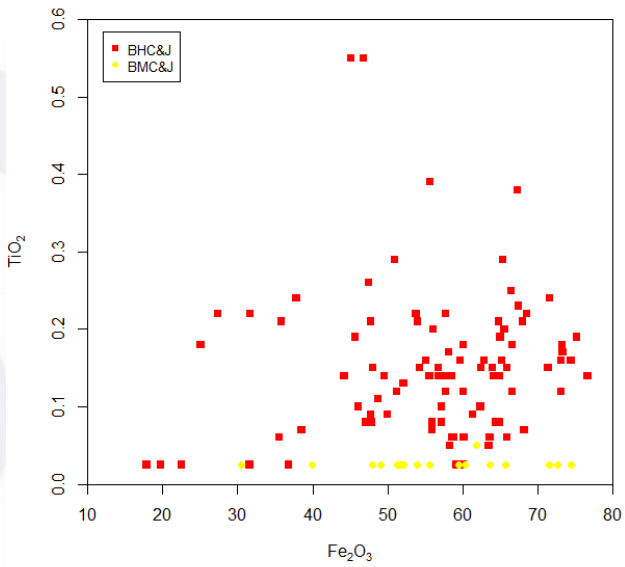
Figure-15.18: Ternary plot showing geochemical relationships among major oxides for BRS samples from block A2.

15.2.5 Binary plots of geochemical relationships of major oxides for channel sample in Block A1

The scatter plots in **Figure 15.18(a & b)** indicate distinct compositional relationships between Fe_2O_3 and the associated oxides. A **strong inverse correlation between Fe_2O_3 and SiO_2** is evident, indicating progressive iron enrichment accompanied by depletion of siliceous gangue, consistent with increasing iron mineralization. **Fe_2O_3–MnO, Fe_2O_3–TiO_2 and Fe_2O_3–Al_2O_3** show weak to moderate positive associations

with considerable scatter, suggesting variable incorporation of Mn-, Ti- and Al-bearing mineral phases within the Fe-rich zones. **Fe_2O_3–P_2O_5** exhibits a weak to moderate positive relationship, indicating variable phosphorus enrichment. The **Al_2O_3–TiO_2** plot shows a comparatively distinct positive correlation, suggesting a common association with aluminosilicate or Ti-bearing detrital phases. The **Fe_2O_3–LOI** relationship is moderately positive, possibly reflecting increased hydrated and/or alteration-related mineral components in Fe-rich samples. Overall, BHC&J samples display greater geochemical variability and stronger Fe enrichment, whereas BMC&J samples generally form a **low-concentration, comparatively restricted population**, indicating compositional and/or mineralogical differences between the two sample groups.





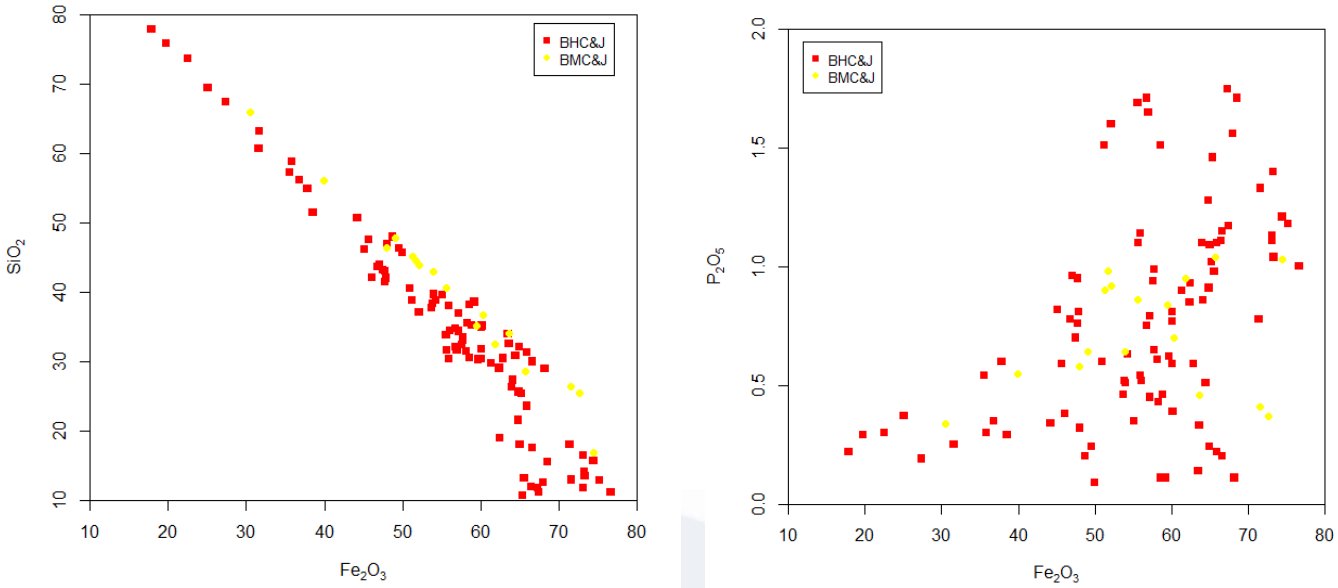
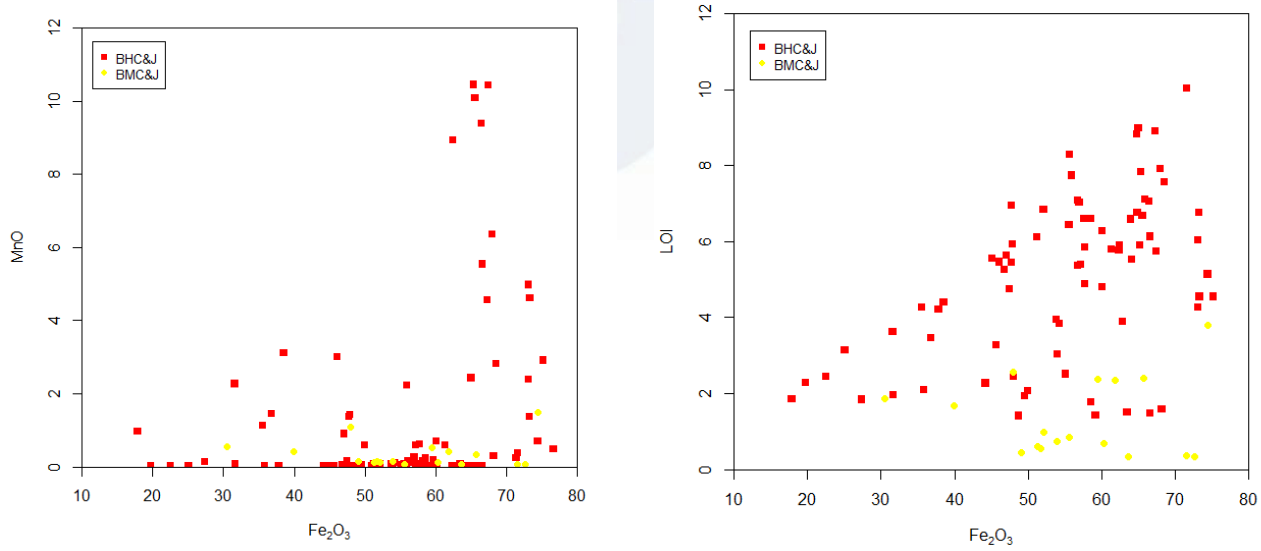


Figure-15.19a: Bivariate plots showing Fe_2O_3 vs Al_2O_3, TiO_2, SiO_2, & P_2O_5 geochemical relationships among major oxides in channel samples from block A1.



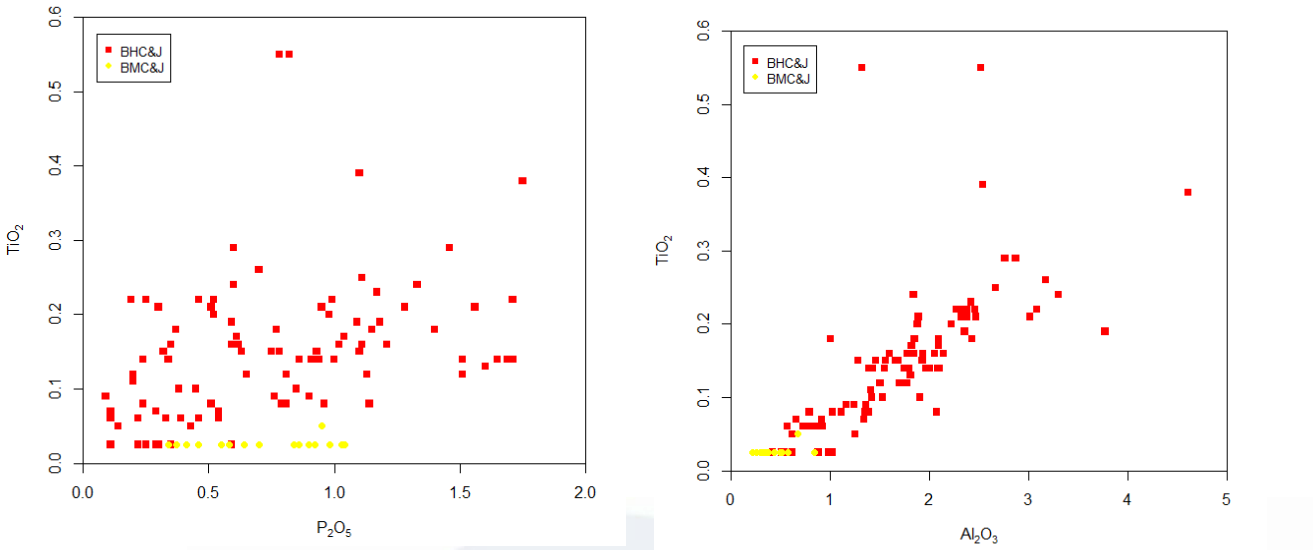


Figure-15.19b: Bivariate plots showing Fe2O3 vs Mno, LOI & TiO2 vs Al_2O_3, P_2O_5 geochemical relationships among major oxides in channel samples from block A1.

15.2.6 Ternary plots of geochemical relationships of major oxides for channel sample in Block A1

The ternary diagram shows in **Figure 15.19** a **strong Fe_2O_3–SiO_2 compositional control**, with most samples concentrated along the Fe_2O_3–SiO_2 join and very limited Al_2O_3 contribution. BHC&J samples display a wider compositional range, extending from relatively SiO_2-rich to strongly Fe_2O_3-enriched compositions, whereas BMC&J samples form a comparatively narrow cluster. The progressive shift from the **SiO_2 apex toward the Fe_2O_3 apex** indicates increasing iron enrichment accompanied by decreasing silica content, while the consistently low Al_2O_3 component suggests that alumina-bearing gangue minerals constitute only a minor proportion. Overall, the distribution is indicative of **silica dilution/replacement by Fe-rich mineralization**, with BHC&J showing greater geochemical variability than BMC&J.

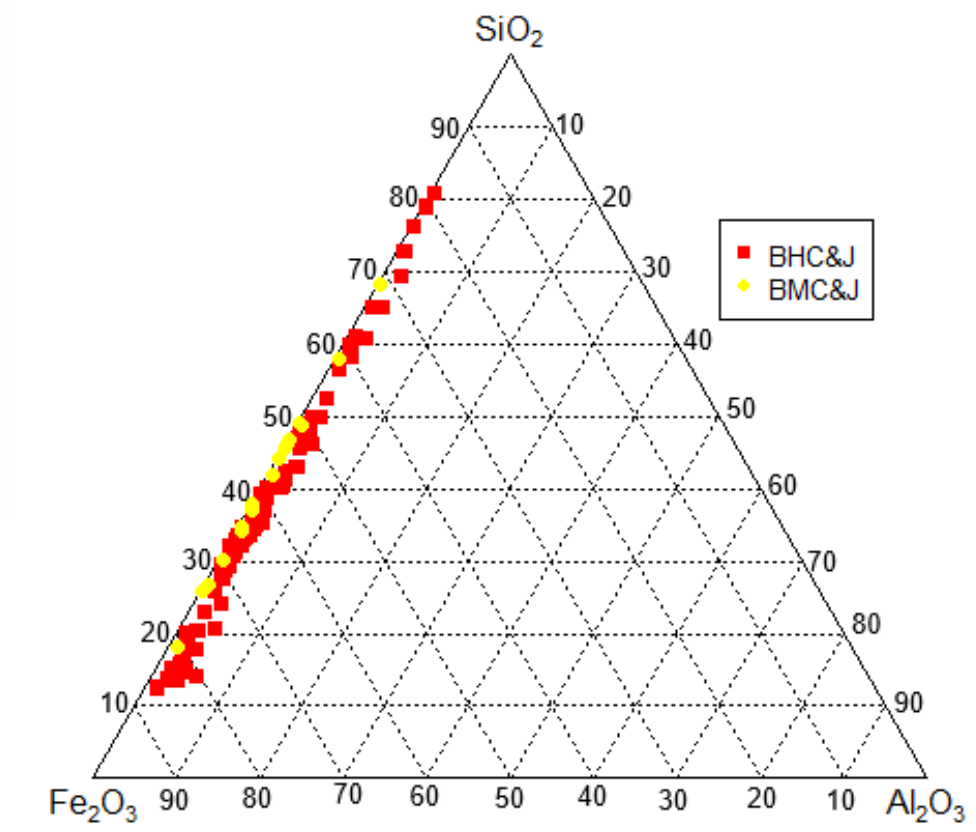


Figure-15.20: Ternary plots showing geochemical relationships among major oxides for channel samples from block A1.

15.2.7 Binary plots of geochemical relationships of major oxides for channel sample in Block A2

The geochemical plots show in **Figure 15.20(a & b)** a clear distinction between **Tuff with Hematite** and **Massive Iron Ore**. The **P_2O_5–TiO_2** and **Al_2O_3–TiO_2** plots indicate a positive association, suggesting that Ti is largely controlled by Al- and P-bearing accessory or gangue phases. **Fe_2O_3–SiO_2** exhibits a strong negative relationship, with increasing Fe_2O_3 accompanied by decreasing SiO_2, confirming progressive enrichment of iron minerals and depletion of siliceous gangue during mineralization. The **Fe_2O_3–MnO** relationship is relatively scattered, although Massive Iron Ore generally shows higher MnO variability. **Fe_2O_3–LOI** shows a moderate positive trend, indicating an association of higher Fe_2O_3 with hydrated and/or alteration-related mineral phases. The **Fe_2O_3–P_2O_5** relationship is weak to moderate and dispersed, reflecting variable phosphorus enrichment. The **Fe_2O_3–TiO_2** and **Fe_2O_3–Al_2O_3** plots show distinct compositional populations, with Massive Iron Ore generally exhibiting higher Fe_2O_3 and lower SiO_2, while Tuff with Hematite is relatively enriched in SiO_2, TiO_2 and Al_2O_3. Overall, the plots indicate **progressive iron enrichment with silica depletion and a clear geochemical separation between tuffaceous hematitic material and massive iron ore**, supporting their distinct mineralogical and lithological characteristics.

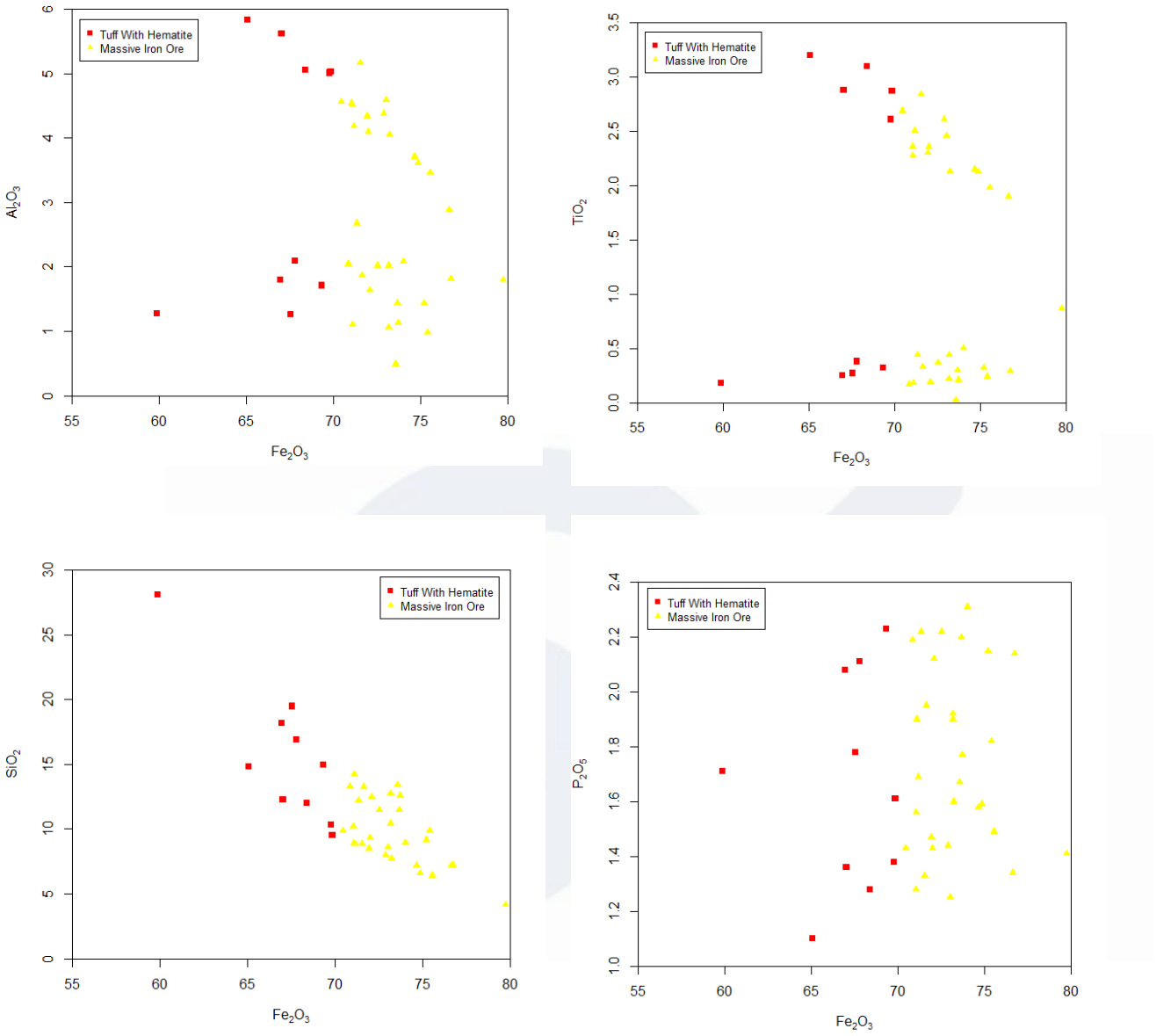


Figure-15.21a Bivariate plots showing Fe_2O_3 Vs Al_2O_3, TiO_2, SiO_2 & P_2O_5 geochemical relationships among major oxides in channel samples from block A2.

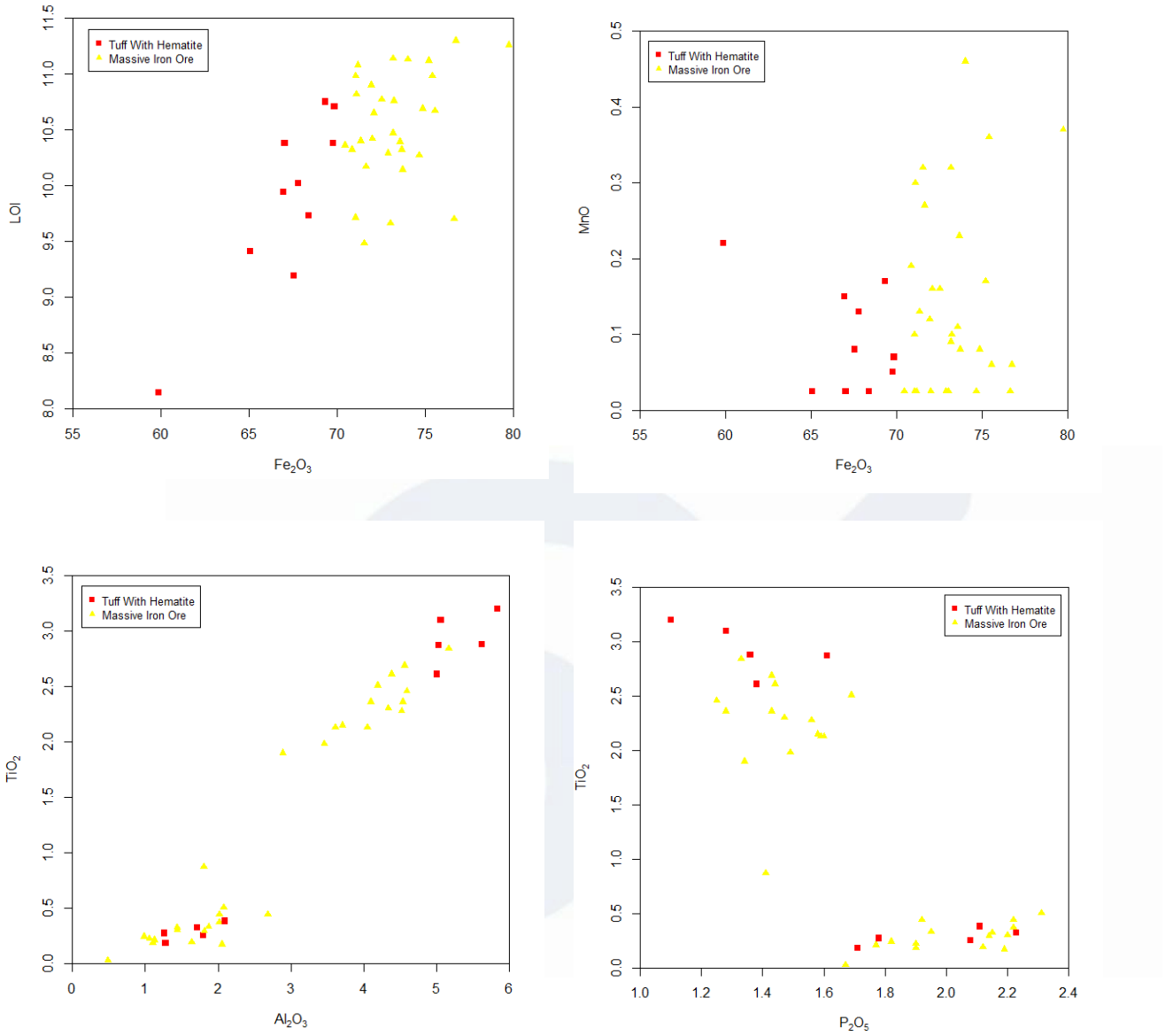


Figure-15.22b: Bivariate plots showing Fe_2O_3 Vs LOI, Mno & TiO_2 Vs Al_2O_3, P_2O_5 geochemical relationships among major oxides in channel samples from block A2.

15.2.8 Ternary plots of geochemical relationships of major oxides for channel sample in Block A2

The ternary diagram shows in Figure **15.21** that both **Tuff with Hematite** and **Massive Iron Ore** samples are strongly concentrated toward the **Fe_2O_3 apex**, indicating Fe-rich compositions with comparatively low combined SiO_2 and Al_2O_3 contents. The **Massive Iron Ore** samples form a relatively tight cluster closer to

the Fe_2O_3 corner, reflecting higher compositional homogeneity and stronger iron enrichment, whereas **Tuff with Hematite** shows a slightly broader distribution toward the SiO_2 component, indicating greater siliceous gangue contribution. The consistently low Al_2O_3 component suggests limited alumina-bearing gangue. Overall, the ternary distribution demonstrates **progressive Fe_2O_3 enrichment with decreasing SiO_2 and minor Al_2O_3**, clearly distinguishing the massive iron ore from the more siliceous tuffaceous hematitic material.

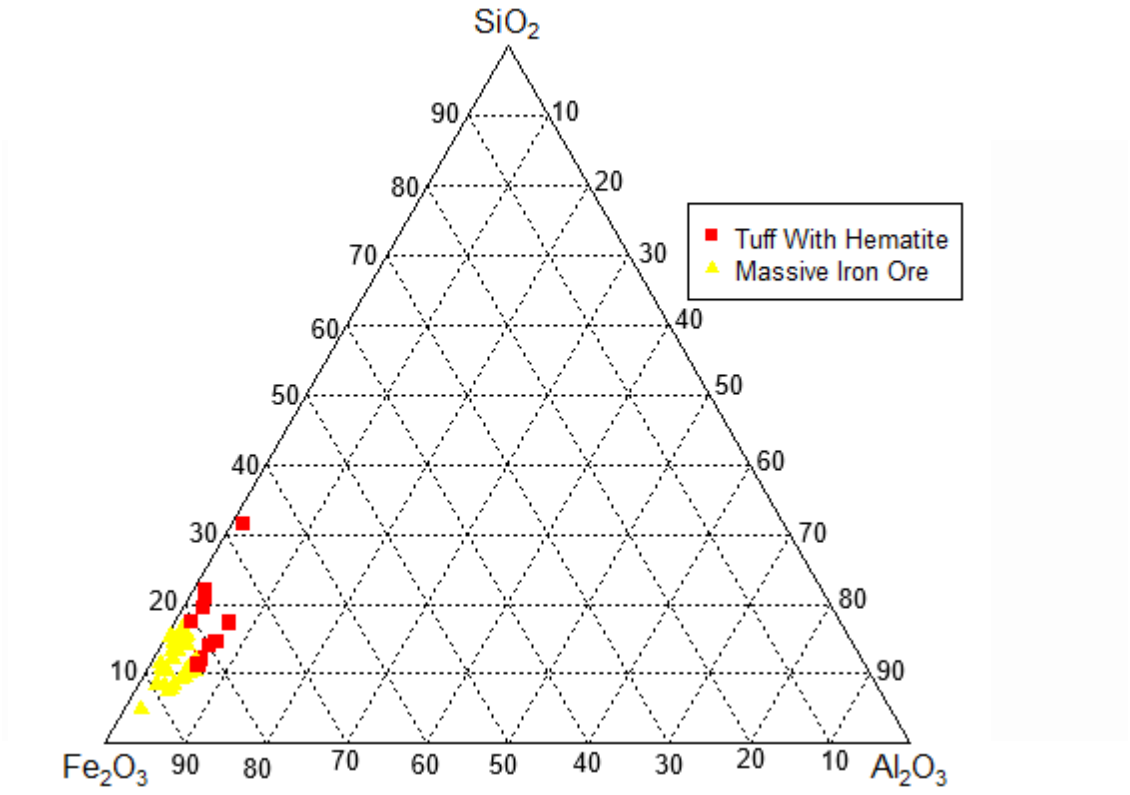


Figure-15.23: Ternary plots showing geochemical relationships among major oxides for channel samples from block A2.

15.2.9 Binary plots of geochemical relationships of major oxides for core sample in Block A1

The geochemical plots show in Figure **15.21(a, b & c)** clear lithological and geochemical differentiation among the **BHC&J, BMC&J, ferruginous phyllite, felsic tuff, and BHC&J with phyllite** populations. **Fe_2O_3–SiO_2** exhibits a strong inverse relationship, indicating progressive iron enrichment accompanied by depletion of silica, particularly in the BHC&J samples. **Fe_2O_3–MnO** shows a generally scattered but locally

positive relationship, with BMC&J displaying relatively higher MnO variability. **Fe_2O_3–LOI** indicates moderate dispersion, with higher LOI commonly associated with intermediate-to-higher Fe_2O_3 values, suggesting the influence of hydrated or alteration-related phases. **Fe_2O_3–P_2O_5** shows a weak to moderate positive association with considerable scatter, indicating variable phosphorus enrichment. **Cr_2O_3 and V_2O_5** are generally very low in most samples; however, distinct anomalous concentrations occur mainly in ferruginous phyllite and a few BHC&J samples, suggesting localized Cr–V-bearing mineral phases. **Fe_2O_3–TiO_2** demonstrates variable Ti enrichment, particularly within ferruginous phyllite, whereas most BMC&J samples contain low TiO_2. **Fe_2O_3–Al_2O_3** shows substantial scatter, with ferruginous phyllite generally exhibiting higher Al_2O_3, consistent with a stronger aluminosilicate component. The **TiO_2–Al_2O_3** plot shows a pronounced positive relationship, indicating common control by Ti- and Al-bearing aluminosilicate phases. Overall, the geochemical distribution suggests **progressive Fe enrichment and silica depletion during iron mineralization, with Ti–Al association and localized Cr–V enrichment reflecting specific lithological or accessory-mineral controls**.

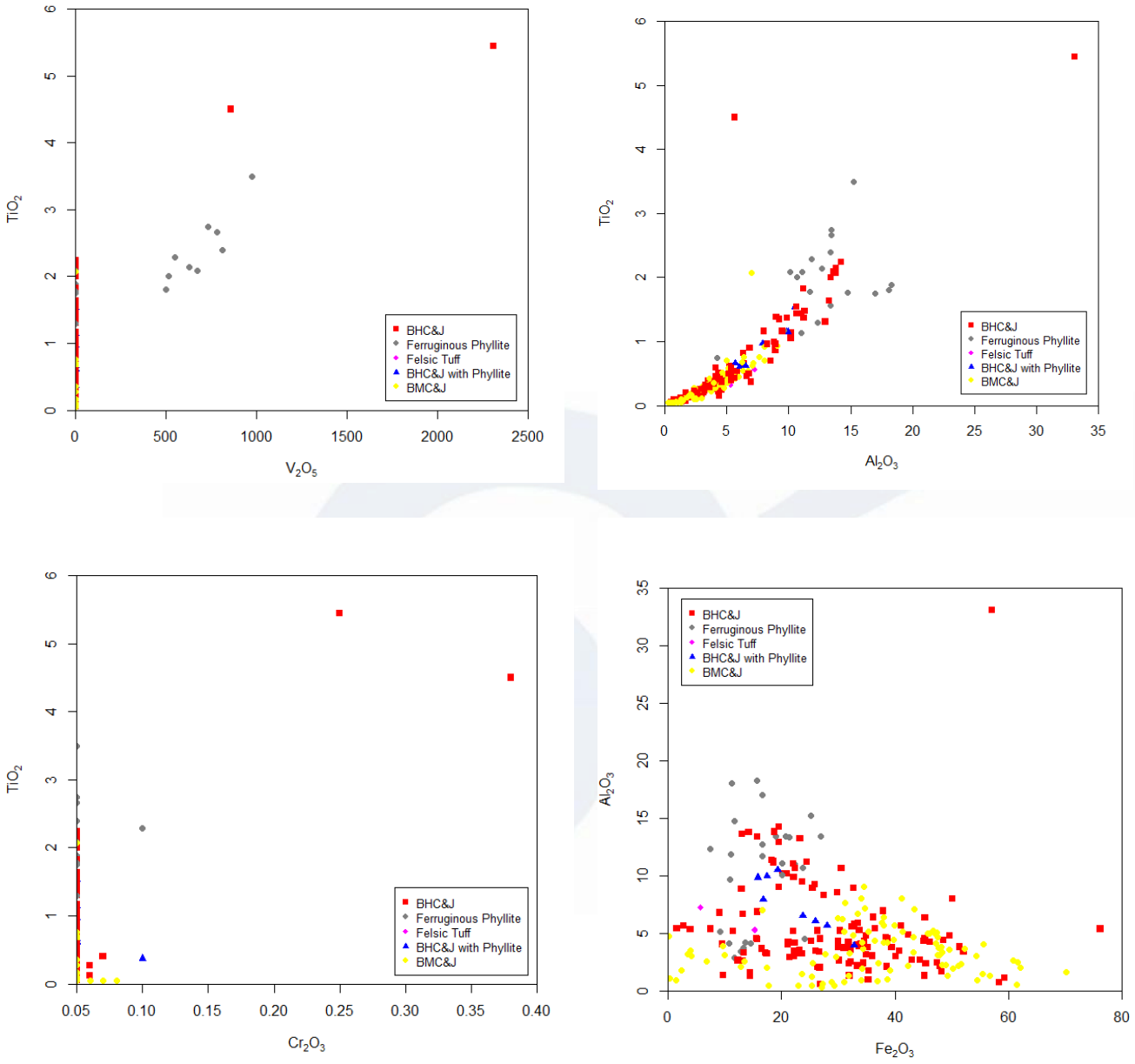


Figure-15.24a: Bivariate plots showing Fe_2O_3 vs Al_2O_3 & TiO_2 vs V_2O_5, Al_2O_5 & Cr_2O_3 geochemical relationships among major oxides in core samples from block A1.

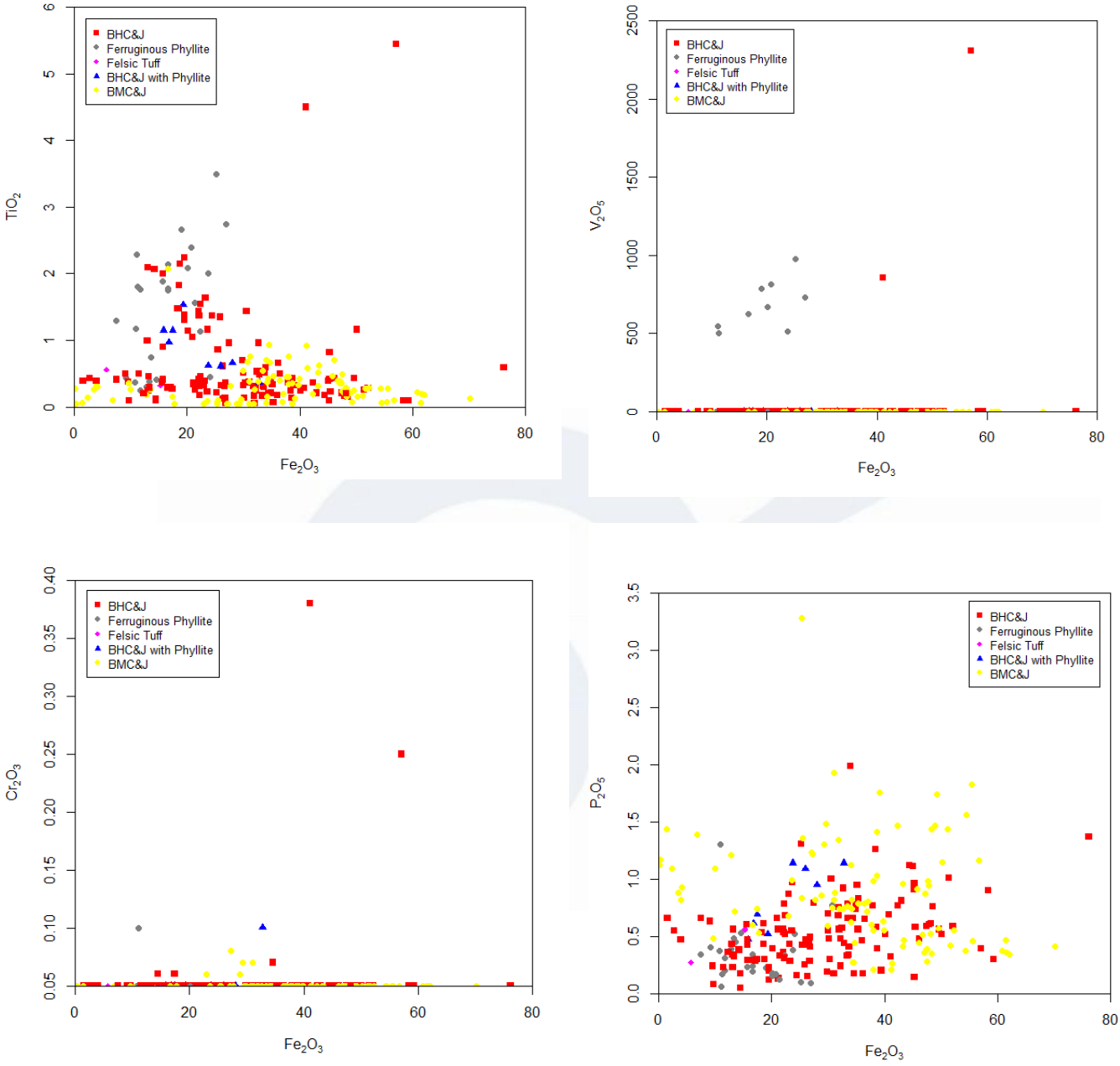


Figure-15.24b: Bivariate plots showing Fe_2O_3 Vs TiO_2, V_2O_5, Cr_2O_3 & P_2O_5 geochemical relationships among major oxides in core samples from block A1.

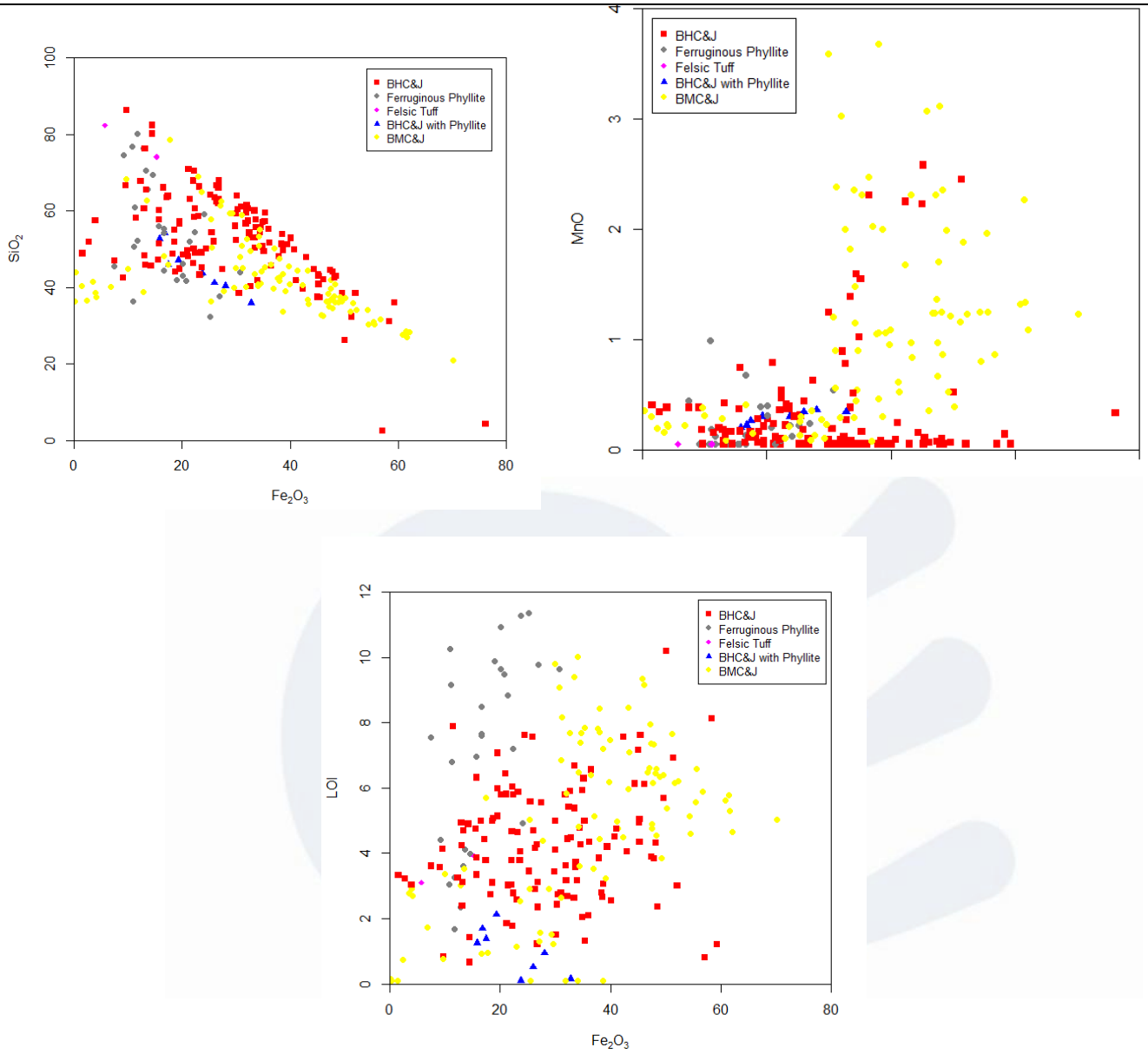


Figure-15.24c: Bivariate plots showing Fe_2O_3 Vs SiO_2, Mno & LOI geochemical relationships among major oxides in core samples from block A1.

15.2.10 Ternary plots of geochemical relationships of major oxides for core sample in Block A1

The ternary diagram shows in Figure **15.22** that the samples are predominantly distributed along the **Fe_2O_3–SiO_2 join**, with relatively limited Al_2O_3 contribution. **BHC&J and BMC&J** samples span a broad range from SiO_2-rich to Fe_2O_3-enriched compositions, reflecting variable degrees of iron mineralization and siliceous dilution. **Ferruginous phyllite** forms a comparatively distinct cluster with relatively higher Al_2O_3 contribution, consistent with its aluminosilicate-rich character, while **felsic tuff and BHC&J with phyllite** occupy intermediate compositions. The overall distribution indicates **progressive Fe_2O_3 enrichment accompanied by decreasing SiO_2 and relatively minor Al_2O_3**, supporting differentiation of the iron-rich mineralized material from the surrounding silicate-rich lithologies.

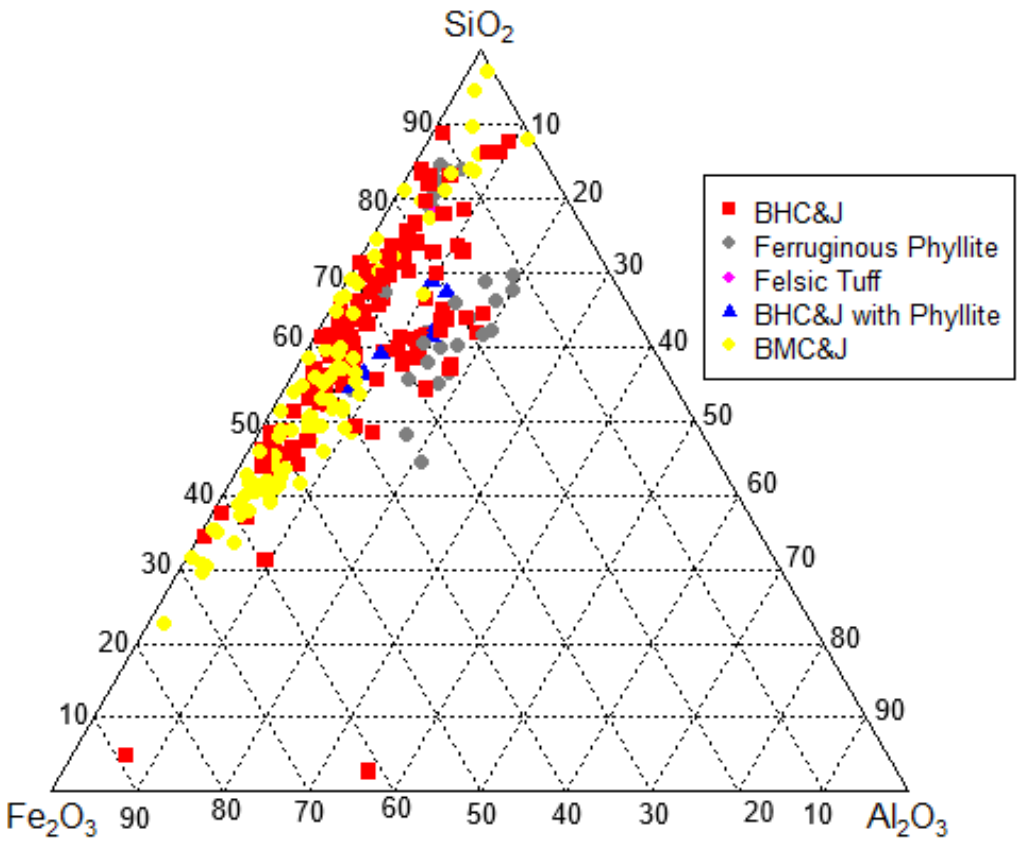


Figure-15.25: Ternary plots showing geochemical relationships among major oxides for core samples from block A1.

15.2.11 Binary plots of geochemical relationships of major oxides for core sample Block A2

The geochemical plots indicate in Figure **15.23 (a, b & c)** clear compositional differences between **BQ with Iron Matrix, Massive Iron Ore, Tuff with Phyllite, and Tuff with Hematite**. A **strong inverse relationship between Fe_2O_3 and SiO_2** is evident, with increasing Fe_2O_3 accompanied by decreasing SiO_2, reflecting progressive iron enrichment and silica dilution/replacement. **Fe_2O_3–Al_2O_3** also shows an inverse trend, particularly for Tuff with Hematite, indicating decreasing aluminosilicate contribution with increasing iron mineralization. **Al_2O_3–TiO_2 and V_2O_5–TiO_2** display positive associations, suggesting a common control by Ti-bearing aluminosilicate/accessory mineral phases; Tuff with Hematite is distinctly enriched in TiO_2 and V_2O_5. **Fe_2O_3–Cr_2O_3** shows higher Cr_2O_3 concentrations in Massive Iron Ore at intermediate Fe_2O_3, whereas Tuff with Hematite generally contains lower Cr_2O_3. **Fe_2O_3–P_2O_5** is variable, with relatively higher P_2O_5 in some Massive Iron Ore samples. **Fe_2O_3–LOI** shows increasing LOI in several Fe-rich samples, suggesting a contribution from hydrated or alteration-related phases. Overall, **Massive Iron Ore is characterized by high Fe_2O_3 and low SiO_2–Al_2O_3, whereas Tuff with Hematite is comparatively enriched in Al_2O_3, TiO_2 and V_2O_5**, reflecting a stronger silicate/accessory-mineral component.

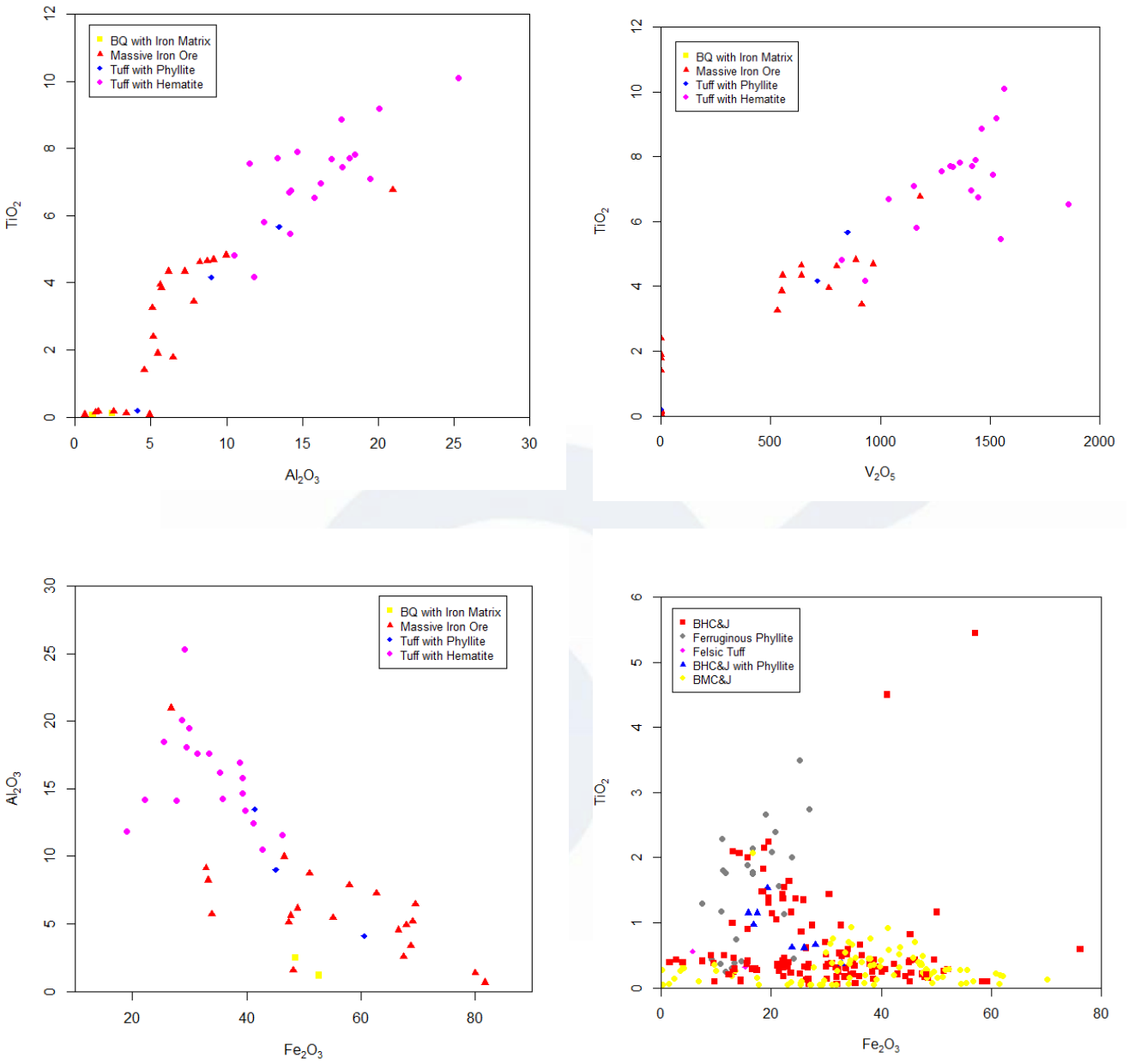


Figure-15.26a: Ternary plots of TiO_2 vs Al_2O_3, V_2O_5 & Fe_2O_3 Vs Al_2O_3, TiO_2 geochemical relationships of major oxides for core sample in block A2.

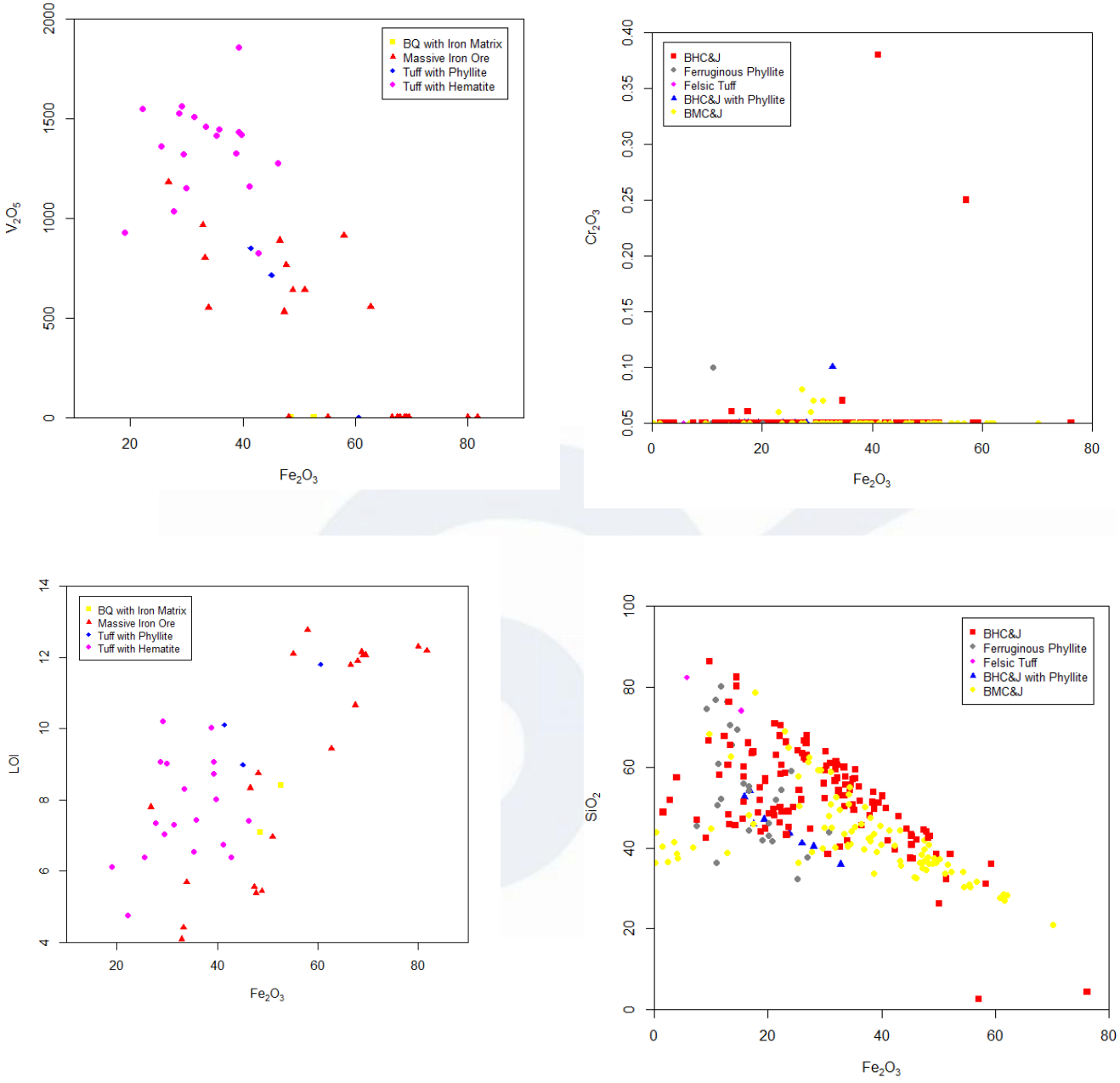


Figure-15.26b: Ternary plots of Fe_2O_3 vs V_2O_5, Cr_2O_3, SiO_2 & LIO geochemical relationships of major oxides for core sample in block A2.

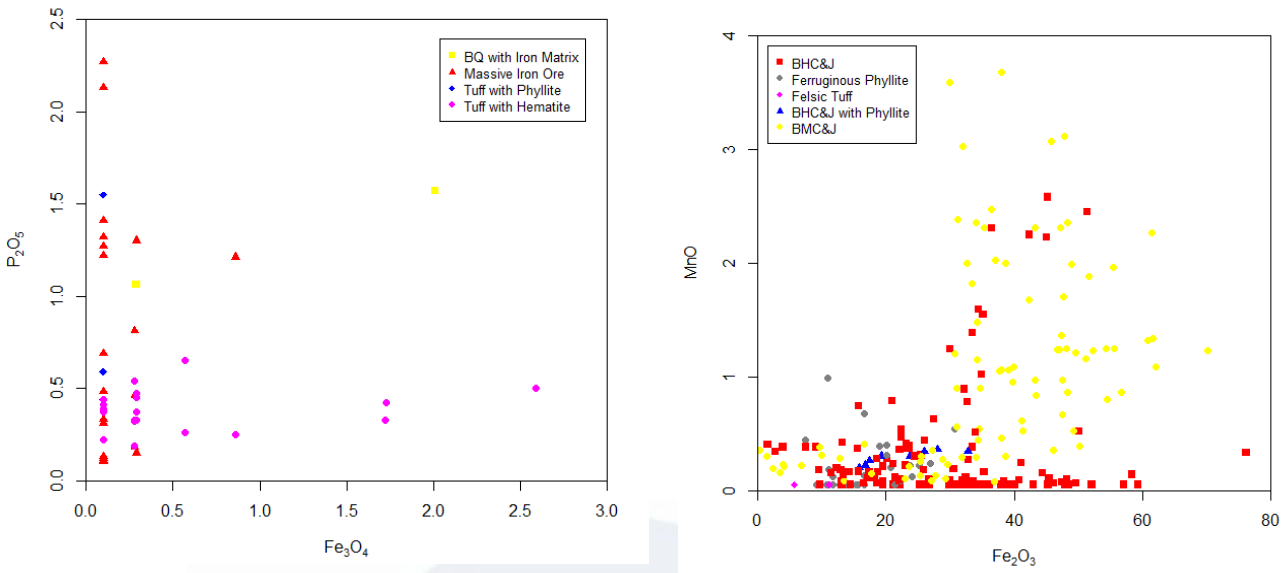


Figure-15.26c: Ternary plots of Fe_2O_3 vs P_2O_5 & Mno geochemical relationships of major oxides for core sample in block A2.

15.2.12 Ternary plots of geochemical relationships of major oxides for core sample in Block A2

The ternary diagram in Figure **15.24** demonstrates a clear **compositional differentiation between the four lithological/sample groups**. **Massive Iron Ore** samples are concentrated toward the **Fe_2O_3 apex**, indicating strong iron enrichment with relatively low SiO_2 and Al_2O_3 contents. **Tuff with Hematite** occupies a comparatively SiO_2- and Al_2O_3-richer field, reflecting a greater silicate/aluminosilicate component, while **Tuff with Phyllite** shows an intermediate composition. **BQ with Iron Matrix** occurs mainly between the Fe_2O_3- and SiO_2-dominated fields. Overall, the distribution indicates **progressive Fe_2O_3 enrichment coupled with depletion of silicate components**, providing a clear geochemical distinction between massive iron mineralization and the associated tuffaceous/phyllitic lithologies.

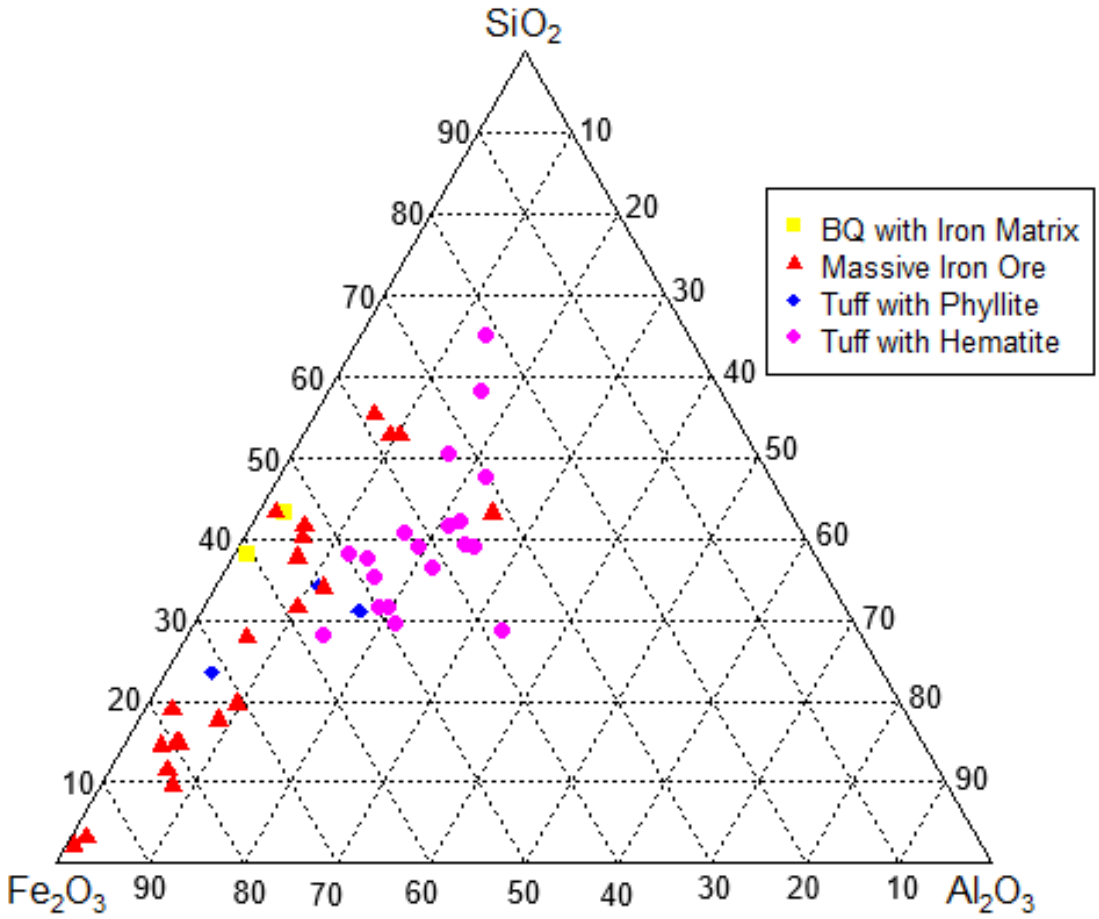


Figure-15.27: Ternary plots showing geochemical relationships among major oxides for core samples from block A2.

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.

As per the Standard Operating Procedure (SOP) of the National Mineral Exploration Trust (NMET), approximately 10% of the primary samples were selected as check samples for verification of the analytical results. Accordingly, 09 bedrock samples out of the sanctioned 90 samples, 15 channel samples out of 150 samples, and 32 core samples out of 309 samples were selected for external cross-checking, resulting in a total of 56 check samples. These samples were analyzed at SGS Laboratories, Bhubaneswar, an NABL-accredited laboratory (CIN: U74990MH1950PTC008117). The sample preparation and analytical procedures adopted during the BRS, channel and core sampling programmes are presented in Annexures II, III and IV, respectively.

Out of the **56** check samples, **02** showed in Table-15.1 comparatively higher deviation and may require consideration in relation to possible sample preparation, analytical or contamination-related factors. The remaining 54 samples analysis received from Two laboratory were considered for further interpretation.

The comparison between the primary sample results and the corresponding check sample results for Fe (%) is presented in the scatter plot above. The regression analysis shows a very good fit of coefficient of determination **(R^2)** of **0.9787.** The R^2 value indicates a very strong positive correlation between the primary and check sample Fe% results, demonstrating a high degree of agreement between the two datasets. The slope of the regression line (1.0341) is close to unity, further indicating that there is no substantial systematic bias between the primary and check analyses over the range of concentrations tested are illustrated in Figure-15.25.

The close clustering of the analytical results around the regression trend also indicates good sample preparation homogeneity and analytical repeatability. The results therefore provide satisfactory verification of the analytical performance and support the effectiveness of the QA/QC programme adopted for the iron-ore sampling and analysis.

Overall, the check sample evaluation demonstrates good analytical precision, satisfactory repeatability, and strong agreement between the primary and check sample datasets, supporting the reliability of the geochemical analytical results generated for the exploration programme.

Table-15.1: 10% of check sample include of BRS, channel & core sample.

Sample Type	Sample	Primary Sample (Fe%)	Check Sample (Fe%)	Error
BRS Sample	UPCK/BRS-1	57.03	57.03	0.00
	UPCK/BRS-9	33.66	33.36	0.30
	UPCK/BRS-14	65.88	65.62	0.26
	UPCK/BRS-26	40.36	39.56	0.80
	UPCK/BRS-33	31.00	30.48	0.52
	UPCK/BRS-54	43.18	41.93	1.25
	UPCK/BRS-59	18.23	18.16	0.07
	UPJT/BRS-71	56.37	56.12	0.25
	UPJT/BRS-85	41.23	40.45	0.78
Channel Sample	UPCK/BHC&J -1/ CH-1/A11	39.08	38.30	0.79
	UPCK/BHC&J -1/ CH-2/B3	40.40	38.95	1.45
	UPCK/BHC&J -1/ CH-3/C6	53.60	52.93	0.68
	UPCK/BHC&J -1/ CH-4/D5	44.77	43.77	1.00
	UPCK/BHC&J -1/ CH-5/E7	24.86	23.83	1.03
	UPCK/BHC&J -2/ CH-2/B10	32.24	31.28	0.96
	UPCK/BHC&J -2/ CH-3/C11	52.05	51.10	0.95
	UPCK/BHC&J -2/ CH-4/D4	40.00	38.68	1.32
	UPCK/BHC&J -2/ CH-5/E6	44.40	42.71	1.69
	UPCK/BMC&J -6/ CH-1/A4	45.97	44.53	1.44
	UPCK/BMC&J -6/ CH-2/B5	34.29	33.43	0.86
	UPJT/HOB -1/ CH-1/A6	47.24	46.54	0.71

	UPJT/HOB -1/ CH-1/A14	52.73	52.01	0.72
	UPJT/HOB -2/ CH-1/A7	53.59	53.13	0.46
	UPJT/HOB -2/ CH-1/A18	45.52	44.66	0.86
Core Sample	UPCKB-01/01	32.08	29.90	2.18
	UPCKB-01/11	34.18	35.74	-1.56
	UPCKB-01/12	37.48	40.24	-2.76
	UPCKB-01/19	42.71	40.60	2.11
	UPCKB-01/30	32.28	27.82	4.46
	UPCKB-01/52	31.28	31.11	0.17
	UPCKB-02/07	31.48	28.25	3.23
	UPCKB-02/09	22.49	21.13	1.36
	UPCKB-02/13	35.91	33.30	2.61
	UPCKB-02/21	24.39	24.17	0.22
	UPCKB-03/03	34.66	32.50	2.16
	UPCKB-03/10	39.02	37.81	1.24
	UPCKB-03/16	49.01	48.08	0.93
	UPCKB-03/19	43.33	40.84	2.49
	UPCKB-03/40	20.86	16.85	4.05
	UPCKB-03/45	30.44	25.36	5.08
	UPCKB-04/06	25.77	22.43	3.34
	UPCKB-04/08	33.58	34.34	-0.76
	UPCKB-04/27	33.73	30.34	3.39
	UPCKB-04/34	26.09	21.21	4.88
	UPCKB-05/04	39.88	2.77	**37.11**
	UPCKB-05/14	54.33	53.57	0.76
	UPCKB-05/31	33.28	31.45	1.83
	UPCKB-05/36	40.21	37.86	2.35
	UPCKB-06/04	41.48	44.51	-3.04
	UPCKB-06/09	12.79	12.52	0.27
	UPJTB-01/19	34.28	38.56	-4.28
	UPJTB-01/22	57.18	56.82	0.36
	UPJTB-01/30	38.78	49.34	**-10.56**
	UPJTB-02/08	18.69	16.72	1.97
	UPJTB-02/12	35.68	31.48	4.20
	UPJTB-02/18	22.99	22.08	0.91

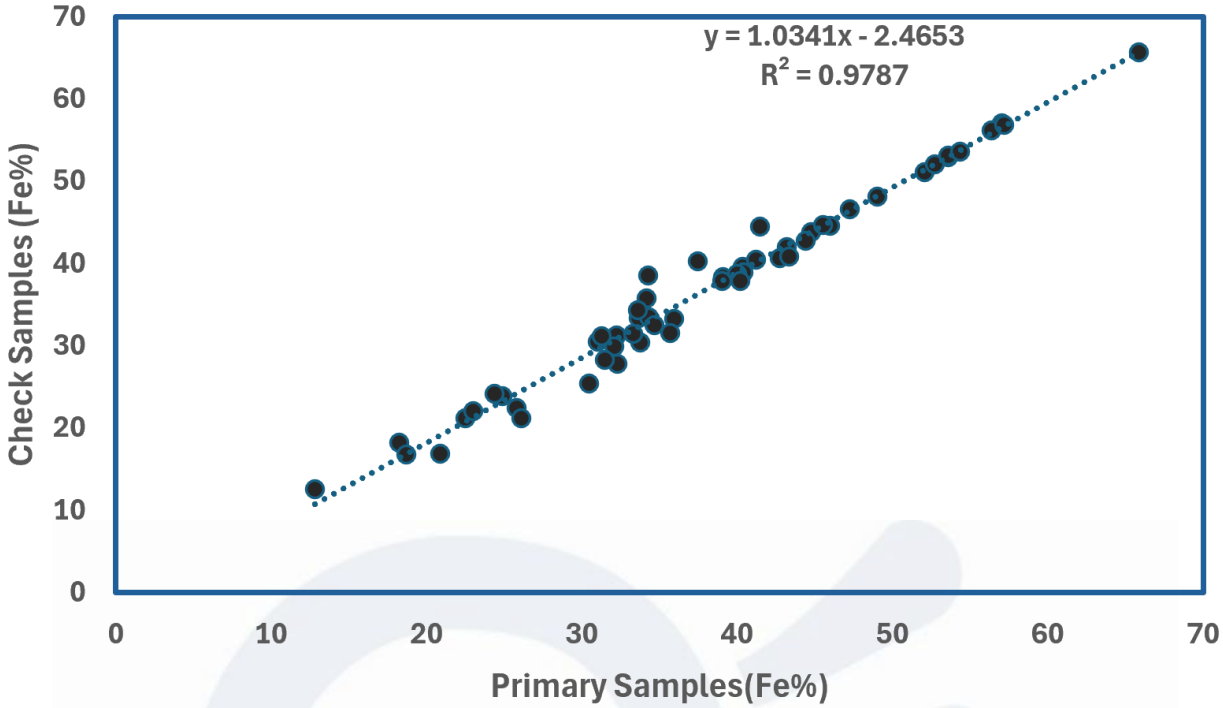


Figure-15.28: correlation between primary samples (shiva analytical laboratory, bengaluru) and check samples (sgs, bhubaneswar).

CHAPTER 16: MOISTURE

16.1 Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.

The mineralized tonnage has been estimated on an **in-situ dry-weight basis** using the interpreted mineralized volume and the applicable **bulk density values** determined for the respective mineralized zones. The tonnage calculation represents the estimated quantity of mineralized material in its geological/in-situ condition, with natural moisture not considered as an additional component of the reported mineralized tonnage.

The tonnage has been derived using the relationship **Tonnage = Volume × Bulk Density**, where the mineralized volume is determined from the geological interpretation, sectional continuity and thickness of the mineralized zones, and the corresponding bulk density is applied to convert the estimated volume into tonnage. The density values are considered representative of the respective lithological and mineralized domains.

No separate moisture correction has been applied to the reported tonnage because natural moisture content was not independently incorporated into the tonnage estimation procedure. Consequently, the reported tonnage should be regarded as a **dry in-situ tonnage**, rather than a wet or mine-delivered tonnage. Any variation in natural moisture content during mining, handling, transportation or stockpiling is therefore not reflected in the reported geological tonnage.

The distinction between **dry tonnage and wet tonnage** is important for subsequent mine planning, beneficiation and material handling studies. Where required at a later stage, representative samples from the mineralized domains may be subjected to controlled moisture determination, and the resulting moisture factors can be used to convert between wet and dry weights. Until such data are incorporated, the tonnage reported in this study is considered appropriate for **geological resource estimation and exploration-stage evaluation**.

CHAPTER 17: BULK DENSITY

17.1 Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method is used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.

Bulk density analysis of representative **iron ore and associated mineralized lithologies** was carried out at **Shiva Analytical India Pvt. Ltd., Bengaluru**, using the **water displacement method**. The procedure involved determination of the sample mass and the corresponding volume by measuring the volume of water displaced by the sample. Specific gravity was calculated from the measured mass and displaced-water volume, and bulk density was subsequently determined using the density of water (**1.0 g/cm³**) as the reference. A total of **20 representative drill-core samples are given below Table-17.1** were selected from different boreholes, depths and lithological/mineralized domains, including **BHC&J, BHC, BMC&J, BMC, BHQ with Iron Matrix and Massive Iron Ore**, to capture the variation in density associated with different iron-bearing lithologies. The measured bulk density values range from **2.38 to 3.71 g/cm³**.

The average bulk density varies according to lithology and degree of iron enrichment. Massive Iron Ore (n=3) has an average density of 3.37 g/cm³, BHC&J (n=4) averages 2.76 g/cm³, BHC (n=7) averages 2.74 g/cm³, BMC&J (n=5) averages 3.23 g/cm³, while BHQ with Iron Matrix (n=1) has a density of 2.74 g/cm³.The relatively higher density of Massive Iron Ore and BMC reflects their comparatively higher proportion of dense iron-bearing minerals, whereas the lower values in BHC and BHC&J are consistent with a greater contribution from siliceous and other gangue minerals.

The distribution of samples across multiple boreholes and lithological domains provides coverage of the principal mineralized and associated rock types encountered during exploration. The laboratory-derived density values were therefore considered appropriate for application to the corresponding geological domains. These values constitute an important input to **resource estimation**, where the interpreted mineralized volume

is converted to tonnage using the relationship **Tonnage = Volume × Bulk Density**. The use of lithology-specific density values also helps reduce potential bias associated with applying a single bulk density value to the entire mineralized zone. The results are provided on the table below.

Table-17.1: Bulk density analysis

Sl. No.	Sample ID	Rock Type	Sample Depth (m)	Method	SOP/OM/094
				Units	gm/cm3
				Lab ID	Bulk Density
1	UPCKB-04/BD/08	BMC&J	28.00	G4949-265	3.40
2	UPCKB-05/BD/14	BMC&J	52.00	G4949-271	3.32
3	UPCKB-05/BD/15	BMC&J	54.00	G4949-272	3.32
4	UPCKB-06/BD/16	BMC&J	17.00	G4949-273	3.71
5	UPCKB-03/BD/07	BMC&J	30.00	G4949-264	2.38
Avg. (n=5)					**3.23**
1	UPJTB-01/BD/18	Massive Iron Ore	16.00	G4949-275	3.50
2	UPJTB-02/BD/19	Massive Iron Ore	36.00	G4949-276	3.55
3	UPJTB-02/BD/20	Massive Iron Ore	45.00	G4949-277	3.06
Avg. (n=3)					**3.37**
1	UPCKB-01/BD/01	BHC&J	12.00	G4949-258	2.86
2	UPCKB-01/BD/04	BHC&J	94.00	G4949-261	2.49
3	UPCKB-04/BD/11	BHC&J	76.00	G4949-268	3.05
4	UPCKB-05/BD/13	BHC&J	48.00	G4949-270	2.65
Avg. (n=4)					**2.76**
1	UPCKB-01/BD/02	BHC	30.00	G4949-259	2.92
2	UPCKB-01/BD/03	BHC	84.00	G4949-260	2.63
3	UPCKB-02/BD/05	BHC	22.00	G4949-262	2.60
4	UPCKB-02/BD/06	BHC	49.00	G4949-263	3.12
5	UPCKB-04/BD/09	BHC	25.00	G4949-266	2.59
6	UPCKB-04/BD/10	BHC	48.00	G4949-267	2.56
7	UPCKB-05/BD/12	BHC	27.00	G4949-269	2.74
Avg. (n=7)					**2.73**
1	UPJTB-01/BD/17	BHQ with Iron matrix	4.00	G4949-274	2.73

CHAPTER 18: BENEFICIATION STUDIES AS MAY BE REQUIRED

18.1 Details of beneficiation studies carried out at laboratory scale of bench scale involving bulks sampling tests to understand and suggest technological factors for optimum recovery of explored mineral commodity, any additional associated mineralisation or co-products that may be available in the ore which is recoverable should also be discussed. The detailed flow sheet with yield recovery factors and to be discussed.

Beneficiation studies have not been carried out during the present stage of exploration, as they were not envisaged under the scope of the sanctioned exploration programme. The present investigation was focused on geological mapping, structural studies, systematic sampling, chemical characterization, and exploration drilling to assess nature, continuity, grade, and mineralization potential. Detailed mineralogical characterization, beneficiation response tests, and process optimization were beyond the scope of the sanctioned work. Beneficiation studies may, therefore, be undertaken at the G3 stage of subsequent exploration or during pre-feasibility/feasibility studies, based on the established resource characteristics, mineralogy, and grade distribution.

CHAPTER 19: RESOURCE ESTIMATION TECHNIQUES

19.1 Discussion on sufficient data density to assure continuity of mineralisation and synthesis adequate database for estimation procedure used.

The resource estimation is based on an integrated geological and geochemical database comprising geological mapping, bedrock and channel sampling, and analytical data from eight exploratory boreholes. The principal Fe-mineralised zones were delineated using the applicable cut-off grades for BHC&J, BMC&J, massive iron ore, and tuff with hematite mineralisation in Blocks A1 and A2. Geological cross-sections and plan interpretations were used to establish the spatial disposition, true thickness, geometry, and continuity of the mineralised zones. An influenced distance of up to 400 m on either side of the drillholes was considered for interpretation of the mineralised domains, supported by geological and analytical evidence.

The boreholes were positioned at irregular, wide spacing along the interpreted mineralised trends, with planimetric separations varying substantially between adjacent holes. The drilling density is appropriate only for reconnaissance-stage interpretation and provides preliminary control on subsurface geometry; it is insufficient by itself to demonstrate continuous mineralisation between all boreholes.

19.2 Whether previous exploration data has been used and integrated with the current exploration data for assessment of the updated resources.

No significant previous exploration data were available for the investigated block for direct integration with the present exploration results. Therefore, the assessment has been based primarily on the **current geological mapping, surface sampling, geophysical investigations, drilling, core logging, sampling and analytical data** generated during the present investigation. Available information from the

adjoining/proximally explored areas, wherever relevant, was considered for geological correlation and interpretation.

19.3 The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters, maximum distance of extrapolation from data points

Resource estimation was carried out using the cross-sectional method in conjunction with the area-of-influence approach, considered appropriate for the G4 (Reconnaissance Survey) stage given the limited and irregularly distributed drilling data. Mineralised zones were delineated based on lithological continuity, geological and structural controls, drill-hole intersections, and the applicable Fe cut-off grades for BHC&J, BMC&J, massive iron ore, and tuff-associated hematite mineralisation. The average grade of the mineralised intervals was assigned to the corresponding zones. Rock-type-specific average bulk densities were applied for tonnage estimation, namely 2.76 g/cm³ for BHC&J, 3.23 g/cm³ for BMC&J, 3.37 g/cm³ for massive iron ore, and 2.73 g/cm³ for tuff with hematite, thereby accounting for variations in lithology and mineralogical composition.

The estimation was based on eight boreholes drilled over the 18.56 km² investigation area under the approved G4-stage programme. Considering the reconnaissance nature of the drilling and the irregular borehole spacing, the resource estimates should be regarded as preliminary reconnaissance-stage estimates and should not be extrapolated beyond the interpreted geological envelopes without additional drilling control.

No statistical grade capping or top-cutting was applied owing to the limited number and spatial distribution of analytical data, which were insufficient to establish statistically robust top-cut values. Higher-grade assay values were therefore retained within their respective mineralised zones. The interpretation was constrained by lithological contacts, mineralised horizons, structural trends, and applicable cut-off grades. Where mineralised bands occurred at relatively elevated ground levels, an approximate 10–15 m vertical adjustment was considered during interpretation to avoid unsupported extrapolation from surface exposures.

Considering the wide and irregular drill spacing and the reconnaissance nature of the investigation, the resulting estimates are considered appropriate for the G4 stage and represent a preliminary assessment of the mineralisation potential. The estimates may be refined through additional infill drilling, increased sampling density, improved geological control, and database validation during subsequent exploration, particularly at the G3 (Preliminary Exploration) stage.

19.4 The basis for the classification of mineral resources into varying confidence classes.

The estimated iron ore resource has been classified as a **Reconnaissance Mineral Resource** based on the available drilling, geological interpretation, assay data and bulk-density information. Considering the **G4 reconnaissance-stage exploration** and wide drill spacing of approximately **1100 × 1,400 m**, confidence in mineralisation continuity is limited. Further infill drilling is required to increase geological confidence and support upgrading of the resource classification.

19.5 The assumptions made regarding recovery of associated mineralisation.

TiO_2 and V_2O_5 have been identified as **associated TiO_2–V_2O_5 mineralisation associated with the iron ore mineralisation**, with Channel and Core sample results indicating significant concentrations above the respective cut-off grades. The analytical results and corresponding mineralized intervals are presented in **Tables 19.1 to 19.13 and Figures 19.1 to 19.6**.

At the current **G4 (Reconnaissance Survey) stage**, no specific metallurgical recovery factors have been assumed or applied, as representative beneficiation and metallurgical test work has not yet been undertaken. Therefore, the reported quantities represent **in-situ contained oxide estimates** and not recoverable product quantities.

Based on the available data, TiO_2 is estimated at **11.66 Mt @ 2.28%** TiO_2 in block A1, & **8.01Mt @ 6.45%** (**1.50%** cut-off)in block A2. while the combined A1–A2 TiO_2 estimate is **19.67 Mt @ 3.87%** TiO_2. The current detailed intersection data indicates a maximum true thickness of 12.61 m in A2. Similarly, the combined A1–A2 V_2O_5 estimate is 12.48 Mt @ 1,019.85 ppm V_2O_5 at a **500-ppm** cut-off.

These are geological mineralisation estimates and are not equivalent to recoverable products without beneficiation and metallurgical studies.

A further mineralized zone indicates **8.01 Mt @ 5.94% TiO_2** and **8.01 Mt @ 1,089.63 ppm V_2O_5**, using the respective cut-off grades, with mineralized thickness ranging from **1.40–12.61 m**. These results demonstrate the potential significance of **TiO_2 and V_2O_5 as associated associated mineralisation**; however, **future metallurgical testing is required to establish mineral deportment, beneficiation performance, recovery factors and their potential economic contribution**.

Table-19.1: Block-wise estimation of tonnage and TiO_2 grade of ferruginous phyllite ore in block A1

Ferruginous Phyllite Ore Block A1 (≥1.50 TiO2%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICK NESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**TiO2 % (CS)**	**TiO2 METAL OXIDES (tonnes)**	**Avg. TiO2 (%)**
UPCKB-01	800	100	7.76	620800	2.73	1694784	3.50	5931744.0	**2.47**
	800	100	0.97	77600	2.73	211848	2.29	485131.9	
	800	100	0.97	77600	2.73	211848	1.56	330482.8	
	800	100	0.97	77600	2.73	211848	2.40	508435.2	
	800	100	1.94	155200	2.73	423696	2.14	906709.4	
	800	100	1.94	155200	2.73	423696	1.80	762652.8	
UPCKB-02	800	100	1.94	155200	2.73	423696	2.74	1160927.0	
	800	100	1.94	155200	2.73	423696	2.67	1131268.3	
	800	100	0.97	77600	2.73	211848	2.00	423696.0	
	800	100	2.38	190120	2.73	519028	1.88	975772.6	
UPCKB-04	800	80	3.88	248320	2.73	677914	2.09	1416840.3	
	800	80	2.91	186240	2.73	508435	1.75	889761.2	
	800	80	1.94	124160	2.73	338957	1.78	603343.4	
Total (Metric tonnes)						**6281293**		**155268**	
Total (Million tonnes)						**6.28**		**0.1553**	

The total estimated resource of Ferruginous Phyllite Ore through Cross-Section Method at 1.5 % TiO_2 is **6.28 million tonnes (MT)** with **wt. average grade of 2.47% Fe.**

Table-19.2: Block-wise estimation of tonnage and TiO_2 grade of banded hematite chert & jasper ore in block A1

Banded Hematite Chert & Jasper Ore Block A1 (≥1.50 TiO2%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**TiO2 % (CS)**	**TiO2 METAL OXIDES (tonnes)**	**Avg. TiO2 (%)**
UPCKB-02	800	100	1.94	155200	2.73	423696	1.53	6483	**1.69**
	800	100	3.88	310400	2.73	847392	1.77	14999	
Total (Metric tonnes)						**1271088**		**21481**	
Total (Million tonnes)						**1.27**		**0.0215**	

The total estimated resource of BMC&J and BHC&J Cross-Section Method at 1.5 % TiO_2 is **1.27 million tonnes (MT)** with **wt. average grade of 1.69% Fe.**

Table-19.3: Block-wise estimation of tonnage and TiO_2 grade of banded magnetite ore in block A1

Banded Magnetite Chert & Jasper Ore Block A1 (≥1.50 TiO2%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**TiO2 % (CS)**	**TiO2 METAL OXIDES (tonnes)**	**Avg. TiO2 (%)**
UPCKB-03	800	110	11.64	1024320	3.23	3308554	1.77	58561	**2.16**
	800	110	0.97	85360	3.23	275713	4.5	12407	
	800	110	0.97	85360	3.23	275713	1.54	4246	
UPCKB-05	800	100	0.97	77600	3.23	250648	5.45	13660	
Total (Metric tonnes)						**4110627**		**88875**	
Total (Million tonnes)						**4.11**		**0.0889**	

The total estimated resource of Block A1 through Cross-Section Method at 1.5 % TiO_2 is **11.66 million tonnes (MT)** with **wt. average grade of 2.28%** TiO_2

Table-19.4: Total resource estimation of tonnage and TiO_2 grade in block A1

Resource Estimation Block A1 (≥1.50 TiO2%)			
Lithology	**Tonnage (mT)**	**TiO2 Metal Oxides (Tonnes)**	**Avg. TiO2 (%)**
Ferruginous Phyllite	6281293	155268	**2.47**
Banded Hematite Chert & Jasper	1271088	21481	1.69
Banded Magnetite Chert & Jasper	4110627	88875	2.16
Total (mT)	**11663008**	**265624**	
Total (MT)	**11.66**	**0.27**	**2.28**

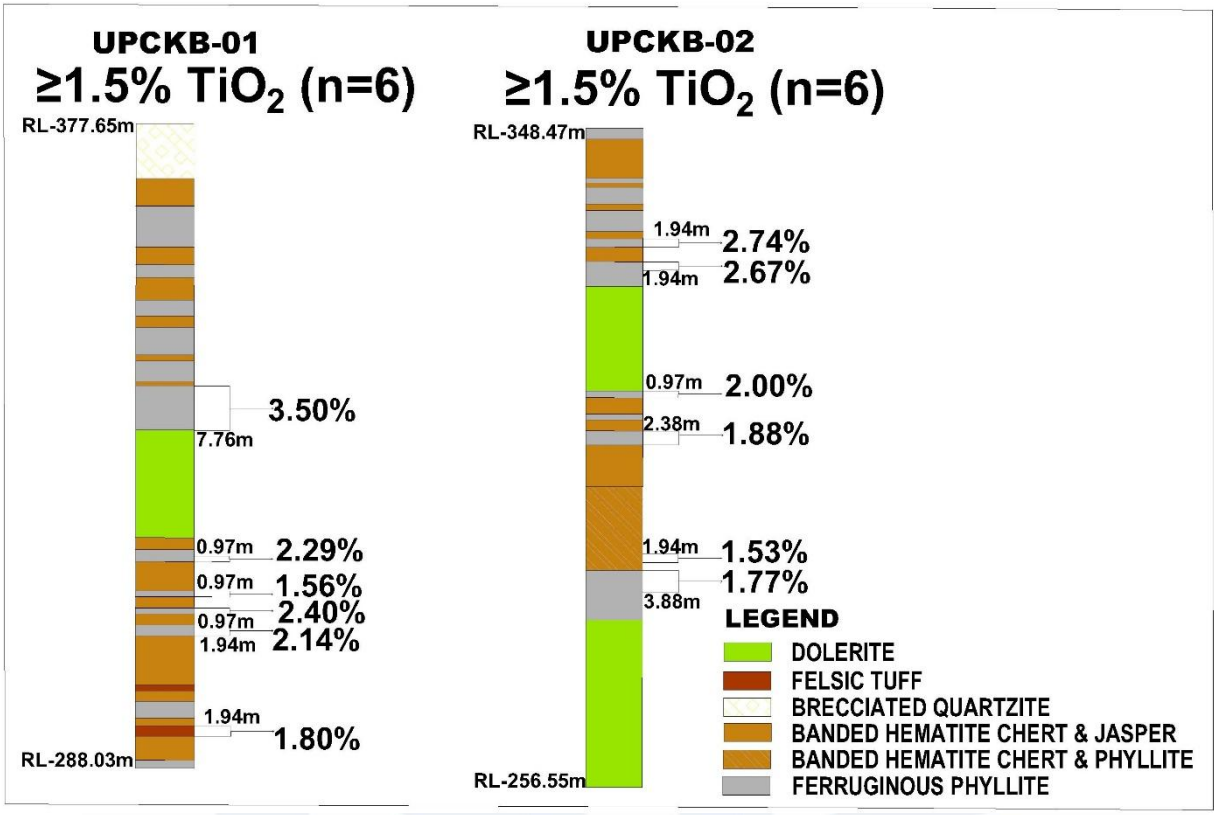
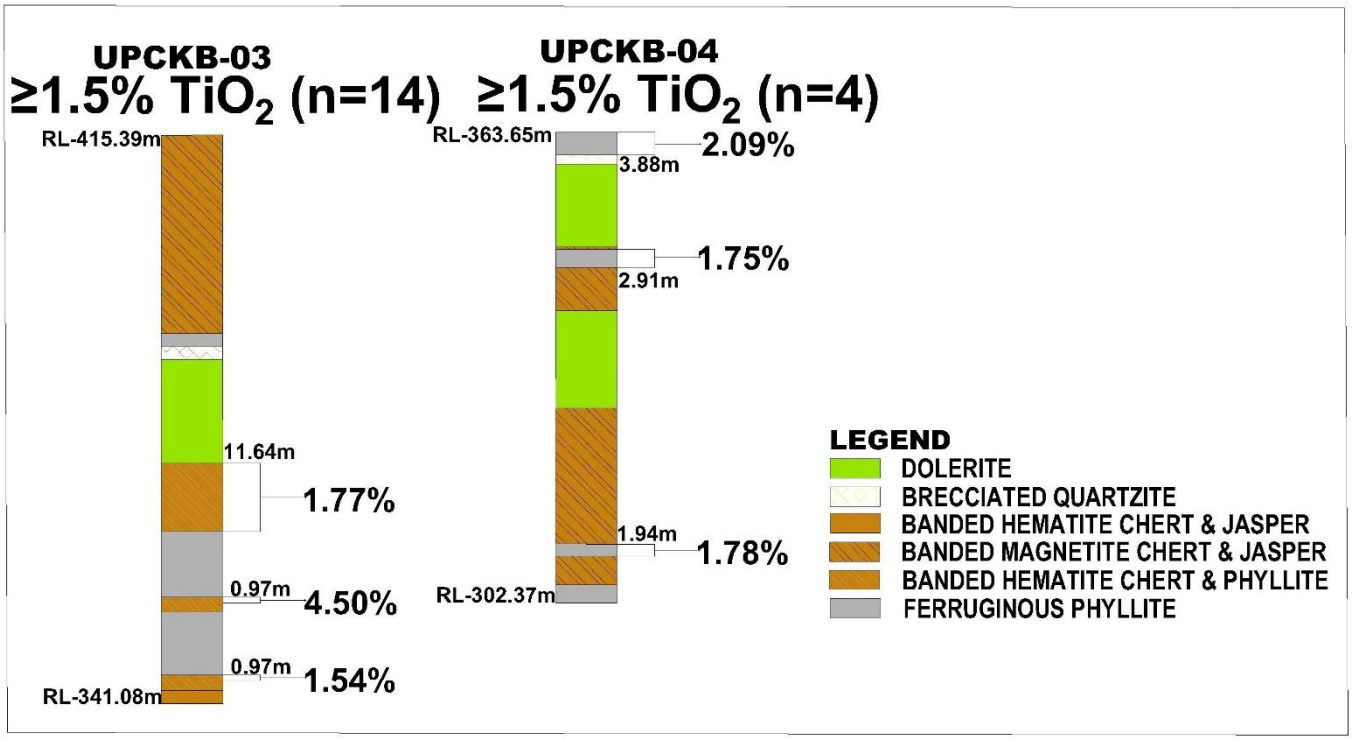


Figure -19.1: Distribution of TiO_2 mineralization (≥1.5% TiO_2) in boreholes UPCKB-01 and UPCKB-02



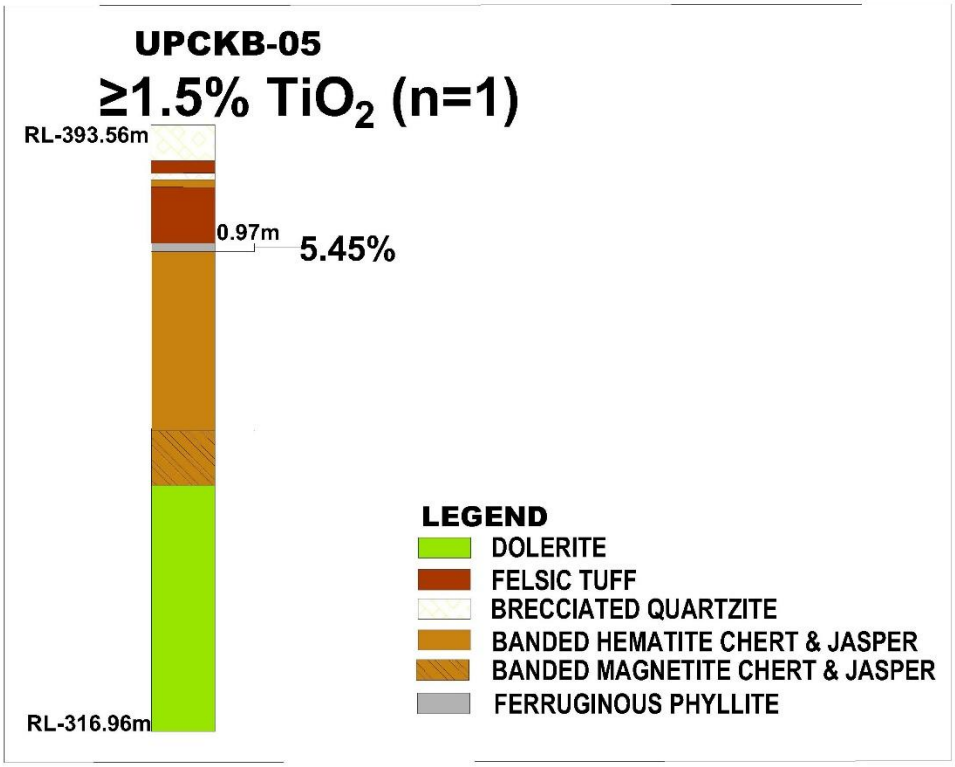


Figure -19.2: Distribution of TiO_2 mineralization (≥1.5% TiO_2) in boreholes UPCKB-03, UPCKB-04 and UPCKB-05.

The total estimated resource of Tuff with Phyllite Ore through Cross-Section Method at 1.5% TiO_2 is **2.44 million tonnes (MT)** with **wt. average grade of 4.29 %** TiO_2. And Massive Iron Ore through Cross Section method at 1.5% TiO_2 is **1.48 million tonnes (MT)** with **wt. average grade of 4.78 %** TiO_2 & Further, Tuff with Hematite Iron Ore through Cross Section method at 1.5% TiO_2 is **4.09 million tonnes (MT)** with **wt. average grade of 7.34 %** TiO_2.

Table-19.5: Block-wise estimation of tonnage and TiO_2 grade of tuff with phyllite in block A2

Tuff with Phyllite Ore Block A2 (≥1.5% TiO2)									
BH-ID	LENGTH (M)	PLAN WIDTH (M)	THICKNESS (M)	VOLUME (M3)	BULK DENSITY (t/m3)	TONNAGE (t)	TiO2 % (CS)	TiO2 METAL OXIDES (tonnes)	Avg. TiO2 (%)
UPJTB-01	800	50	9.70	388000	2.73	1059240	4.92	52115	4.29
	800	50	12.61	504400	2.73	1377012	3.80	52326	
Total (Metric tonnes)						**2436252**		**104441**	
Total (Million tonnes)						**2.44**		**0.104**	

Table-19.6: Block-wise estimation of tonnage and TiO_2 grade of massive iron ore in block A2

Massive Iron Ore Block A2 (≥1.5% TiO2)									
BH-ID	LENGTH (M)	PLAN WIDTH (M)	THICKNESS (M)	VOLUME (M3)	BULK DENSITY (t/m3)	TONNAGE (t)	TiO2 % (CS)	TiO2 METAL OXIDES (tonnes)	Avg. TiO2 (%)
UPJTB-02	600	80	7.76	372480	3.37	1255258	4.80	60252	4.78
	600	80	1.40	67046	3.37	225946	4.64	10484	
Total (Metric tonnes)						**1481204**		**70736**	
Total (Million tonnes)						**1.48**		**0.0707**	

Table-19.7: Block-wise estimation of tonnage and TiO_2 grade of tuff with hematite ore in block A2

Tuff with Hematite Ore Block A2 (≥1.5% TiO2)									
BH-ID	LENGTH (M)	PLAN WIDTH (M)	THICKNESS (M)	VOLUME (M3)	BULK DENSITY (t/m3)	TONNAGE (t)	TiO2 % (CS)	TiO2 METAL OXIDES (tonnes)	Avg. TiO2 (%)
UPJTB-02	600	80	7.76	372480	2.73	1016870	7.30	74232	7.34
	600	80	2.91	139680	2.73	381326	7.86	29972	
	600	80	3.88	186240	2.73	508435	8.29	42149	
	600	80	6.50	311952	2.73	851629	7.62	64894	
	600	80	3.88	186240	2.73	508435	6.74	34269	
	600	80	1.46	69840	2.73	190663	9.19	17522	
	600	80	4.85	232800	2.73	635544	5.87	37306	
Total (Metric tonnes)						**4092903**		**300344**	
Total (Million tonnes)						**4.09**		**0.3**	

Table-19.8: Total resource estimation of tonnage and TiO_2 grade in block A2

Resource Estimation Block A2 (≥1.5% TiO2)			
Lithology	Tonnage (mT)	TiO2 Metal Oxides (Tonnes)	Avg. TiO2 (%)
Massive Iron Ore	1481204	70736	5.94
Tuff with Phyllite	2436252	104441	
Tuff with Hematite	4092903	300344	
Total (mT)	**8010359**	**475521**	
Total (MT)	**8.01**	**0.48**	**5.94**

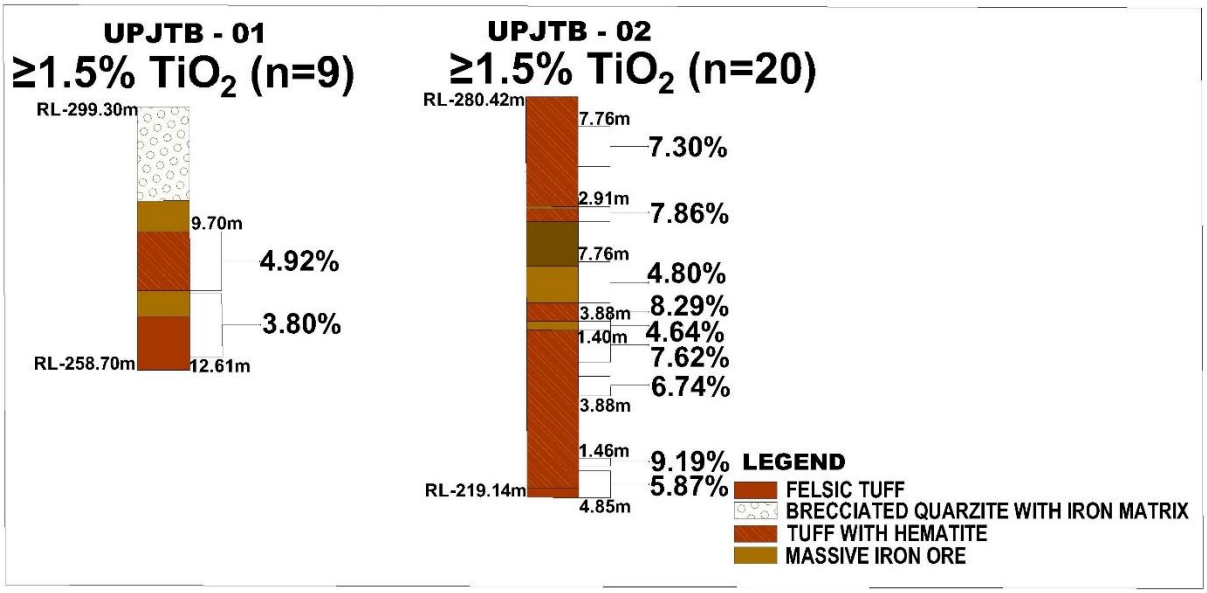


Figure -19.3: Distribution of TiO_2 mineralization (≥1.5% TiO_2) in boreholes UPJTB-01, and UPJTB-02.

The total estimated resource of Ferruginous Phyllite Ore through Cross-Section Method at 500ppm V_2O_5 **is 3.94 million tonnes (MT)** with **wt. average grade of** 807.4 ppm V_2O_5.

Table-19.9: Block- wise estimation of tonnage and V_2O_5 grade of ferruginous phyllite ore in block A1

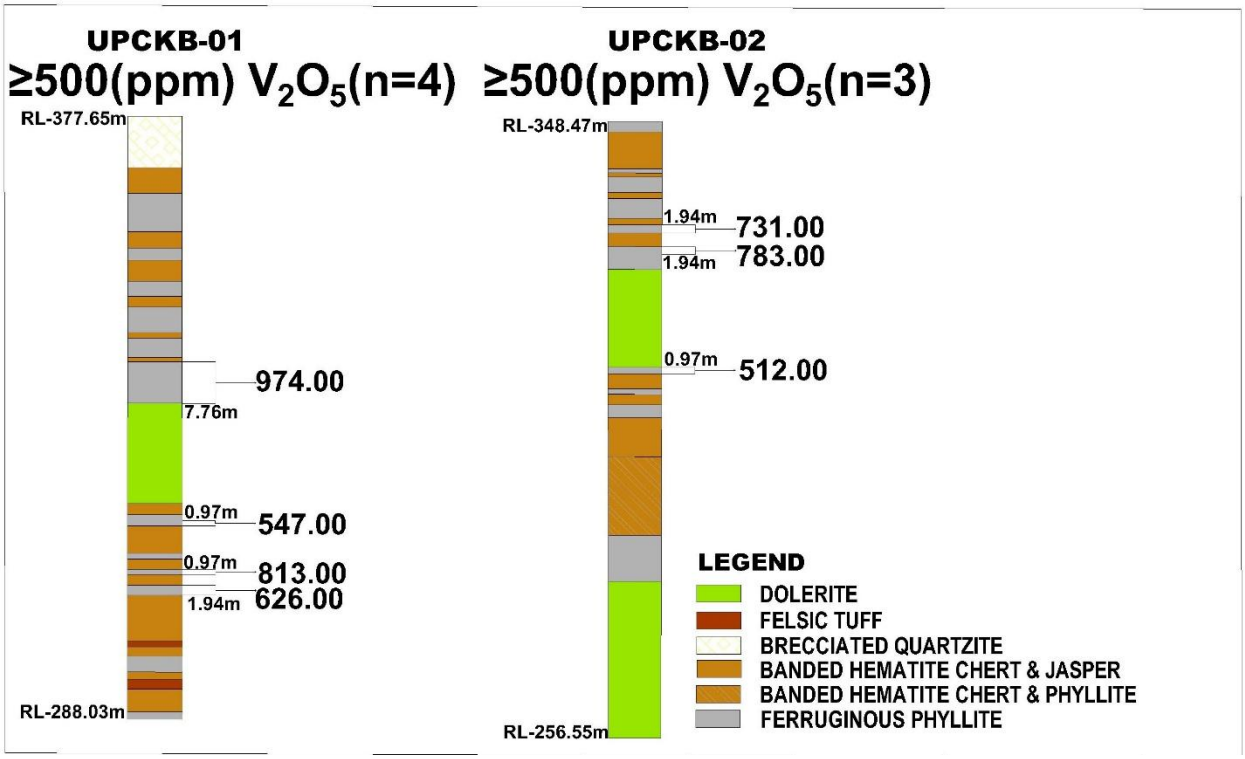
Ferruginous Phyllite Ore Block A1 (≥500 (ppm) V2O5)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**V2O5 ppm (CS)**	**V2O5 METAL OXIDES (tonnes)**	**Avg. V2O5 (ppm)**
UPCKB-01	800	100	7.76	620800	2.73	1694784	974	1651	**807.40**
	800	100	0.97	77600	2.73	211848	547	116	
	800	100	0.97	77600	2.73	211848	813	172	
	800	100	1.94	155200	2.73	423696	626	265	
UPCKB-02	800	100	1.94	155200	2.73	423696	731	310	
	800	100	1.94	155200	2.73	423696	783	332	
	800	100	0.97	77600	2.73	211848	512	108	
UPCKB-04	800	80	1.94	124160	2.73	338957	671	227	
Total (Metric tonnes)						**3940373**		**3181**	
Total (Million tonnes)						**3.94**		**0.003**	

Table-19.10: Block-wise estimation of tonnage and V_2O_5 grade of banded magnetite chert & jasper ore in block A1

Banded Magnetite Chert & Jasper Ore Block A1 (≥500 (ppm) V2O5)									
BH-ID	LENGTH (M)	PLAN WIDTH (M)	THICKNESS (M)	VOLUME (M3)	BULK DENSITY (t/m3)	TONNAGE (t)	V2O5 ppm (CS)	V2O5 METAL OXIDES (tonnes)	Avg. V2O5 (ppm)
UPCKB-03	800	110	0.97	85360	3.23	275713	856	236	1548.38
UPCKB-05	800	100	0.97	77600	3.23	250648	2310	579	
Total (Metric tonnes)						**526361**		**815**	
Total (Million tonnes)						**0.53**		**0.001**	

Table-19.11: Total resource estimation of tonnage and V_2O_5 grade in block A1

Resource Estimation Block A1 (≥500 ppm V2O5)			
Lithology	Tonnage (mT)	V2O5 Metal Oxides (Tonnes)	Avg. V2O5 (ppm)
Ferruginous Phyllite	3940373	3181	807.40
Banded Magnetite Chert & Jasper	526361	815	
Total (mT)	**4466734**	**3996**	
Total (mT)	**4.47**	**0.004**	**894.72**



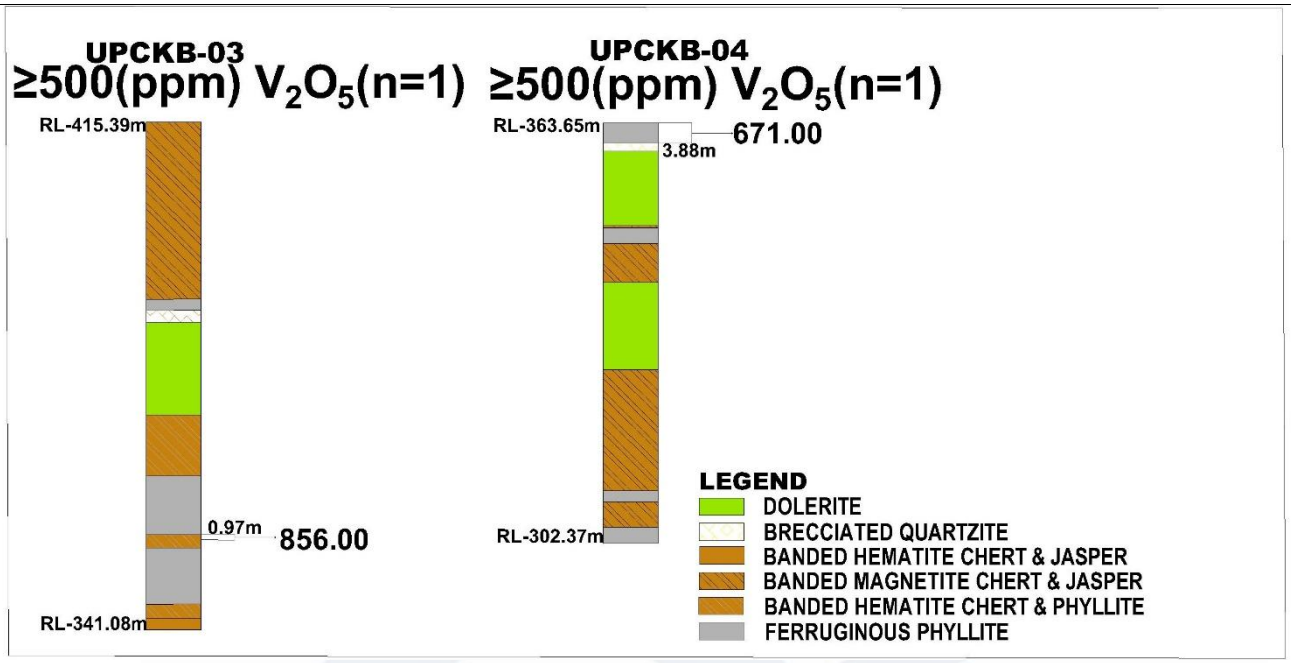


Figure -19.4: Distribution of TiO_2 mineralization (≥500ppm V2O5) in boreholes UPCKB-01,02,03 and UPCKB-04.

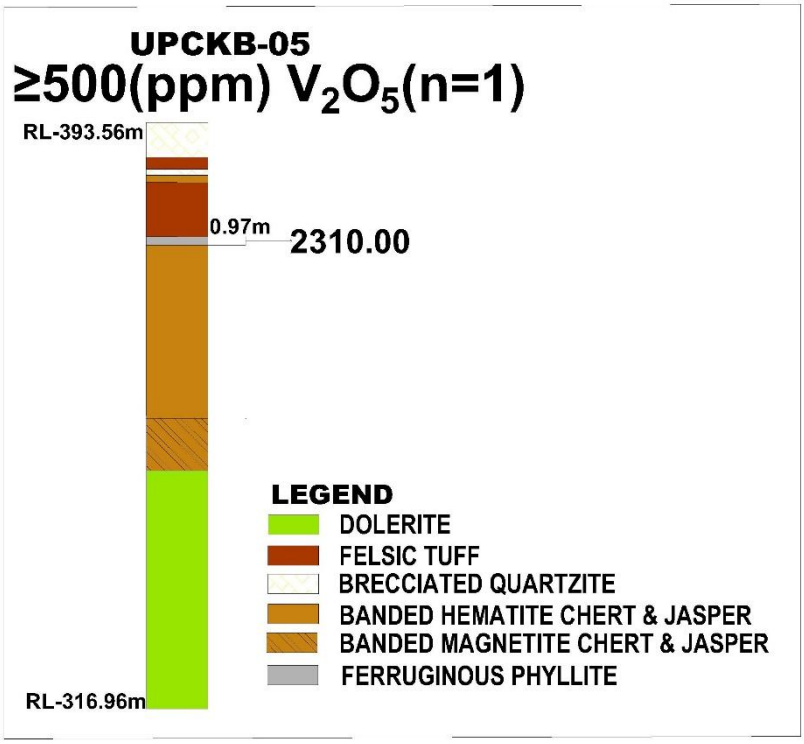


Figure -19.5: Distribution of TiO_2 mineralization (≥500ppm V2O5) in boreholes UPCKB-05

Table-19.12: Block-wise estimation of tonnage and V_2O_5 grade of tuff with phyllite ore in block A1

Tuff with Phyllite Ore Block A2 (≥500 (ppm) V2O5)									
BH-ID	LENGTH (M)	PLAN WIDTH (M)	THICKNESS (M)	VOLUME (M3)	BULK DENSITY (t/m3)	TONNAGE (t)	V2O5 ppm (CS)	V2O5 METAL OXIDES (tonnes)	Avg. V2O5 (ppm)
UPJTB-01	800	50	9.70	388000	2.73	1059240	782.50	829	**833.61**
	800	50	12.61	504400	2.73	1377012	872.92	1202	
Total (Metric tonnes)						**2436252**		**2031**	
Total (Million tonnes)						**2.44**		**0.002**	

Table-19.13: Block-wise estimation of tonnage and V_2O_5 grade of tuff with hematite ore in block A1

Tuff with Hematite Ore Block A2 (≥500 (ppm) V2O5)									
BH-ID	LENGTH (M)	PLAN WIDTH (M)	THICKNESS (M)	VOLUME (M3)	BULK DENSITY (t/m3)	TONNAGE (t)	V2O5 ppm (CS)	V2O5 METAL OXIDES (tonnes)	Avg. V2O5 (ppm)
UPJTB-02	600	80	7.76	372480	2.73	1016870	1442.5	1467	**1344.99**
	600	80	2.91	139680	2.73	381326	1252.5	478	
	600	80	3.88	186240	2.73	508435	1440.0	732	
	600	80	6.50	311952	2.73	851629	1362.5	1160	
	600	80	3.88	186240	2.73	508435	1445.0	735	
	600	80	1.46	69840	2.73	190663	1529.0	292	
	600	80	4.85	232800	2.73	635544	1009.8	642	
Total (Metric tonnes)						**4092903**		**5505**	
Total (Million tonnes)						**4.09**		**0.006**	

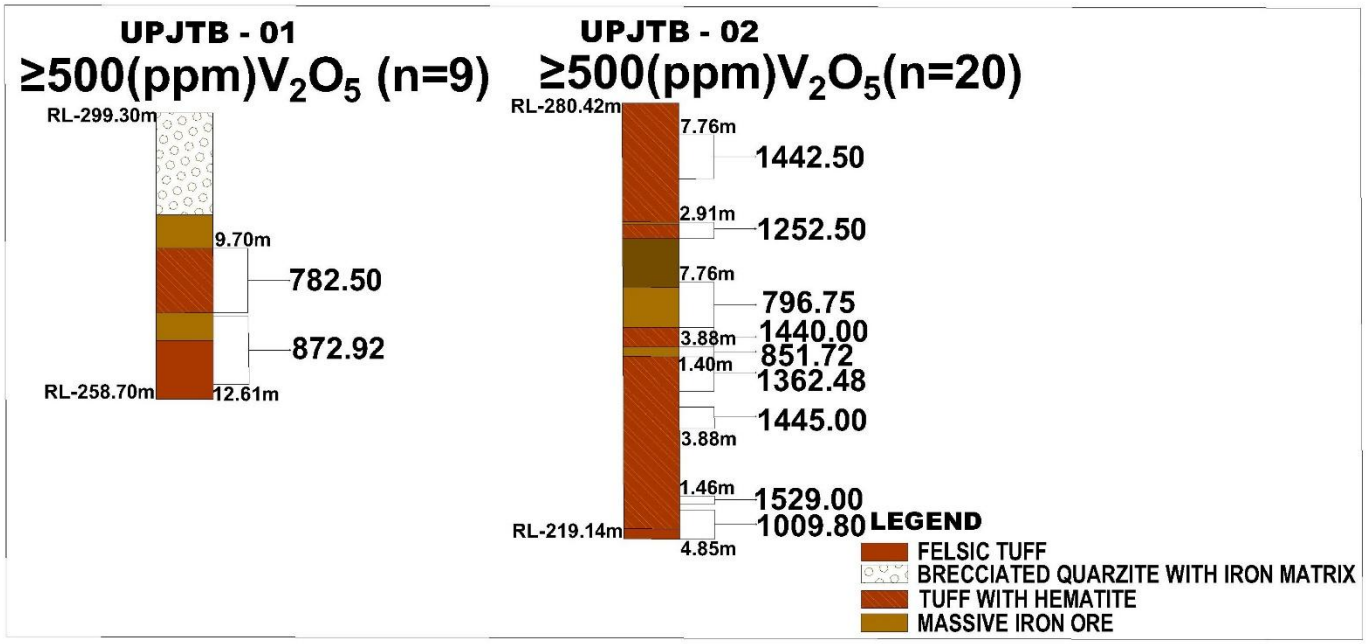


Figure -19.6: Distribution of TiO_2 mineralization (≥500ppm V2O5) in boreholes UPJTB-01, and UPJTB-02.

19.6 Detailed description of the method used, and the assumptions made to estimate tonnages and grades (section, polygon, inverse distance, geostatistical, or other method).

The resource estimation of the study area was carried out to evaluate the quantity and grade of Iron ore mineralization encountered in the drilled boreholes. The estimation is based on the geological and geochemical data obtained from eight boreholes drilled within the study area. Core samples collected at regular depth intervals were analyzed for Iron ore using XRF methods.

Based on Fe% values, mineralized zones were delineated using cut-off grades of 30% and 35% for BHC and BHC&J, and 15%, 30% and 35% for BMC and BMC&J. Bulk density values obtained from laboratory measurements were used for ore tonnage estimation. Resource estimation was carried out by integrating the thickness of the mineralized zones, average grade, and bulk density to compute the total ore tonnage and containing iron in the study area. The results of the estimation provide insights into the distribution and grade variation of iron ore mineralization, as well as its potential economic significance.

The cross-sectional method was adopted for the estimation of iron ore resources. In this approach, the area of influence of each borehole was considered as a rectangular block measuring 800 m × 800 m, extending vertically to the depth of iron ore intersection obtained from drilling. The average bulk density

values used for tonnage estimation were derived from laboratory measurements: Massive Iron Ore (n = 3) recorded an average of 3.37 g/cm³, BHC&J (n = 4) 2.76 g/cm³, BHC (n = 7) 2.74 g/cm³, and BMC (n = 5) 3.23 g/cm³. These values were applied for the calculation of ore tonnage. The average iron ore grades were determined from laboratory geochemical analyses and expressed in percentage (%).

The following parameters and formulae were used for the estimation:

- Volume (m³) = Length × Plan Width × Thickness
- Ore Tonnage (t) = Volume × Bulk Density
- Iron ore Grade (%) = Average Fe content determined from geochemical analysis
- Contained Iron ore (t) = Ore Tonnage × Fe Grade (%) / 100

The Cross -section on inclined plane (50°).

19.7 Description of how geological interpretation was used to control the resource estimates.

The geological interpretation was used to define the geometry, continuity and extent of the Fe-mineralized zones based on lithological logging, drilling intersections, assay results and cross-sectional interpretation. The drilling data provided a clear basis for delineating the mineralized horizons and estimating their collar RL, bottom RL, plan width and true thickness with reference to the datum line. Cross-sections were used to interpret the strike continuity and establish the area of influence of individual boreholes. The plan width and true thickness of the mineralized zones was considered during interpretation to obtain a more representative estimate of the mineralized volume. The principal mineralized lithologies, including BHC&J, BMC&J, Massive Iron Ore and Tuff with Hematite, were correlated between boreholes using the applicable Fe cut-off grades. The interpreted mineralized volume was subsequently converted to tonnage using the determine avg. bulk density received from lithology, while average Fe % grades were assigned from laboratory analytical results. Considering the G-4 exploration stage and wide drill spacing, the interpretation was restricted to the influence of boreholes max. 400m either side of the boreholes areas reasonably supported by available drilling data, with limited extrapolation beyond established geological control.

19.8 Discussion of basis for using or not using grade cutting or capping. If any computer software was used for estimation of resources, then name of the software with the version and method chosen, description of programmers and parameters used.

Mineral resource estimation was carried out using the **cross-sectional method**, based on interpreted geological sections, borehole data, assay results, mineralised thickness, grade distribution and geological continuity. **No specialised resource-modelling software, automated geostatistical estimation package or computer-based interpolation method was used**; the estimates were derived from the interpreted geological sections and drill-hole data.

Grade cutting or capping was not applied to the assay data, as the available grade distribution did not warrant top cutting. Instead, separate **Fe cut-off grades** were applied to assess the mineralised inventory at different grade thresholds. The selected cut-offs were considered with respect to the geological characteristics, grade distribution and continuity of the mineralisation, as well as the applicable IBM guidelines.

In **Block A1**, the **BHC&J bands** were evaluated at **≥30% Fe and ≥35% Fe**, with a **280 m RL datum** adopted as the relevant geological and estimation constraint. The **BMC&J bands** were evaluated at the IBM-recommended **≥15% Fe cut-off**, with additional estimates at **≥30% Fe and ≥35% Fe** to assess the distribution and tonnage of higher-grade mineralisation.

In **Block A2**, comprising **Massive Iron Ore and Tuff with Hematite**, the mineralised zones were evaluated at **≥30% Fe and ≥35% Fe**, with a **220 m RL datum** adopted as the relevant geological and estimation constraint.

The **true thickness** of the mineralised intervals was determined from the borehole intersections by considering the borehole orientation, core geometry and interpreted dip of the mineralised bands. As the bands are steeply dipping at approximately **75°**, their interpreted dip and the inclination of the boreholes were considered while converting the intersected plan width to the corresponding true thickness.

19.9 Geostatistical methods are extremely varied and should be described in detail. The method chosen should be justified. The geostatistical parameters, including the variogram, and their compatibility with the geological interpretation should be discussed. Experience gained in applying geo-statistics to similar deposits should be taken into account.

The available dataset comprises **G4-stage reconnaissance drilling with limited and irregularly distributed boreholes**, which is insufficient to establish reliable spatial statistics. Therefore, **no geostatistical estimation, variogram modelling or kriging interpolation** was undertaken.

Resource estimation was carried out using the **geological cross-sectional method with an area-of-influence approach**, considered appropriate for the **steeply dipping, stratabound iron-ore bands** and their interpreted geological continuity.

The estimation considered the **interpreted mineralised zones, section spacing of up to 800 m, plan width, true thickness, grade distribution and geological continuity**. The approximately **75° dip** was considered for determining true thickness, while the upper **10–15 m weathered/structurally disturbed zones** were excluded where identified.

Due to the limited data density, **variogram, anisotropy, nugget, range, search neighbourhood and kriging parameters** were not established or applied. The estimates were reviewed for consistency with the **geological interpretation, mineralisation geometry, grade distribution, thickness and continuity**, consistent with the reconnaissance objectives of G4-stage exploration.

19.10 Data verification or validation procedures used, including peer review report.

Response to Peer Reviewer's Comments		
Agency: GeoExore Pvt. Ltd., Bengaluru | Reviewer: L.L. Vishwakarma, ADG, Rte, GSI		
Sl. No.	**Comments / Suggestions of the Peer Reviewer**	**Response / Action Taken by GeoExore Pvt. Ltd.**

1	This report follows the format prescribed by NMEDT for the submission of G-4 exploration reports.	Acknowledged with thanks. The report has been prepared in accordance with the format prescribed by NMEDT for submission of G-4 exploration reports.
2	The suggestions provided in the page margins of the report may kindly be addressed.	The suggestions in the page margins have been addressed in the revised report, with necessary modifications and improvements in data synthesis and organisation.
3	A large-scale geological map and geological section at a scale of 1:12,500 may kindly be attached. The identification and numbering of ore bodies are either absent from, or not clearly visible on the detailed geological map. The dimensions (L × W) and, where possible, the exposed thickness should be presented in tabular form. The same ore-body numbering should be used consistently for bedrock sampling, channel sampling, petrology and petrography, drilling, and ore-reserve calculation in the successive chapters of this report to facilitate correlation and evaluation of ore bodies. All boreholes, trenches, BRS locations, and analytical data should be plotted on a 1:12,500-scale map for better understanding.	The suggestions have been addressed in the revised report. The dimensions (L × W) and exposed thickness of the ore bodies were already presented in tabular form in the Executive Summary. Additionally, the 1:12,500-scale geological maps and sections have been updated, with consistent ore-body numbering and plotting of boreholes, trenches, BRS locations and relevant analytical data to facilitate correlation and evaluation and also will be attached with the report in physical form.
4	A holistic description of individual ore bodies/geological units should be provided, covering their physical occurrence; the nature and variation of strike length and thickness; composition and grade of metamorphism; and the effects of later tectonic and diastrophic events. This would be preferable to describing individual samples, which is difficult to correlate when reviewing this voluminous report.	The suggestion has been addressed in the revised report. The individual ore bodies and geological units have been described comprehensively under Block A1 and Block A2 separately, covering their occurrence, continuity, strike and thickness variations, lithological characteristics, metamorphism, and subsequent tectonic effects, thereby improving their correlation and overall understanding.
5	Appreciable work has been undertaken on petrographic studies and geochemical interpretation, which are generally carried out at the G-3 and G-2 stages of exploration.	Acknowledged with thanks. The petrographic and geochemical studies have enhanced the understanding of ore characteristics and provide useful inputs for resource estimation, also the preliminary mineral beneficiation, mineral processing parameters and subsequent G-3 and G-2 exploration, particularly for BHC&J and BMC&J.
6	Drilling: Site selection and borehole planning are satisfactory; however, no drilled borehole sections have been included in this chapter. Similarly, the chapter does not provide detailed borehole lithologs. After calculating the true thickness of drilled litho-unit's/ore bodies, the mineralised zones should be identified and demarcated by Fe percentage as part of this chapter.	Acknowledged with thanks. These details, previously included in the Resource Estimation chapter, have now been appropriately incorporated here as suggested. The suggestion has been addressed in the revised report by incorporating drilled borehole sections, detailed lithologs, true thickness calculations, and Fe-based demarcation of mineralised zones in the Drilling chapter.
7	Resource estimation: The authors' attempt to estimate grade-wise resources is appreciable. However, for better visualisation, a 1:12,500-scale sheet should show all boreholes, correlated ore zones, and resource calculations. A separate sheet should be used for Block A2 and ores such as TiO_2 and V_2O_5. As borehole spacing is irregular and too wide, all resources will fall under the inferred category only.	Acknowledged with thanks. The suggestions have been addressed in the revised report. The 1:12,500-scale resource estimation sheets have been updated to show the boreholes, correlated ore zones, and resource calculation details, with separate representation for Block A2 and TiO_2–V_2O_5 mineralisation. Considering the irregular and wide borehole spacing, all estimated resources have been retained under the Inferred category.
	Overall, the quality of the report is very good, and it incorporates sufficient field and laboratory data. However, some data synthesis and organisation are required, as suggested in the report margins. This will help avoid repetition in the text.	Acknowledged with thanks. The suggestions have been addressed through improved data synthesis and organisation, with repetitive descriptions reduced to enhance clarity and overall presentation of the report.

CHAPTER 20: REPORTING OF RESOURCES

20.1 Resource estimation

The resource estimation of the study area was carried out to evaluate the quantity and grade of Iron ore mineralization encountered in the drilled boreholes. The estimation is based on the geological and geochemical data obtained from eight boreholes drilled within the study area. Core samples collected at regular depth intervals were analyzed for Iron ore using XRF methods.

A total of **700.10 m** of drilling was carried out during FS: 2024-25 through eight boreholes with an objective assessing the mineral potential and geological continuity of the iron-bearing zones in the area. The borehole was drilled at the spacing of **1100m to 1400m** in general and inclination angle was taken **50°** due to steep dipping of borehole location point and for proper suitable location for drilling rig. The subsurface iron ore mineralization in the area was targeted at **30m vertical depth (1st Level) from 280m datum line.** The mineralized zones have been demarcated based on the analytical data with **Fe cut off ≥ 30% and ≥ 35%.** The iron ore zones have been established in all eight boreholes namely **UPCKB-01 to UPCKB-06** in Block A1 and **UPJTB-01 & UPJTB-02**. The wt. avg. grade of mineralization in drilled boreholes at **30% Fe and 35% Fe is 36.31% and 40.69%** respectively. Resources have been estimated for the strike length of 800m each.

Based on Fe% values, mineralized zones were delineated using cut-off grades of **30% and 35% for BHC&J, and 15%, 30% and 35% for BMC&J**. Bulk density values obtained from laboratory measurements were used for ore tonnage estimation. Resource estimation was carried out by integrating the thickness of the mineralized zones, average grade, and bulk density to compute the total ore tonnage and containing iron in the study area. The results of the estimation provide insights into the distribution and grade variation of iron ore mineralization, as well as its potential economic significance.

The cross-section method was adopted for the estimation of iron ore resources. In this approach, the area of influence of **each borehole was considered 800 m**, extending vertically to the depth of iron ore intersection obtained from drilling. The average bulk density values used for tonnage estimation were derived from laboratory measurements: **Massive Iron Ore (n = 3) recorded an average of 3.37 g/cm³, BHC&J (n = 4) 2.76 g/cm³, BHC (n = 7) 2.74 g/cm³, and BMC&J (n = 5) 3.23 g/cm³.** These values

were applied for the calculation of ore tonnage. The average iron ore grades were determined from laboratory geochemical analyses and expressed in percentage (%).

The following parameters and formulae were used for the estimation:

- Volume (m^3) = Length × Plan Width × Thickness
- Ore Tonnage (t) = Volume × Bulk Density
- Iron ore Grade (%) = Average Fe content determined from geochemical analysis
- Contained Iron (t) = Ore Tonnage × Fe Grade (%) / 100

The Cross-section on inclined plane (50°).

20.2 Resource estimation by cross sectional method (taking true thickness)

In this method, the volume of the mineralized zone has been calculated by multiplying the true thickness of the mineralized zones with its strike influence and dip influence. The total resource has been calculated at two cut-offs i.e., **at ≥30% and ≥35% Fe for BHC&J** and for **BMC&J** the total resource has been calculated at three cut-offs i.e., **at ≥15%, ≥30% and ≥35% Fe**. The total resource has been calculated by following formula:

Total Resource = Strike length x Plan width x True thickness x Bulk Density

20.2.1 Details of resource (BMC&J) intersected ≥15%, ≥30%, ≥35% Fe cutoff grade in drilled boreholes in Block A1

TECHNICAL REVIEW NOTE — RESOURCE GEOMETRY: The resource tables below are retained from the supplied dataset for traceability. Before final submission, true thickness must be recalculated from the actual three-dimensional relationship between borehole azimuth/inclination and the interpreted strike, dip and dip direction of each mineralised zone. The ≥15% Fe BMC&J table also requires reconciliation of the reported intervals against Table 20.1. The resulting final resource values must then be propagated consistently through the Executive Summary, Chapter 19, Chapter 20, Chapter 21 and all corresponding tables/figures.

The Banded Magnetite Chert and Jasper (BMC&J) resources in Block A1 were estimated using the Cross-Sectional Method based on mineralised zones intersected in the drilled boreholes and evaluated at ≥15%, ≥30% and ≥35% Fe cut-off grades. At a **≥15%** Fe cut-off grade, the current calculated BMC&J resource

is **20.84** million tonnes (MT), with a weighted average grade of 31.62% Fe. This value is provisional because the thickness used in the resource table is not fully traceable to the detailed intersection table; the true-thickness geometry and section polygons must be reconciled before final submission. Tables 20.1 to 20.4 and Figures 20.1 to 20.8 present the supporting calculations and sections.

At a **≥30%** Fe cut-off grade, the estimated resource decreases to **11.74 million tonnes MT**, with a weighted **average grade of 35.68% Fe**, while the thickness of the mineralised zones varies from 0.97 m to 13.58 m. At the higher **≥35%** Fe cut-off grade, the estimated resource further decreases to **5.48 million tonnes MT**, with a corresponding weighted **average grade of 38.76% Fe**, and the mineralised zone thickness ranges from 0.97 m to 5.82 m. The progressive reduction in resource tonnage and mineralised-zone thickness with increasing Fe cut-off grade, accompanied by a corresponding increase in the weighted average Fe grade, reflects the grade distribution, continuity, and variability of BMC&J mineralisation within the drilled portion of Block A1.

BMC&J domain of Block A1, boreholes **UPCKB-03, UPCKB-04, UPCKB-05, and UPCKB-06** have collar RLs of 363.651 m, 393.569 m, 415.390 m and 309.796 m, respectively, with total drilled depths of 80.00 m, 100.00 m, 97.00 m and 53.10 m. The corresponding apparent bottom RLs are approximately 283.651 m, 293.569 m, 318.390 m and 256.696 m, respectively. At the **≥15% Fe cut-off**, the cumulative mineralized thicknesses represented in the sections are approximately **35.89 m, 23.28m, 7.76 m and 16.98 m**, respectively (**Figure 19.7**). These intersections indicate a relatively broad Fe-bearing BMC&J zone, although its thickness and distribution vary between boreholes, reflecting heterogeneity in Fe mineralization.

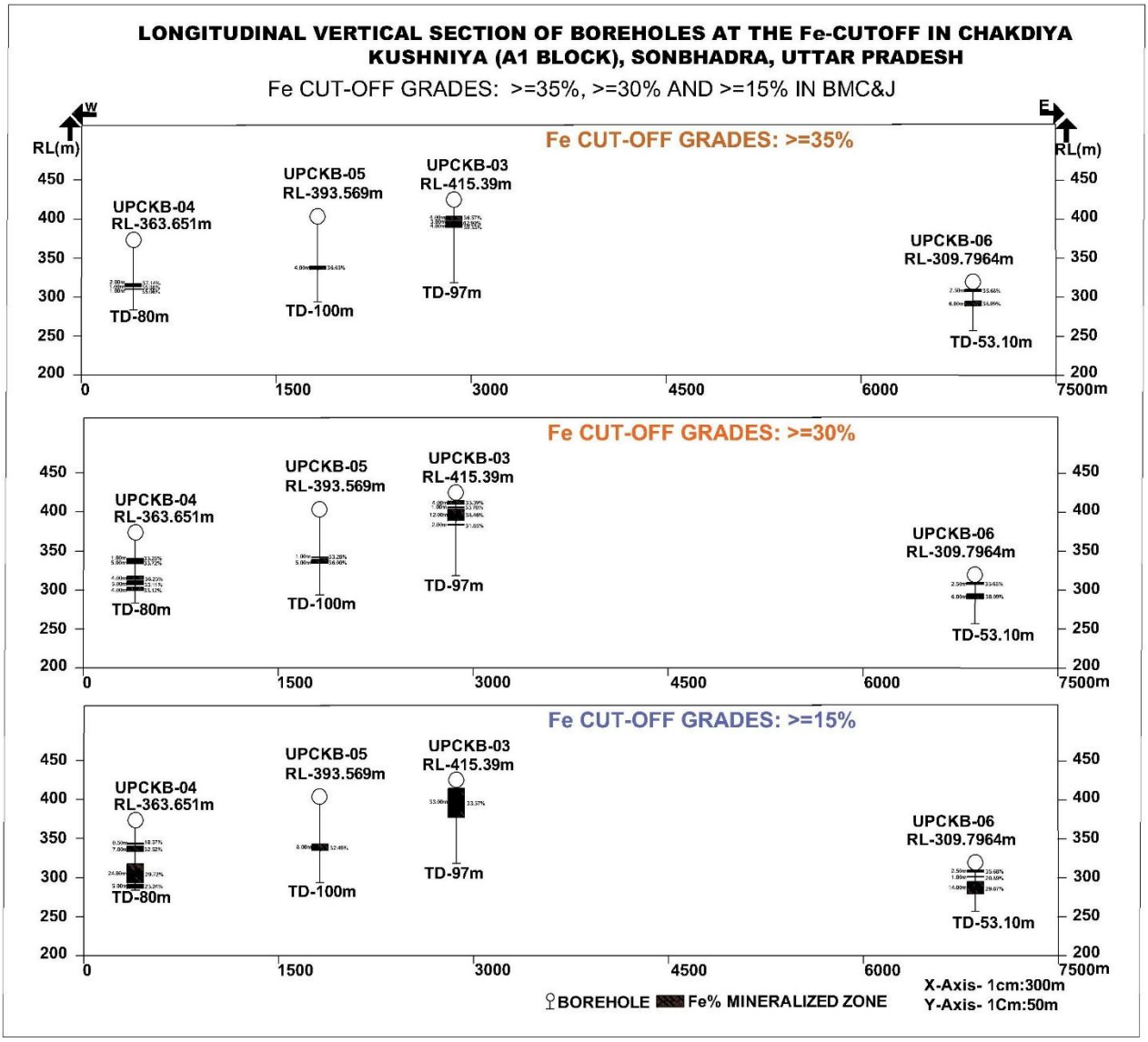


Figure-13.3: LV section for all boreholes in BMC&J ≥ 15% of Fe in block A1

Table-20.1: Details of intersected BMC&J Ore zones in drilled boreholes block A1

Details of intersected BMC&J ore zones in drilled boreholes Block A1						
At 15% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPCKB-03	Zone-I	1.00	34.00	33.00	32.01	33.37
UPCKB-04	Zone-I	19.50	20.00	0.50	0.49	18.37
	Zone-II	23.00	30.00	7.00	6.79	32.52
	Zone-III	46.00	70.00	24.00	23.28	29.72
	Zone-IV	72.00	77.00	5.00	4.85	23.24
UPCKB-05	Zone-I	51.00	59.00	8.00	7.76	32.49
UPCKB-06	Zone-I	0.00	2.50	2.50	2.43	35.68
	Zone-II	8.00	9.00	1.00	0.97	20.79
	Zone-III	15.00	21.00	6.00	5.82	38.09
At 30% Fe Cut Off						

Borehole No.	Mineralized Zone	From (m)	To (m)	Total Thickness (m)	True Thickness (m)	Weighted Avg. Grade Fe%
UPCKB-03	Zone-I	1.00	5.00	4.00	3.88	33.56
	Zone-II	9.00	10.00	1.00	0.97	33.70
	Zone-III	12.00	26.00	14.00	13.58	38.46
	Zone-IV	31.00	33.00	2.00	1.94	31.88
UPCKB-04	Zone-I	23.00	24.00	1.00	0.97	33.28
	Zone-II	25.00	30.00	5.00	4.85	33.72
	Zone-III	46.00	50.00	4.00	3.88	36.23
	Zone-IV	52.00	57.00	5.00	4.85	33.11
	Zone-V	60.00	64.00	4.00	3.88	33.12
UPCKB-05	Zone-I	51.00	52.00	1.00	0.97	33.28
	Zone-II	54.00	59.00	5.00	4.85	36.00
UPCKB-06	Zone-I	0.00	2.50	2.50	2.43	35.68
	Zone-II	15.00	21.00	6.00	5.82	38.09
At 35% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPCKB-03	Zone-I	12.00	16.00	4.00	3.88	39.57
	Zone-II	18.00	21.00	3.00	2.91	42.90
	Zone-III	22.00	26.00	4.00	3.88	39.33
UPCKB-04	Zone-I	46.00	48.00	2.00	1.94	37.14
	Zone-II	49.00	50.00	1.00	0.97	35.88
	Zone-III	53.00	54.00	1.00	0.97	35.08
UPCKB-05	Zone-I	54.00	58.00	4.00	3.88	36.63
UPCKB-06	Zone-I	0.00	2.50	2.50	2.43	35.68
	Zone-II	15.00	21.00	6.00	5.82	38.09

The current calculated BMC&J resource at a **≥15%** Fe cut-off is **20.84** million tonnes (MT) with a weighted average grade of 31.62% Fe. This estimate is provisional pending final reconciliation of true thickness, mineralised intervals and cross-sectional polygons.

Table-20.2: Total resources at Fe ≥ 15% calculated by the cross-section method of BMC&J in block A1

Banded Magnetite Chert & Jasper Block A1 (≥15 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**Fe % (CS)**	**Fe METAL (tonnes)**	**Avg. (Fe %)**
UPCKB-03	800	110	35.89	3158320	3.23	10201374	33.37	3404198	**31.62**
UPCKB-04	800	80	0.49	31040	3.23	100259	18.37	18418	
	800	80	6.79	434560	3.23	1403629	32.52	456460	
	800	80	23.28	1489920	3.23	4812442	29.72	1430258	
	800	80	4.85	310400	3.23	1002592	23.24	233002	
UPCKB-05	800	100	7.76	620800	3.23	2005184	32.49	651484	
UPCKB-06	800	30	2.43	58200	3.23	187986	35.68	67073	
	800	30	0.97	23280	3.23	75194	20.79	15633	
	800	30	5.82	139680	3.23	451166	38.09	171849	
	800	30	7.76	186240	3.23	601555	23.72	142689	
Total (Metric tonnes)						**20841381**		**6591065**	
Total (Million tonnes)						**20.84**		**6.59**	

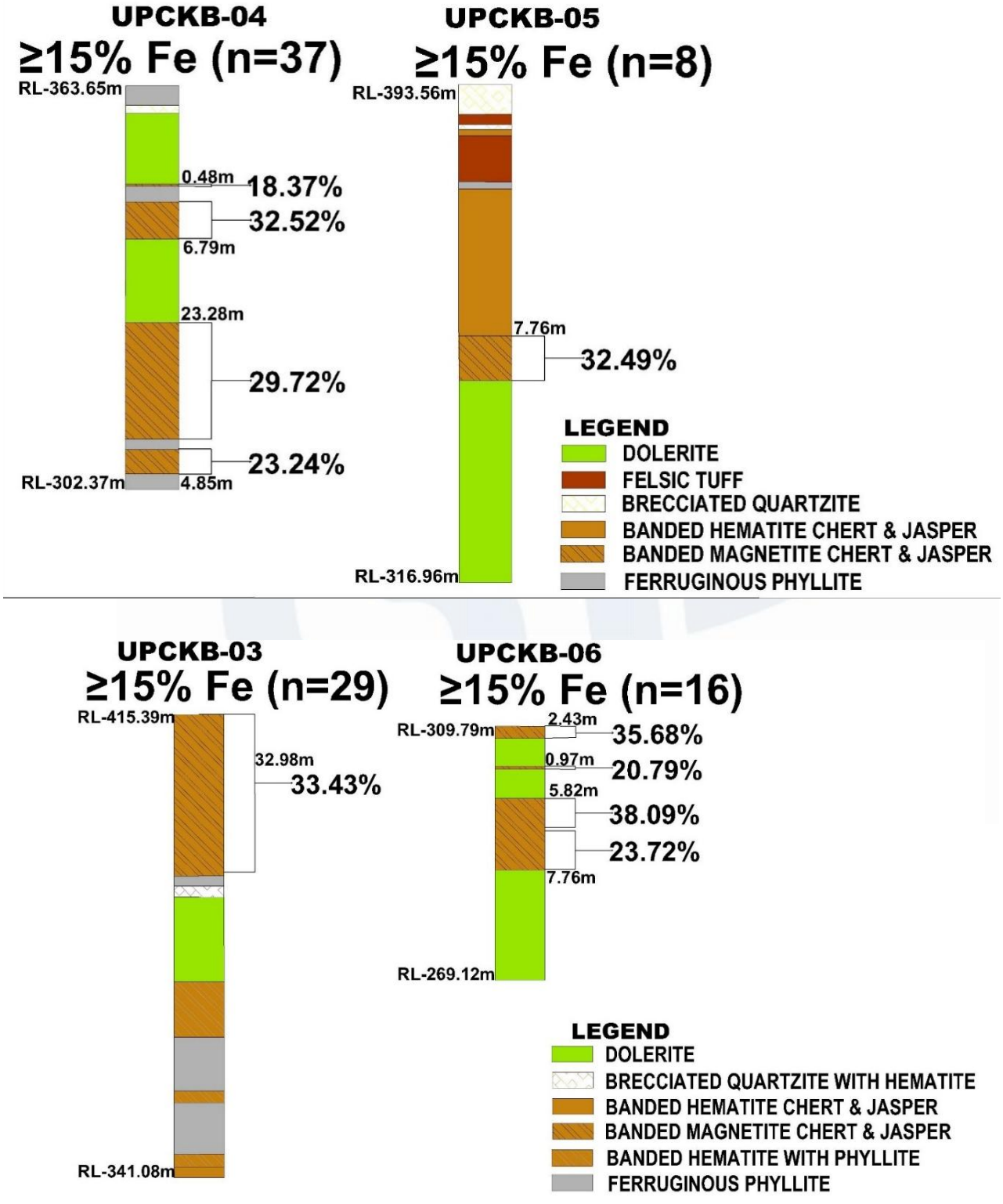
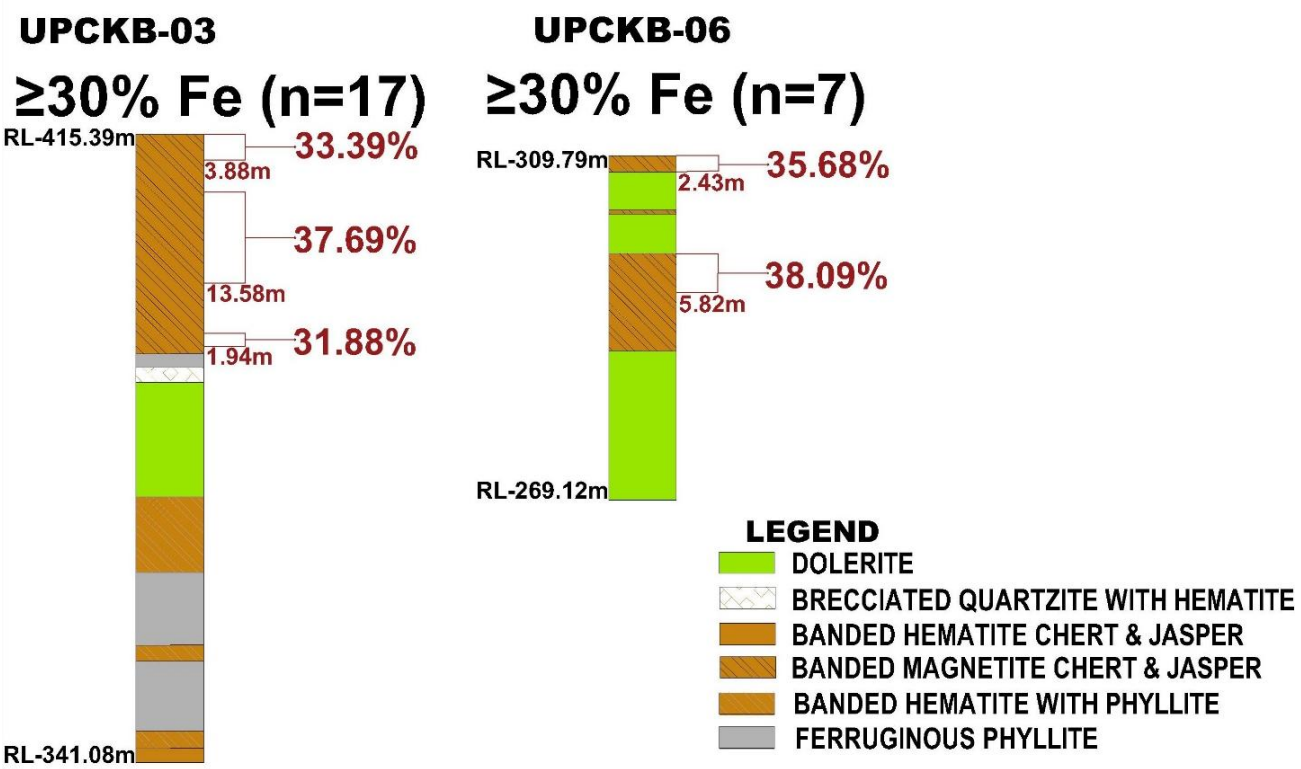


Figure 20.5. Downhole distribution of Fe-bearing intervals (≥15% Fe) in boreholes UPCKB-03,04,05 and UPCKB-06

The total estimated resource of **BMC&J** through **Cross-Section Method** at **30%** Fe is **11.74** million tonnes (MT) with wt. average grade of **35.68%** Fe.

Table-20.3: Total resource at Fe ≥ 30% calculated by the cross-section method of BMC&J in A1 block

Banded Magnetite Chert & Jasper Block A1 (≥30 Fe%)									
BH-ID	**Length (M)**	**Plan Width (M)**	**Thickness (M)**	**Volume (M3)**	**Bulk Density (T/M3)**	**Tonnage (T)**	**Fe % (CS)**	**Fe Metal (tonnes)**	**Avg. (Fe %)**
UPCKB-03	800	110	3.88	341440	3.23	1102851	33.56	370117	
	800	110	0.97	85360	3.23	275713	33.70	92915	
	800	110	13.58	1195040	3.23	3859979	38.46	1484548	
	800	110	1.94	170720	3.23	551426	31.88	175794	
UPCKB-04	800	80	0.97	62080	3.23	200518	33.28	66733	
	800	80	4.85	310400	3.23	1002592	33.72	338074	
	800	80	3.88	248320	3.23	802074	36.23	290591	**35.68**
	800	80	4.85	310400	3.23	1002592	33.11	331958	
	800	80	3.88	248320	3.23	802074	33.12	265647	
UPCKB-05	800	100	0.97	77600	3.23	250648	33.28	83416	
	800	100	4.85	388000	3.23	1253240	36.00	451166	
UPCKB-06	800	30	2.43	58200	3.23	187986	35.68	67073	
	800	30	5.82	139680	3.23	451166	38.09	171849	
Total (Metric tonnes)						**11742859**		**4189882**	
Total (Million tonnes)						**11.74**		**4.19**	



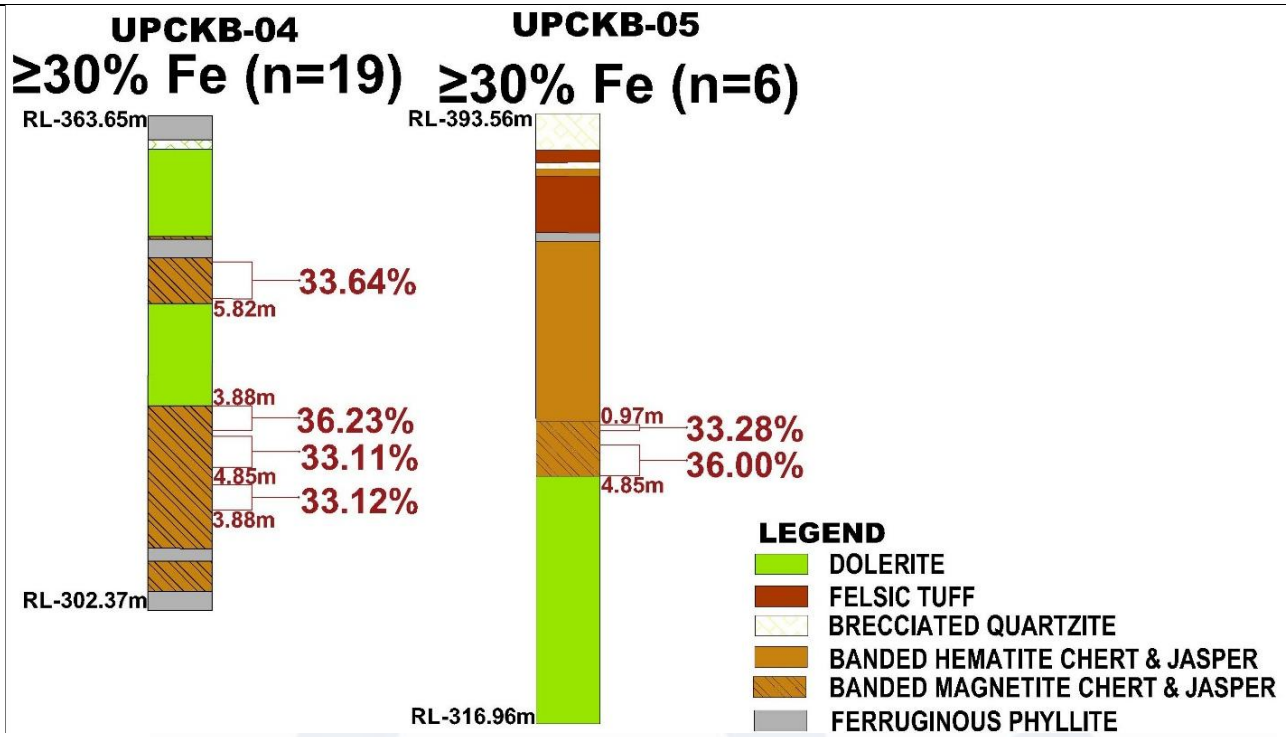


Figure 20.6. Downhole distribution of Fe-bearing intervals (≥30% Fe) in boreholes UPCKB-03,04,05 and UPCKB-06.

The total estimated resource of **BMC&J** through **Cross-Section Method** at **35%** Fe is **5.48** million tonnes (MT) with wt. average grade of **38.76%** Fe.

Table-20.4: Total resource at Fe ≥ 35% calculated by the cross-section method of BMC&J in A1 block

Banded Magnetite Chert & Jasper Block A1 (≥35 Fe%)									
BH-ID	**Length (m)**	**Plan Width (m)**	**Thickness (m)**	**Volume (M3)**	**Bulk Density (T/M3)**	**Tonnage (t)**	**Fe % (CS)**	**Fe Metal (tonnes)**	**Avg. (Fe %)**
UPCKB-03	800	110	3.88	341440	3.23	1102851	39.57	436398	
	800	110	2.91	256080	3.23	827138	42.9	354842	
	800	110	3.88	341440	3.23	1102851	39.33	433751	
UPCKB-04	800	80	1.94	124160	3.23	401037	37.14	148945	
	800	80	0.97	62080	3.23	200518	35.88	71946	**38.76**
	800	80	0.97	62080	3.23	200518	35.08	70342	
UPCKB-05	800	100	3.88	310400	3.23	1002592	36.63	367249	
UPCKB-06	800	30	2.43	58200	3.23	187986	35.68	67073	
	800	30	5.82	139680	3.23	451166	38.09	171849	
Total (Metric tonnes)						**5476659**		**2122397**	
Total (Million tonnes)						**5.48**		**2.12**	

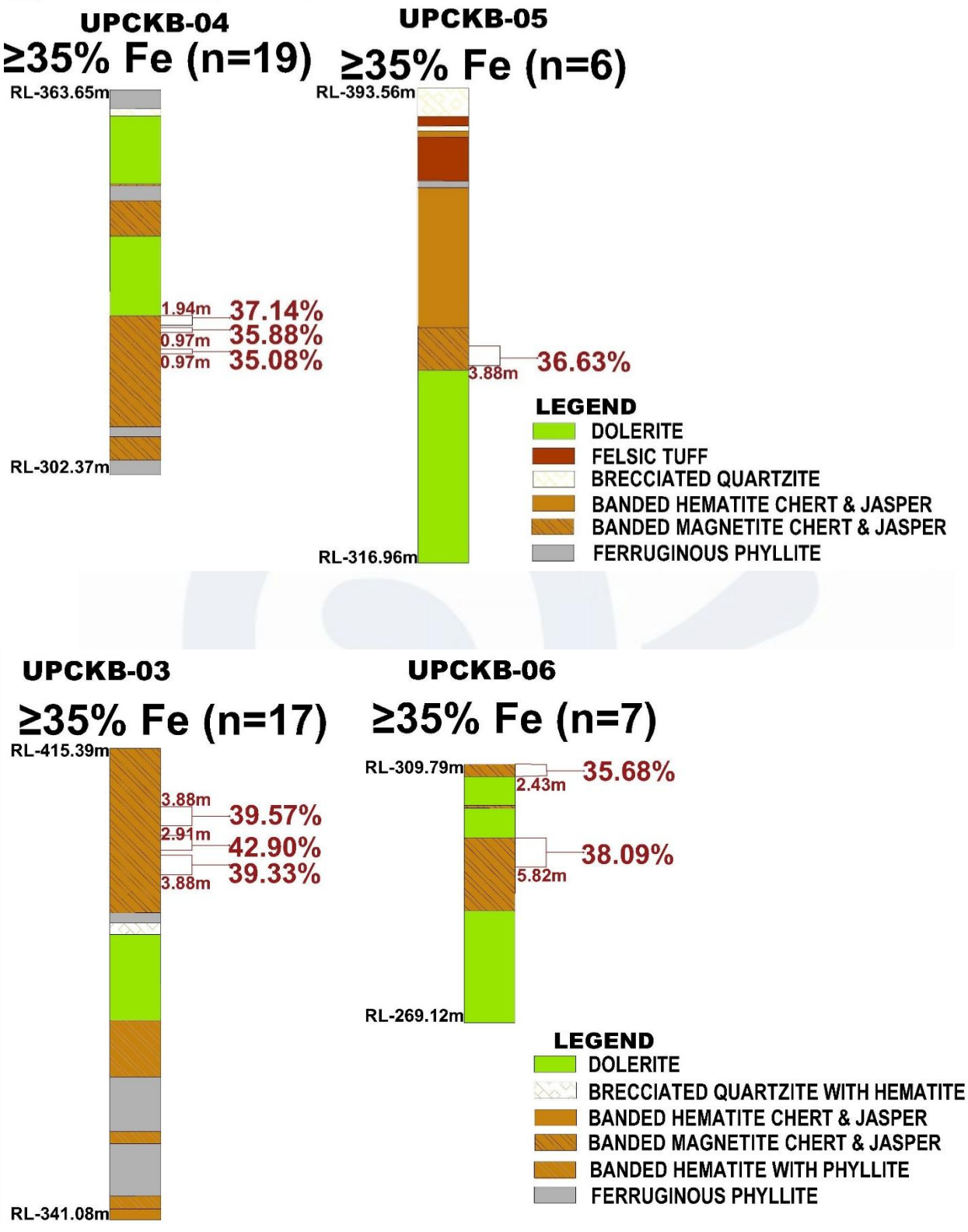


Figure 20.7. Downhole distribution of Fe-bearing intervals (≥35% Fe) in boreholes UPCKB-03,04,05 and UPCKB-06.

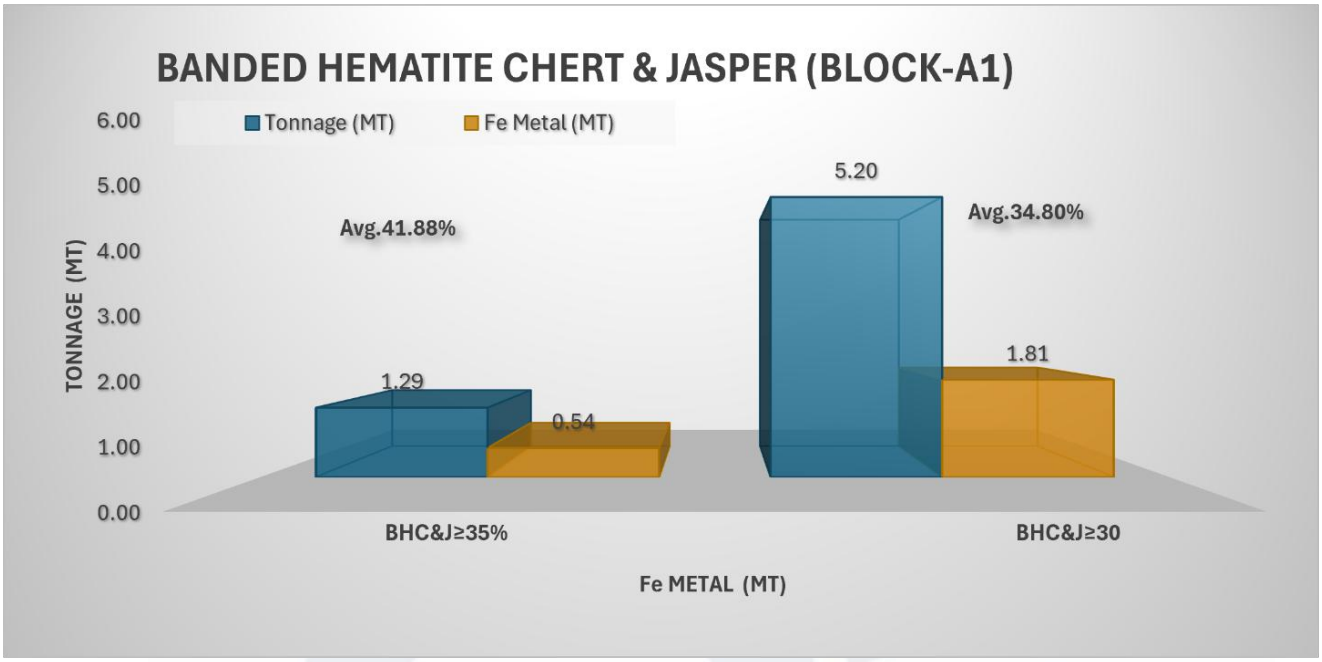


Figure 20.8: Bar Diagram of BMC&J Resources Based on Fe Cut-off Grades (≥35%, ≥30% and ≥15%)

20.2.2 Details of resources (BHC&J) intersected at ≥30% & ≥35% Fe cutoff grade in drilled boreholes in Block A1

The Banded Hematite Chert and Jasper (BHC&J) resources in Block A1 were estimated using the Cross-Sectional Method based on the mineralized zones intersected in the drilled boreholes and evaluated at ≥30% and ≥35% Fe cut-off grades are reflected in Table-20.5 to 20.8. At a ≥30% Fe cut-off grade, the estimated BHC&J resource is **5.20 million tonnes (MT)** with a weighted **average grade of 34.80% Fe**, while the thickness of the mineralized zones ranges from 0.97 m to 3.88 m. At the higher ≥35% Fe cut-off grade, the estimated resource decreases to **1.29 million tonnes MT**, with a corresponding increase in the weighted **average grade to 41.88% Fe**, and the mineralized-zone thickness varying from 0.97 m to 1.94m. The decrease in resource tonnage and mineralized-zone thickness with increasing Fe cut-off grade, accompanied by an increase in the weighted average Fe grade, reflects the grade distribution and variability of BHC&J mineralisation in Block A1 is illustrated in Figure-20.8 to 20.11.

The **BHC&J zone in Block A1** has been evaluated at a cut-off grade of **≥30% Fe**. The mineralization occurs as comparatively discrete Fe-mineralized intervals in boreholes **UPCKB-01, UPCKB-02, UPCKB-03 and UPCKB-05**. Their collar RLs are 377.656 m, 348.472 m, 415.390 m and 393.569 m, respectively, with total drilled depths of 117.00 m, 120.00 m, 97.00 m and 100.00 m. The corresponding apparent bottom RLs are approximately 260.656 m, 228.472 m, 318.390 m and 293.569 m. At the **≥30% Fe cut-off**, the cumulative mineralized thicknesses are approximately **10.67 m, 6.98 m, 0.97 m and 4.85**

m, respectively (**Figure 19.8**). The comparatively limited thickness and discontinuous distribution indicate a more restricted mineralized zone relative to the broader BMC&J domain.

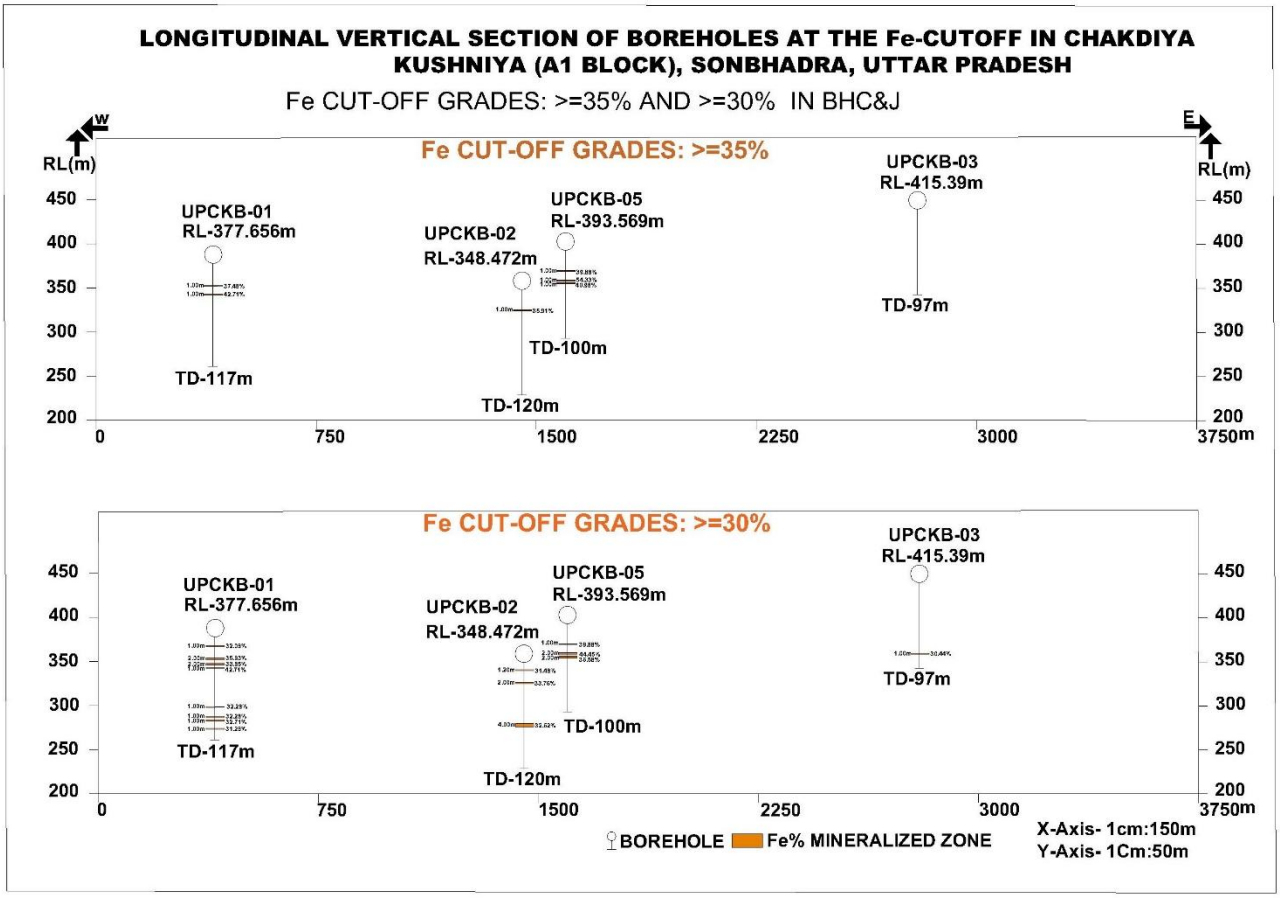


Figure-13.2: LV section for all boreholes in BHC&J ≥ 30% of Fe in block A1

Table-20.5: Details of intersected BHC&J ore zones in drilled boreholes block A1

Details of intersected BHC&J ore zones in drilled boreholes Block A1						
At 30% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPCKB-01	Zone-I	10.00	11.00	1.00	0.97	32.08
	Zone-II	24.00	26.00	2.00	1.94	35.83
	Zone-III	30.00	32.00	2.00	1.94	33.85
	Zone-IV	35.00	36.00	1.00	0.97	42.71
	Zone-V	79.00	80.00	1.00	0.97	32.28
	Zone-VI	90.00	91.00	1.00	0.97	32.28
	Zone-VII	94.00	96.00	2.00	1.94	32.71
	Zone-VIII	104.00	105.00	1.00	0.97	31.28
UPCKB-02	Zone-I	8.00	9.20	1.20	1.16	31.48
	Zone-II	22.00	24.00	2.00	1.94	33.76
	Zone-III	69.00	73.00	4.00	3.88	32.62
UPCKB-03	Zone-I	80.00	81.00	1.00	0.97	30.44
UPCKB-05	Zone-I	23.00	24.00	1.00	0.97	39.88
	Zone-II	33.00	35.00	2.00	1.94	44.45
	Zone-III	37.00	39.00	2.00	1.94	36.58

At 35% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPCKB-01	Zone-I	25.00	26.00	1.00	0.97	37.48
	Zone-II	35.00	36.00	1.00	0.97	42.71
UPCKB-02	Zone-I	23.00	24.00	1.00	0.97	35.91
UPCKB-05	Zone-I	23.00	24.00	1.00	0.97	39.88
	Zone-II	33.00	35.00	2.00	1.94	44.45
	Zone-III	37.00	38.00	1.00	0.97	40.98

The total estimated resource of **BHC&J** through **Cross-Section Method** at **30%** Fe is **5.20** million tonnes (MT) with wt. average grade of **34.80%** Fe.

Table-20.6: Total resource at Fe ≥ 30% calculated by the cross-section method of BHC&J in block A1

Banded Hematite Chert & Jasper Block A1 (≥30 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (tonnes)**	**Fe % (CS)**	**Fe METAL (tonnes)**	**Avg. (Fe %)**
UPCKB-01	800	100	0.97	77600	2.76	214176	32.08	68708	
	800	100	1.94	155200	2.76	428352	35.83	153479	
	800	100	1.94	155200	2.76	428352	33.85	144997	
	800	100	0.97	77600	2.76	214176	42.71	91475	
	800	100	0.97	77600	2.76	214176	32.28	69136	
	800	100	0.97	77600	2.76	214176	32.28	69136	
	800	100	1.94	155200	2.76	428352	32.17	137801	
	800	100	0.97	77600	2.76	214176	31.28	66994	**34.80**
UPCKB-02	800	100	1.16	93120	2.76	257011	31.48	80907	
	800	100	1.94	155200	2.76	428352	33.76	144612	
	800	100	3.88	310400	2.76	856704	32.62	279457	
UPCKB-03	800	110	0.97	85360	2.76	235594	30.44	71715	
UPCKB-05	800	100	0.97	77600	2.76	214176	39.88	85413	
	800	100	1.94	155200	2.76	428352	44.45	190402	
	800	100	1.94	155200	2.76	428352	36.58	156691	
Total (Metric tonnes)						**5204477**		**1810922**	
Total (Million tonnes)						**5.20**		**1.81**	

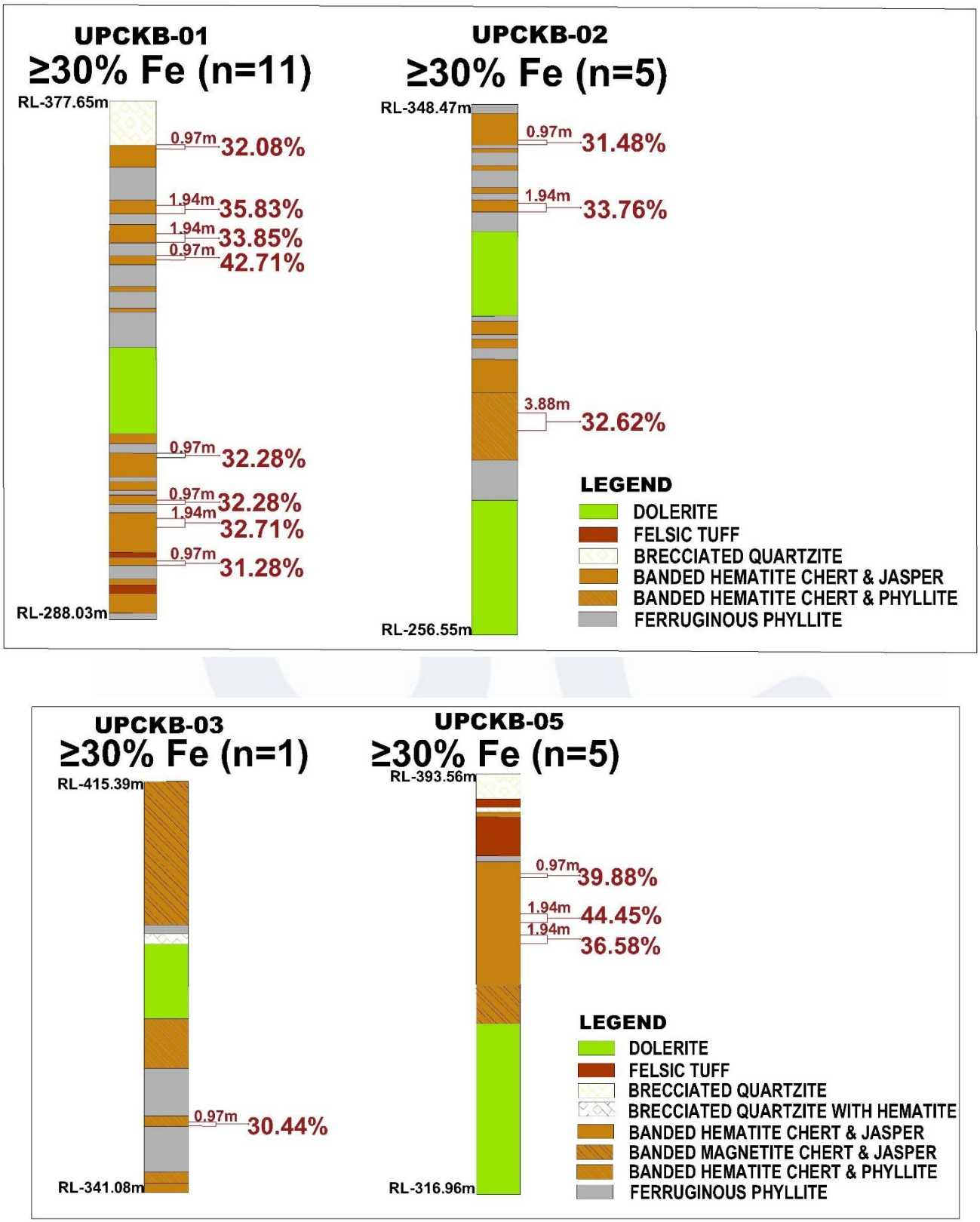


Figure 20.9. Downhole distribution of Fe-bearing intervals (≥30% Fe) in boreholes UPCKB-01,02,03&05

The total estimated resource of **BHC&J** through **Cross-Section Method** at **35%** Fe is **1.29** million tonnes (MT) with wt. average grade of **41.88%** Fe.

Table-20.7: Total resource at Fe ≥ 35% calculated by the cross-section method of BHC&J in block A1

Banded Hematite Chert & Jasper Block A1 (≥35 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (tonnes)**	Fe % (CS)	Fe METAL (tonnes)	Avg. (Fe %)
UPCKB-01	800	100	0.97	77600	2.76	214176	37.48	80273	41.88
	800	100	0.97	77600	2.76	214176	42.71	91475	
UPCKB-02	800	100	0.97	77600	2.76	214176	35.91	76911	
UPCKB-05	800	100	0.97	77600	2.76	214176	39.88	85413	
	800	100	0.97	77600	2.76	214176	54.33	116362	
	800	100	0.97	77600	2.76	214176	40.98	87769	
Total (Metric tonnes)						**1285056**		**538203**	
Total (Million tonnes)						**1.29**		**0.54**	

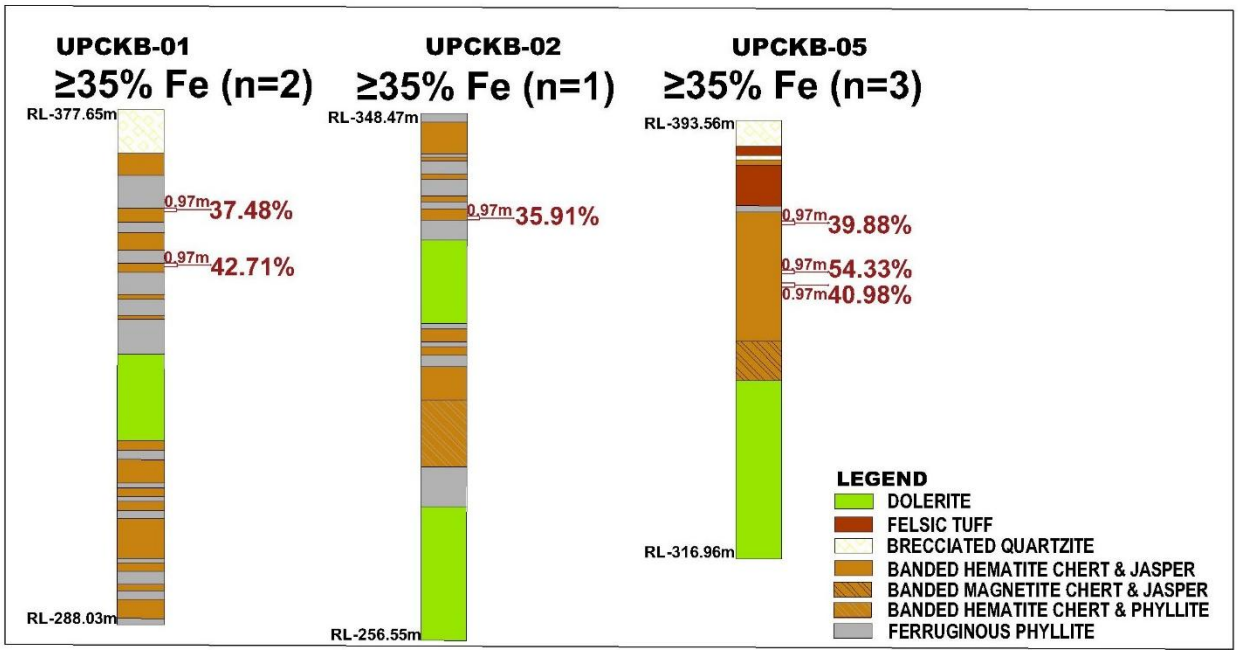


Figure 20.10. Downhole distribution of Fe-bearing intervals (≥35% Fe) in boreholes UPCKB-01,02 and 05

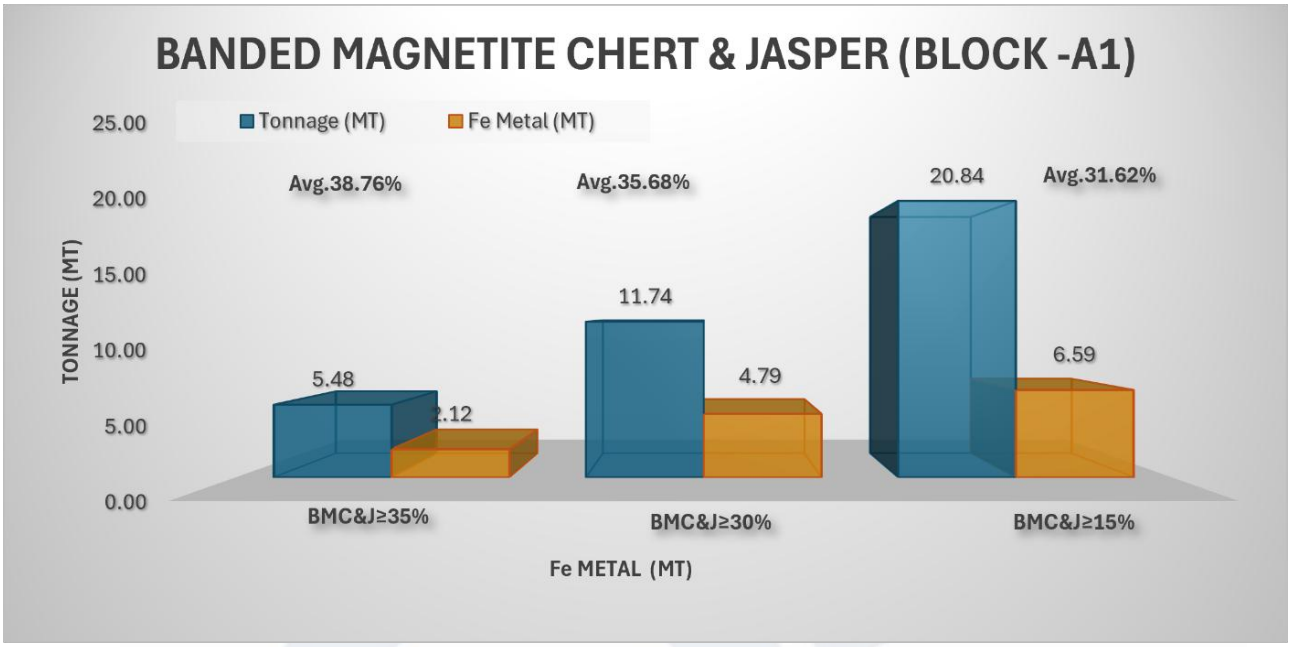


Figure 20.11: Bar Diagram of BHC&J Resources Based on Fe Cut-off Grades (≥35% and ≥30%)

The total estimated resource of Block A1 through Cross-Section Method at 30% Fe is 16.95 million tonnes (MT) with wt. average grade of 35.55% Fe.

Table-20.8: Total resources at Fe ≥ 30% in BHC&J & Fe ≥ 15% in BMC&J calculated by the cross-section method in block A1.

Resource Estimation Block A1 (≥30 Fe%)			
Lithology	**Tonnage (mT)**	**Fe Metal (Tonnes)**	**Avg. (Fe%)**
BHC&J	5204477	1810922	34.80
BMC&J	11742859	4189882	35.68
Total (mT)	**16947336**	**6000804**	
Total (MT)	**16.95**	**6.00**	**35.41**

20.2.3 Detailed resources (massive iron ore and tuff with hematite) intersected at ≥30% & ≥35% Fe cutoff grade in drilled boreholes in block A2

In **Block A2**, the mineralized zones intersected by **UPJTB-01 and UPJTB-02** have been evaluated at a **≥30% Fe cut-off**. UPJTB-01 has a collar RL of 299.304 m and a drilled depth of 53.00 m, corresponding to an apparent bottom RL of approximately 246.304 m. The borehole intersects approximately **6.74 m and 10.11m of massive iron ore** within the interpreted mineralized domain. UPJTB-02 has a collar RL of 280.421 m and a drilled depth of 80.00 m, corresponding to an apparent bottom RL of approximately 200.421 m. The mineralized intervals comprise approximately **2.73 and 5.46 m of Tuff with Hematite**

(**Figure 19.9**). These intersections indicate Fe mineralization associated with hematite-bearing and tuffaceous lithologies in Block A2.

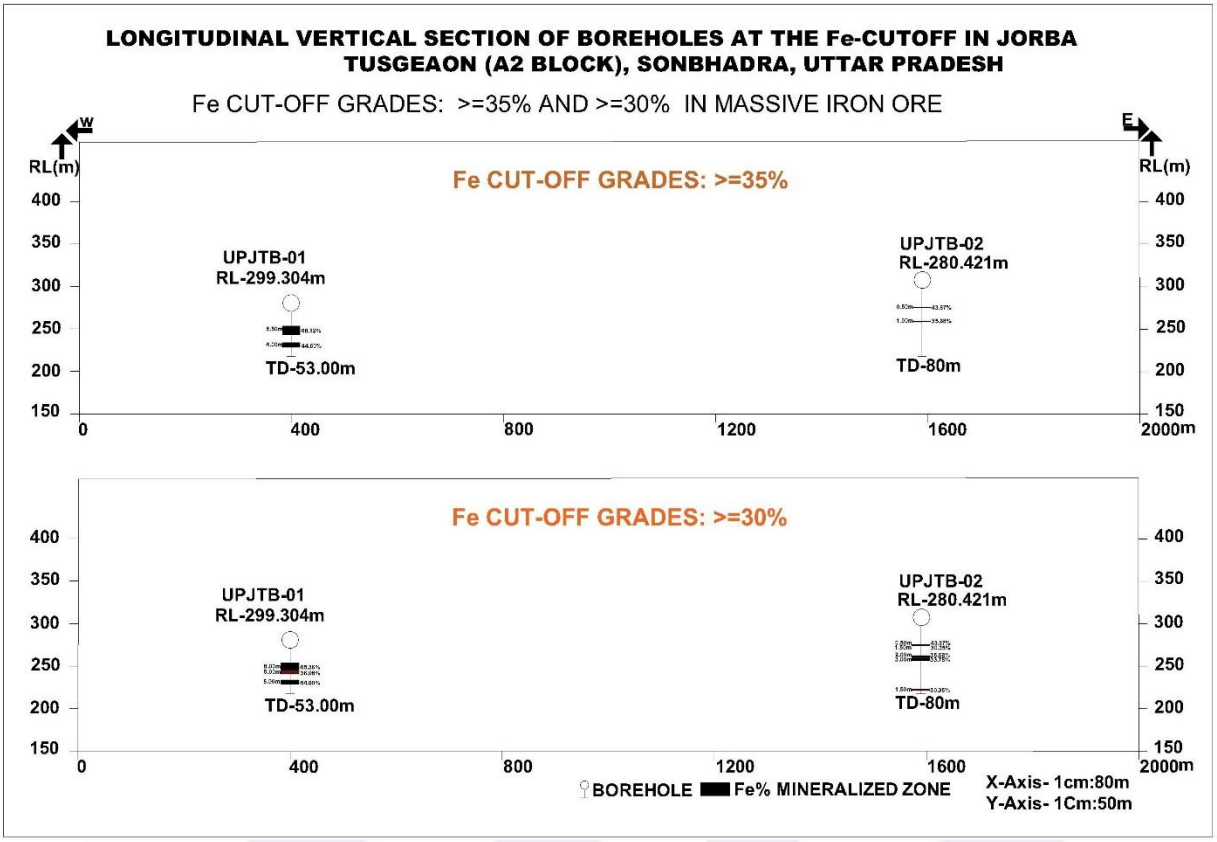


Figure-13.4: LV section for all boreholes in massive iron ore ≥ 30% of Fe in block A2

The total estimated resource of Tuff with Hematite Ore through Cross-Section Method at 35% Fe is 0.26 million tonnes (MT) with a weighted average grade of 42.38% Fe.

Table-20.9: Details of intersected iron ore zones in drilled boreholes block A2

Details of intersected Massive Iron ore zones in drilled boreholes Block A2						
At 30% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPJTB-01	Zone-I	17.00	25.00	8.00	7.76	45.36
	Zone-II	37.00	42.00	5.00	4.85	44.60
UPJTB-02	Zone-I	22.00	22.50	0.50	0.49	43.87
	Zone-II	35.00	37.00	2.00	1.94	33.88
	Zone-III	38.00	41.00	3.00	2.91	33.78
At 35% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPJTB-01	Zone-I	17.00	18.00	1.00	0.97	38.25
	Zone-II	20.00	25.00	5.00	4.85	51.24
UPJTB-02	Zone-I	22.00	22.50	0.50	0.49	43.87
	Zone-II	38.00	39.00	1.00	0.97	35.68
Details of intersected Tuff with Hematite ore zones in drilled boreholes Block A2						

At 30% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPJTB-01	Zone-I	25.00	30.00	5.00	4.85	36.98
UPJTB-02	Zone-I	22.50	24.00	1.50	1.46	34.18
	Zone-II	75.00	76.50	1.50	1.46	30.35
At 35% Fe Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade Fe%**
UPJTB-01	Zone-I	25.00	27.50	2.50	2.425	42.38
UPJTB-02	Zone-I	22.00	22.50	0.50	0.49	43.87
	Zone-II	38.00	39.00	1.00	0.97	35.68

The total estimated resource of Massive Iron Ore through Cross-Section Method at 30% Fe is **2.56 million tonnes (MT)** with **wt. average grade of 41.59% Fe.**

Table-20.10: Total resources at Fe ≥ 30% calculated by the cross-section method of massive iron ore in block A2

Massive Iron Ore Block A2 (≥30 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**Fe % (CS)**	**Fe METAL (tonnes)**	**Avg. (Fe %)**
UPJTB-01	800	50	7.76	310400	3.37	1046048	45.36	474487	
	800	50	4.85	194000	3.37	653780	44.60	291586	
UPJTB-02	600	80	0.49	23280	3.37	78454	43.87	34418	**41.59**
	600	80	1.94	93120	3.37	313814	33.88	106320	
	600	80	2.91	139680	3.37	470722	33.78	159010	
Total (Metric tonnes)						**2562818**		**1065821**	
Total (Million tonnes)						**2.56**		**1.07**	

The total estimated resource of Tuff with Hematite Ore through Cross-Section Method at 30% Fe is 0.91 million tonnes (MT) with a weighted average grade of 35.01% Fe.

Table-20.11: Total resources at Fe ≥ 30% calculated by the cross-section method of tuff with hematite ore in block A2

Tuff with Hematite Ore Block A2 (≥30 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**Fe % (CS)**	**Fe Metal (tonnes)**	**Avg. (Fe %)**
UPJTB-01	800	50	4.85	194000	2.73	529620	36.98	195853	
UPJTB-02	600	80	1.46	69840	2.73	190663	34.18	65169	**35.01**
	600	80	1.46	69840	2.73	190663	30.35	57866	
Total (Metric tonnes)						**910946**		**318888**	
Total (Million tonnes)						**0.91**		**0.32**	

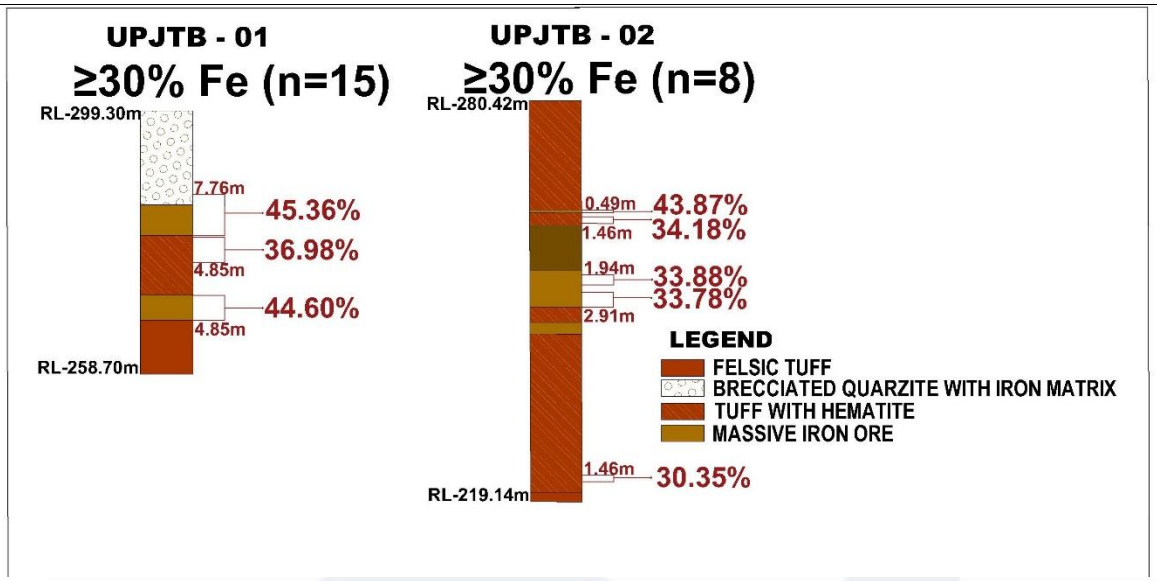


Figure 20.14. Downhole distribution of Fe-bearing intervals (≥30% Fe) in boreholes UPJTB-01 & 02

The total estimated resource of Massive Iron Ore through Cross-Section Method at 35% Fe is **1.67 million tonnes (MT)** with **wt. average grade of 45.83% Fe.**

Table-20.12: Total resources at Fe ≥ 35% calculated by the cross-section method of massive iron ore in block A2

Massive Iron Ore Block A2 (≥35 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**Fe % (CS)**	**Fe METAL (tonnes)**	**Avg. (Fe %)**
UPJTB-01	800	50	0.97	38800	3.37	130756	38.28	50053	**45.83**
	800	50	4.85	194000	3.37	653780	51.24	334997	
	800	50	4.85	194000	3.37	653780	44.60	291586	
UPJTB-02	600	80	0.49	23280	3.37	78454	43.87	34418	
	600	80	0.97	46560	3.37	156907	35.68	55984	
Total (Metric tonnes)						**1673677**		**767038**	
Total (Million tonnes)						**1.67**		**0.77**	

The total estimated resource of Tuff with Hematite Ore through Cross-Section Method at 35% Fe is 0.26 million tonnes (MT) with a weighted average grade of 42.38% Fe.

Table-20.13: Total resources at Fe ≥ 35% calculated by the cross-section method of tuff with hematite ore in block A2

Tuff with Hematite Ore Block A2 (≥35 Fe%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**Fe % (CS)**	**Fe METAL (tonnes)**	**Avg. (Fe %)**
UPJTB-01	800	50	2.43	97000	2.73	264810	42.38	112226	**42.38**
Total (Metric tonnes)						**264810**		**112226**	
Total (Million tonnes)						**0.26**		**0.11**	

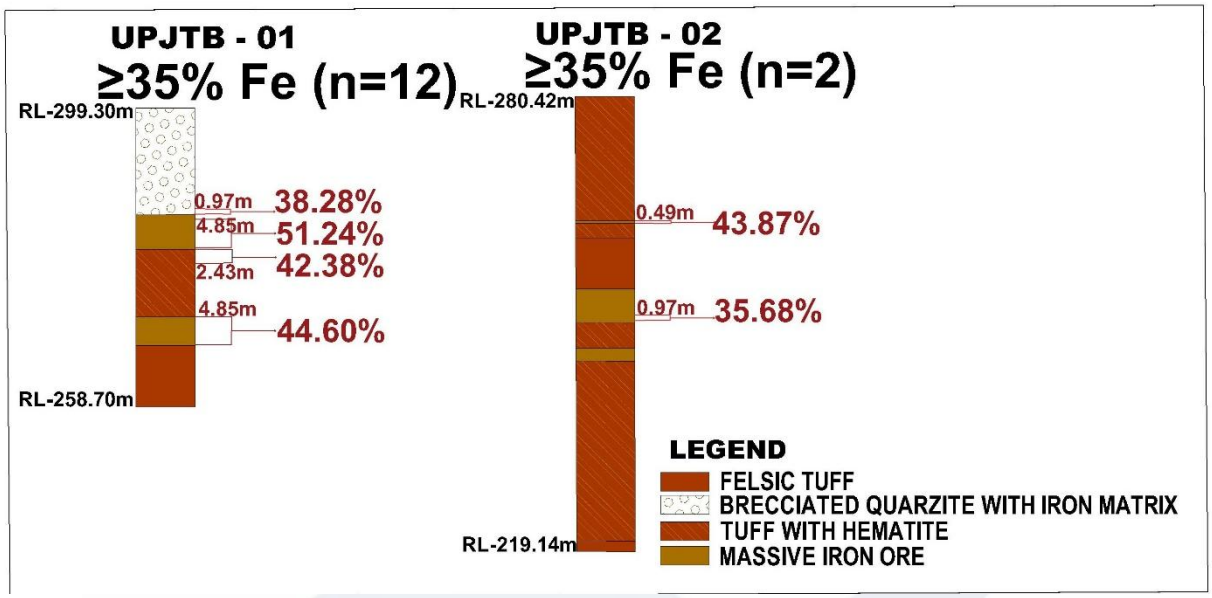


Figure 20.15. Downhole distribution of Fe-bearing intervals (≥35% Fe) in boreholes UPJTB-01 & 02

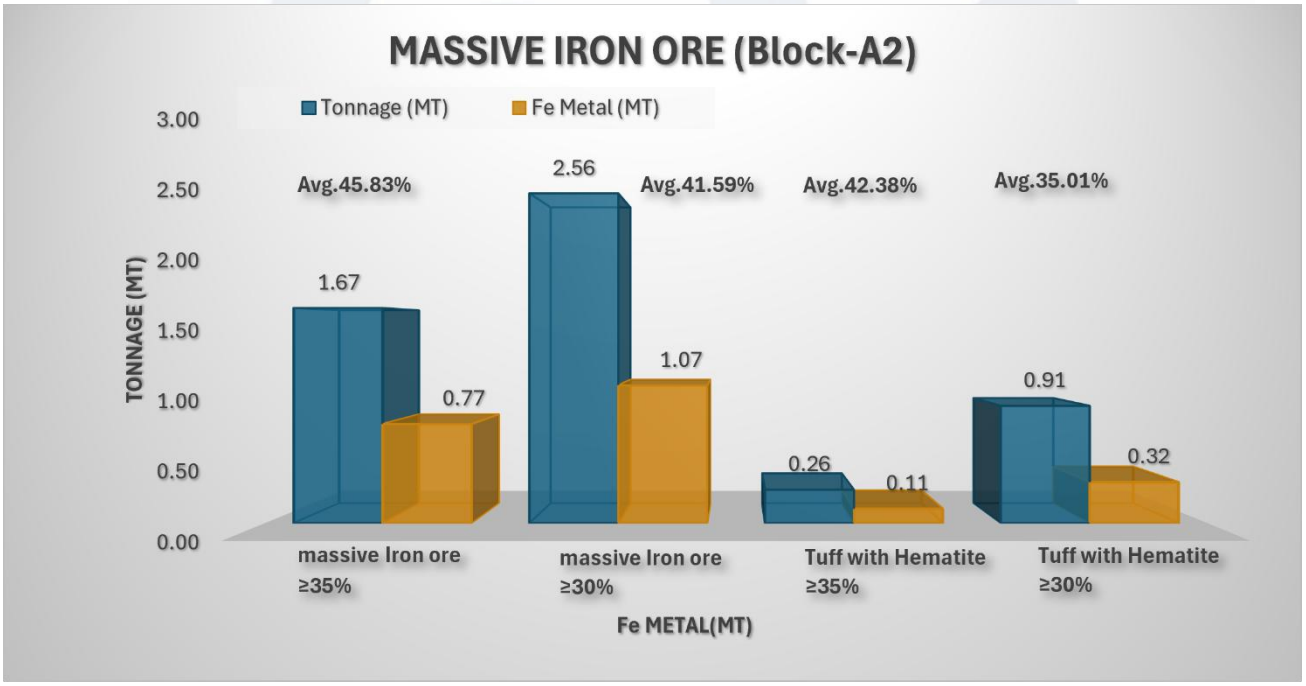


Figure 20.16: Bar diagram of massive iron ore resources based on Fe cut-off grades (≥35% and ≥30%)

The total estimated resource of Block A2 through Cross-Section Method at 30% Fe is **3.47 million tonnes (MT)** with **wt. average grade of 39.86% Fe.**

Table-20.14: Total resources at Fe ≥ 30% calculated by the cross-section in block A2

Resource Estimation Block A2 (≥30 Fe%)			
Lithology	**Tonnage (mT)**	**Fe Metal (Tonnes)**	**Avg. (Fe%)**
Massive Iron Ore	2562818	1065821	41.59
Tuff with Hematite	910946	318888	35.01
Total (mT)	**3473764**	**1384709**	
Total (MT)	**3.47**	**1.38**	**39.86**

The total estimated resource of Block A1 & A2 through Cross-Section Method at 30% Fe is **20.42 million tonnes (MT)** with **wt. average grade of 36.31% Fe.**

Table-20.15: Total resources at Fe ≥ 30% BHC&J, MIO & Tuff with Hematite & Fe ≥ 15%BMC&J calculated by the cross-section in block A1&A2

Resource Estimation Block A1 & A2 (≥30 Fe%)			
Lithology	**Tonnage (mT)**	**Fe Metal (Tonnes)**	**Avg. (Fe%)**
BHC&J	5204477	1810922	35.01
BMC&J	11742859	4189882	
Massive Iron Ore	2562818	1065821	
Tuff with Hematite	910946	318888	
Total (mT)	**20421100**	**7385514**	36.17
Total (mT)	**20.42**	**7.39**	

20.2.4 Details of intersected ≤30% Fe in drilled boreholes in block A1

The core analytical data indicates a heterogeneous distribution of ≤30% Fe mineralization within BHC&J, BMC&J and associated iron-bearing tuffaceous lithologies across the investigated boreholes. In UPCKB-01, BHC&J is intersected at several discrete intervals between 11.00 and 116.00 m, with individual interval thicknesses ranging from 0.97 to 7.7.00 m and Fe(T) values varying from 12.09% to 26.29%, indicating moderate Fe enrichment with significant downhole grade variability is illustrated in Figure-20.17. is given below in Table-20.16

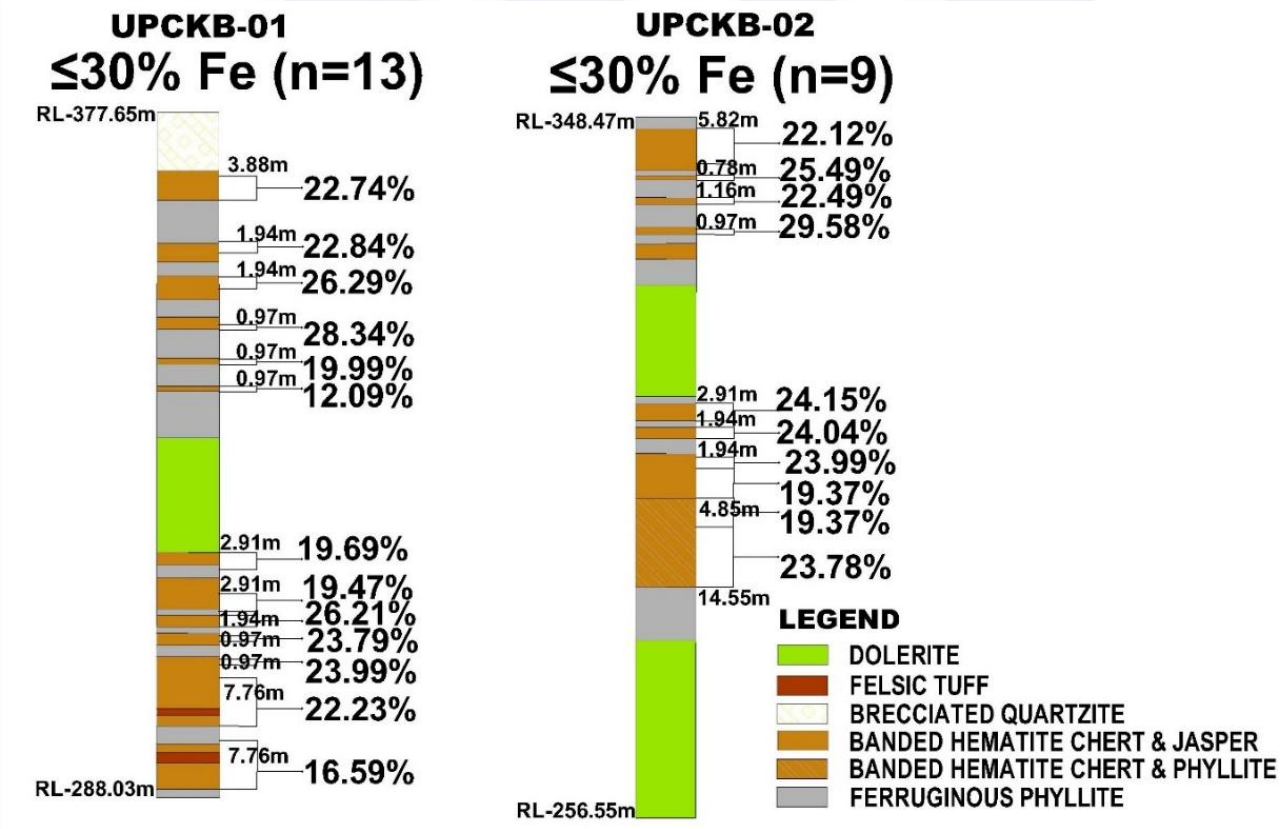
Table-20.16: Intersected ≤30% Fe in drilled boreholes in block A1

Borehole ID	Sample Description	From	To	Thickness	Fe (T)
UPCKB-01	BHC&J	11	15	3.88	22.74
	BHC&J	22	24	1.94	22.84
	BHC&J	28	30	1.94	26.29
	BHC&J	36	37	0.97	20.79
	BHC&J	42	43	0.97	19.99
	BHC&J	47	48	0.97	12.09
	BHC&J	75	78	2.91	19.69
	BHC&J	82	85	2.91	19.47
	BHC&J	86	88	1.94	26.21
	BHC&J	89	90	0.97	23.79
	BHC&J	93	94	0.97	23.99
	BHC&J	96	104	7.76	22.23
	BHC&J	108	116	7.76	16.59
UPCKB-02	BHC&J	2	8	5.82	22.12
	BHC&J	10	10.8	0.776	25.49
	BHC&J	13.8	15	1.164	22.49
	BHC&J	19	20	0.97	29.58
	BHC&J	49	52	2.91	24.15
	BHC&J	53	55	1.94	24.04
	BHC&J	57.45	59.45	1.94	23.99
	BHC&J	60	65	4.85	19.37
	BHC&J with Phyllite	65	80	14.55	23.78
UPCKB-03	BMC&J	5	9	3.88	27.16
	BMC&J	26	31	4.85	26.65
	BMC&J	33	34	0.97	25.42
	BHC&J	34	38	3.88	18.44
	BHC&J	56	68	11.64	17.85
	BHC&J	79	80	0.97	28.95
	BHC&J	81	83	1.94	19.13
	BHC&J	92	97	4.85	21.46
UPCKB-04	BMC&J	19.5	20	0.485	18.37
	BMC&J	24	25	0.97	25.77
	BMC&J	50	52	1.94	26.43
	BMC&J	57	60	2.91	25.35
	BMC&J	64	70	5.82	23.57
	BMC&J	72	77	4.85	23.24
UPCKB-05	BHC&J	9	10	0.97	24.89
	BHC&J	21	23	1.94	9.05
	BHC&J	25	33	7.76	16.12
	BHC&J	35	37	1.94	17.79
	BHC&J	39	50	10.67	18.26

	BMC&J	50	51	0.97	12.39
	BMC&J	52	54	1.94	23.32
UPCKB-06	BMC&J	8	9	0.97	20.79
	BMC&J	21	29	7.76	21.08

UPCKB-02 shows comparatively persistent BHC&J mineralization between 1.00 and 80.00 m, with individual intervals ranging from 0.97 to 14.55 m and Fe(T) values of 19.37–29.58%, including a maximum value of 29.58% Fe(T). In UPCKB-03, BMC&J occurs in the shallow portion of the borehole at 4.85.00–32.98 m, with Fe(T) values of 25.42–27.16%, whereas the underlying BHC&J intervals between 34.00 and 97.00 m generally contain lower Fe(T) values of 17.85–28.95%, demonstrating a vertical variation in Fe enrichment between the two lithological domains.

UPCKB-04 contains BMC&J mineralization between 19.50 and 77.00 m, with individual intervals of 0.45–4.82m and Fe(T) values ranging from 18.37% to 26.43%, indicating relatively consistent moderate-grade Fe mineralization. In UPCKB-05, BHC&J occurs from 9.00 to 50.00 m, with Fe(T) values ranging from 9.05% to 24.89%, followed by BMC&J intervals at 50.00–54.00 m containing 12.39–23.32% Fe(T). UPCKB-06 records BMC&J mineralization between 8.00 and 29.00 m, with Fe(T) values of 20.79–21.08%.



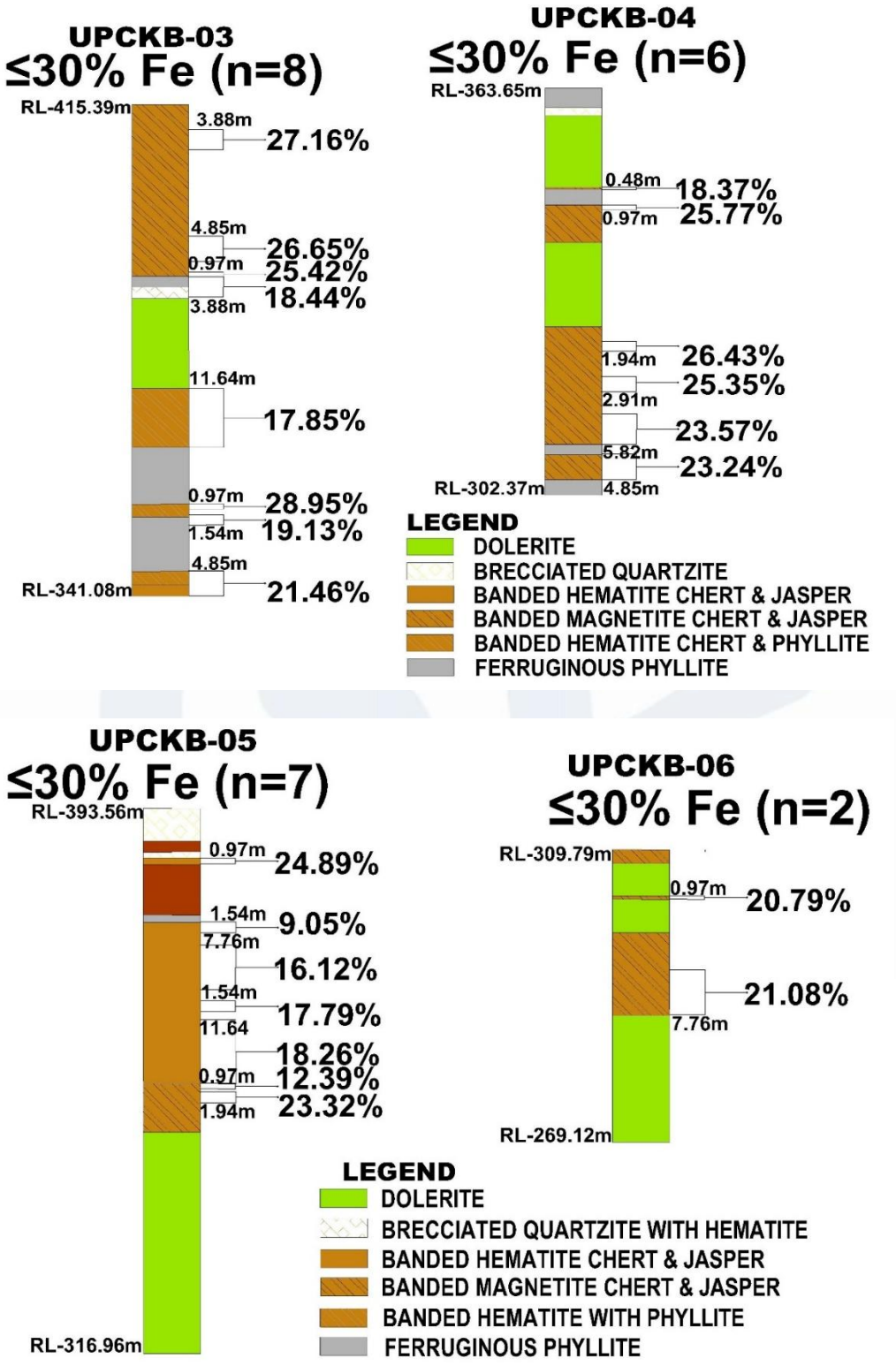


Figure 20.17. Downhole distribution of Fe-bearing intervals (≥35% Fe) in boreholes UPCKB-01,02,03,04,05 & 06

20.2.5 Detailed of intersected ≤30% Fe in drilled boreholes in block A2

In the **A2 Block**, UPJTB-01 contains iron-bearing lithologies including **BQ with iron matrix, tuff with phyllite and tuff**, with Fe(T) values ranging from **11.33% to 28.98%**. UPJTB-02 shows in Table-20.17 comparatively significant Fe enrichment associated with **felsic tuff with hematite, tuff with hematite and massive iron ore**, with Fe(T) values ranging from **18.69% to 26.55%**. The occurrence of hematite-bearing felsic tuff and massive iron ore, together with the comparatively elevated Fe(T) values, indicates a more concentrated iron-mineralized assemblage in UPJTB-02. Overall, the downhole data demonstrates **marked lithological and grade variability, multiple discrete mineralized intervals, and locally persistent Fe enrichment**, with BMC&J and BHC&J in the A1 Block representing moderate Fe-bearing domains and hematite-bearing tuffaceous to massive iron-ore lithologies in the A2 Block representing more concentrated Fe mineralization. These observations provide useful geological and geochemical constraints for interpreting **mineralized-zone geometry, downhole continuity, lithological controls on Fe enrichment** are shown in Figure-20.18.

Table-20.17: Intersected ≤30% Fe in drilled boreholes in block A2

Borehole ID	Sample Description	From	To	Thickness	Fe (T)
UPJTB-01	BQ with Iron Matrix	1.00	17.00	15.52	11.33
	Tuff with Phyllite	30.00	35.00	4.85	28.98
	Tuff	42.00	50.00	7.76	14.37
UPJTB-02	Felsic Tuff with Hematite	6.00	14.00	7.76	26.55
	Tuff with Hematite	24.00	25.00	0.97	20.79
	Massive Iron ore	33.00	35.00	1.94	18.69
	Massive Iron ore	37.00	38.00	0.97	23.95
	Felsic Tuff with Hematite	41.00	53.14	11.78	22.88
	Felsic Tuff with Hematite	56.00	60.00	3.88	25.19
	Felsic Tuff with Hematite	72.50	74.00	1.46	20.26
	Felsic Tuff	76.50	80.00	3.39	24.29

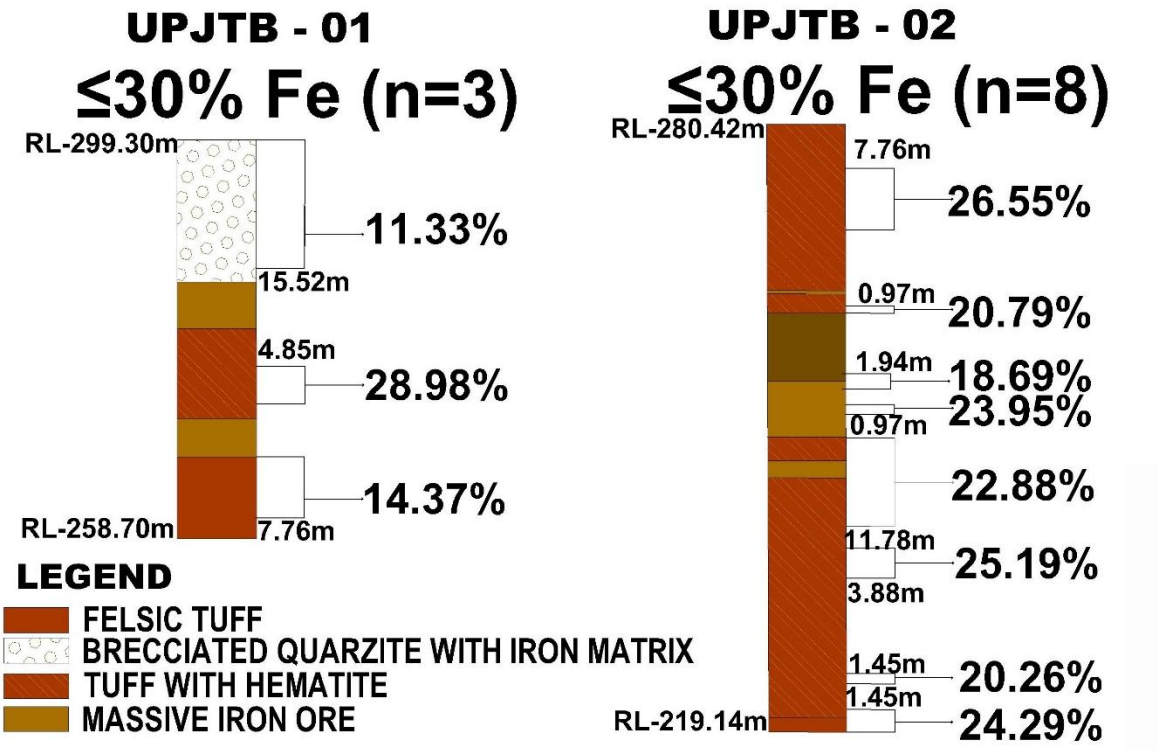


Figure 20.18. Downhole distribution of Fe-bearing intervals (≥35% Fe) in boreholes UPJTB-01 & 02

20.2.6 Resource estimation and assessment of associated titanium and vanadium mineralisation in iron Ore

TiO_2 and V_2O_5 have been identified as **associated TiO_2–V_2O_5 mineralisation associated with the iron ore mineralisation**, with Channel and Core sample results indicating significant concentrations above the respective cut-off grades. At the current **G4 (Reconnaissance Survey) stage**, no specific metallurgical recovery factors have been assumed or applied, as representative beneficiation and metallurgical test work has not yet been undertaken; therefore, the reported quantities represent **in-situ contained oxide estimates** and not recoverable product quantities.

Based on the available data, TiO_2 is estimated at **11.66 Mt @ 2.28%** TiO_2 in block A1, & **8.01Mt @ 6.45%** (**1.50%** cut-off) in block A2. while the combined A1–A2 TiO_2 estimate is **19.67 Mt @ 3.87%** TiO_2. The current detailed intersection data indicates a maximum true thickness of 12.61 m in A2. Similarly, the combined A1–A2 V_2O_5 estimate is 12.48 Mt @ 1,019.85 ppm V_2O_5 at a **500-ppm** cut-off. These are geological mineralisation estimates and are not equivalent to recoverable products without beneficiation and metallurgical studies.

A further mineralized zone indicates **8.01 Mt @ 5.94% TiO_2** and **8.01 Mt @ 1,089.63 ppm V_2O_5**, using the respective cut-off grades, with mineralized thickness ranging from **1.40–12.61 m**.

Table-20.18: Details of intersected titanium dioxide ore zones in drilled boreholes block A1

Details of intersected Ferruginous Phyllite ore zones in drilled boreholes Block A1						
At 1.50% TiO2 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade TiO2%**
UPCKB-01	Zone-I	48.00	56.00	8.00	7.76	3.50
	Zone-II	78.00	79.00	1.00	0.97	2.29
	Zone-III	85.00	86.00	1.00	0.97	1.56
	Zone-IV	88.00	89.00	1.00	0.97	2.40
	Zone-V	91.00	93.00	2.00	1.94	2.14
	Zone-VI	109.00	111.00	2.00	1.94	1.80
UPCKB-02	Zone-I	20.00	22.00	2.00	1.94	2.74
	Zone-II	24.00	26.00	2.00	1.94	2.67
	Zone-III	48.00	49.00	1.00	0.97	2.00
	Zone-IV	55.00	57.45	2.45	2.38	1.88
UPCKB-04	Zone-I	0.00	4.00	4.00	3.88	2.09
	Zone-II	20.00	23.00	3.00	2.91	1.75
	Zone-III	70.00	72.00	2.00	1.94	1.78
UPCKB-05	Zone-I	23.00	24.00	1.00	0.97	5.45
Details of intersected BHC&J ore zones in drilled boreholes Block A1						
At 1.50% TiO2 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade TiO2%**
UPCKB-02	Zone-I	77.00	79.00	2.00	1.94	1.53
	Zone-II	80.00	84.00	4.00	3.88	1.77
Details of intersected BMC&J ore zones in drilled boreholes Block A1						
At 1.50% TiO2 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade TiO2%**
UPCKB-03	Zone-I	56.00	68.00	12.00	11.64	1.77
	Zone-II	79.00	80.00	1.00	0.97	4.5
	Zone-III	92.00	93.00	1.00	0.97	1.54

The total estimated resource of Ferruginous Phyllite in Block A1 through Cross-Section Method at (**≥1.50 TiO2%)** is **6.28 million tonnes (MT)** with **wt. average grade of 2.47%TiO2**

Table-20.19: Total resources at ≥1.50 TiO2%) calculated by the cross-section method of ferruginous phyllite ore in block A1

Ferruginous Phyllite Ore Block A1 (≥1.50 TiO2%)									
BH-ID	**Length (M)**	**Plan Width (M)**	**Thickness (M)**	**Volume (M3)**	**Bulk Density (T/M3)**	**Tonnage (T)**	**TiO2 %**	**TiO2 Metal Oxides (Tonnes)**	**Avg. TiO2 (%)**
UPCKB-01	800	100	7.76	620800	2.73	1694784	3.5	59317	**2.47**
	800	100	0.97	77600	2.73	211848	2.29	4851	
	800	100	0.97	77600	2.73	211848	1.56	3305	
	800	100	0.97	77600	2.73	211848	2.4	5084	

	800	100	1.94	155200	2.73	423696	2.14	9067	
	800	100	1.94	155200	2.73	423696	1.8	7627	
UPCKB-02	800	100	1.94	155200	2.73	423696	2.74	11609	
	800	100	1.94	155200	2.73	423696	2.67	11313	
	800	100	0.97	77600	2.73	211848	2	4237	
	800	100	2.38	190120	2.73	519028	1.88	9758	
UPCKB-04	800	80	3.88	248320	2.73	677914	2.09	14168	
	800	80	2.91	186240	2.73	508435	1.75	8898	
	800	80	1.94	124160	2.73	338957	1.78	6033	
Total (Metric tonnes)						**6281293**		**155268**	
Total (Million tonnes)						**6.28**		**0.1553**	

The total estimated resource of Banded Hematite Chert & jasper in Block A1 through Cross-Section Method at (**≥1.50 TiO2%)** is **1.27 million tonnes (MT**) with **wt. average grade of 1.69%TiO2**

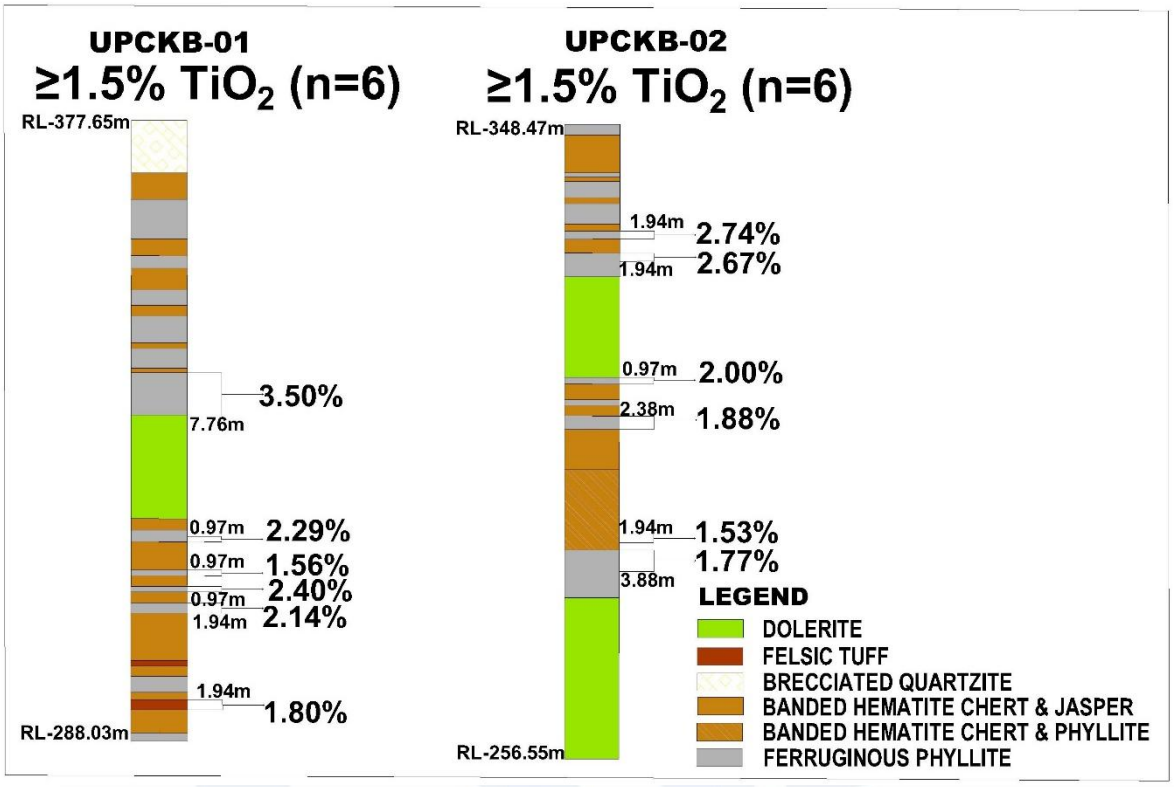
Table-20.20: Total resources at ≥1.50 TiO2%) calculated by the cross-section method of banded hematite chert & jasper ore in block A1

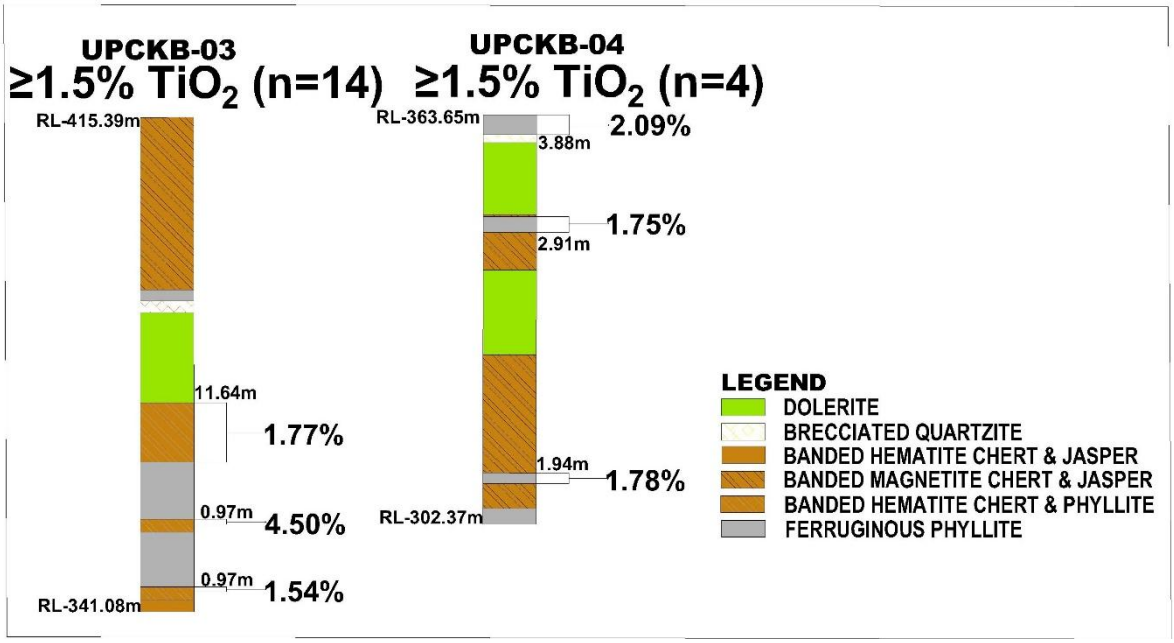
Banded Hematite Chert & Jasper Ore Block A1 (≥1.50 TiO2%)									
BH-ID	**Length (M)**	**Plan Width (M)**	**Thickness (M)**	**Volume (M3)**	**Bulk Density (T/M3)**	**Tonnage (T)**	**TiO2 % (CS)**	**TiO2 Metal Oxides (Tonnes)**	**Avg. TiO2 (%)**
UPCKB-02	800	100	1.94	155200	2.73	423696	1.53	6483	**1.69**
	800	100	3.88	310400	2.73	847392	1.77	14999	
Total (Metric tonnes)						**1271088**		**21481**	
Total (Million tonnes)						**1.27**		**0.0215**	

The total estimated resource of Banded Magnetite Chert & jasper in Block A1 through Cross-Section Method at (**≥1.50 TiO2%)** is **4.11 million tonnes (MT**) with **wt. average grade of 2.20%TiO2**

Table-20.21: Total resources at ≥1.50 TiO2%) calculated by the cross-section method of banded magnetite chert & jasper ore in block A1

Banded Magnetite Chert & Jasper Ore Block A1 (≥1.50 TiO2%)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**TiO2 % (CS)**	**TiO2 METAL OXIDES (tonnes)**	**Avg. TiO2 (%)**
UPCKB-03	800	110	11.64	1024320	3.23	3308554	1.8	58561	**2.2**
	800	110	0.97	85360	3.23	275713	4.5	12407	
	800	110	0.97	85360	3.23	275713	1.5	4246	
UPCKB-05	800	100	0.97	77600	3.23	250648	5.5	13660	
Total (Metric tonnes)						**4110627**		**88875**	
Total (Million tonnes)						**4.11**		**0.0889**	


UPCKB-01
≥1.5% TiO2 (n=6)
RL-377.65m
3.50%
7.76m
0.97m 2.29%
0.97m 1.56%
0.97m 2.40%
1.94m 2.14%
1.94m 1.80%
RL-288.03m
UPCKB-02
≥1.5% TiO2 (n=6)
RL-348.47m
1.94m 2.74%
1.94m 2.67%
0.97m 2.00%
2.38m 1.88%
1.94m 1.53%
1.77%
3.88m
RL-256.55m
LEGEND
DOLERITE
FELSIC TUFF
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED HEMATITE CHERT & PHYLLITE
FERRUGINOUS PHYLLITE


UPCKB-03
≥1.5% TiO2 (n=14)
RL-415.39m
11.64m
1.77%
0.97m 4.50%
0.97m 1.54%
RL-341.08m
UPCKB-04
≥1.5% TiO2 (n=4)
RL-363.65m
3.88m 2.09%
1.75%
2.91m
1.94m 1.78%
RL-302.37m
LEGEND
DOLERITE
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
BANDED HEMATITE CHERT & PHYLLITE
FERRUGINOUS PHYLLITE

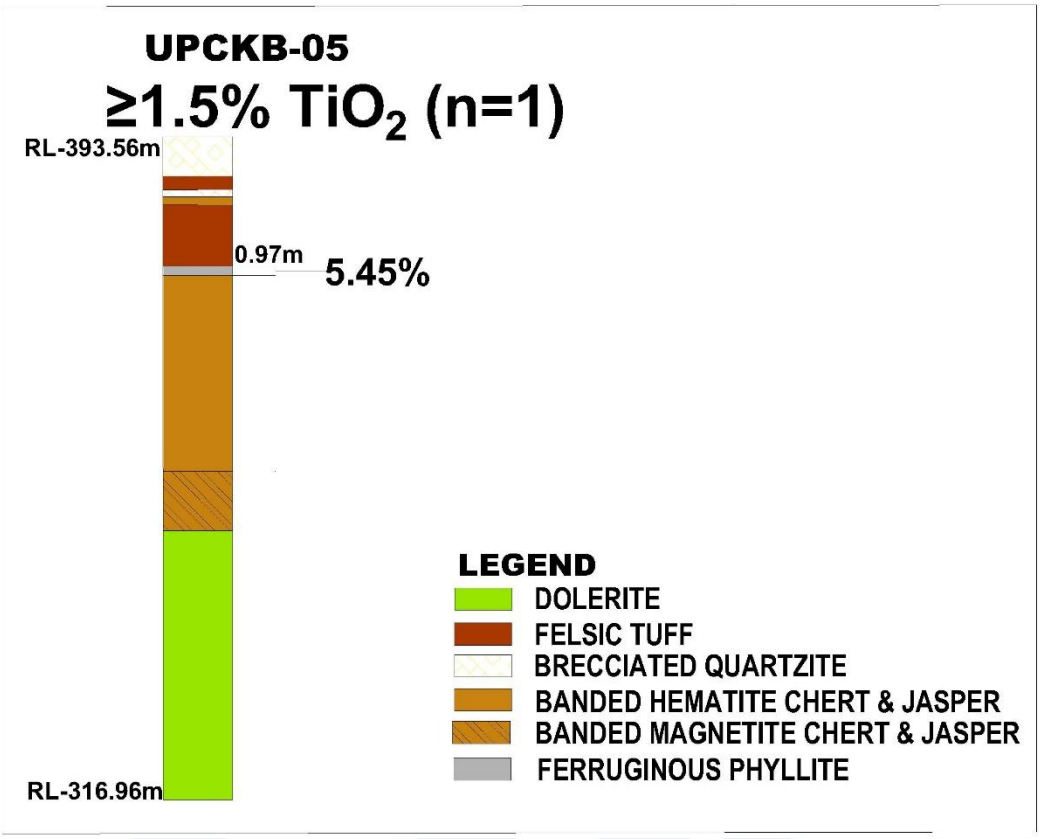


Figure 20.19. Downhole distribution of TiO_2-bearing intervals (≥1.5% TiO_2) in boreholes UPCKB-01,02,03,04 & 05.

The total estimated resource of Banded Magnetite Chert & jasper in Block A1 through Cross-Section Method at (**≥1.50 TiO2%)** is **4.11 million tonnes (MT**) with **wt. average grade of 2.20%TiO2**

Table-20.22: Total resources at ≥1.50 TiO2%) calculated by the cross-section method in block A1

Resource Estimation Block A1 (≥1.50 TiO2%)			
Lithology	**Tonnage (mT)**	**TiO2 Metal Oxides (Tonnes)**	**Avg. TiO2 (%)**
Ferruginous Phyllite	6281293	155268	**2.47**
Banded Hematite Chert & Jasper	1271088	21481	
Banded Magnetite Chert & Jasper	4110627	88875	
Total (mT)	**11663008**	**265624**	
Total (MT)	**11.66**	**0.27**	**2.28**

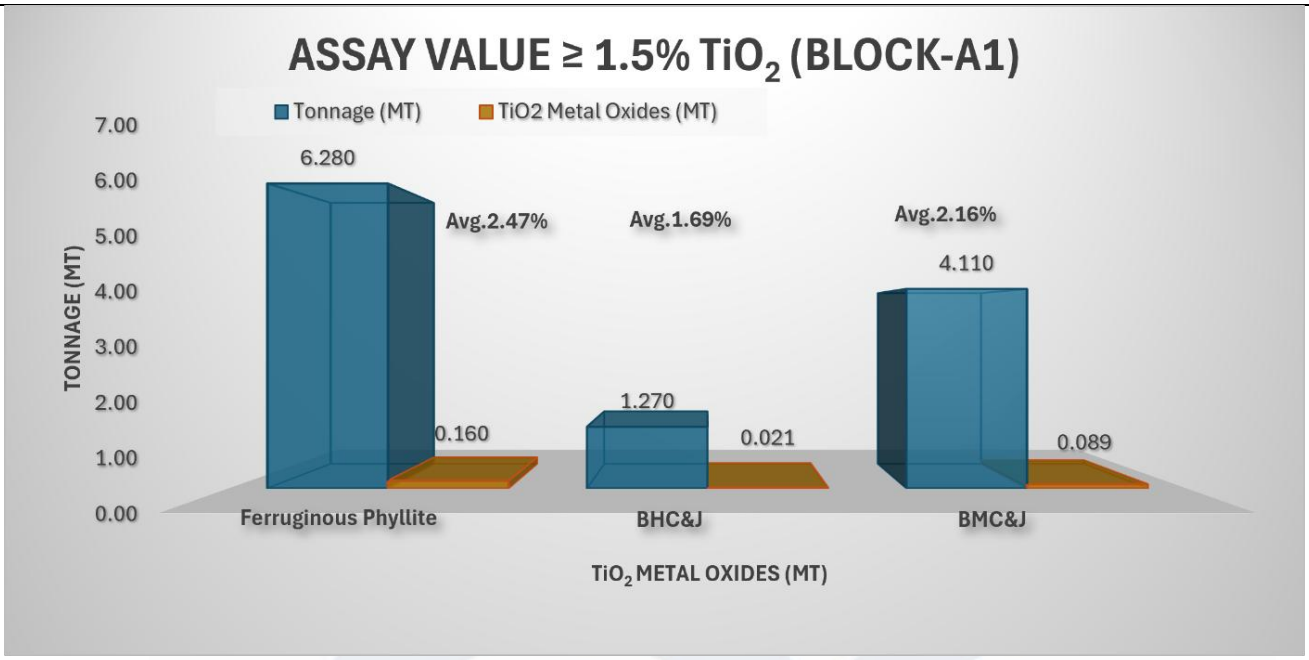


Figure 20.20: Bar diagram of resources based on TiO2 cut-off grades (≥1.5%) in block A1

Table-20.23: Details of intersected vanadium pentoxide ore zones in drilled boreholes block A1

Details of intersected Ferruginous Phyllite ore zones in drilled boreholes Block A1						
At 500 ppm V2O5 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade V2O5 ppm**
UPCKB-01	Zone-I	48.00	56.00	8.00	7.76	974
	Zone-II	78.00	79.00	1.00	0.97	547
	Zone-III	88.00	89.00	1.00	0.97	813
	Zone-IV	91.00	93.00	2.00	1.94	626
UPCKB-02	Zone-I	20.00	22.00	2.00	1.94	731
	Zone-II	24.00	26.00	2.00	1.94	783
	Zone-III	48.00	49.00	1.00	0.97	512
UPCKB-04	Zone-I	0.00	4.00	4.00	3.88	671
UPCKB-05	Zone-I	23.00	24.00	1.00	0.97	2310
Details of intersected BMC&J ore zones in drilled boreholes Block A1						
At 500 ppm V2O5 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade V2O5 ppm**
UPCKB-03	Zone-I	79.00	80.00	1.00	0.97	856

The total estimated resource of Ferruginous Phyllite in Block A1 through Cross-Section Method **(500 (ppm) V2O5)** is **3.94 million tonnes (MT)** with **wt. average grade of 807.4ppm**

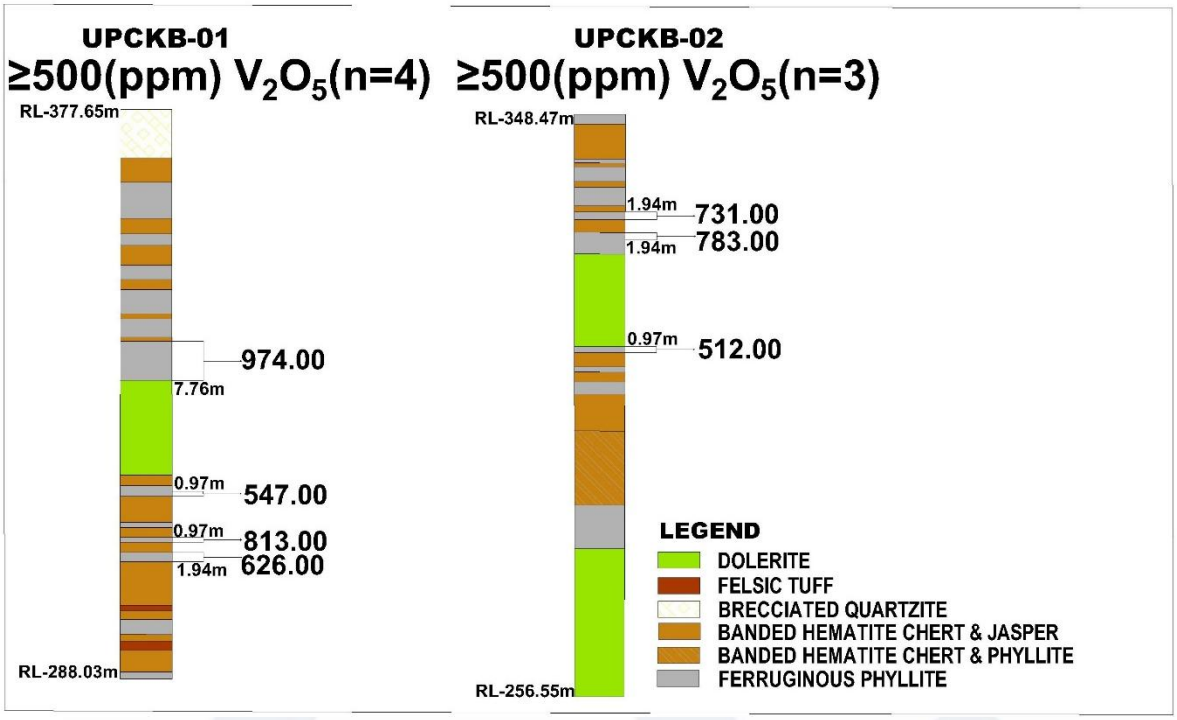
Table-20.24: Total resources at (500 (ppm) V2O5) calculated by the cross-section method of ferruginous phyllite ore in block A1

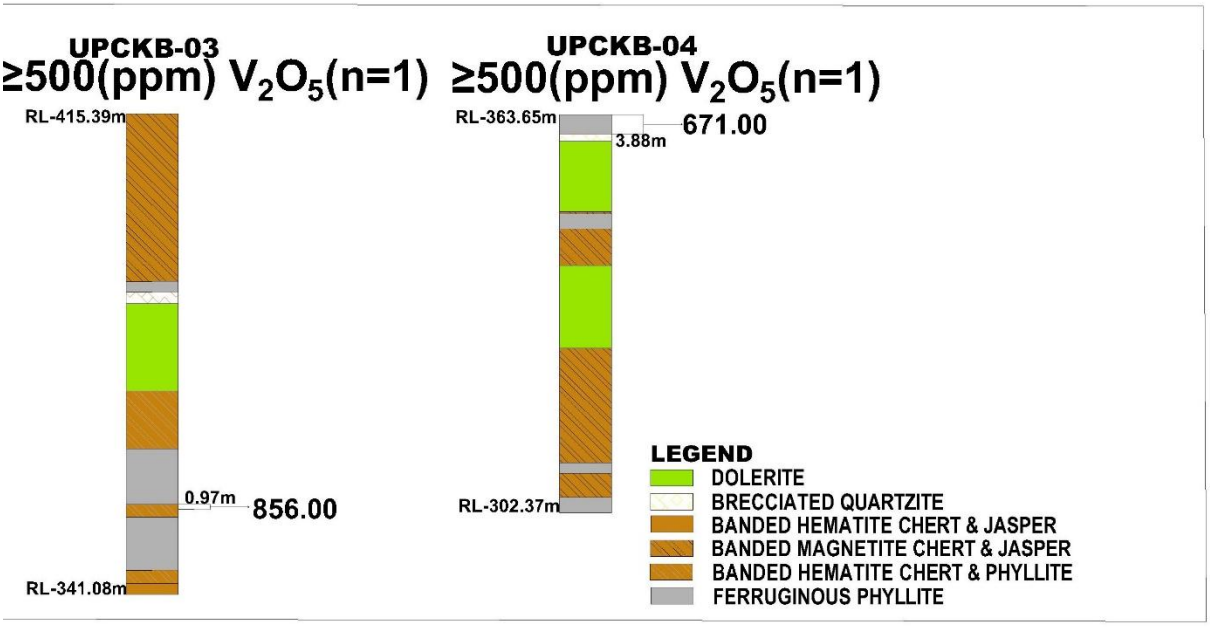
Ferruginous Phyllite Ore Block A1 (≥500 (ppm) V2O5)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**V2O5 ppm (CS)**	**V2O5 METAL OXIDES (tonnes)**	**Avg. V2O5 (ppm)**
UPCKB-01	800	100	7.76	620800	2.73	1694784	974	1651	**807.4**
	800	100	0.97	77600	2.73	211848	547	116	
	800	100	0.97	77600	2.73	211848	813	172	
	800	100	1.94	155200	2.73	423696	626	265	
UPCKB-02	800	100	1.94	155200	2.73	423696	731	310	
	800	100	1.94	155200	2.73	423696	783	332	
	800	100	0.97	77600	2.73	211848	512	108	
UPCKB-04	800	80	1.94	124160	2.73	338956.8	671	227	
Total (Metric tonnes)						**3940373**		**3181**	
Total (Million tonnes)						**3.94**		**0.003**	

The total estimated resource of Banded Magnetite Chert & jasper in Block A1 through Cross-Section Method **(500 (ppm) V_2O_5)** is **0.53 million tonnes (MT)** with **wt. average grade of 1548.00ppm**

Table-20.25: Total resources at (500 (ppm) V2O5) calculated by the cross-section method of banded magnetite chert & jasper ore in block A1

Banded Magnetite Chert & Jasper Ore Block A1 (≥500 (ppm) V2O5)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**V2O5 ppm (CS)**	**V2O5 METAL OXIDES (tonnes)**	**Avg. V2O5 (ppm)**
UPCKB-03	800	110	0.97	85360	3.23	275713	856	236	**1548**
UPCKB-05	800	100	0.97	77600	3.23	250648	2310	579	
Total (Metric tonnes)						**526361**		**815**	
Total (Million tonnes)						**0.53**		**0.001**	


UPCKB-01
≥500(ppm) V_2O_5(n=4)
RL-377.65m
974.00
7.76m
0.97m
547.00
0.97m
813.00
1.94m
626.00
RL-288.03m
UPCKB-02
≥500(ppm) V_2O_5(n=3)
RL-348.47m
1.94m
731.00
1.94m
783.00
0.97m
512.00
RL-256.55m
LEGEND
DOLERITE
FELSIC TUFF
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED HEMATITE CHERT & PHYLLITE
FERRUGINOUS PHYLLITE


UPCKB-03
≥500(ppm) V_2O_5(n=1)
RL-415.39m
0.97m
856.00
RL-341.08m
UPCKB-04
≥500(ppm) V_2O_5(n=1)
RL-363.65m
671.00
3.88m
RL-302.37m
LEGEND
DOLERITE
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
BANDED HEMATITE CHERT & PHYLLITE
FERRUGINOUS PHYLLITE

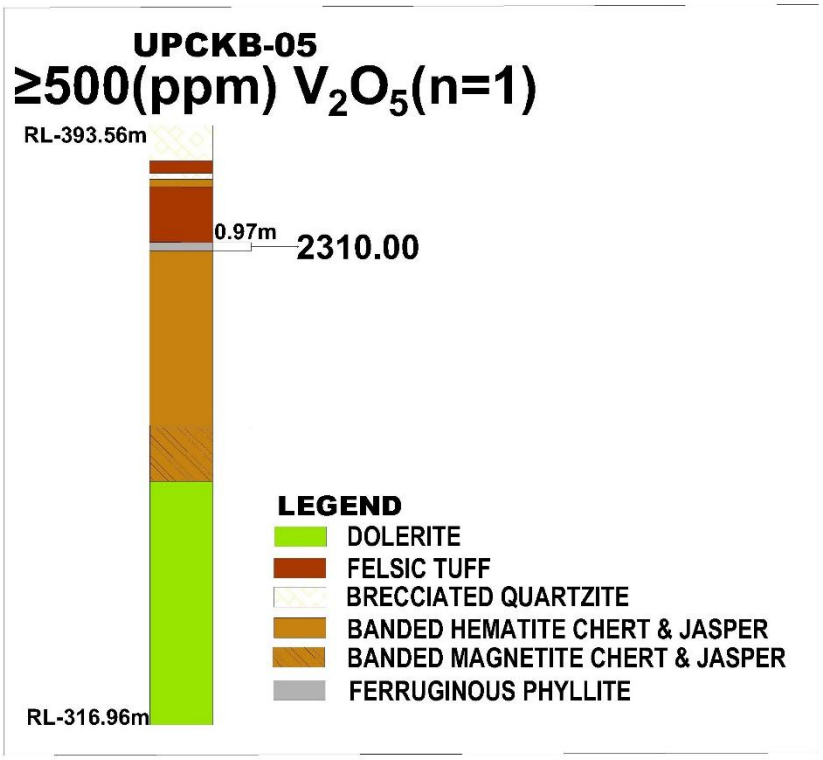


Figure 20.21. Downhole distribution of TiO_2-bearing intervals (≥500ppm V_2O_5) in boreholes UPCKB-01,02,03,04 & 05.

Table-20.26: Total resources at (≥500 ppm V2O5) calculated by the cross-section method in block A1

Resource Estimation Block A1 (≥500 ppm V2O5)			
Lithology	**Tonnage (mT)**	**V2O5 Metal Oxides (Tonnes)**	**Avg. V2O5 (ppm)**
Ferruginous Phyllite	3940373	3181	**807.4**
Banded Magnetite Chert & Jasper	526361	815	
Total (mT)	**4466734**	**3996**	
Total (MT)	**4.47**	**0.004**	**894.72**

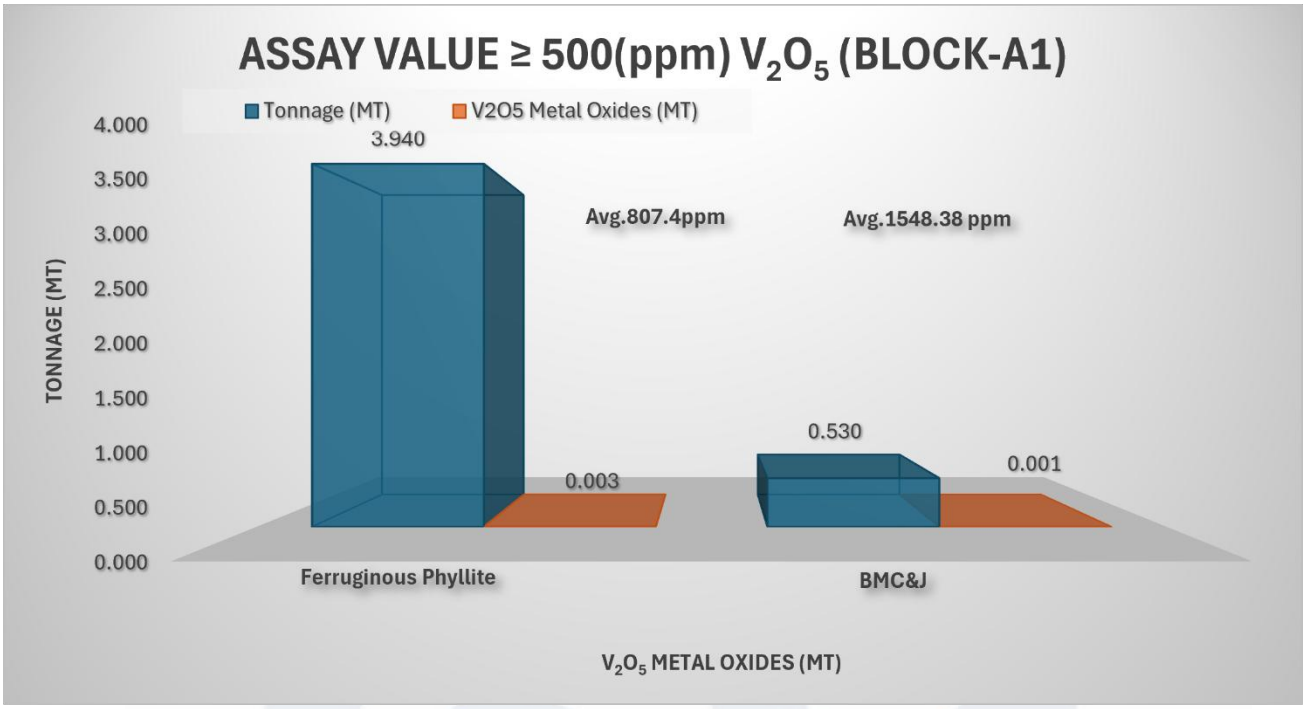


Figure 20.22: Bar diagram of resources based on V2O5 cut-off grades (≥500ppm) in block a1

Table-20.27: Details of intersected titanium dioxide ore zones in drilled boreholes block A2

Details of intersected Tuff with Phyllite ore zones in drilled boreholes Block A2						
At 1.50% TiO2 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade TiO2%**
UPJTB-01	Zone-I	25.00	35.00	10.00	9.70	4.92
	Zone-II	37.00	50.00	13.00	12.61	3.80
Details of intersected Tuff with Hematite ore zones in drilled boreholes Block A2						
At 1.50% TiO2 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade TiO2%**
UPJTB-02	Zone-I	6.00	14.00	8.00	7.76	7.30
	Zone-II	22.00	25.00	3.00	2.91	7.86
	Zone-III	41.00	45.00	4.00	3.88	8.29
	Zone-IV	46.44	53.14	6.70	6.50	7.62
	Zone-V	56.00	60.00	4.00	3.88	6.74
	Zone-VI	72.50	74.00	1.50	1.46	9.19
	Zone-VII	75.00	80.00	5.00	4.85	5.87
Details of intersected Massive Iron ore zones in drilled boreholes Block A2						
At 1.50% TiO2 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade TiO2%**
UPJTB-02	Zone-I	33.00	41.00	8.00	7.76	4.80
	Zone-II	45.00	46.44	1.44	1.3968	4.64

The total estimated resource of Tuff with Phyllite in Block A2 through Cross-Section Method (**1.50 TiO2%)** is **2.44 million tonnes (MT**) with **wt. average grade of 4.29%TiO2**

Table-20.28: Total resources at ≥1.50 TiO2%) calculated by the cross-section method of tuff with phyllite ore in block A2

Tuff with Phyllite Ore Block A2 (≥1.5% TiO2)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	TiO2 % (CS)	TiO2 METAL OXIDES (tonnes)	Avg. TiO2 (%)
UPJTB-01	800	50	9.7	388000	2.73	1059240	4.92	52115	**4.29**
	800	50	12.61	504400	2.73	1377012	3.8	52326	
Total (Metric tonnes)						**2436252**		**104441**	
Total (Million tonnes)						**2.44**		**0.104**	

The total estimated resource of Massive Iron Ore in Block A2 through Cross-Section Method (**1.50 TiO2%)** is **1.48 million tonnes (MT**) with **wt. average grade of 4.78%TiO2**

Table-20.29: Total resources at ≥1.50 TiO2%) calculated by the cross-section method of massive iron ore in block A2

Massive Iron Ore Block A2 (≥1.5% TiO2)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**TiO2 % (CS)**	**TiO2 METAL OXIDES (tonnes)**	**Avg. TiO2 (%)**
UPJTB-02	600	80	7.76	372480	3.37	1255258	4.8	60252	**4.78**
	600	80	1.4	67046	3.37	225946	4.64	10484	
Total (Metric tonnes)						**1481204**		**70736**	
Total (Million tonnes)						**1.48**		**0.0707**	

The total estimated resource of Tuff with Hematite Ore in Block A2 through Cross-Section Method (**1.50 TiO2%)** is **4.09 million tonnes (MT**) with **wt. average grade of 73.4%TiO2.**

Table-20.30: Total resources at ≥1.50 TiO2%) calculated by the cross-section method of tuff with hematite ore in block A2

Tuff with Hematite Ore Block A2 (≥1.5% TiO2)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**TiO2 % (CS)**	**TiO2 METAL OXIDES (tonnes)**	**Avg. TiO2 (%)**
UPJTB-02	600	80	7.76	372480	2.73	1016870	7.3	74232	**7.34**
	600	80	2.91	139680	2.73	381326	7.86	29972	
	600	80	3.88	186240	2.73	508435	8.29	42149	
	600	80	6.5	311952	2.73	851629	7.62	64894	
	600	80	3.88	186240	2.73	508435	6.74	34269	
	600	80	1.46	69840	2.73	190663	9.19	17522	
	600	80	4.85	232800	2.73	635544	5.87	37306	
Total (Metric tonnes)						**4092903**		**300344**	
Total (Million tonnes)						**4.09**		**0.3**	

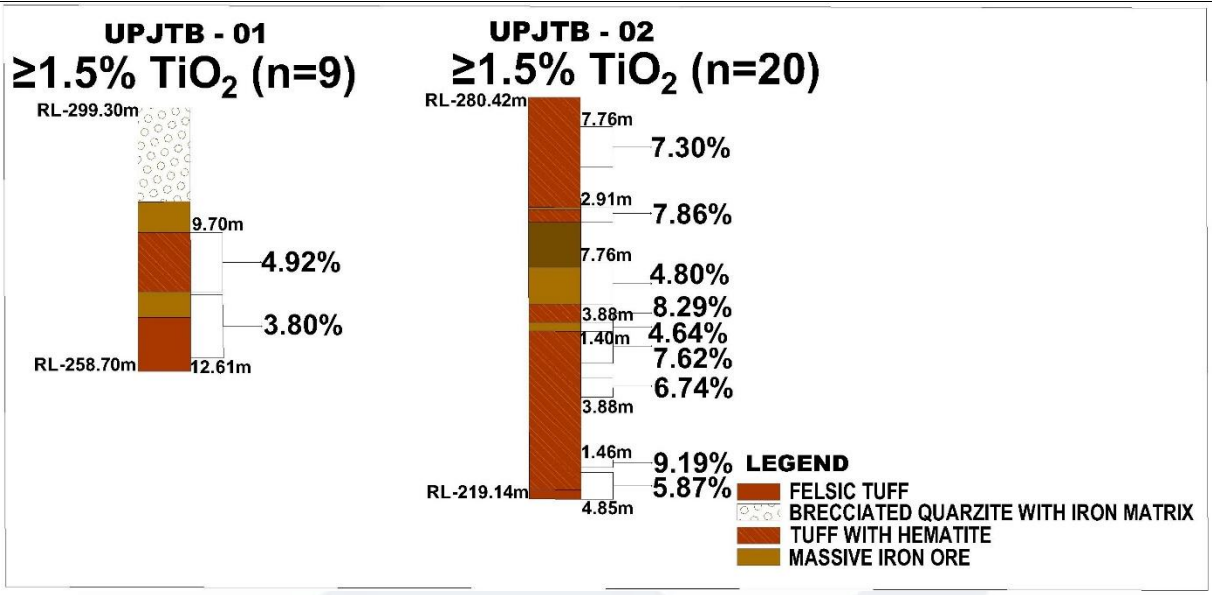


Figure 20.23. Downhole distribution of TiO_2-bearing intervals (≥1.5% TiO_2) in boreholes UPJTB-01 & 02

Table-20.31: Total resources at ≥1.50 TiO2%) calculated by the cross-section method in block A2

Resource Estimation Block A2 (≥1.5% TiO2)			
Lithology	**Tonnage (mT)**	**TiO2 Metal Oxides (Tonnes)**	**Avg. TiO2 (%)**
Massive Iron Ore	1481204	70736	**4.78**
Tuff with Phyllite	2436252	104441	
Tuff with Hematite	4092903	300344	
Total (mT)	**8010359**	**475521**	
Total (MT)	**8.01**	**0.48**	**5.94**

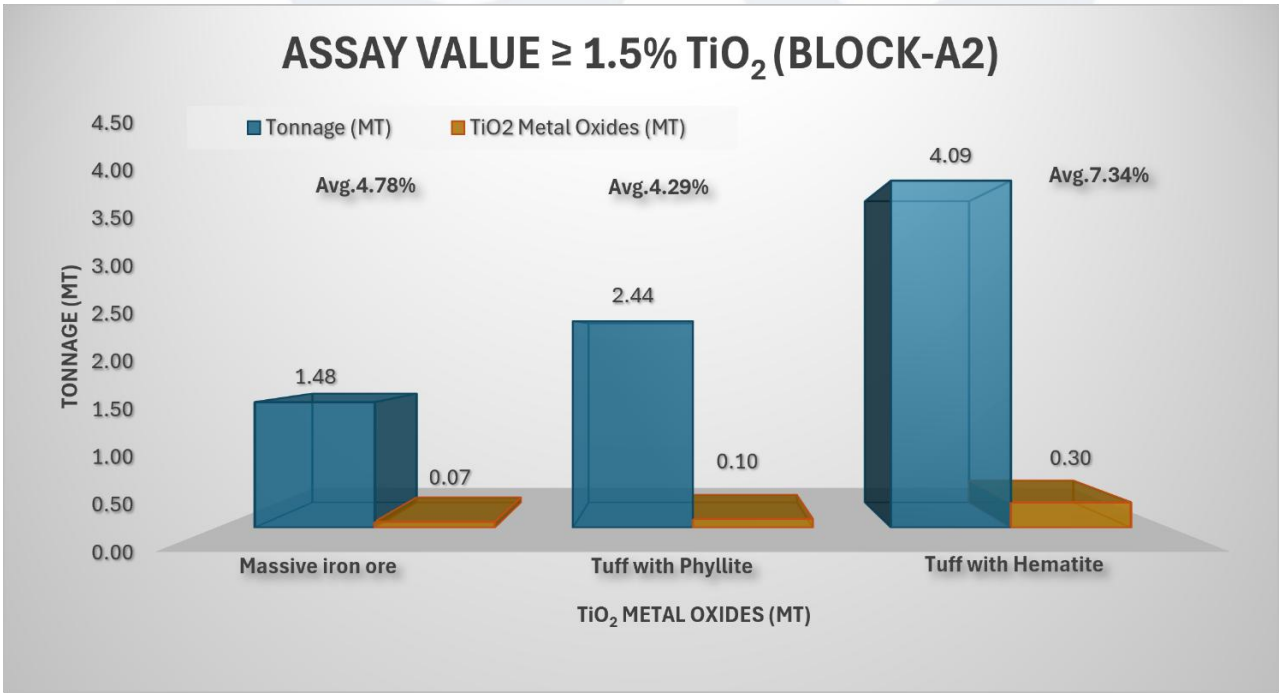


Figure 20.24: Bar diagram of resources based on TiO2 cut-off grades (≥1.5%) in block A2

Table-20.32: Details of intersected vanadium pentoxide ore zones in drilled boreholes block A2

Details of intersected Tuff with Phyllite ore zones in drilled boreholes Block A2						
At 500 ppm V2O5 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade V2O5 ppm**
UPJTB-01	Zone-I	25.00	35.00	10.00	9.7	782.50
	Zone-II	37.00	50.00	13.00	12.61	872.92
Details of intersected Tuff with Hematite ore zones in drilled boreholes Block A2						
At 500 ppm V2O5 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade V2O5 ppm**
UPJTB-02	Zone-I	6.00	14.00	8.00	7.76	1442.50
	Zone-II	22.00	25.00	3.00	2.91	1252.50
	Zone-III	41.00	45.00	4.00	3.88	1440.00
	Zone-IV	46.44	53.14	6.70	6.50	1362.48
	Zone-V	56.00	60.00	4.00	3.88	1445.00
	Zone-VI	72.50	74.00	1.50	1.46	1529.00
	Zone-VII	75.00	80.00	5.00	4.85	1009.80
Details of intersected Massive Iron ore zones in drilled boreholes Block A2						
At 500 ppm V2O5 Cut Off						
Borehole No.	**Mineralized Zone**	**From (m)**	**To (m)**	**Total Thickness (m)**	**True Thickness (m)**	**Weighted Avg. Grade V2O5 ppm**
UPJTB-02	Zone-I	33.00	41.00	8.00	7.76	796.75
	Zone-II	45.00	46.44	1.44	1.40	851.72

The total estimated resource of Tuff with Phyllite in Block A2 through Cross-Section Method **(500 (ppm) V_2O_5)** is **2.44 million tonnes (MT)** with **wt. average grade of 833.61ppm**

Table-20.33: Total resources at (500 (ppm) V2O5) calculated by the cross-section method of tuff with phyllite ore in block A2

Tuff with Phyllite Ore Block A2 (≥500 (ppm) V2O5)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**V2O5**	**V2O5 METAL OXIDES**	**Avg.**
							ppm	**(tonnes)**	**V2O5**
							(CS)		**(ppm)**
UPJTB-01	800	50	9.7	388000	2.73	1059240	782.5	829	**833.61**
	800	50	12.61	504400	2.73	1377012	872.92	1202	
Total (Metric tonnes)						**2436252**		**2031**	
Total (Million tonnes)						**2.44**		**0.002**	

The total estimated resource of Tuff with Hematite in Block A2 through Cross-Section Method **(500 (ppm) V_2O_5)** is **4.09 million tonnes (MT)** with **wt. average grade of 1344.99 ppm.**

Table-20.34: Total resources at (500 (ppm) V2O5) calculated by the cross-section method of tuff with hematite ore in block A2

Tuff with Hematite Ore Block A2 (≥500 (ppm) V2O5)									
BH-ID	**LENGTH (M)**	**PLAN WIDTH (M)**	**THICKNESS (M)**	**VOLUME (M3)**	**BULK DENSITY (t/m3)**	**TONNAGE (t)**	**V2O5 ppm**	**V2O5 METAL OXIDES (tonnes)**	**Avg. V2O5 (ppm)**
UPJTB-02	600	80	7.76	372480	2.73	1016870	1442.5	1467	**1344.99**
	600	80	2.91	139680	2.73	381326	1252.5	478	
	600	80	3.88	186240	2.73	508435	1440	732	
	600	80	6.5	311952	2.73	851629	1362.48	1160	
	600	80	3.88	186240	2.73	508435	1445	735	
	600	80	1.46	69840	2.73	190663	1529	292	
	600	80	4.85	232800	2.73	635544	1009.8	642	
Total (Metric tonnes)						**4092903**		**5505**	
Total (Million tonnes)						**4.09**		**0.006**	

The total estimated resource of Massive Iron Ore in Block A2 through Cross-Section Method **(500 (ppm) V_2O_5)** is **4.09 million tonnes (MT)** with **wt. average grade of 1344.99 ppm**

Table-20.35: Total resources at (500 (ppm) V2O5) calculated by the cross-section method of tuff with massive iron ore in block A2

Massive Iron Ore Block A2 (≥500 (ppm) V2O5)									
BH-ID	**Length (M)**	**Plan Width (M)**	**Thickness (M)**	**Volume (M3)**	**Bulk Density (T/M3)**	**Tonnage (T)**	**V2O5 Ppm (Cs)**	**V2O5 Metal Oxides (Tonnes)**	**Avg. V2O5 (ppm)**
UPJTB-02	600	80	7.76	372480	3.37	1255258	796.75	1000	**805.14**
	600	80	1.4	67046	3.37	225946	851.72	192	
Total (Metric tonnes)					**1481204**			**1193**	
Total (Million tonnes)					**1.48**			**0.001**	

Table-20.36: Total resources Estimation at (500 (ppm) V2O5) calculated by the cross-section method in block A2

Resource Estimation Block A2 (≥500 ppm V2O5)			
Lithology	**Tonnage (mT)**	**V2O5 Metal Oxides (Tonnes)**	**Avg. V2O5 (ppm)**
Massive Iron Ore	1481204	1193	**805.14**
Tuff with Phyllite	2436252	2031	
Tuff with Hematite	4092903	5505	
Total (mT)	**8010359**	**8728**	
Total (MT)	**8.01**	**0.009**	**1089.63**

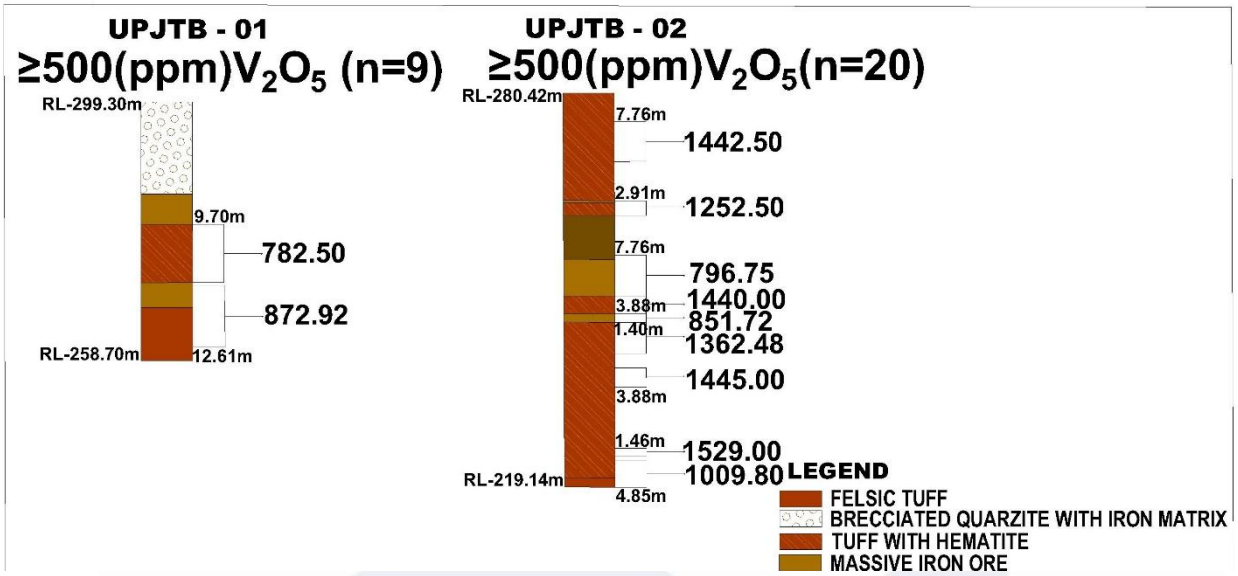


Figure 20.25. Downhole distribution of TiO_2-bearing intervals (≥1.5% TiO_2) in boreholes UPJTB-01 & 02

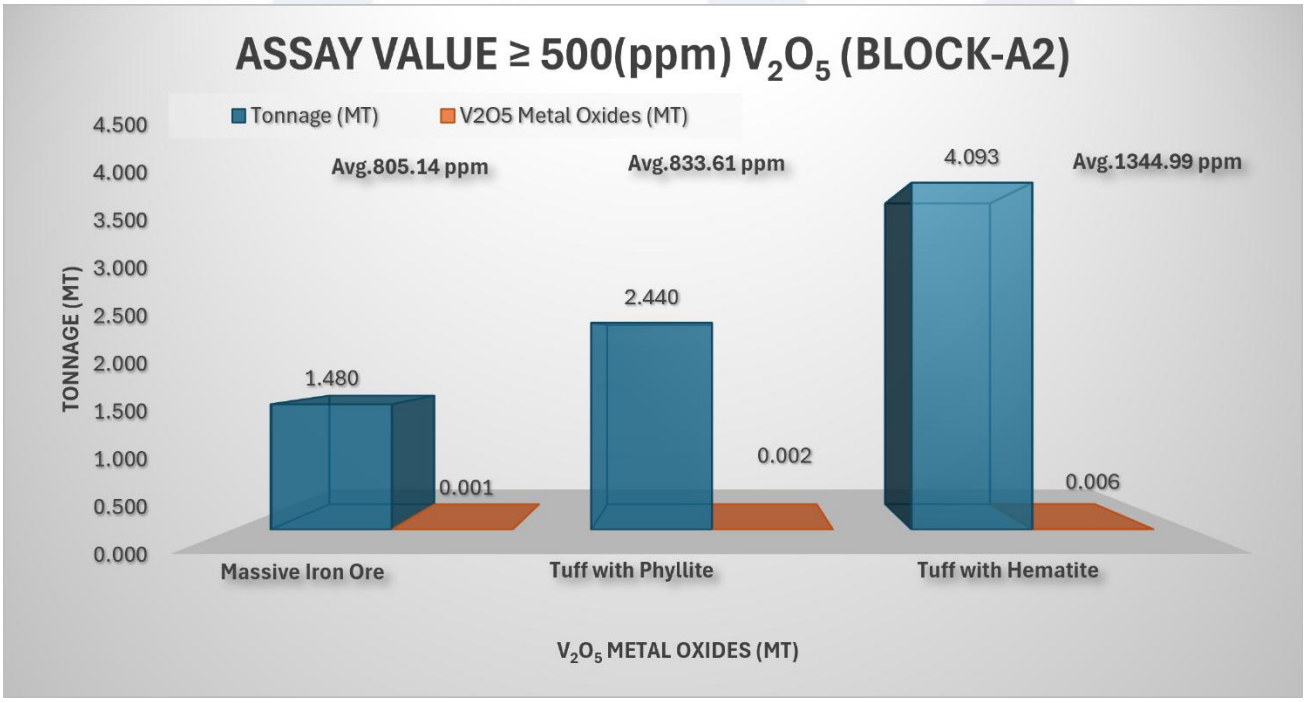


Figure 20.26: Bar diagram of resources based on V2O5 cut-off grades (≥500ppm) in block A2

Table-20.37: Total resources estimation at (≥30 Fe%)) calculated by the cross-section method in block A1 & A2

Resource Estimation Block A1 & A2 (≥30 Fe%)			
Lithology	**Tonnage (mT)**	**Fe Metal (Tonnes)**	**Avg. (Fe%)**
BHC&J	5204477	1810922	**34.80**
BMC&J	11742859	4189882	
Massive Iron Ore	2562818	1065821	
Tuff with Hematite	910946	318888	
Total (mT)	**20421100**	**7385514**	
Total (MT)	**20.42**	**7.39**	**36.17**

Table-20.38: Total resources estimation at (≥1.50 TiO2%) calculated by the cross-section method in block A1 & A2

Resource Estimation Block A1 & A2 (≥1.50 TiO2%)			
Lithology	**Tonnage (mT)**	**TiO2 Metal Oxides (Tonnes)**	**Avg. TiO2 (%)**
Ferruginous Phyllite	6281293	155268	**2.47**
Banded Hematite Chert & Jasper	1271088	21481	
Banded Magnetite Chert & Jasper	4110627	88875	
Massive Iron Ore	1481204	70736	
Tuff with Phyllite	2436252	104441	
Tuff with Hematite	4092903	300344	
Total (mT)	**19673368**	**741145**	
Total (MT)	**19.67**	**0.74**	**3.77**

Table-20.39: Total resources estimation at (≥500 ppm V2O5) calculated by the cross-section method in block A1 & A2

Resource Estimation Block A1 & A2 (≥500 ppm V2O5)			
Lithology	**Tonnage (mT)**	**V2O5 Metal Oxides (mT)**	**Avg. V2O5 (ppm)**
Ferruginous Phyllite	3940373	3181	**807.4**
Banded Magnetite Chert & Jasper	526361	815	
Massive Iron Ore	1481204	1193	
Tuff with Phyllite	2436252	2031	
Tuff with Hematite	4092903	5505	
Total (mT)	**12477093**	**12725**	
Total (MT)	**12.48**	**0.013**	**1019.85**

CHAPTER 21: SUMMARY AND RECOMMENDATIONS

21.1 Summary

Based on large scale geological mapping, BRS, channel sampling, drilling, petrographic, and mineralographic investigations carried out during the G4 level exploration in the Chakdiya A1 & Jorba A2 Blocks, the following conclusions are drawn:

1. **Targets Assigned vs Targets Achieved**: The G4-stage reconnaissance survey for iron ore and associated mineralization in the Chakdiya A1 and Jorba A2 Blocks of Sonbhadra District, Uttar Pradesh, was successfully completed, with all planned activities achieving their respective targets. The entire 18.56 km² area was systematically covered and geologically mapped on a 1:12,500 scale, supported by DGPS surveys (9 no's). Field investigations, including Channeling (13 no's) and drilling (700.10 m), were effectively executed. Geochemical studies were also completed, comprising bedrock sampling (91 samples), channel sampling (150 samples), and core sampling (309 samples). Overall, all project objectives were efficiently fulfilled, enabling a comprehensive evaluation of the iron ore mineralization potential of the study area.

2. Continuity and Extent of Mineralisation: Channel sampling and drilling provide preliminary evidence for lateral and vertical persistence of iron-bearing zones within the investigated areas. The borehole distribution is wide-spaced and irregular, and the current data provide preliminary control on deposit geometry rather than continuous subsurface confirmation between all boreholes. The mapped/prospective BIF trends in Block A1 extend for up to approximately 7 km, while the investigated mineralised bands in Block A2 show prospective strike continuity of approximately 1 km. These mapped extents should not be interpreted as fully demonstrated subsurface mineralised continuity. The occurrence of Tuff with Phyllite and Tuff with Hematite in the drilled cores, together with encouraging TiO_2 and V_2O_5 indications in selected samples, further enhances the mineral potential of the area. Further detailed drilling is recommended to establish depth-wise continuity and improve geological confidence.

3. Resource Estimation (Reconnaissance Mineral Resource; UNFC 334): Based on the integration of geological, geochemical and drilling data, reconnaissance-stage iron mineralisation has been evaluated using the Cross-Sectional Method. The present G4 investigation "Reconnaissance Inferred Resource" (UNFC 334). The estimated resources at the applicable cut-off grades are summarised below; the broader ≥15% Fe BMC&J estimate remains subject to final true-thickness and polygon reconciliation.

   The total resources of Block A1 and Block A2, estimated by the Cross-Sectional Method at a ≥30% Fe cut-off grade, are 20.42 million tonnes (MT) with a weighted average grade of 36.17% Fe. The current true-thickness range represented in the detailed ≥30% Fe intersection tables is 0.49 m to 13.58 m. At a ≥35% Fe cut-off grade, the combined resource is 8.70 MT with a weighted average grade of approximately 40.69% Fe, while the current true-thickness range is 0.49 m to 5.82 m. These figures should be frozen only after the final geometry audit described in the resource-estimation methodology is completed.

4. Multi-Commodity Mineralisation Potential: The investigation identifies Fe–Ti–V-bearing mineralisation in Blocks A1 and A2, hosted by BMC&J, BHC&J, Massive Iron Ore and Tuff with Hematite units. The current reconnaissance-stage estimates were derived using the Cross-Sectional Method. They should be treated as geological mineralisation estimates rather than recoverable multi-commodity products until mineralogical, beneficiation and metallurgical studies establish the relevant recovery factors.
   In addition to iron, the mineralisation is enriched in titanium and vanadium, indicating potential for future multi-commodity evaluation. At a ≥1.50% TiO_2 cut-off, the estimated combined resource is 19.67 MT with a weighted average grade of 3.77% TiO_2 and current true-thickness observations ranging from 0.97 m to 12.61 m. At a ≥500 ppm V_2O_5 cut-off, the estimated combined resource is 12.48 MT with a weighted average grade of 1,019.85 ppm V_2O_5 and current true-thickness observations ranging from 0.97 m to 12.61 m. These figures represent geological mineralisation estimates; recovery cannot be assumed without appropriate beneficiation and metallurgical studies.

5. The resource estimates indicate that a ≥30% Fe cut-off grade captures a substantial component of the currently delineated iron-bearing mineralisation while retaining associated TiO_2- and V_2O_5-bearing zones. The deposit therefore has potential for future integrated multi-commodity evaluation, with iron as the principal commodity and titanium and vanadium considered as

associated mineralisation subject to mineralogical, beneficiation, metallurgical and techno-economic evaluation. No recovery factor has been applied at the present stage.

6. The reported Fe grades show significant variability between lithologies and mineralised intervals. Resource confidence is governed by the geological continuity, data density, sampling quality and estimation methodology rather than by the absolute grade level.

21.2 Recommendation

Based on the encouraging results obtained from the G4-level exploration in the Chakdiya (A1) and Jorba (A2) Blocks, the following recommendations are proposed for further advancement of the project:

1. **Further Exploration / Composite Licence**: Based on the encouraging results of **G4-level exploration** in **Chakdiya (Block A1)** and **Jorba (Block A2)**, further detailed exploration is recommended in the prospective mineralised portions. **Block A1** may be subdivided into **three prospective sub-blocks of approximately 2 km² each** along the principal mineralised trends and taken up for **G3-level detailed exploration** or considered for grant/auction of a **Composite Licence**, as decided by the competent State Government authority. The existing drilling is **wide-spaced and irregular** and should not be interpreted as drilling at a uniform 400 m interval. **Block A2 may be delineated into two prospective sub-blocks** based on the identified mineralised trends, geological continuity, surface sampling and scout drilling results, and both sub-blocks are recommended for **further detailed exploration at G3 level** to establish the continuity, thickness, grade distribution and subsurface extent of the mineralised zones.

2. **Detailed Geological and Structural Studies:** Comprehensive large-scale geological and structural mapping is recommended to establish the **lithological and structural controls of iron ore mineralization**, with particular emphasis on **lithological contacts, faults, folds, shear zones, fractures and deformation patterns** controlling the occurrence, continuity and geometry of the mineralized zones. The results should be used to refine the geological model and guide the planning of subsequent detailed exploration and drilling.

3. Detailed Resource Estimation and Classification: Updated resource estimation and classification should be undertaken after additional drilling, geological interpretation and refined three-dimensional geological modelling in the next stage of exploration. The estimation should follow the applicable Indian reporting framework. The present G4 work should be reported as a Reconnaissance Mineral Resource (UNFC 334); any future upgrading of confidence should be based on additional geological and drilling evidence rather than assumed continuity.

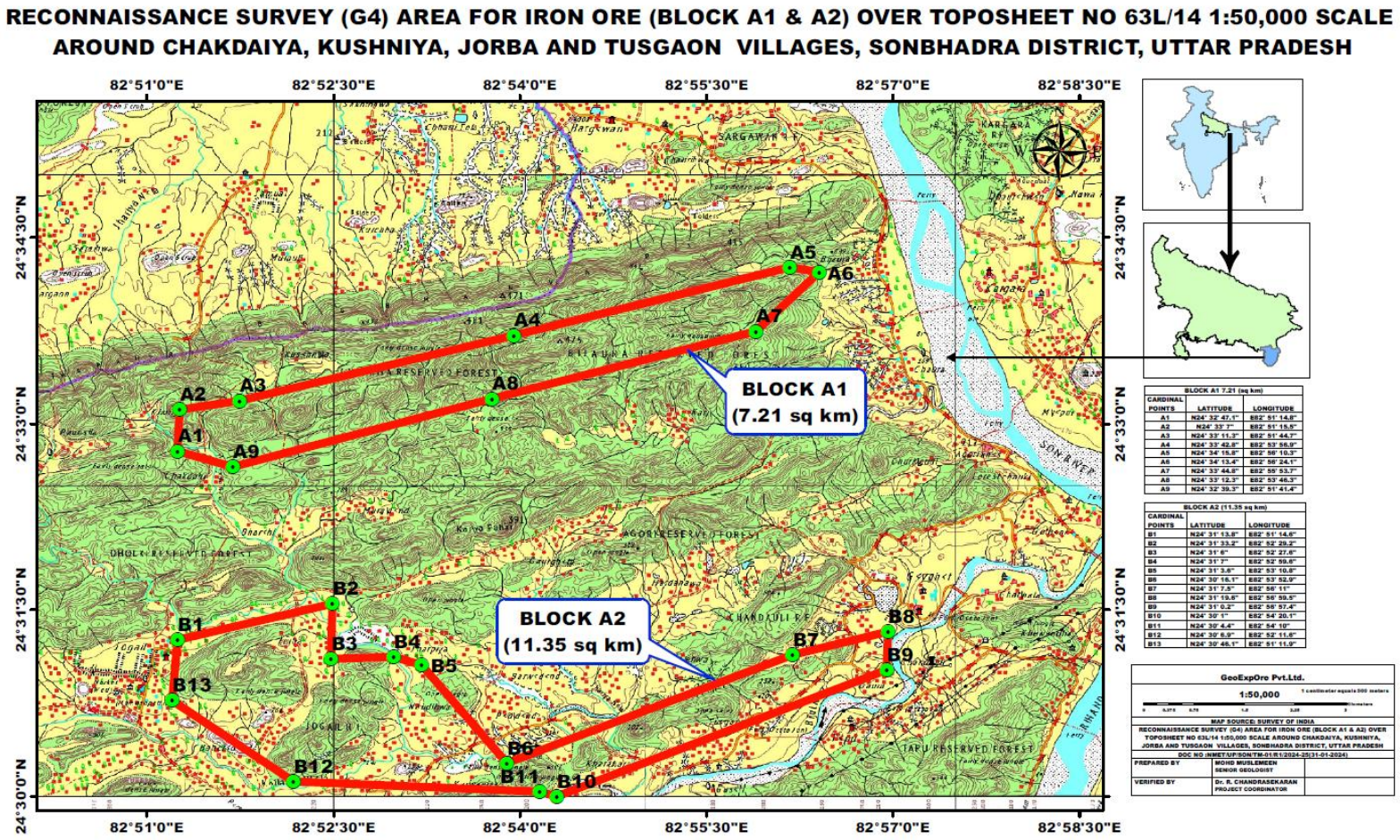
4. Beneficiation Studies: As further exploration advances and the mineralised zones are better defined, comprehensive beneficiation studies should be undertaken to establish processing characteristics and recovery potential. These studies should evaluate iron recovery as the principal

objective and assess the potential recovery of associated titanium and vanadium, supported by mineralogical and metallurgical test work.

5. Pre-feasibility Studies: Following further exploration, resource upgrading and completion of appropriate beneficiation and metallurgical investigations, suitable technical-economic studies may be undertaken to assess the potential technical and economic viability of mining and processing the mineralisation in the Chakdiya A1 and Jorba A2 Blocks.

CHAPTER 22: PLATES AND MAPS

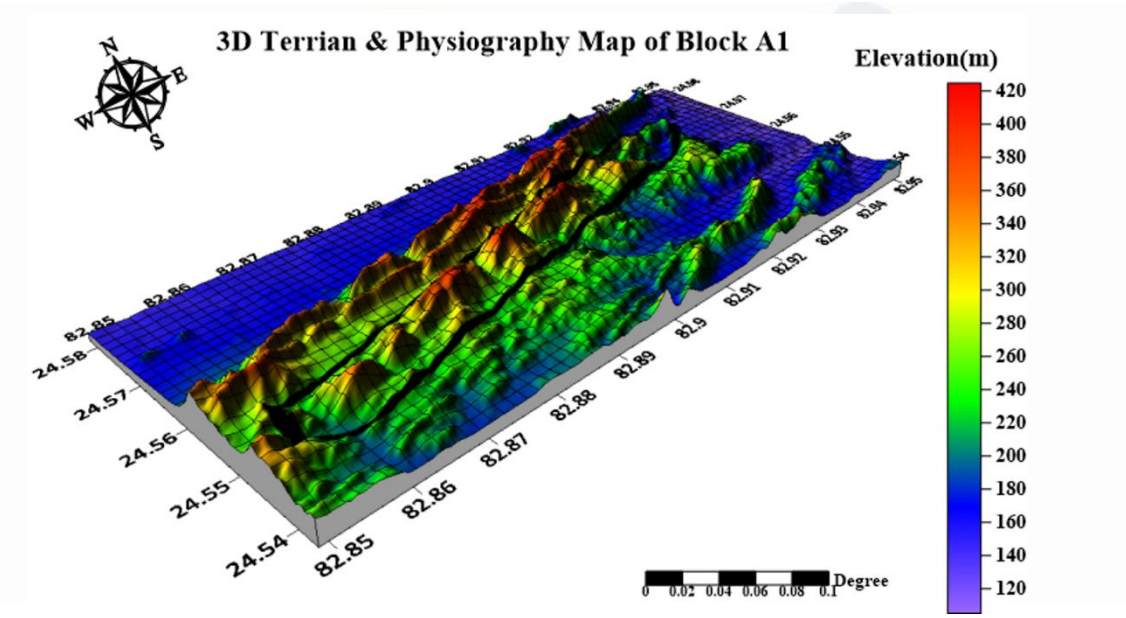
22.1 Location plan of the area on 1:50000 showing various topographic and physiographic features near the project site.

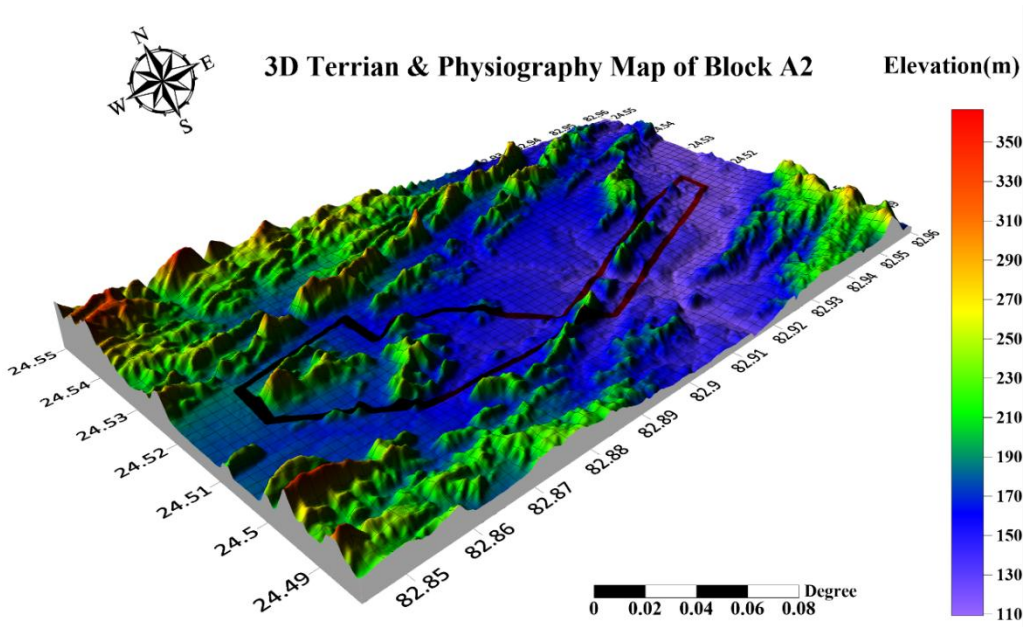


22.2 Topographic map/ cadastral plan on 1:4000, if available.

The explored block was taken up by GeoExpOre at the G4 (Reconnaissance Survey) stage, with geological and investigations carried out at a scale of 1:12,500.

22.3 A physiography or surface topography plan showing various topographical and physiographical features.





22.4 Surface geological plan on appropriate scale showing reliable geological map of appropriate scale with Differential Global Positioning System (DGPS) - global coordinates of the corner points showing major lithological units, structural and tectonic features; extent of surface mineralisation, structure, location of boreholes, pits, trenches, old workings, etc. If the area or part of it has been covered under exploration earlier, then the same with the location details should be shown in a map in appropriate scale.

22.4.1 Outcrop map of iron ore Block A1& A2 Sonbhadra, on scale 1:12,500

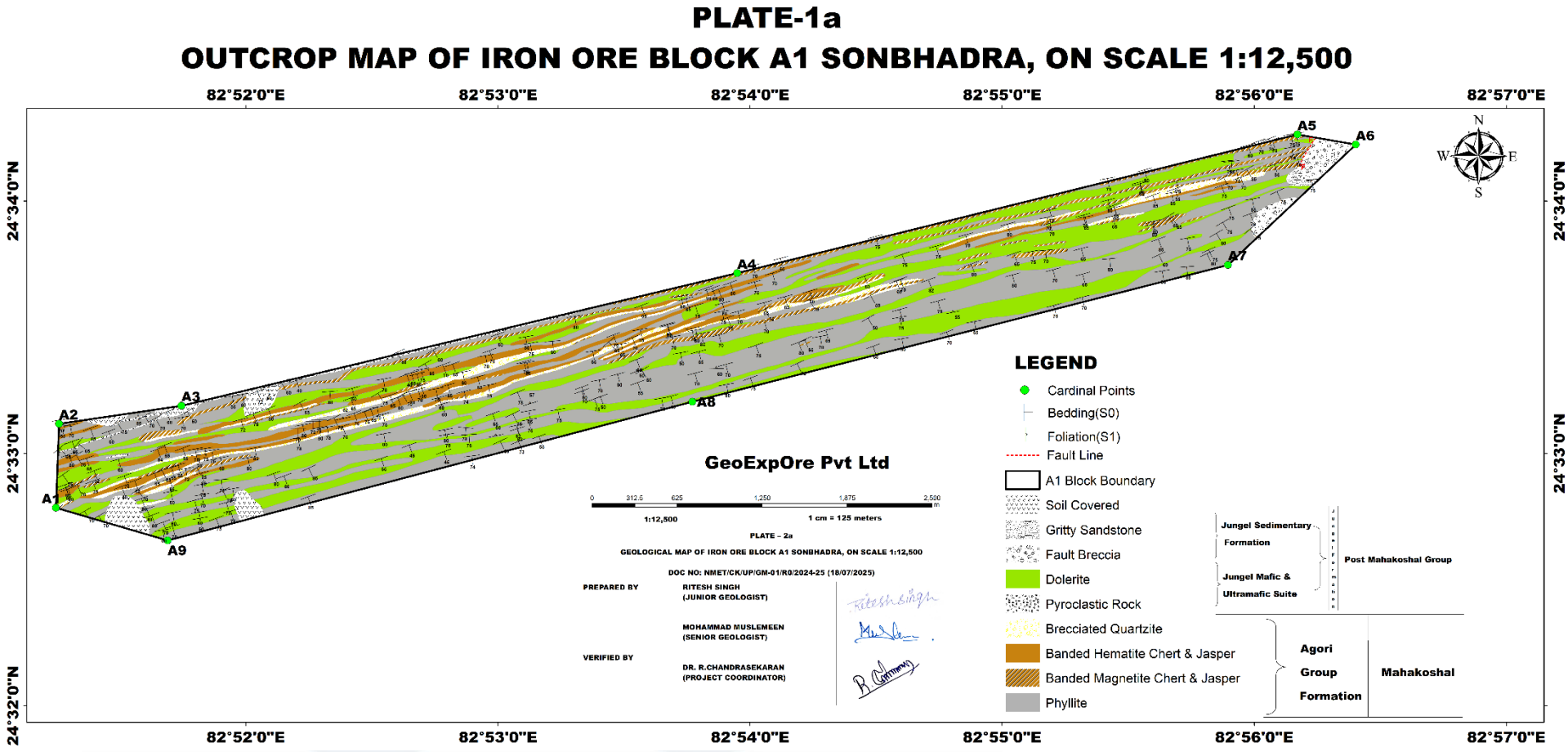
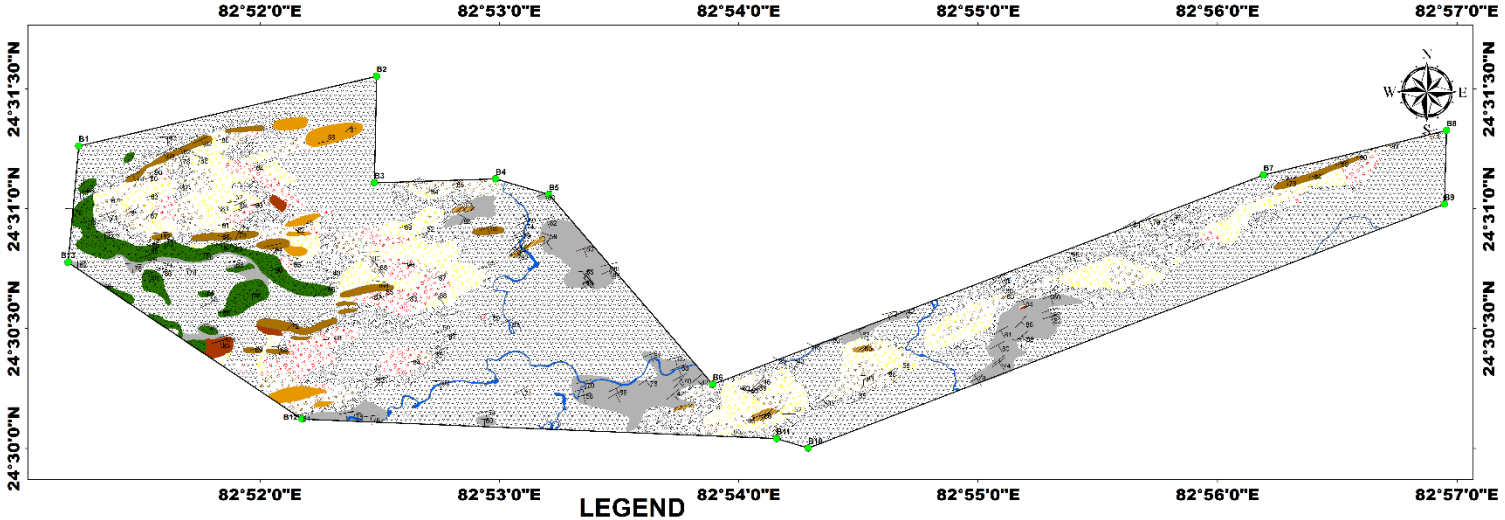


PLATE - 1b

OUTCROP MAP OF IRON ORE BLOCK A2 SONBHADRA, SCALE 1:12,500



GeoExpOre Pvt Ltd

0 312.5 625 1,250 1,875 2,500 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 1b

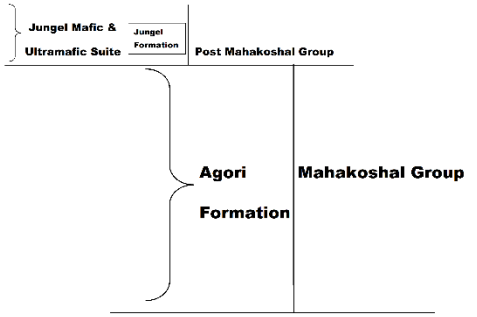
OUTCROP MAP OF IRON ORE BLOCK A2 SONBHADRA, ON SCALE 1:12,500

DOC NO: NMET/UP/JT/OCM-01/R0/2024-25 (19/07/2025)

PREPARED BY	RITESH SINGH (JUNIOR GEOLOGIST)	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)	

LEGEND

- Cardinal Points
- A2 Block Boundary
- Nala Channel
- Bedding (S0)
- Foliation (S1)
- Foliation (S2)
- Joint
- Soil Covered
- Laterite Caping
- Felsic Tuff
- Metabasalt
- Phyllite covered with BQ boulders & fragments
- Brecciated Quartzite
- Brecciated Quartzite with Jasper
- Brecciated Quartzite with Iron Matrix
- Massive Iron Ore
- Banded Hematite/Magnetite Chert & Jasper
- Phyllite



22.4.2 Geological map of iron ore Block A1& A2 Sonbhadra, on scale 1:12,500

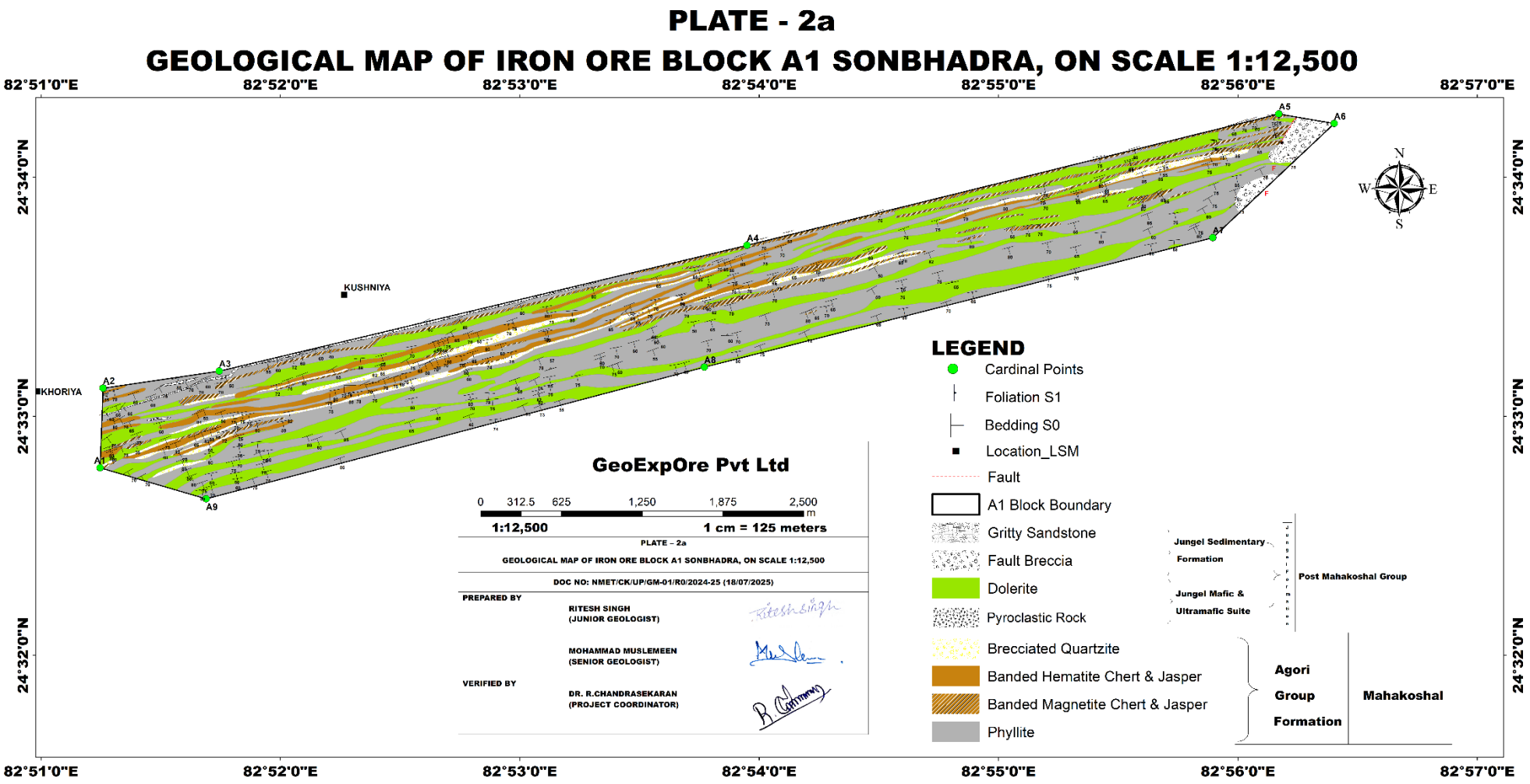
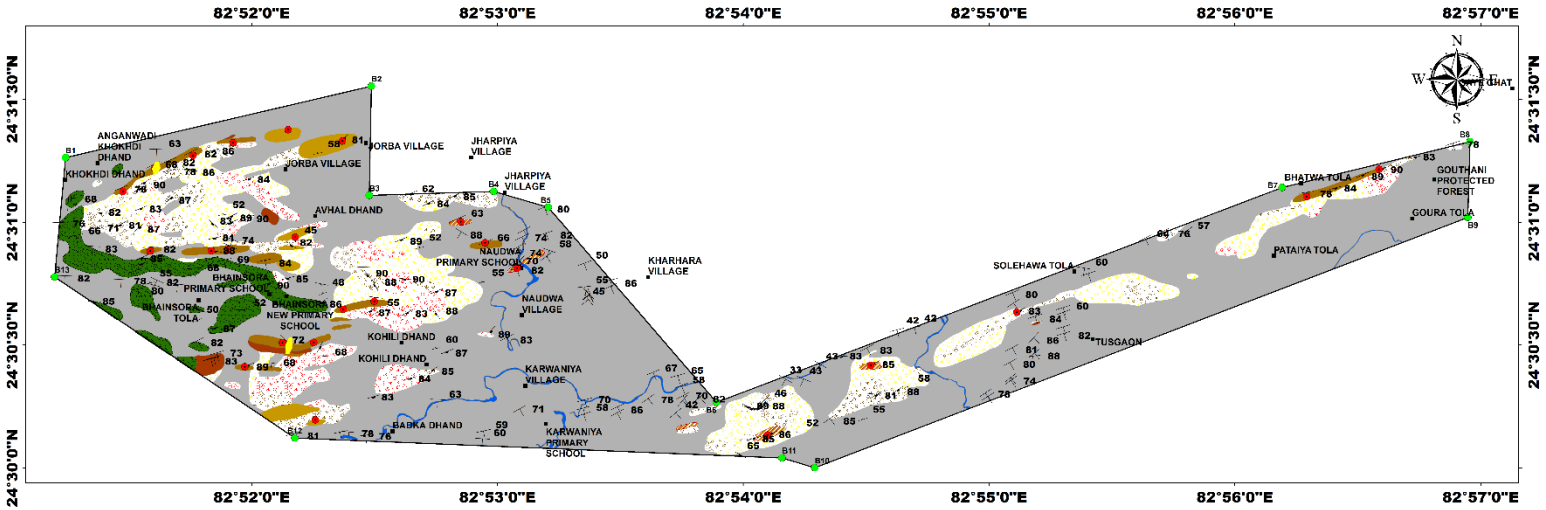


PLATE - 2b

GEOLOGICAL MAP OF IRON ORE BLOCK A2 SONBHADRA, SCALE 1:12,500



GeoExpOre Pvt Ltd

0 310 620 1,240 1,860 2,480 Meters

1:12,500 1 cm = 125 meters

PLATE – 2b

GEOLOGICAL MAP OF IRON ORE BLOCK A2 SONBHADRA, ON SCALE 1:12,500

DOC NO: NMET/JT/UP/GM-01/R0/2024-25 (19/07/2025)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

- CARDINAL POINT
- A2 BLOCK BOUNDARY
- BEDDING (S0)
- FOLIATION(S1)
- FOLIATION (S2)
- JOINT
- LOCATION
- NALA
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Agori Formation — **Mahakoshal Group**

22.4.3 Sample location map of iron ore Block A1& A2 Sonbhadra, on scale 1:12,500

PLATE - 3a

SAMPLE LOCATIONS MAP OF IRON ORE BLOCK A1 SONBHADRA, ON SCALE 1:12,500

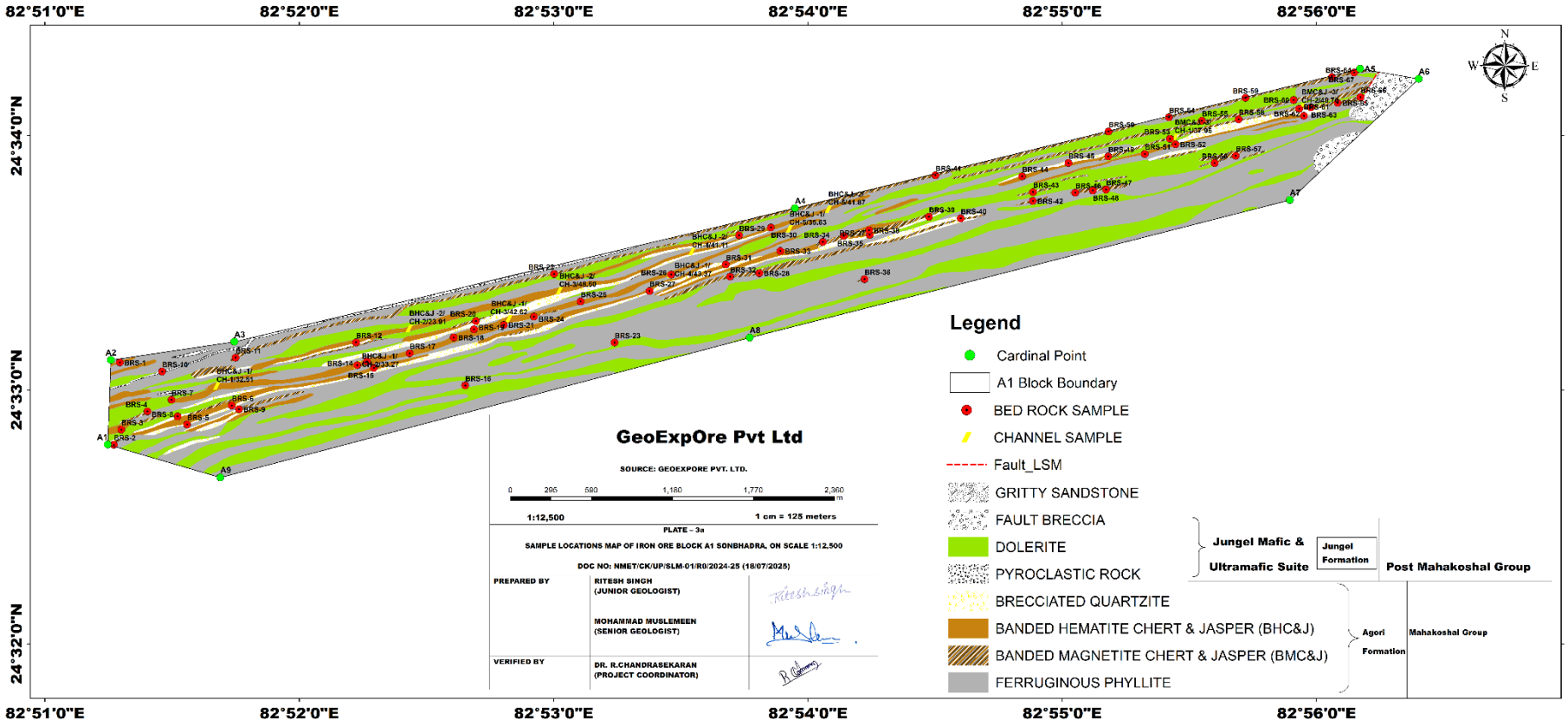
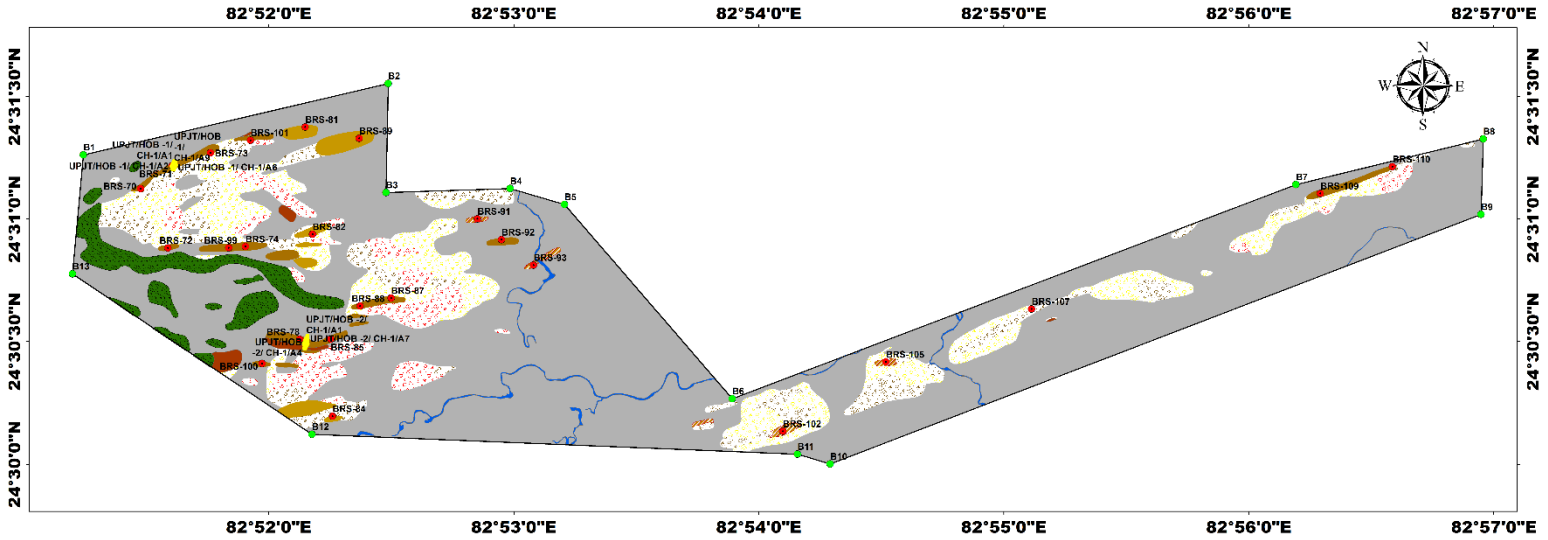


PLATE - 3b

SAMPLE LOCATIONS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500



GeoExpOre Pvt Ltd

0 310 620 1,240 1,860 2,480 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 3b

SAMPLE LOCATIONS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500

DOC NO: NMET/JT/UP/GCM-01/R0/2024-25 (19/07/2024)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

- CARDINAL POINTS
- A2 BLOCK BOUNADRY
- BED ROCK SAMPLE
- CHANNEL SAMPLE
- NALA
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Jungel Mafic & Ultramafic Suite — Jungel Formation — **Post Mahakoshal Group**

Agori Formation — **Mahakoshal Group**

22.4.4 Chemical analysis BRS over geological map of iron ore Block A1& A2 Sonbhadra, on scale 1:12500

PLATE - 4a

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A1 SONBHADRA

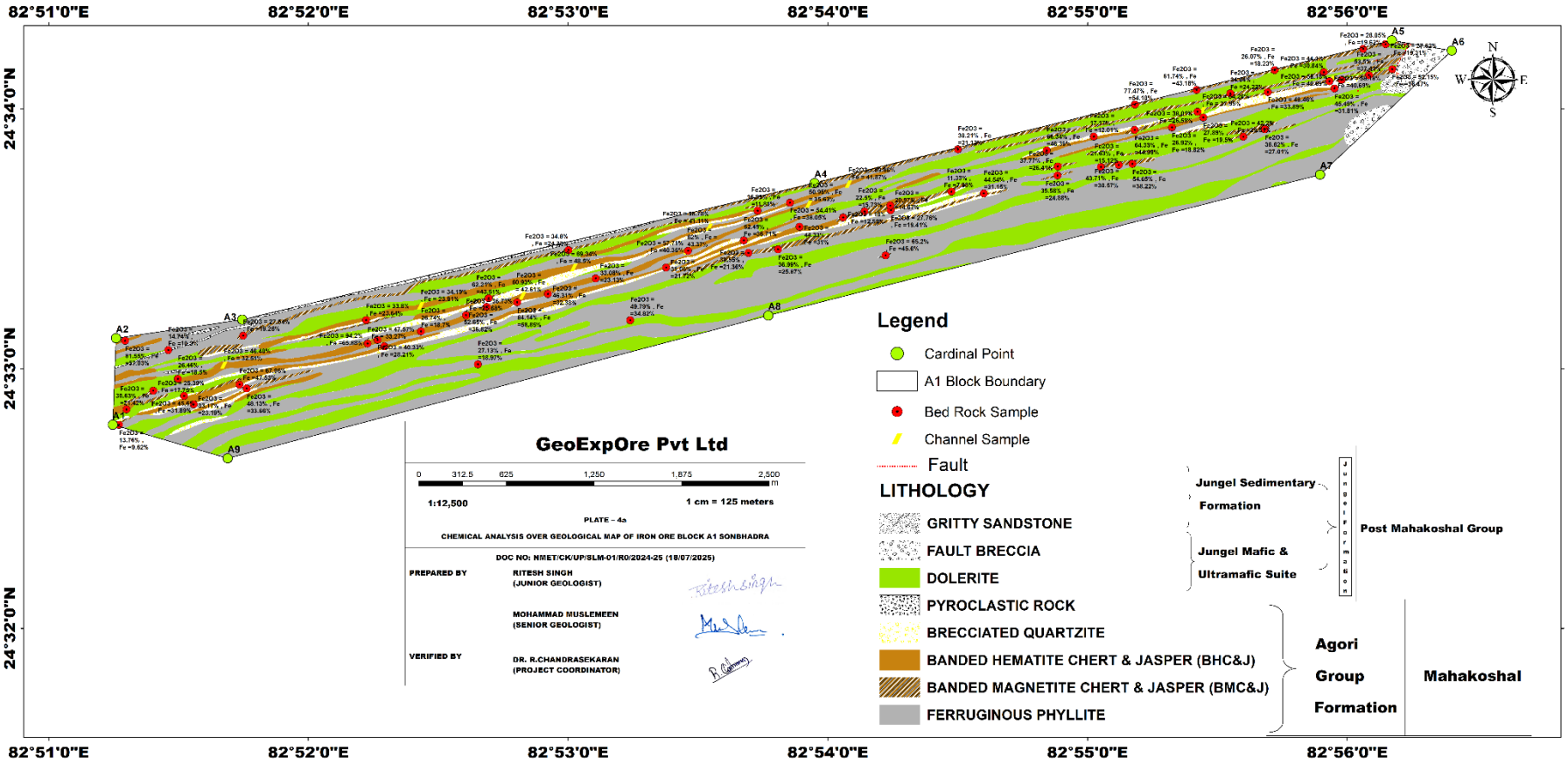
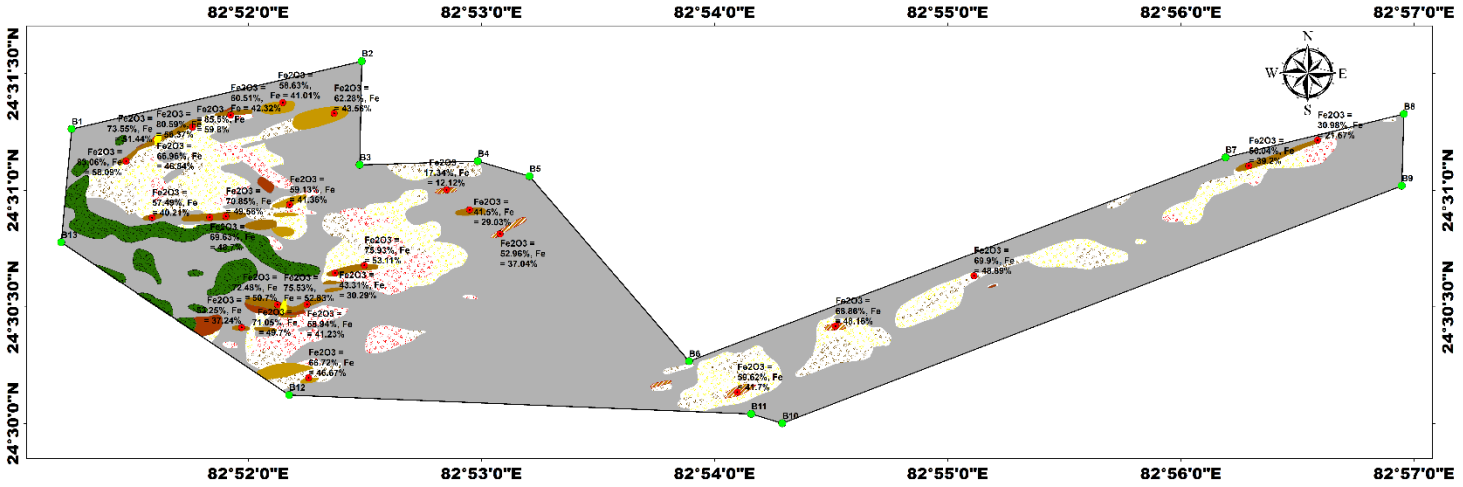


PLATE - 4b

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA.



GeoExpOre Pvt Ltd

0 312.5 625 1,250 1,875 2,500 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 4b

CHEMICAL ANALYSIS BRS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA.

DOC NO: NMET/JT/UP/GCM-01/R0/2024-25 (19/07/2025)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

- CARDINAL POINT
- A2 BLOCK BOUNDARY
- BED ROCK SAMPLE
- CHANNEL SAMPLE
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

Agori Formation — **Mahakoshal Group**

22.4.5 Borehole's location map of iron ore Block A1& A2 Sonbhadra, on scale 1:12,500

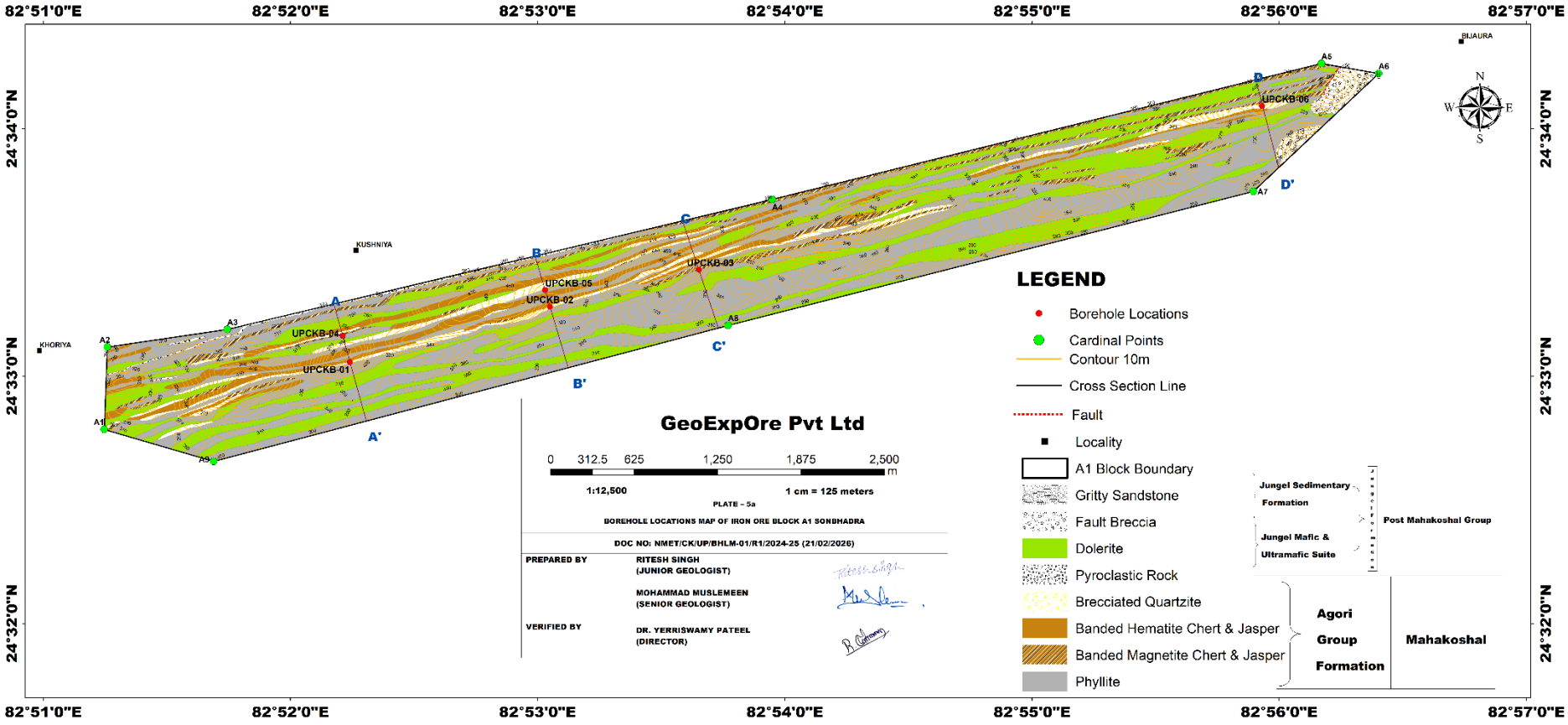
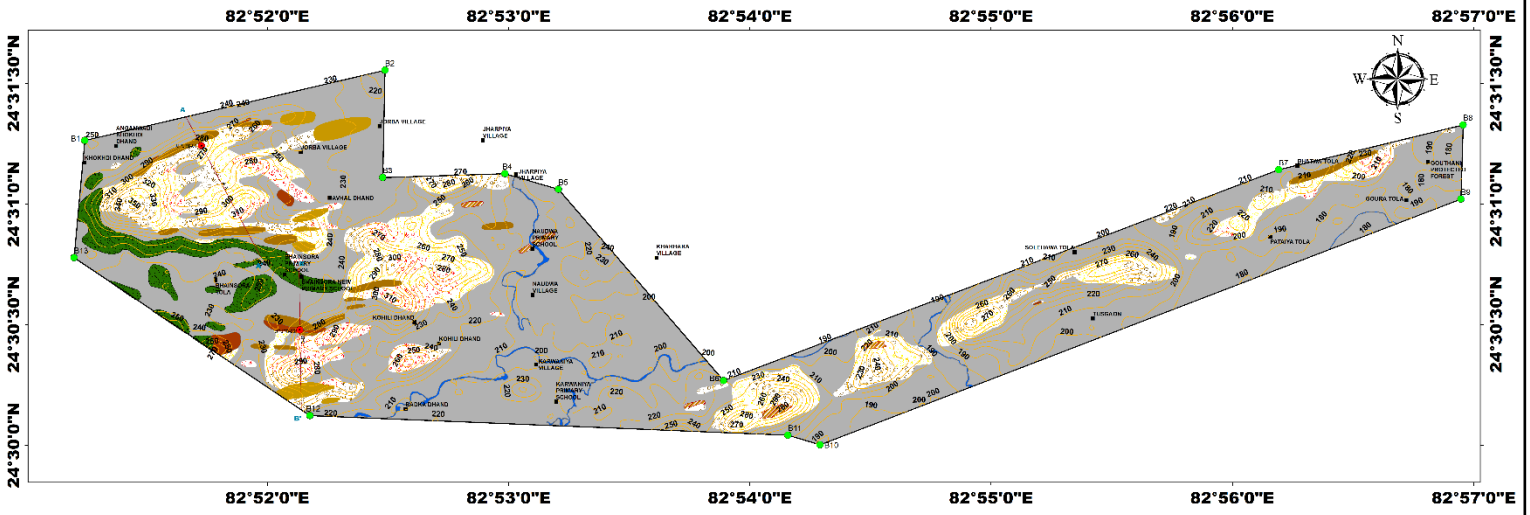


PLATE - 5b

BOREHOLE LOCATIONS MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500



GeoExpOre Pvt Ltd

0 312.5 625 1,250 1,875 2,500 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 5b

BOREHOLE LOCATIONS MAP OF IRON ORE BLOCK A2, SONBHADRA 1:12,500

DOC NO: NMET/UP/JT/BHLM-01/R1/2024-25 (21/02/2026)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. YERRISWAMY PATEEL (DIRECTOR)**	

Legend

- CARDINAL POINTS
- BOREHOLE POINTS
- CONTOUR
- A2 BLOCK BOUNDARY
- CROSS SECTION
- LOCATION
- NALA
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE

Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

Agori Formation — **Mahakoshal Group**

22.4.6 Mineralized zones over geological map of iron ore Block A1& A2 Sonbhadra, on scale 1:12500

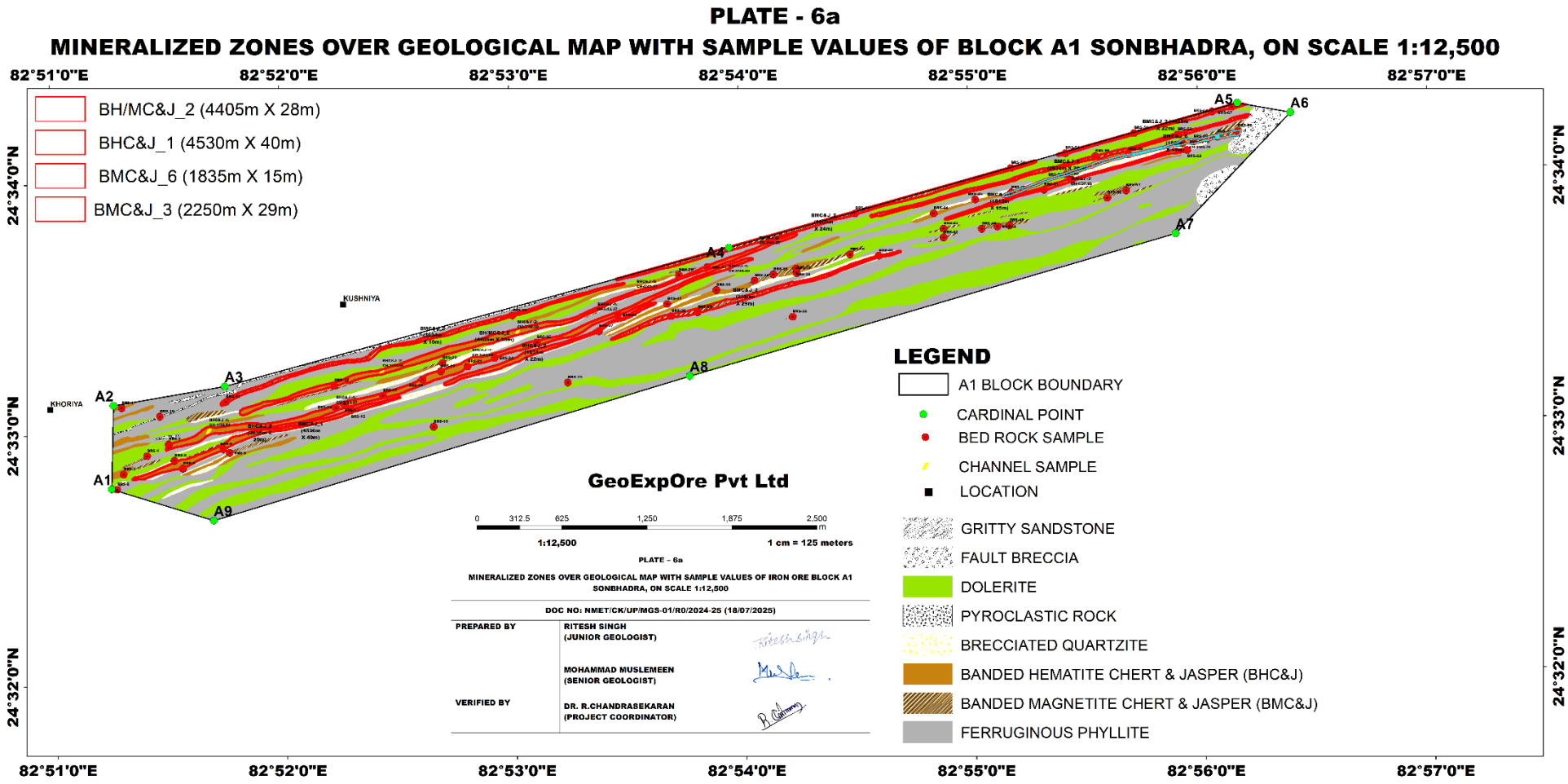
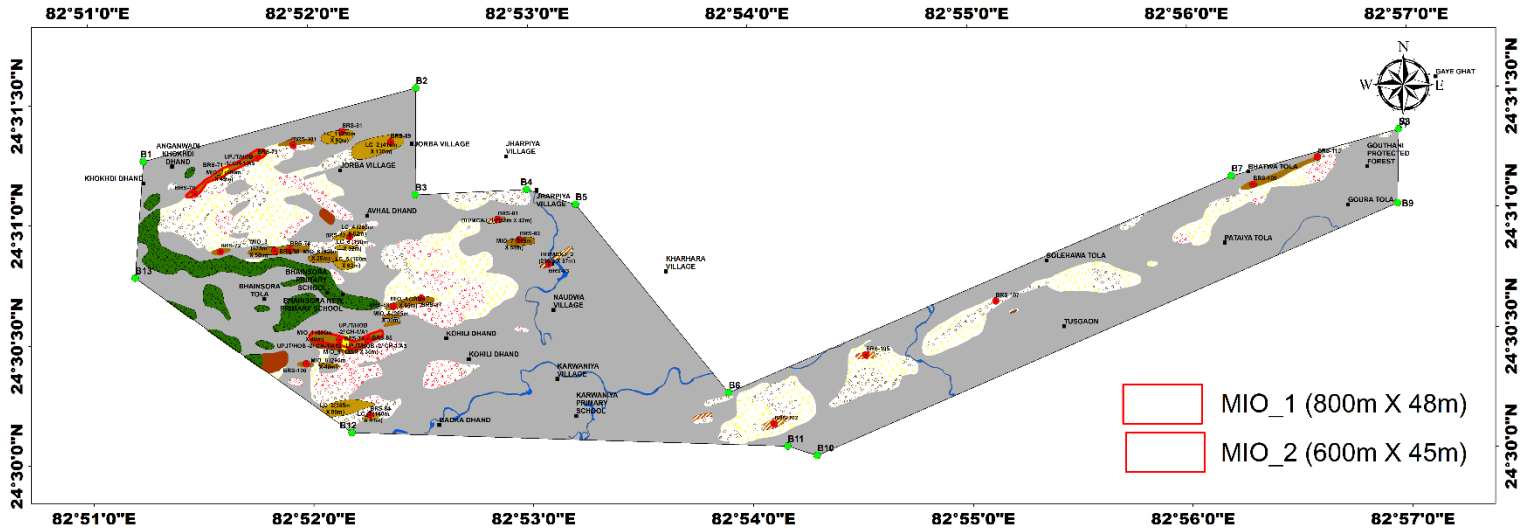


PLATE - 6b

MINERALIZED ZONE OVER GEOLOGICAL MAP WITH SAMPLE VALUES OF BLOCK A2, SONBHADRA SCALE 1:12,500



GeoExpOre Pvt Ltd

0 310 620 1,240 1,860 2,480 Meters

1:12,500 **1 cm = 125 meters**

PLATE – 3b

SAMPLE LOCATIONS OVER GEOLOGICAL MAP OF IRON ORE BLOCK A2, SONBHADRA SCALE 1:12,500

DOC NO: NMET/JT/UP/GCM-01/R0/2024-25 (19/07/2024)

PREPARED BY	**RITESH SINGH (JUNIOR GEOLOGIST)**	
	MOHAMMAD MUSLEMEEN (SENIOR GEOLOGIST)	
VERIFIED BY	**DR. R.CHANDRASEKARAN (PROJECT COORDINATOR)**	

Legend

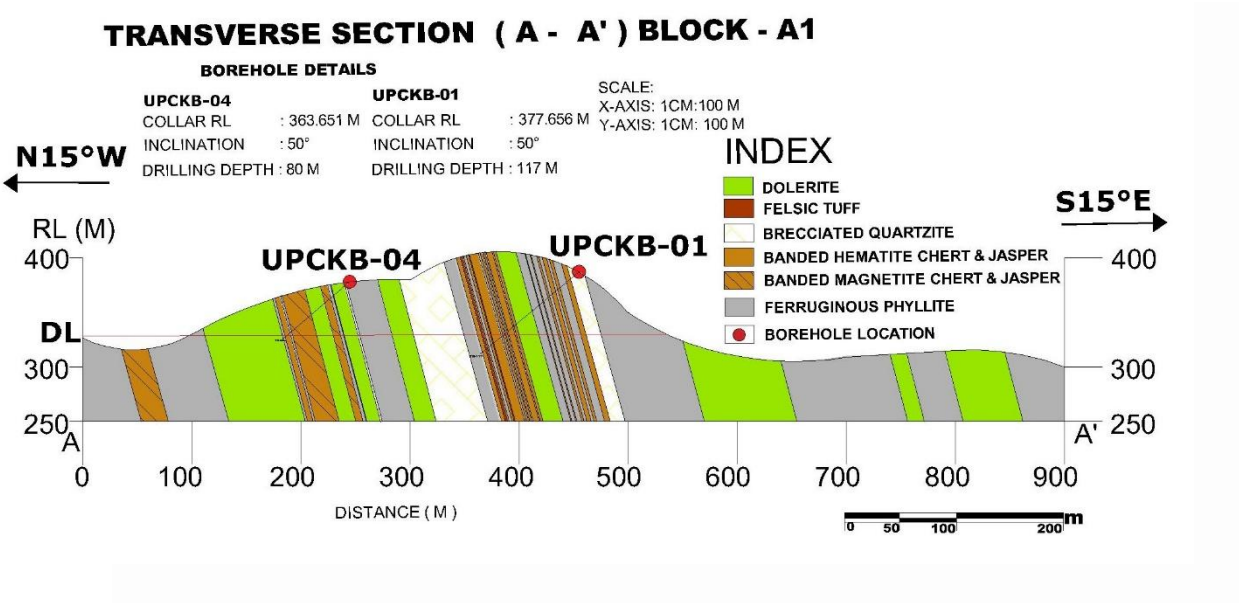
- CARDINAL POINTS
- A2 BLOCK BOUNADRY
- BED ROCK SAMPLE
- CHANNEL SAMPLE
- NALA
- LOCATION
- LATERITE CAPPING
- FELSIC TUFF
- META BASALT
- BRECCIATED QUARTIZITE
- BRECCIATED QUARTZITE WITH JASPER
- BRECCIATED QUARTZITE WITH IRON MATRIX
- MASSIVE IRON ORE
- BANDED HEMATITR/MAGNETITE CHERT & JASPER
- FERRUGINEOUS PHYLLITE

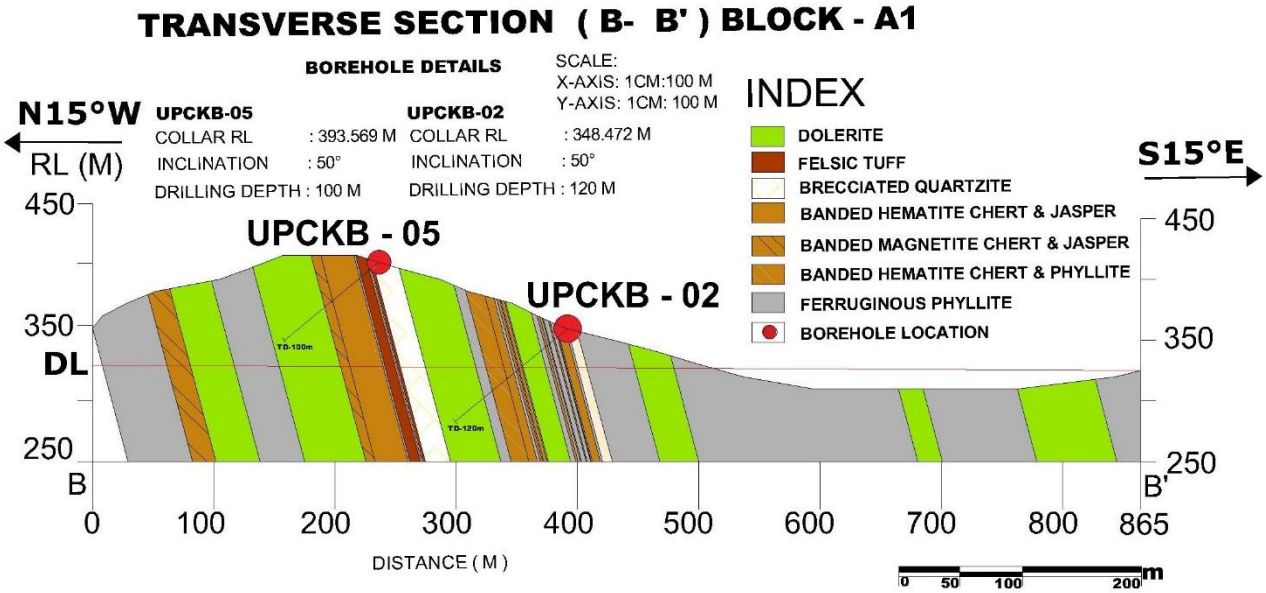
Jungel Mafic & Ultramafic Suite — **Jungel Formation** — **Post Mahakoshal Group**

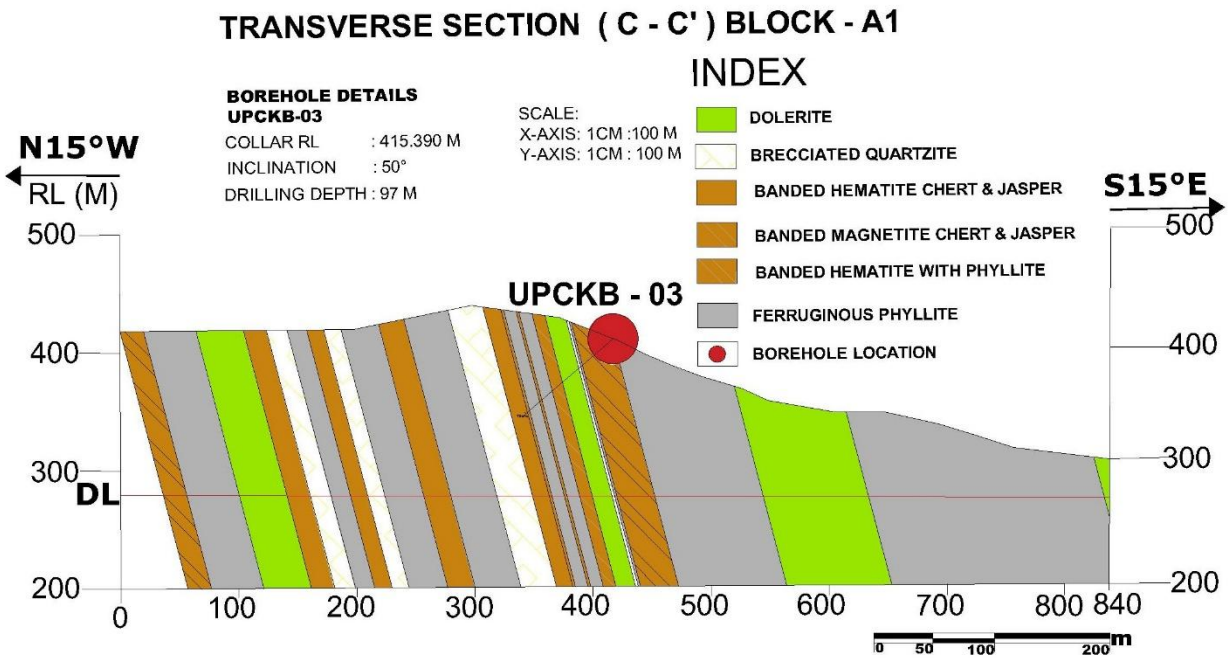
Agori Formation — **Mahakoshal Group**

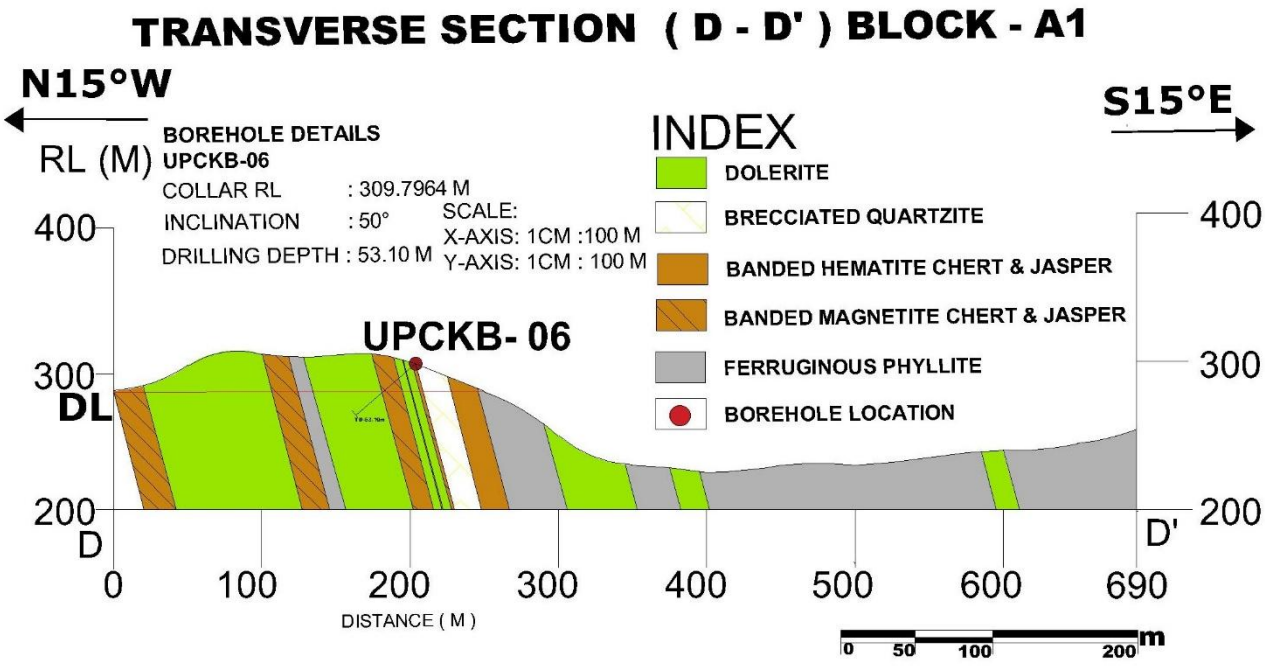
22.5 Cross sections at suitable intervals showing vertical projections of litho-units and mineralisation.

22.5.1 Transverse geological sections showing borehole intersections and lithological distribution in Block A1

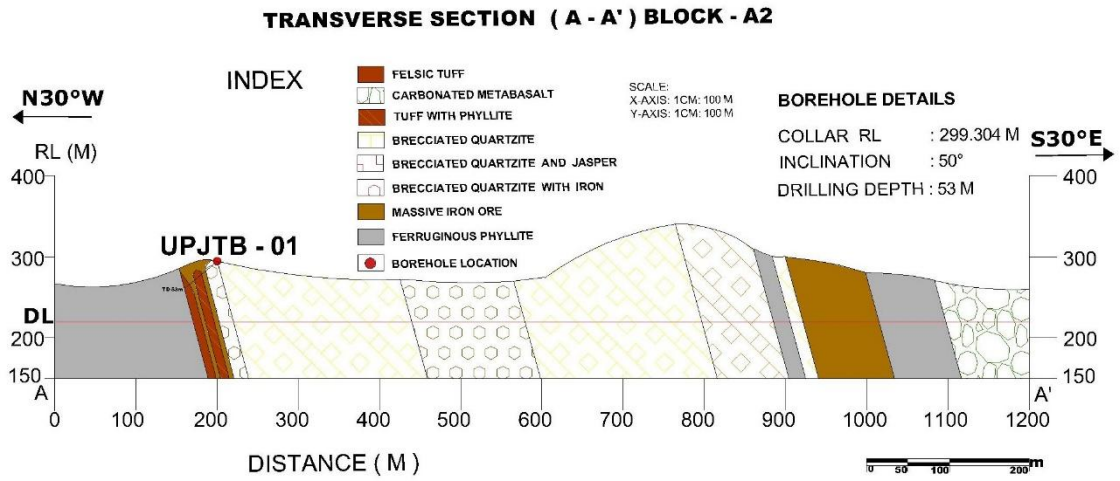


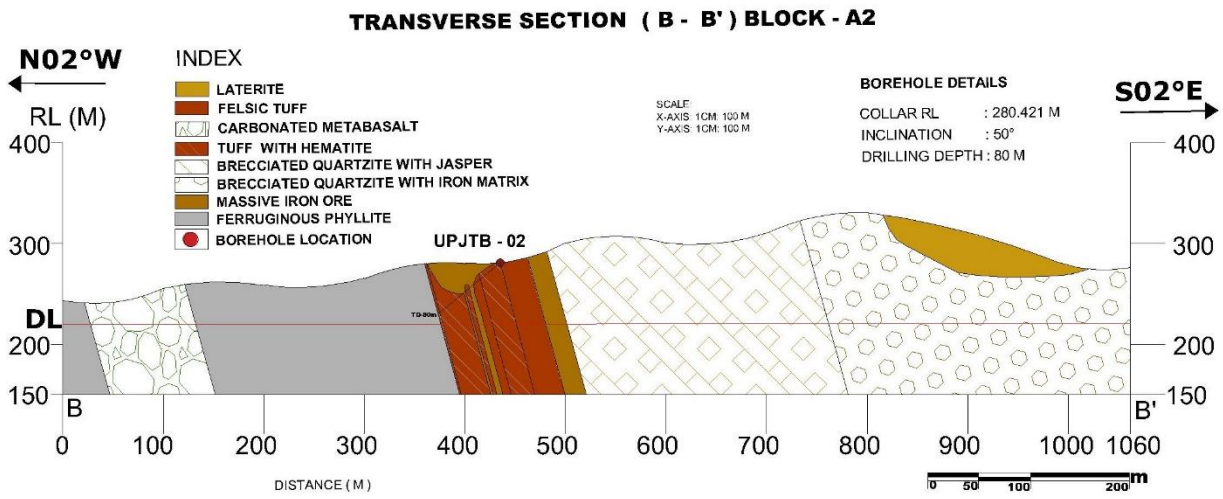



TRANSVERSE SECTION (C - C') BLOCK - A1
BOREHOLE DETAILS
UPCKB-03
COLLAR RL : 415.390 M
INCLINATION : 50°
DRILLING DEPTH : 97 M
SCALE:
X-AXIS: 1CM :100 M
Y-AXIS: 1CM : 100 M
INDEX
DOLERITE
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
BANDED HEMATITE WITH PHYLLITE
FERRUGINOUS PHYLLITE
BOREHOLE LOCATION
N15°W
S15°E
RL (M)
UPCKB - 03
DL
500
400
300
200
0
100
200
300
400
500
600
700
800
840
m

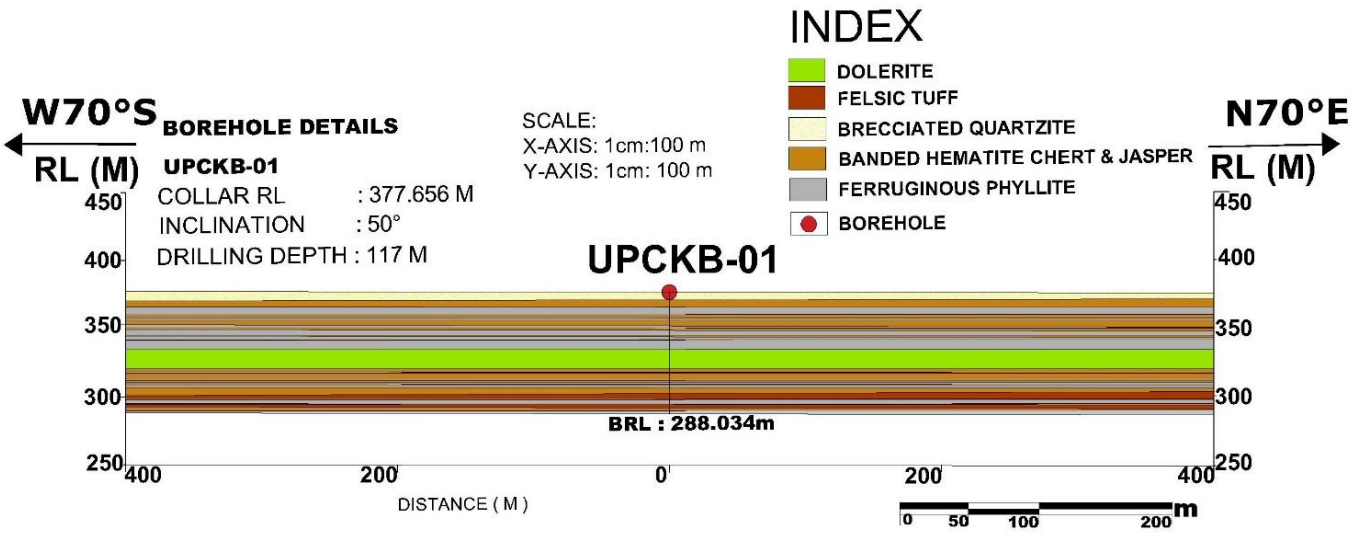

TRANSVERSE SECTION (D - D') BLOCK - A1
N15°W
S15°E
BOREHOLE DETAILS
UPCKB-06
COLLAR RL : 309.7964 M
INCLINATION : 50°
DRILLING DEPTH : 53.10 M
SCALE:
X-AXIS: 1CM :100 M
Y-AXIS: 1CM : 100 M
INDEX
DOLERITE
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
FERRUGINOUS PHYLLITE
BOREHOLE LOCATION
RL (M)
UPCKB- 06
DL
D
D'
400
300
200
0
100
200
300
400
500
600
690
DISTANCE (M)
m

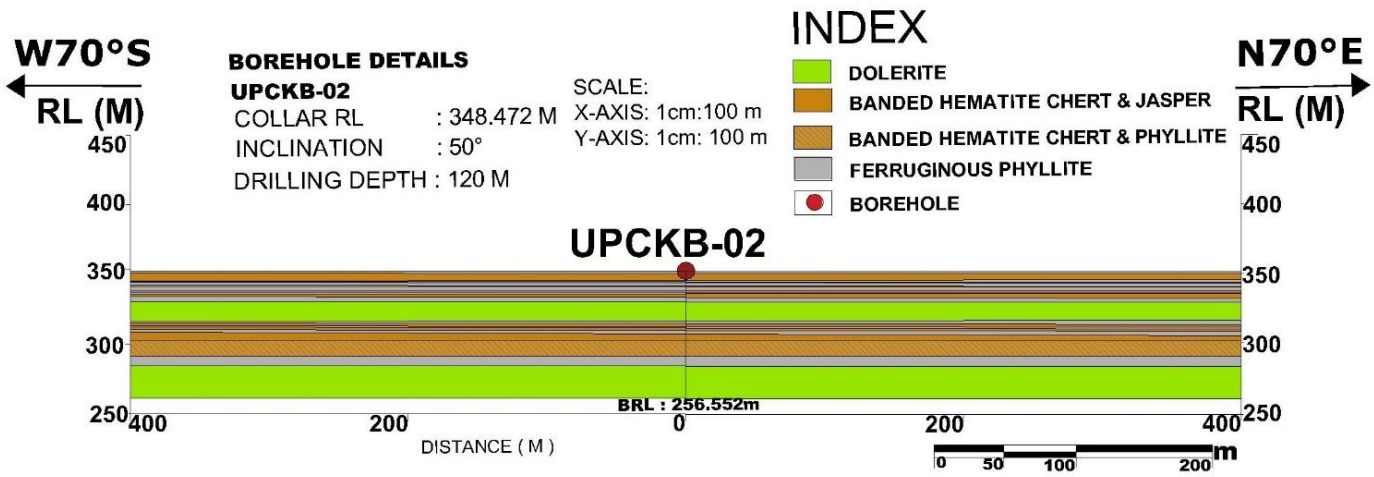
22.5.2 Transverse geological sections showing borehole intersections and lithological distribution in Block A2

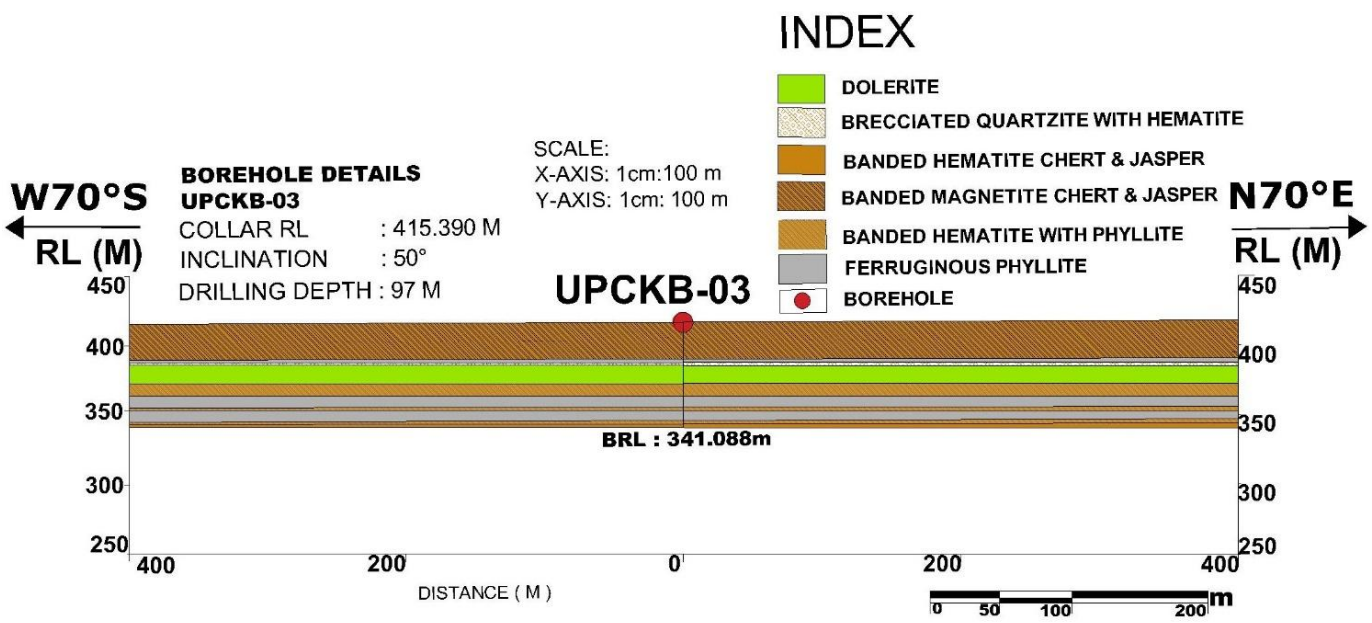


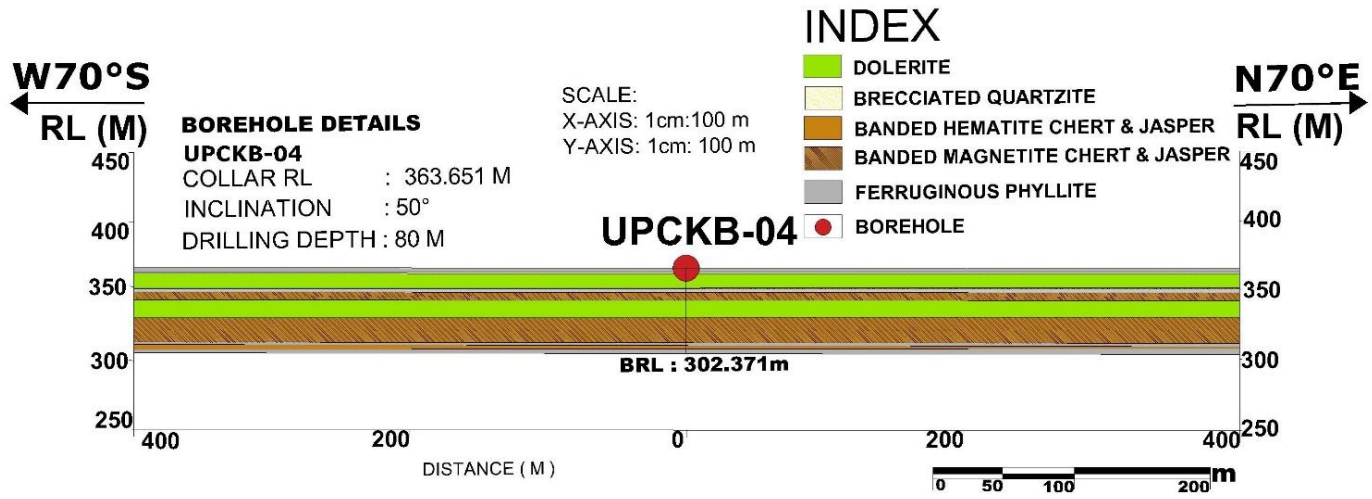


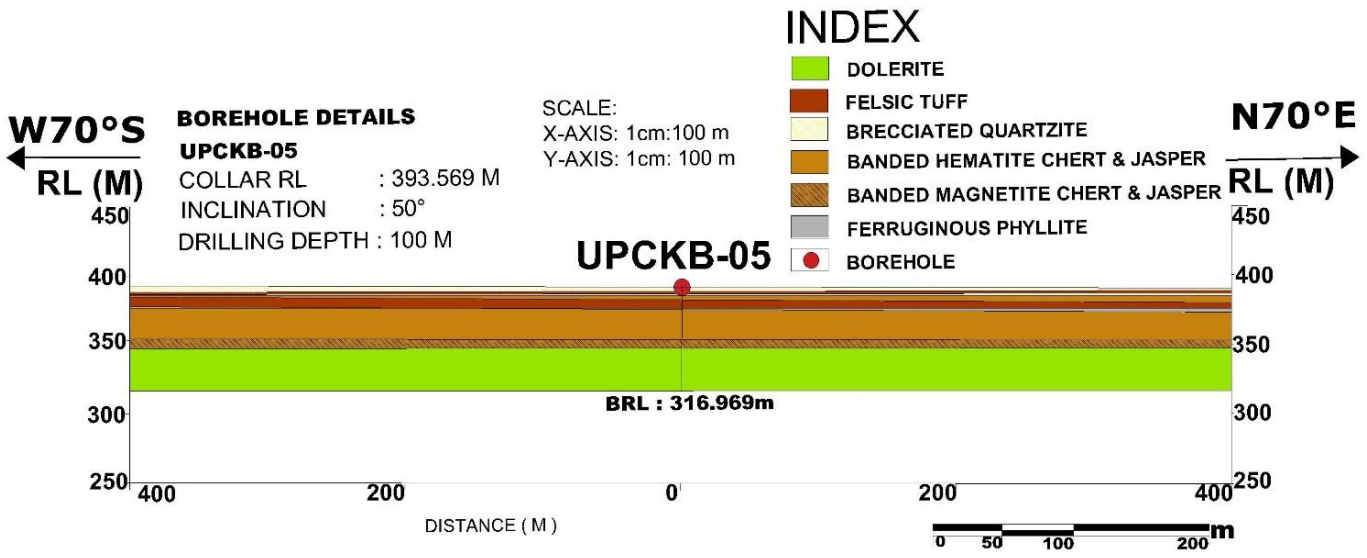
22.5.3 Longitudinal geological section showing lithological distribution and borehole UPCKB-01 to UPCKB-06

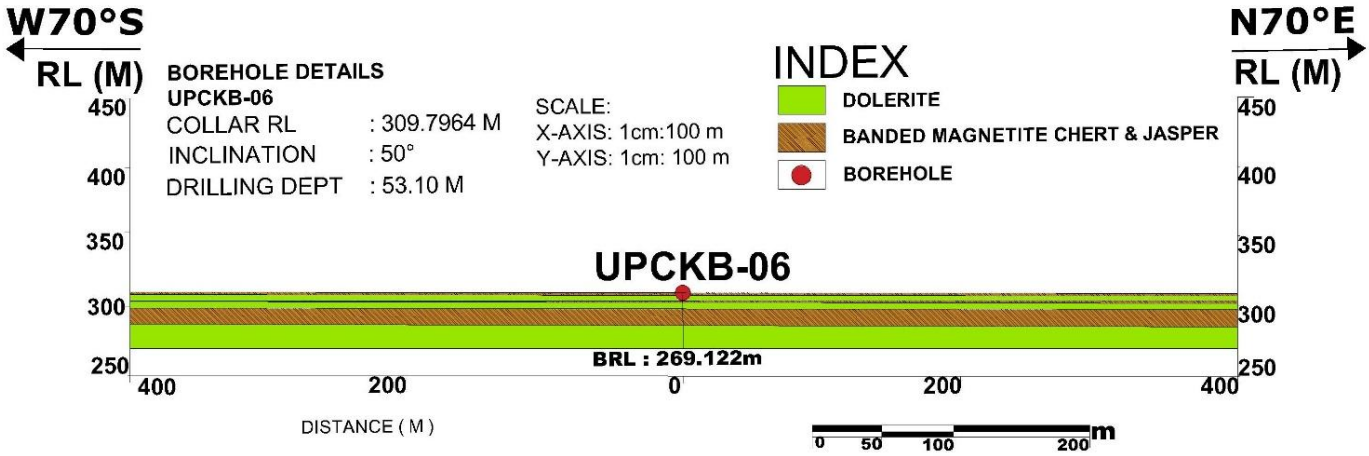




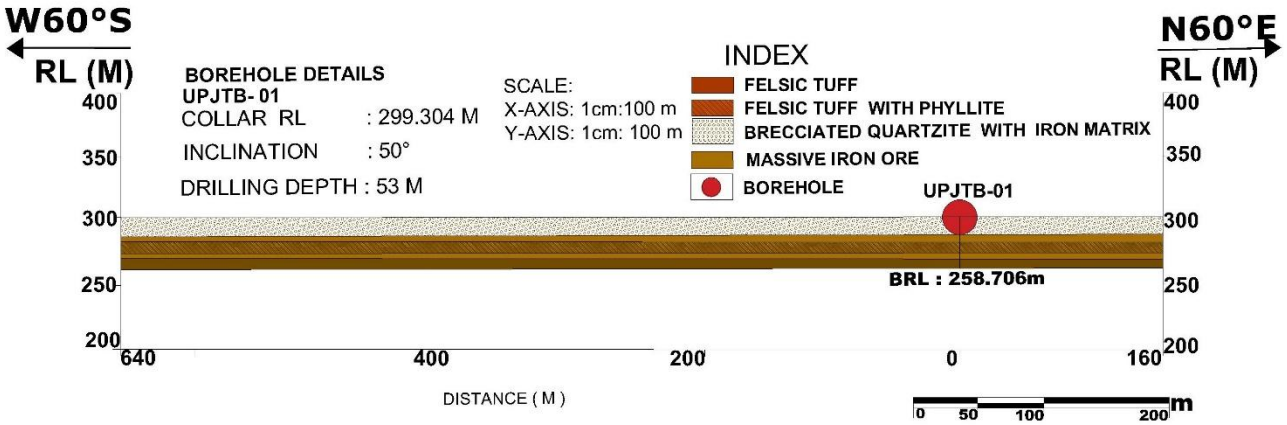

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DOLERITE
BRECCIATED QUARTZITE WITH HEMATITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
BANDED HEMATITE WITH PHYLLITE
FERRUGINOUS PHYLLITE
BOREHOLE
SCALE:
X-AXIS: 1cm:100 m
Y-AXIS: 1cm: 100 m
W70°S
RL (M)
N70°E
RL (M)
BOREHOLE DETAILS
UPCKB-03
COLLAR RL : 415.390 M
INCLINATION : 50°
DRILLING DEPTH : 97 M
UPCKB-03
BRL : 341.088m
450
400
350
300
250
400
200
0
200
400
DISTANCE (M)
0
50
100
200
m

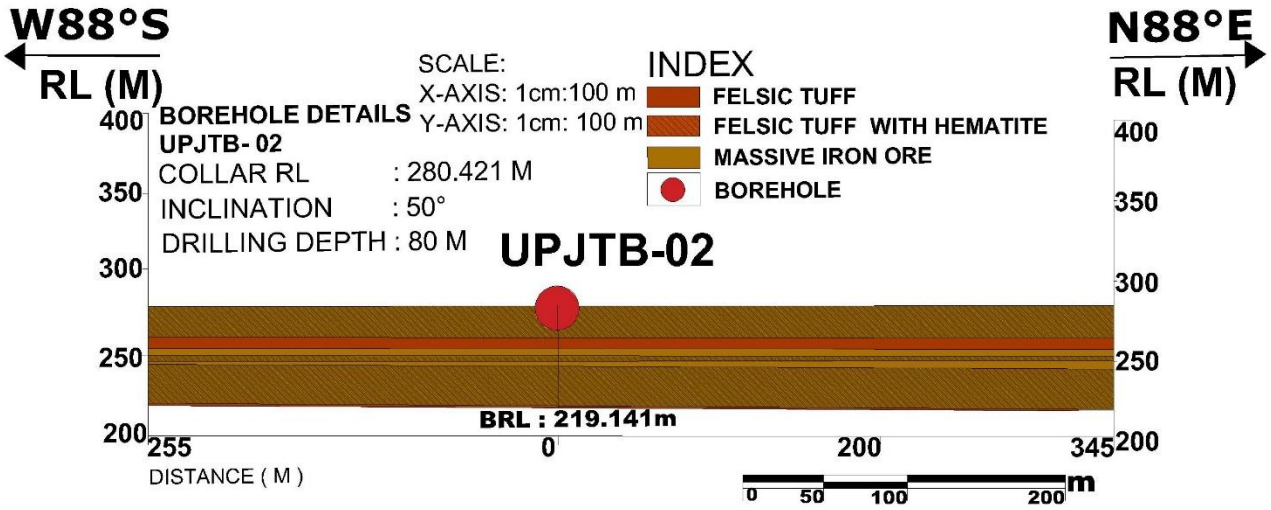

INDEX
DOLERITE
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
FERRUGINOUS PHYLLITE
BOREHOLE
SCALE:
X-AXIS: 1cm:100 m
Y-AXIS: 1cm: 100 m
W70°S
RL (M)
N70°E
RL (M)
BOREHOLE DETAILS
UPCKB-04
COLLAR RL : 363.651 M
INCLINATION : 50°
DRILLING DEPTH : 80 M
UPCKB-04
BRL : 302.371m
450
400
350
300
250
400
200
0
200
400
DISTANCE (M)
0
50
100
200
m


INDEX
DOLERITE
FELSIC TUFF
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
FERRUGINOUS PHYLLITE
BOREHOLE
W70°S
RL (M)
N70°E
RL (M)
BOREHOLE DETAILS
UPCKB-05
COLLAR RL : 393.569 M
INCLINATION : 50°
DRILLING DEPTH : 100 M
SCALE:
X-AXIS: 1cm:100 m
Y-AXIS: 1cm: 100 m
UPCKB-05
BRL : 316.969m
450
400
350
300
250
400
200
0
200
400
DISTANCE (M)
0 50 100 200 m

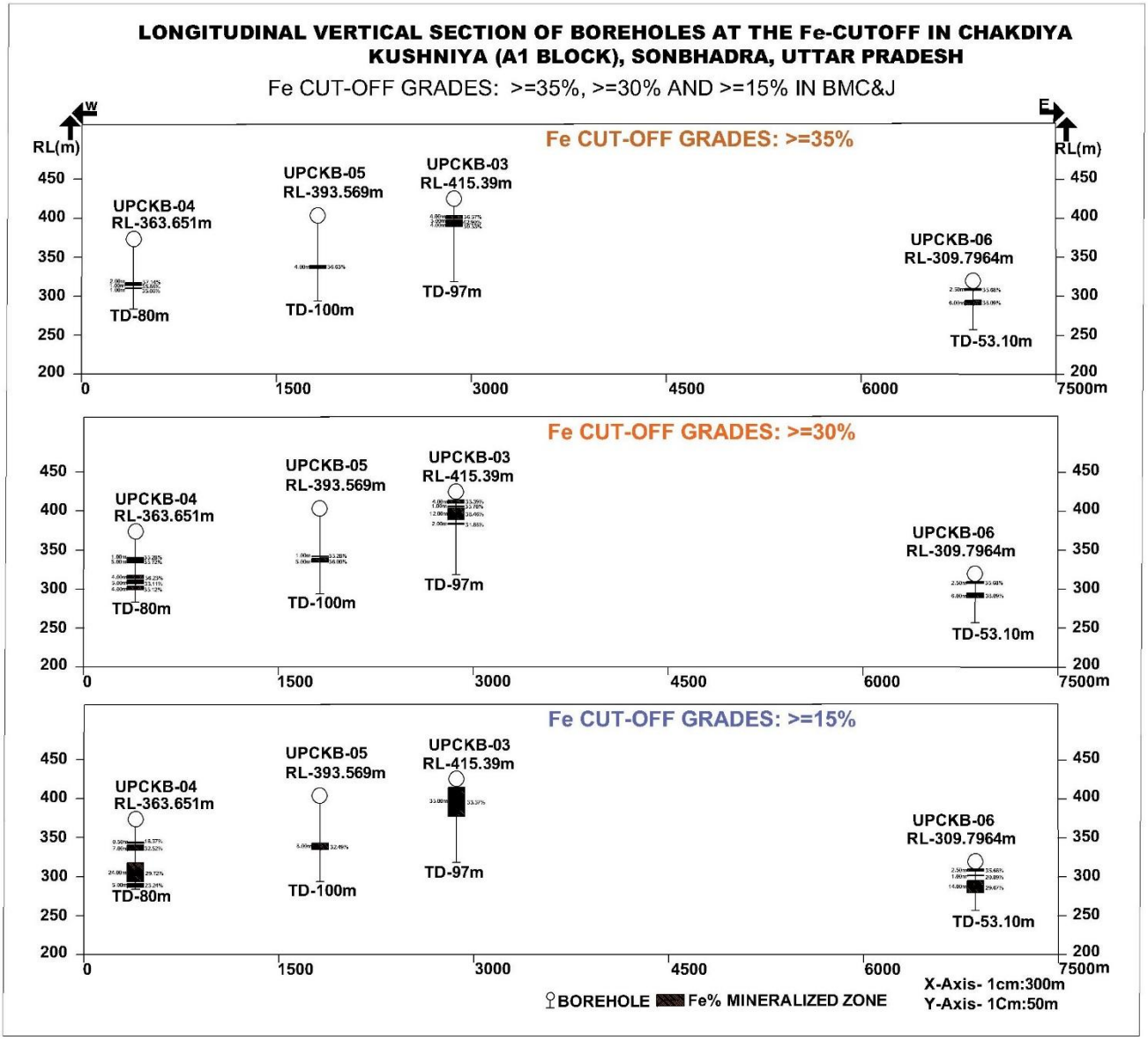

W70°S
RL (M)
N70°E
RL (M)
BOREHOLE DETAILS
UPCKB-06
COLLAR RL : 309.7964 M
INCLINATION : 50°
DRILLING DEPT : 53.10 M
SCALE:
X-AXIS: 1cm:100 m
Y-AXIS: 1cm: 100 m
INDEX
DOLERITE
BANDED MAGNETITE CHERT & JASPER
BOREHOLE
UPCKB-06
BRL : 269.122m
450
400
350
300
250
400
200
0
200
400
DISTANCE (M)
0 50 100 200 m

22.5.4 Longitudinal geological section showing lithological distribution and borehole UPJTB-01 And UPJTB-02

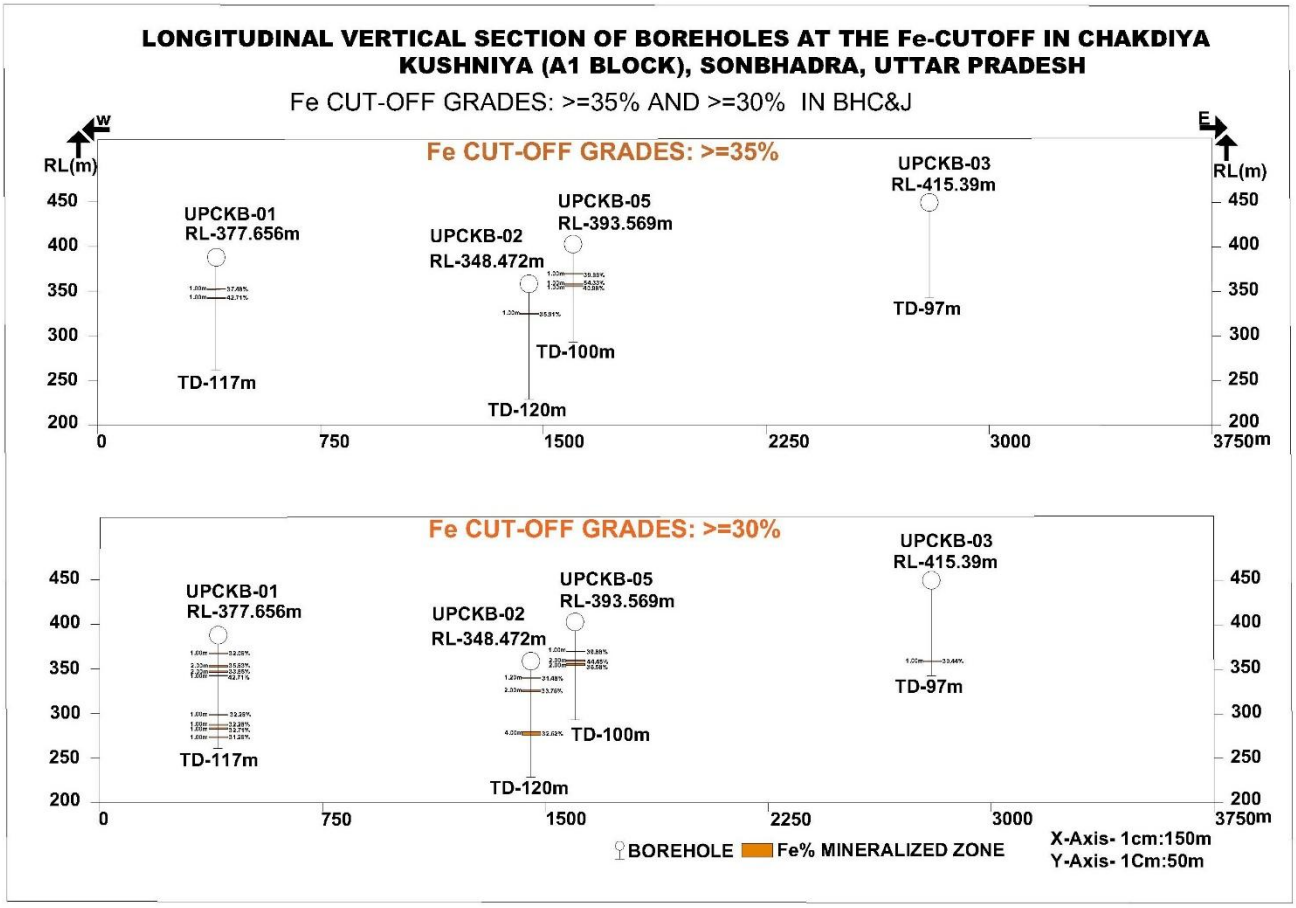




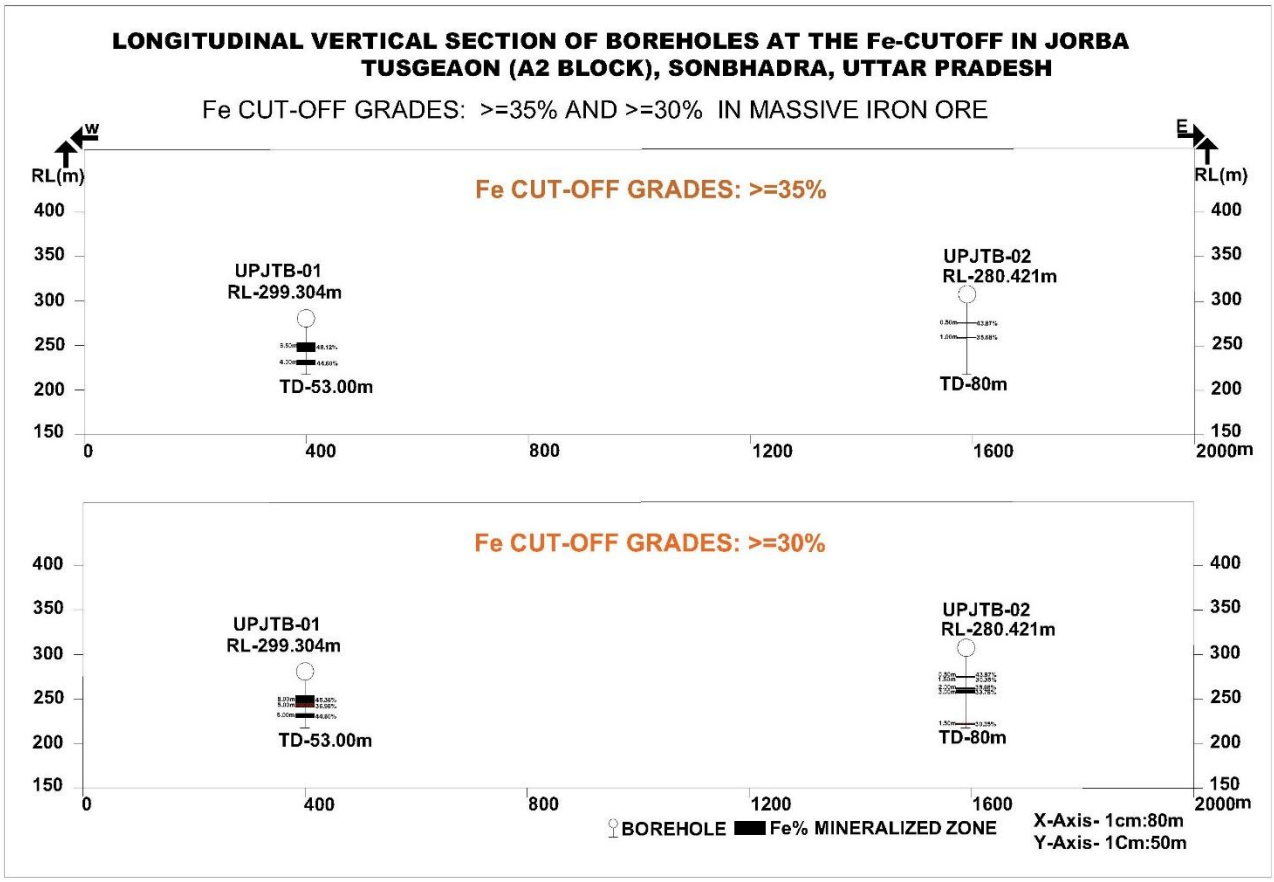
22.5.5 Longitudinal vertical section showing Fe-mineralized zones at different Fe cut-off grades in BMC&J, Chakdiya (A1 Block), Sonbhadra, Uttar Pradesh.



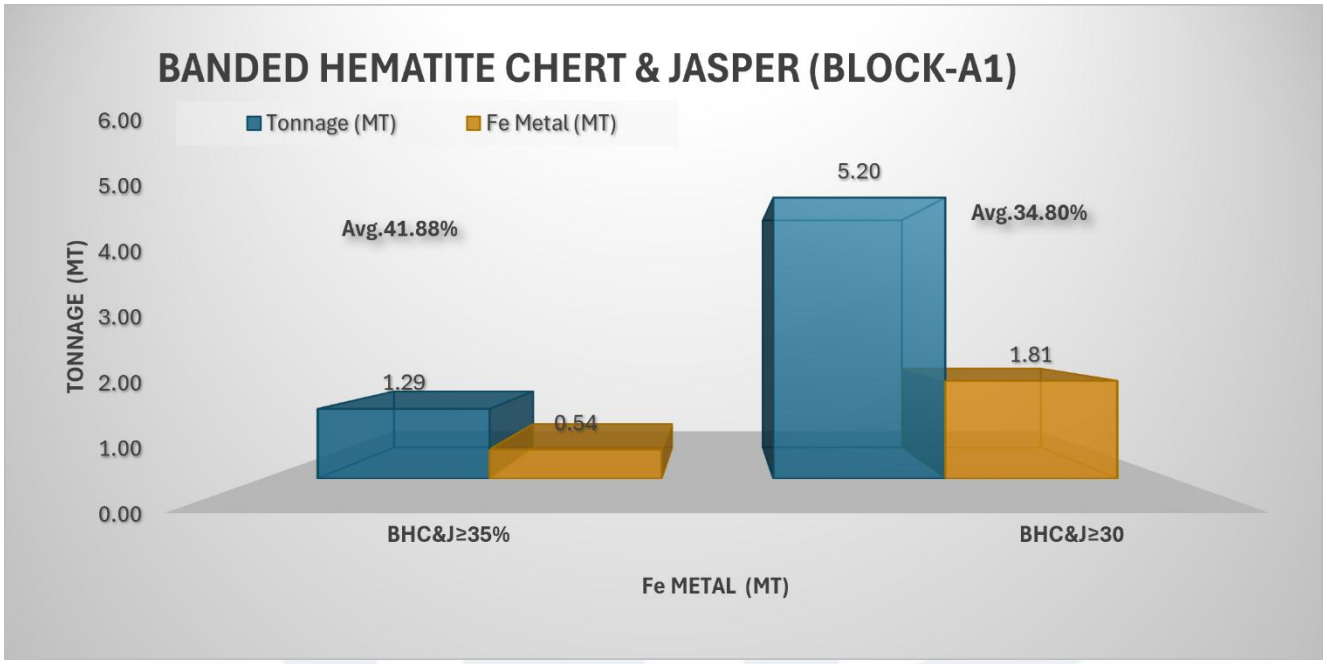
22.5.6 Longitudinal vertical section showing Fe-mineralized zones at different Fe cut-off grades in BHC&J, Chakdiya (A1 Block), Sonbhadra, Uttar Pradesh.



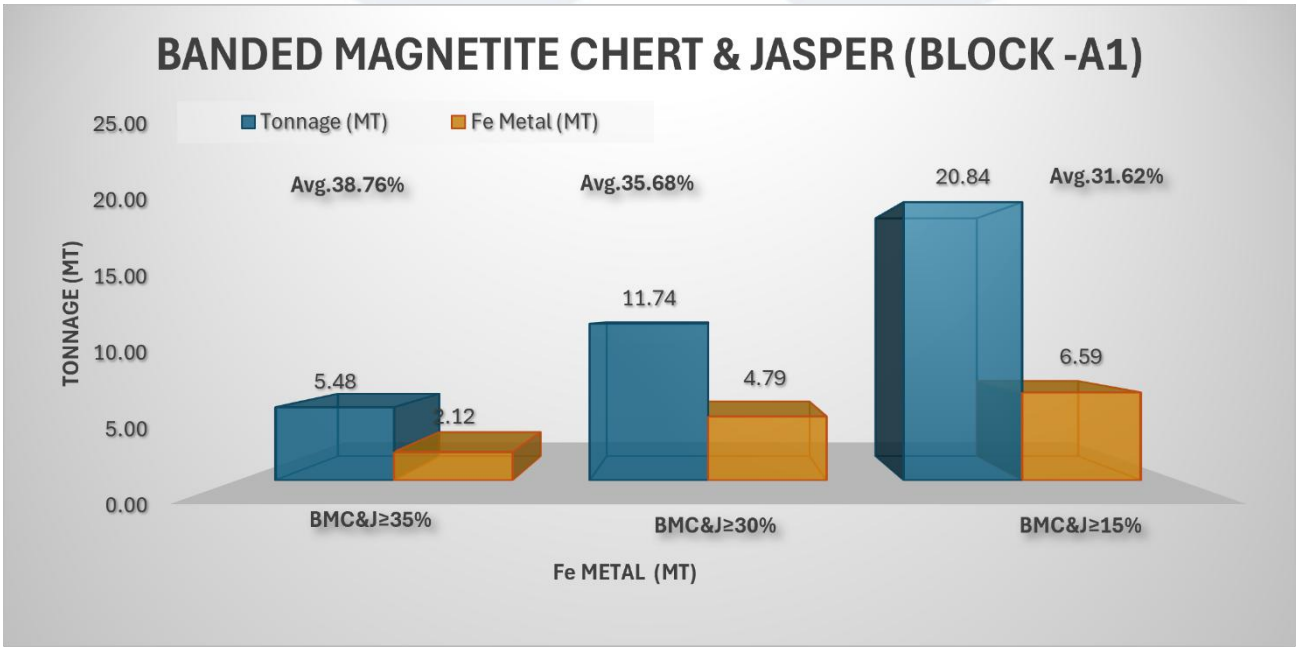
22.5.7 Longitudinal vertical section showing Fe-mineralized zones at different Fe cut-off grades in Massive Iron Ore, Jorba (A2 Block), Sonbhadra, Uttar Pradesh.



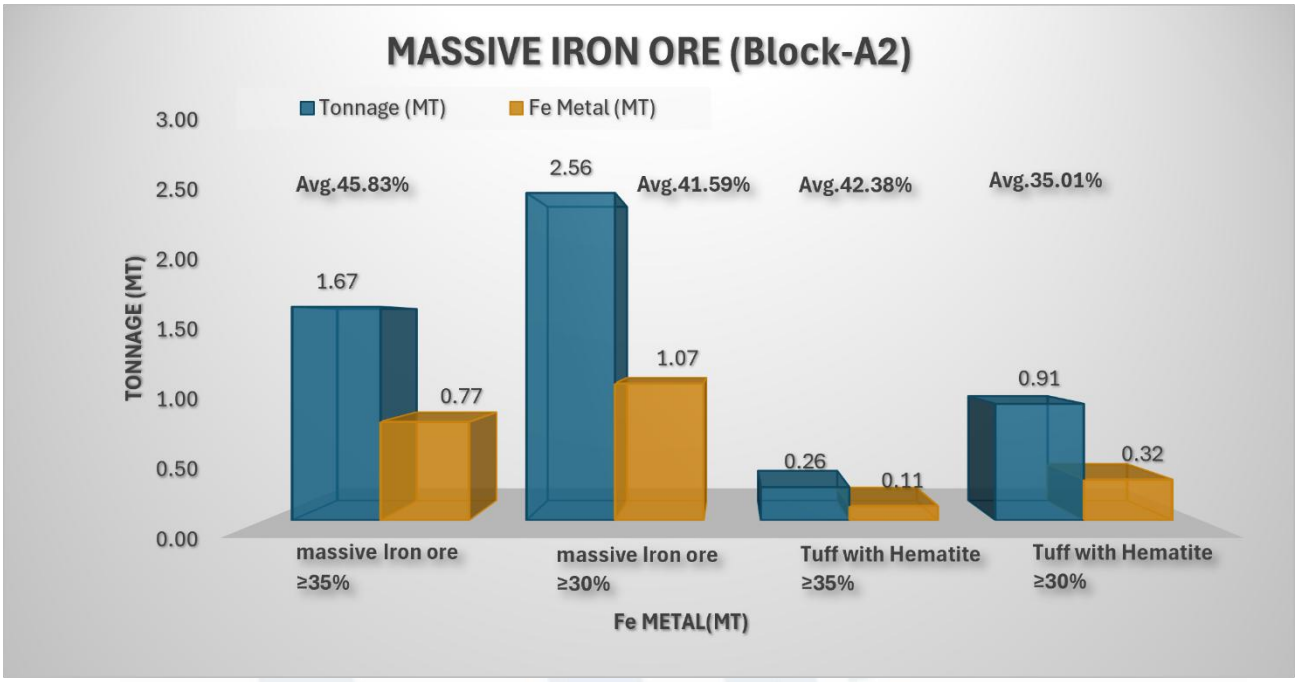
22.5.8 Tonnage and Fe metal estimation of different lithology at different Fe cut-off grades in Block A1



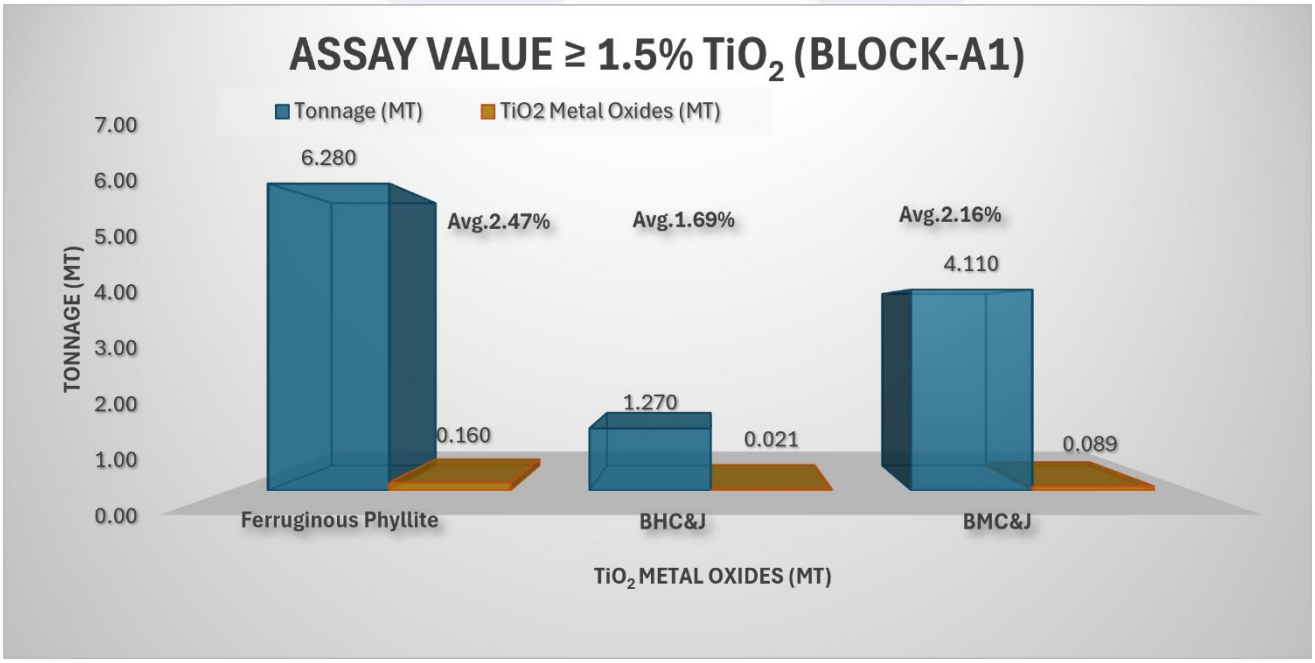
22.5.9 Tonnage and Fe metal estimation of different lithology at different Fe cut-off grades in Block A1



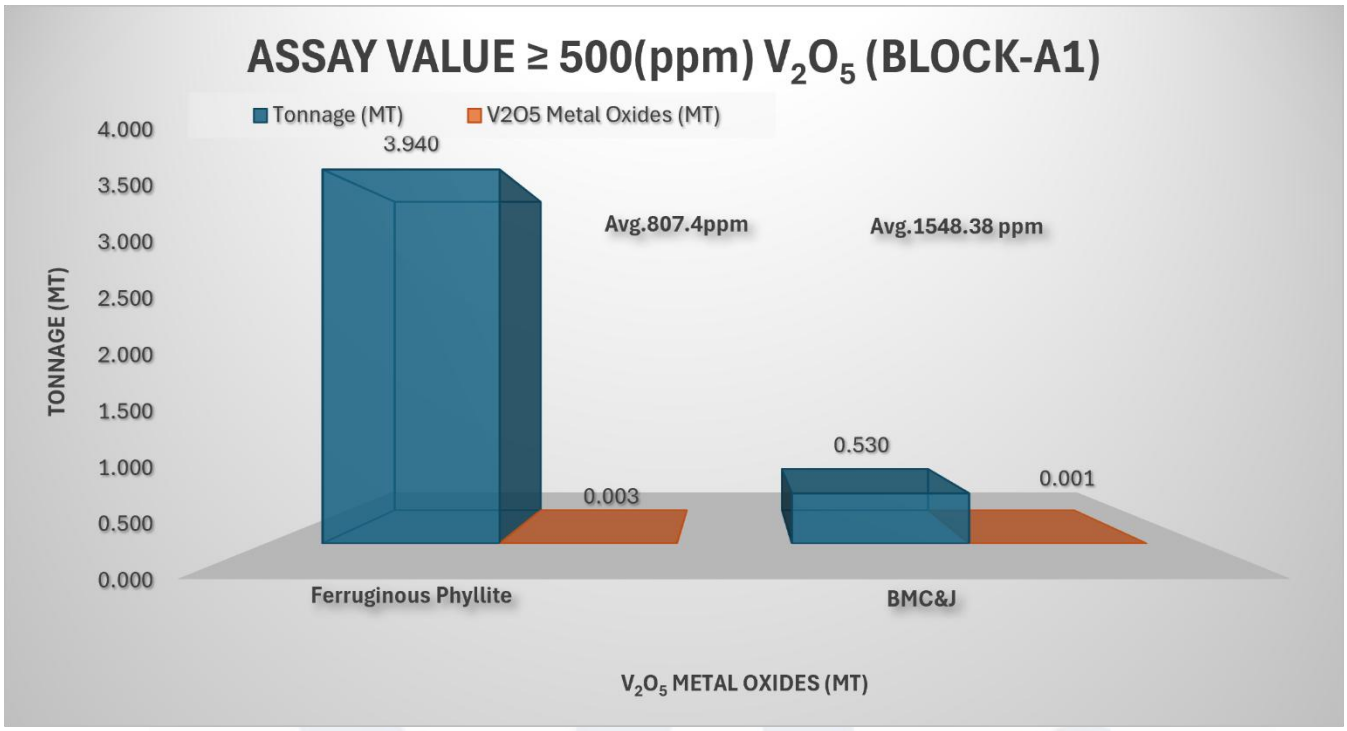
22.5.10 Tonnage and Fe metal estimation of different lithology at different Fe cut-off grades in Block A2



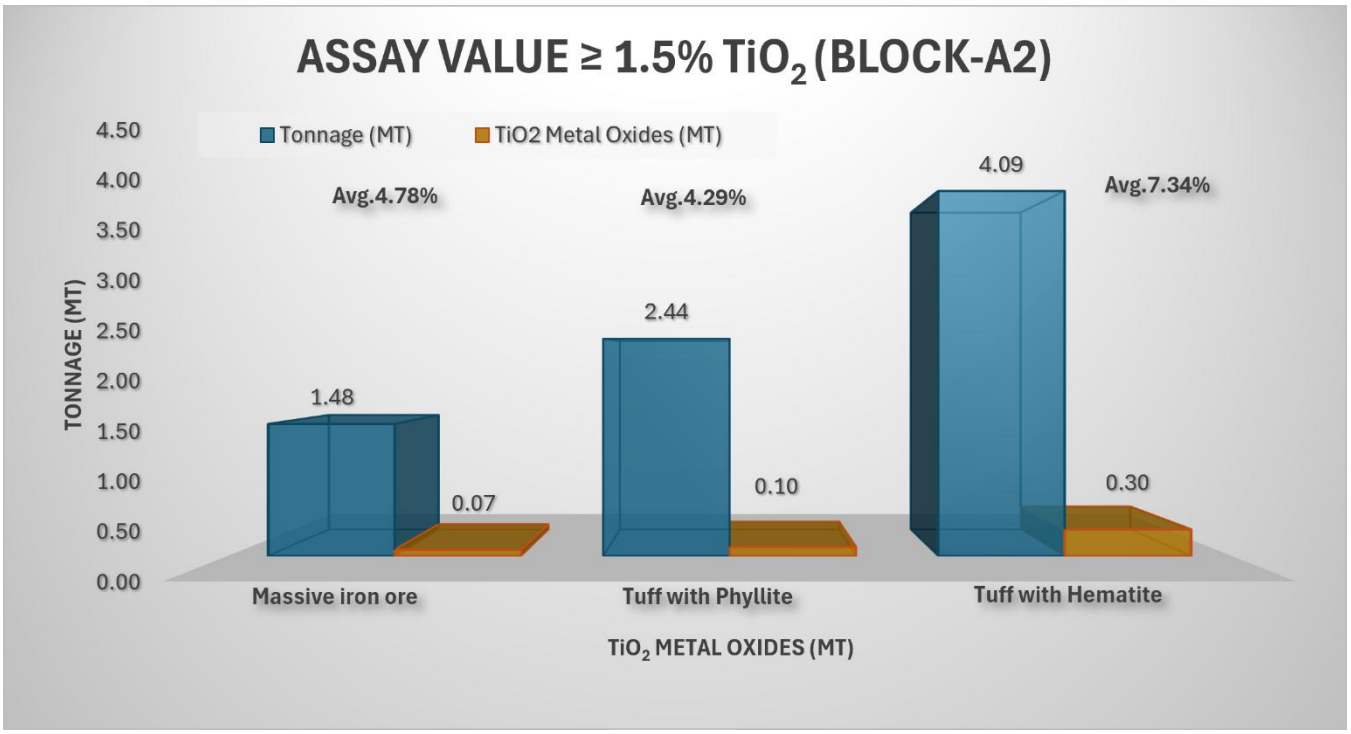
22.5.11 Tonnage and TiO_2 estimation of different lithology at different Fe cut-off grades in Block A1



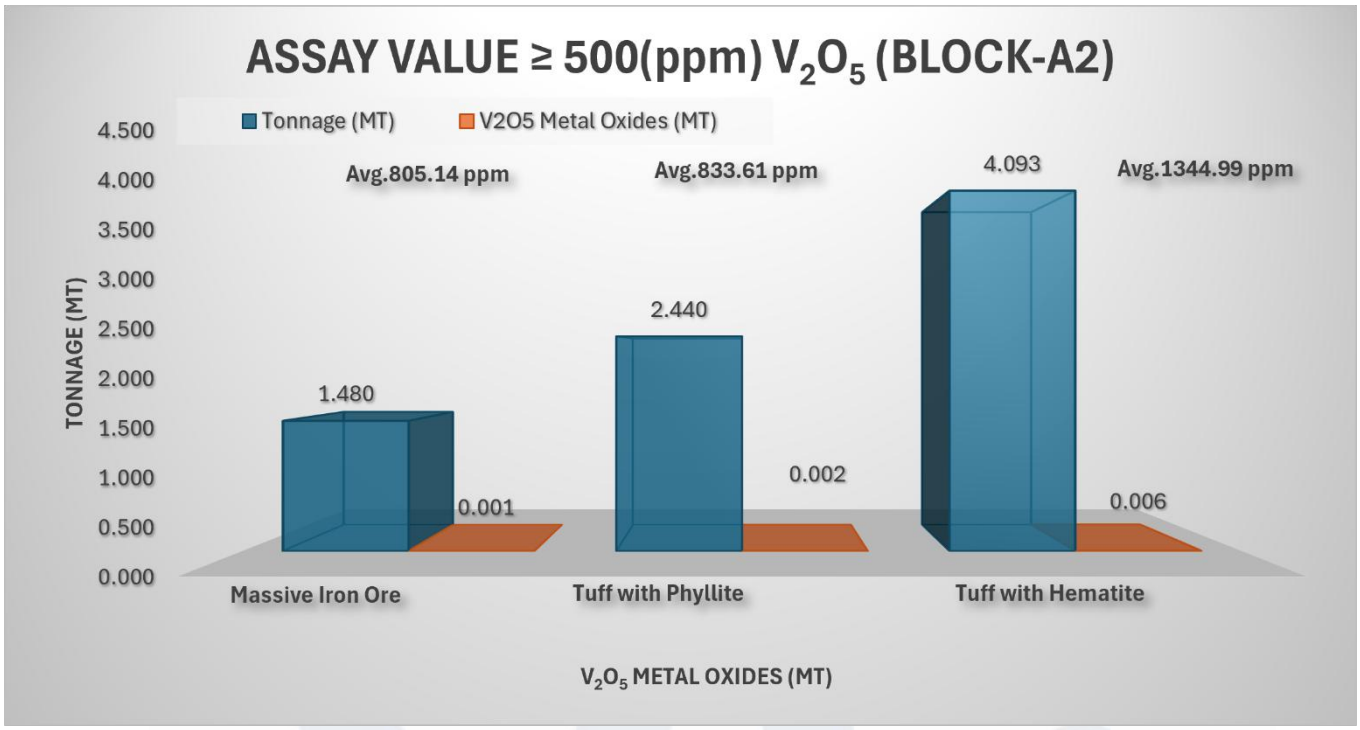
22.5.12 Tonnage and V_2O_5 estimation of different lithology at different Fe Cut-off grades in Block A1



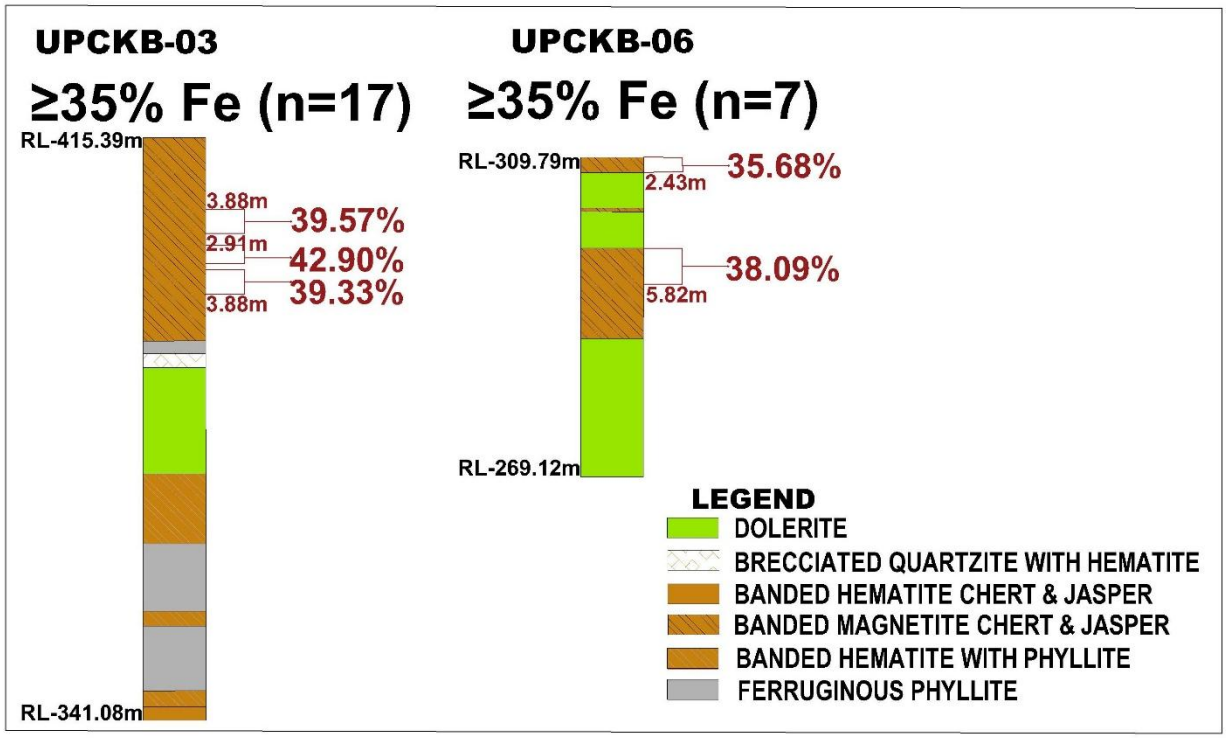
22.5.13 Tonnage and TiO_2 estimation of different lithology at different Fe cut-off grades in Block A

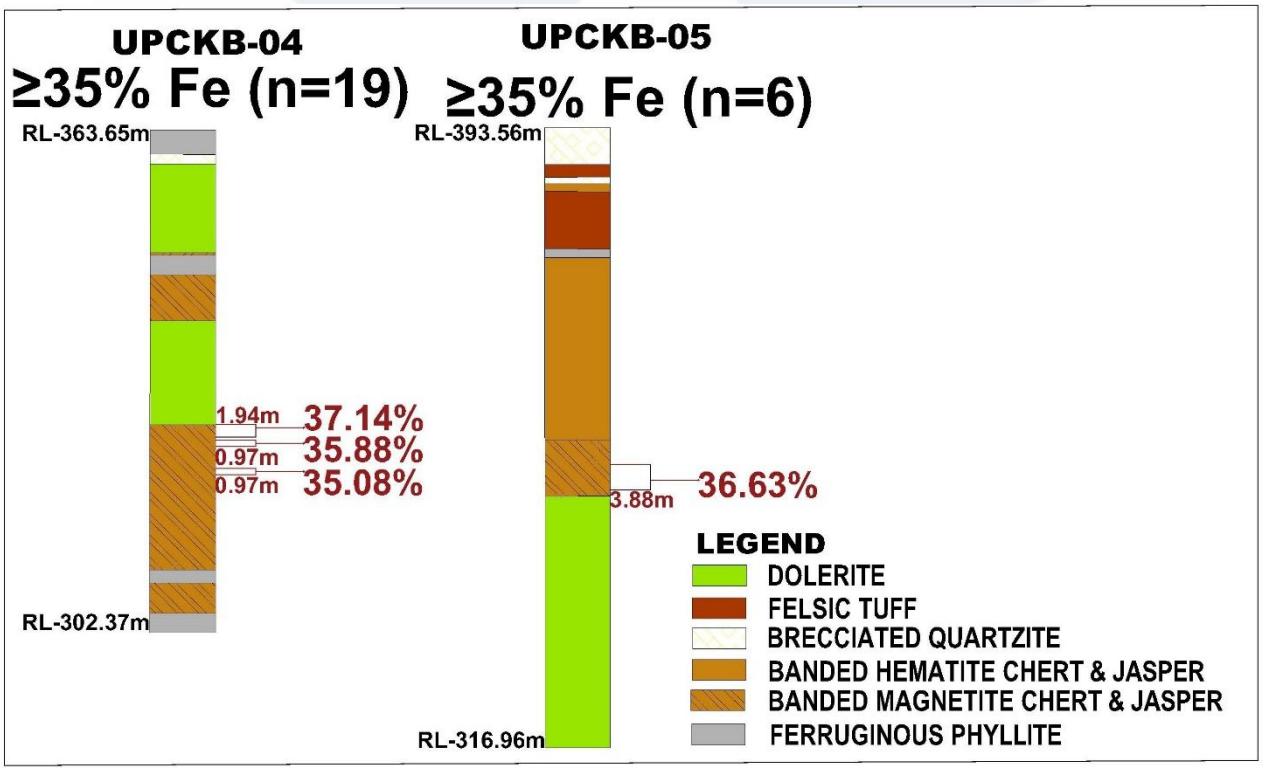


22.5.14 Tonnage and V_2O_5 estimation of different lithology at different Fe cut-off grades in Block A2

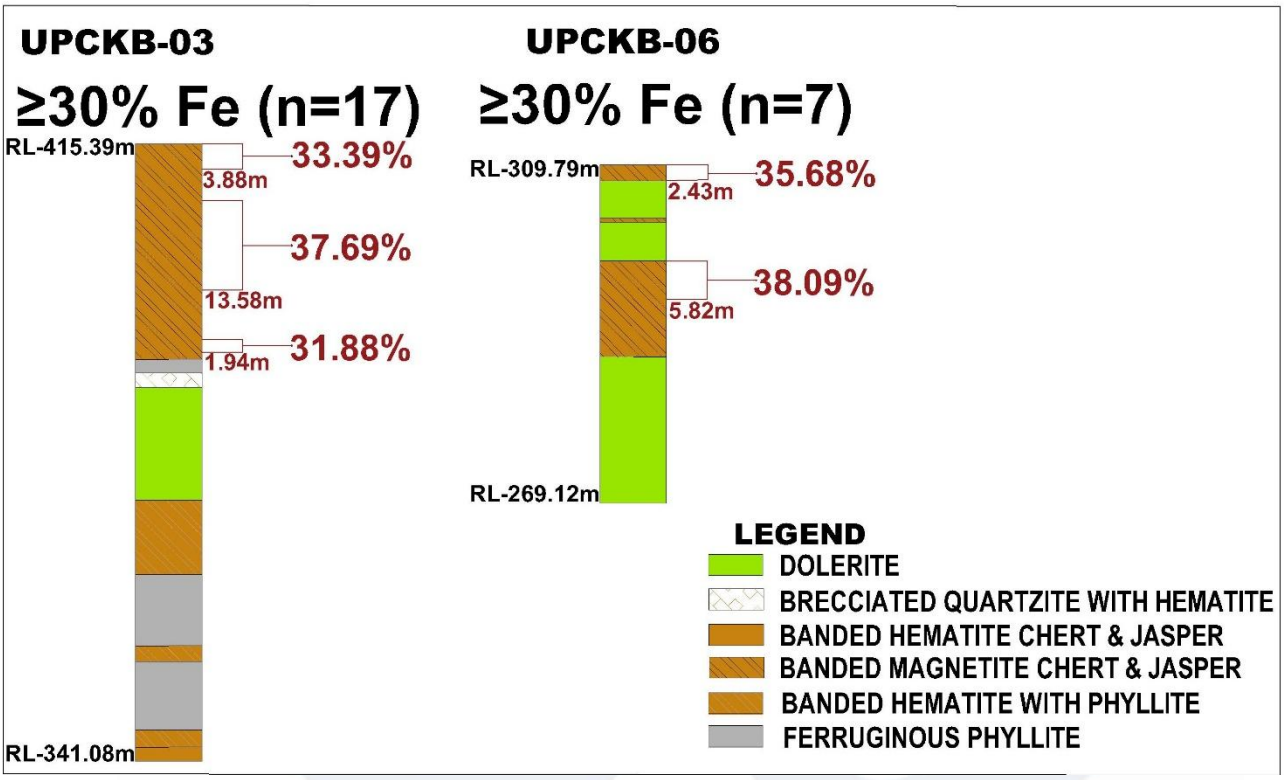


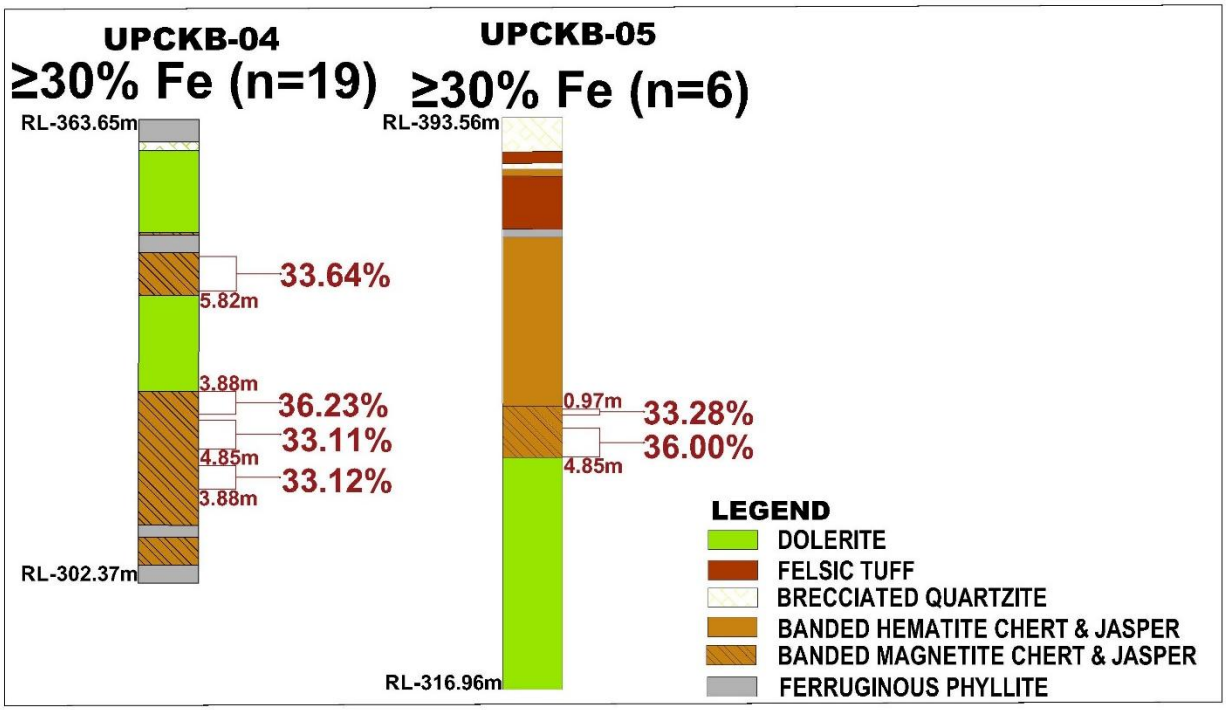
22.5.15 Fe-mineralized intervals at ≥35% Fe in BMC&J cut-off in boreholes UPCKB-03,04,05 and UPCKB-06



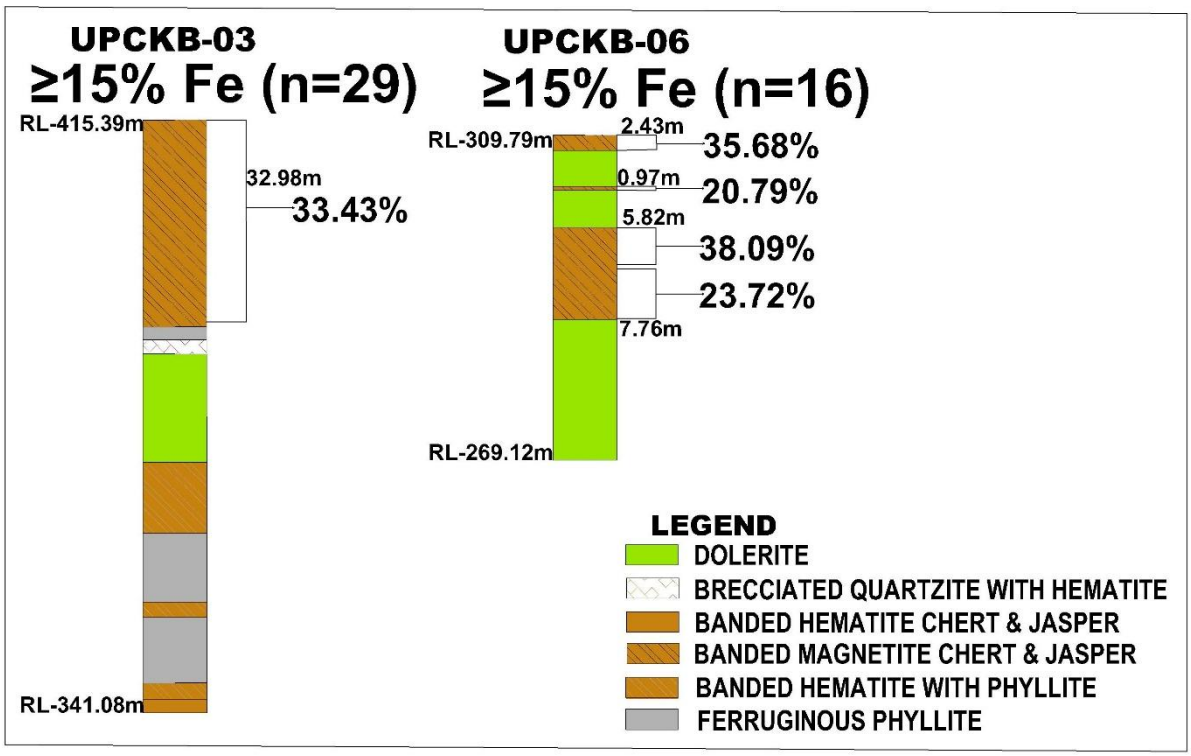


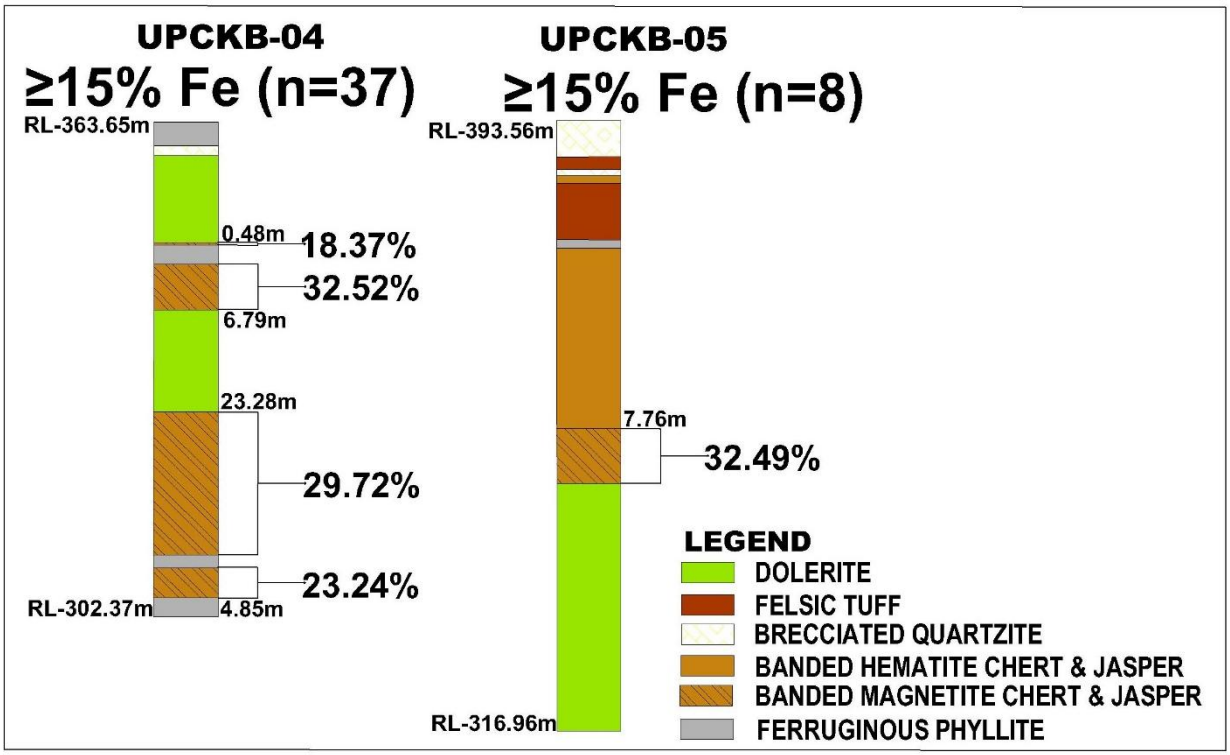
22.5.16 Fe-mineralized intervals at ≥30% Fe in BMC&J cut-off in boreholes UPCKB-03,04,05 and UPCKB-06



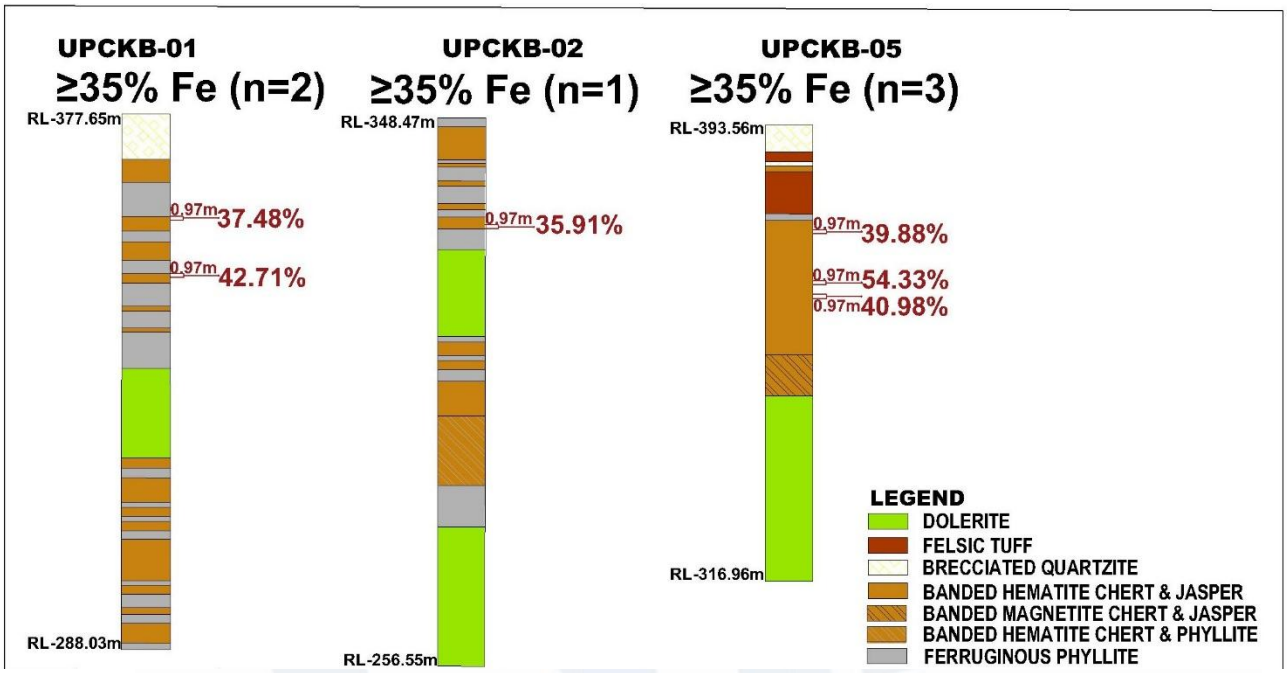


22.5.17 Fe-mineralized intervals at ≥15% Fe in BMC&J cut-off in boreholes UPCKB-03,04,05 and UPCKB-06

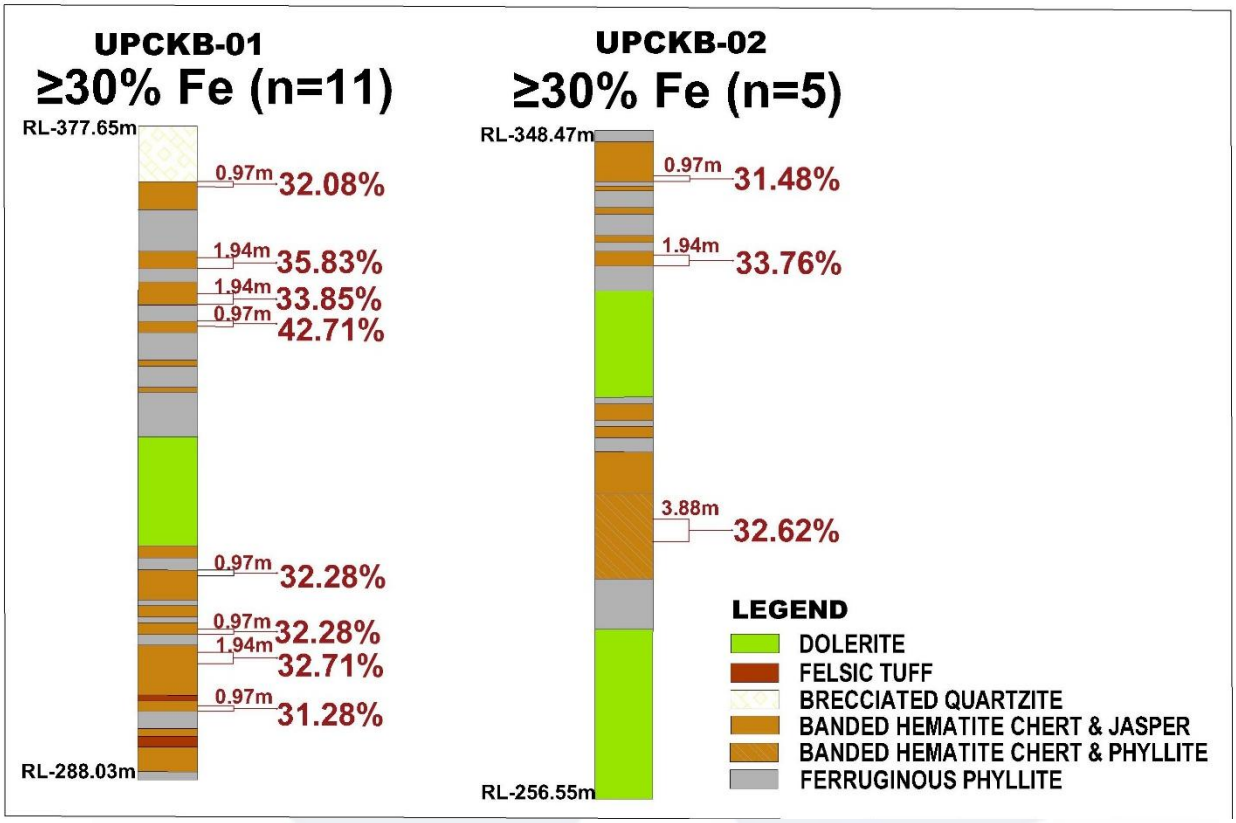


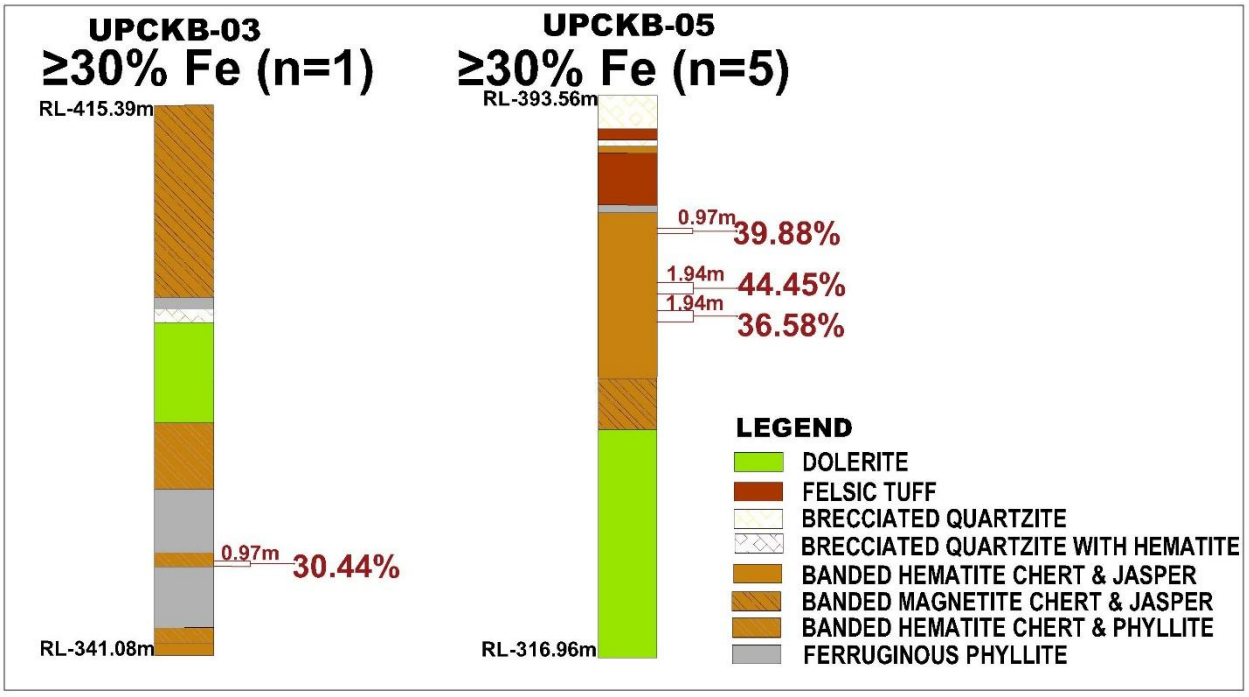


22.5.18 Fe-mineralized intervals at ≥35% Fe in BHC&J cut-off in boreholes UPCKB-01,02 and UPCKB-05

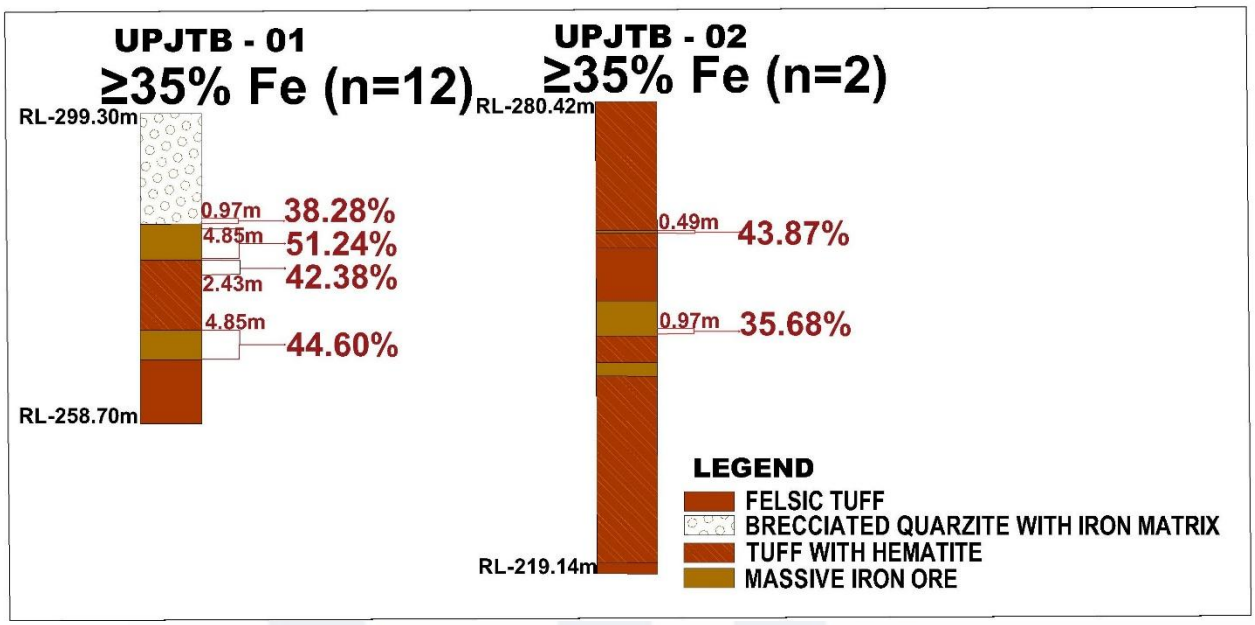


22.5.19 Fe-mineralized intervals at ≥30% Fe in BHC&J cut-off in boreholes UPCKB-01,02,03 and UPCKB-05

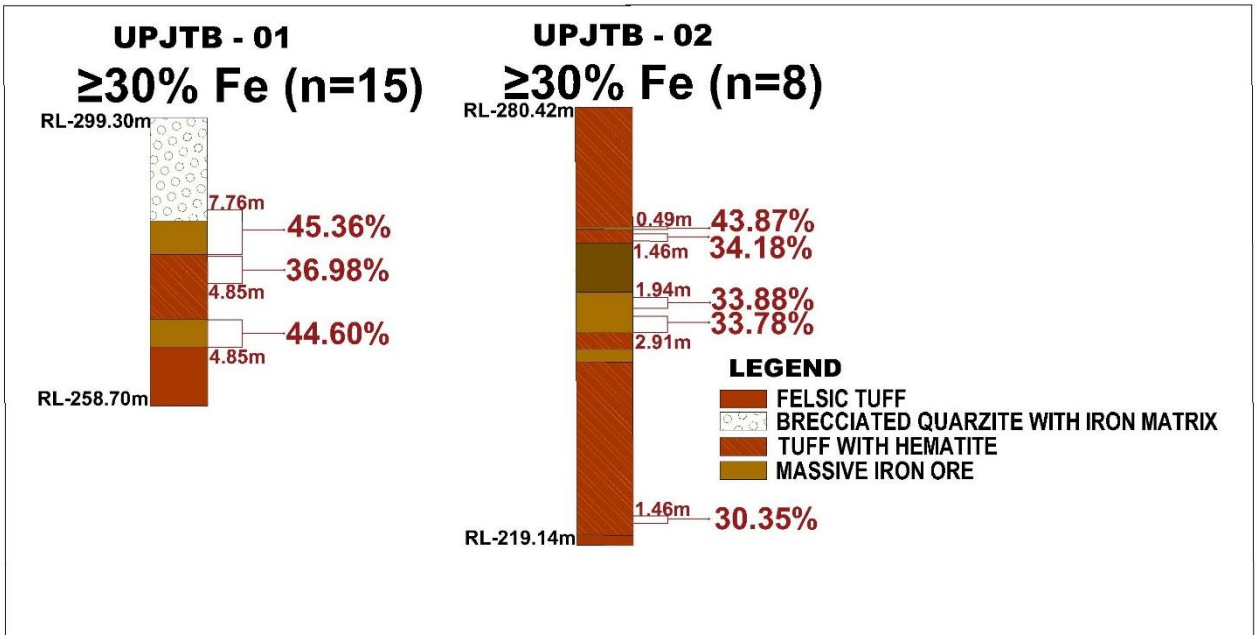




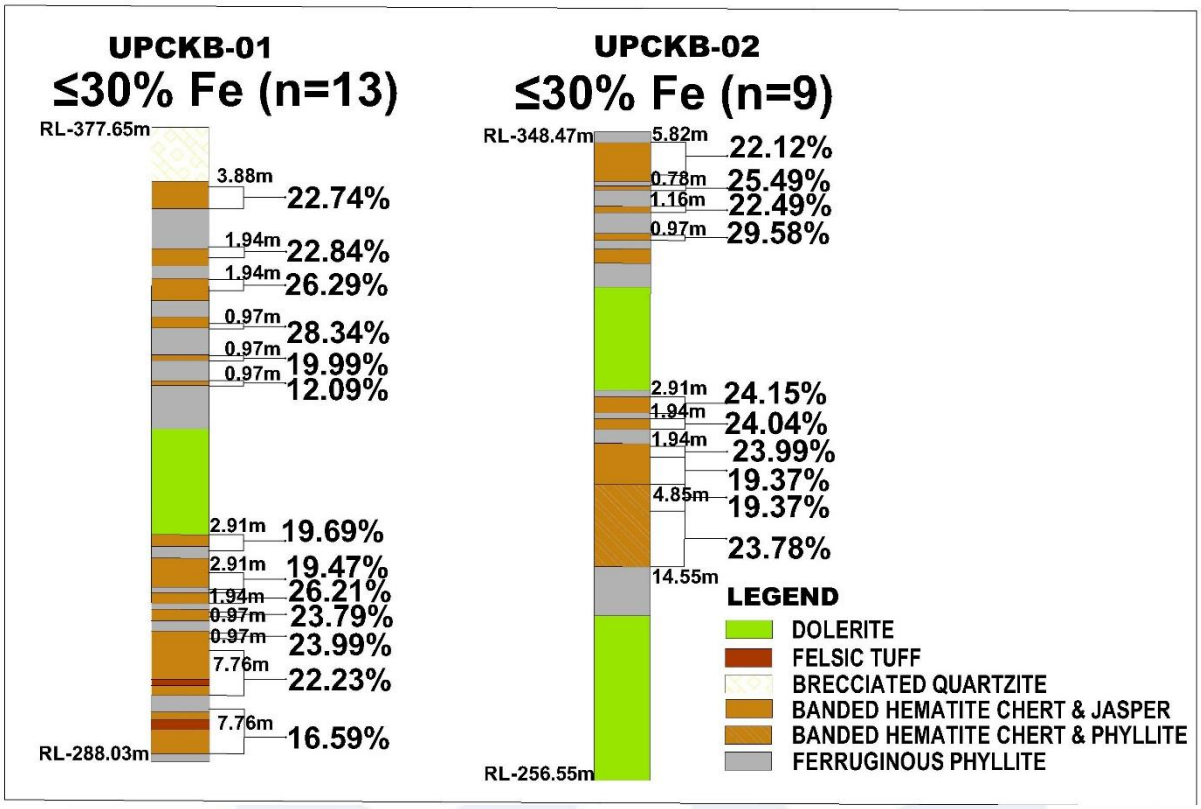
22.5.20 Fe-mineralized intervals at ≥35% Fe in massive iron ore cut-off in boreholes UPJTB-01 and UPCKB-02

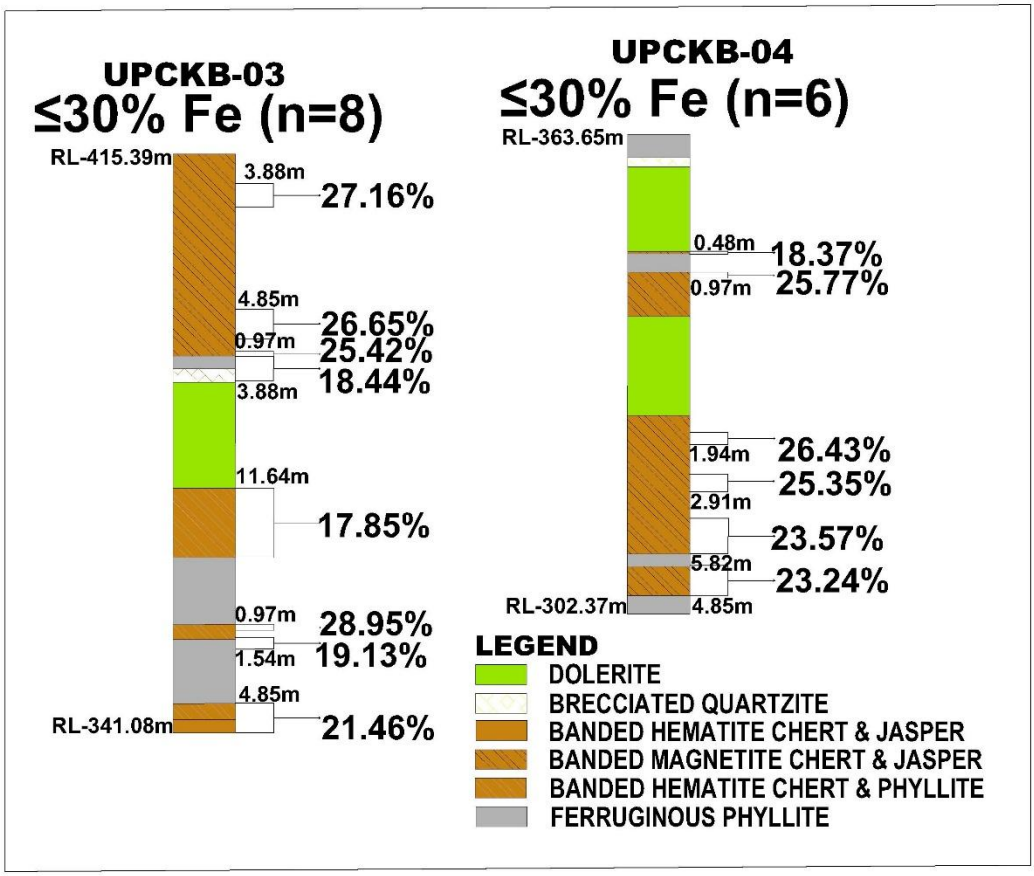


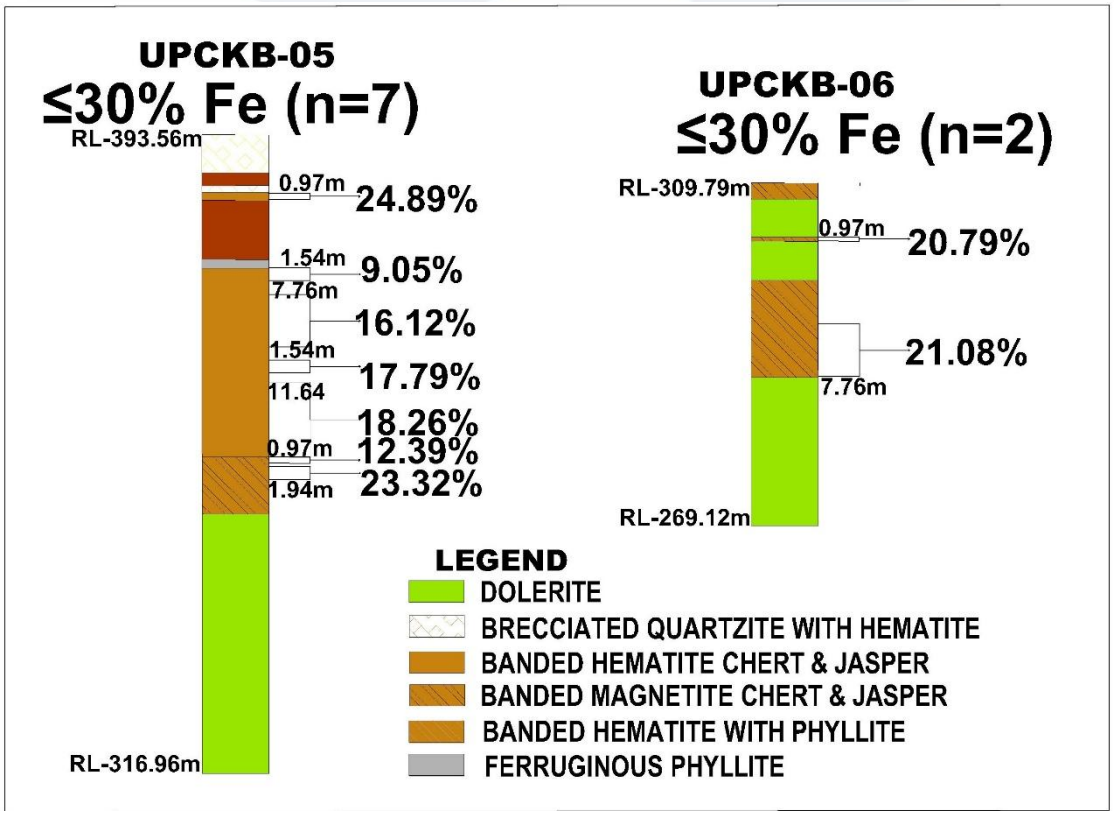
22.5.21 Fe-mineralized intervals at ≥30% Fe in massive iron ore cut-off in boreholes UPJTB-01 and UPCKB-02



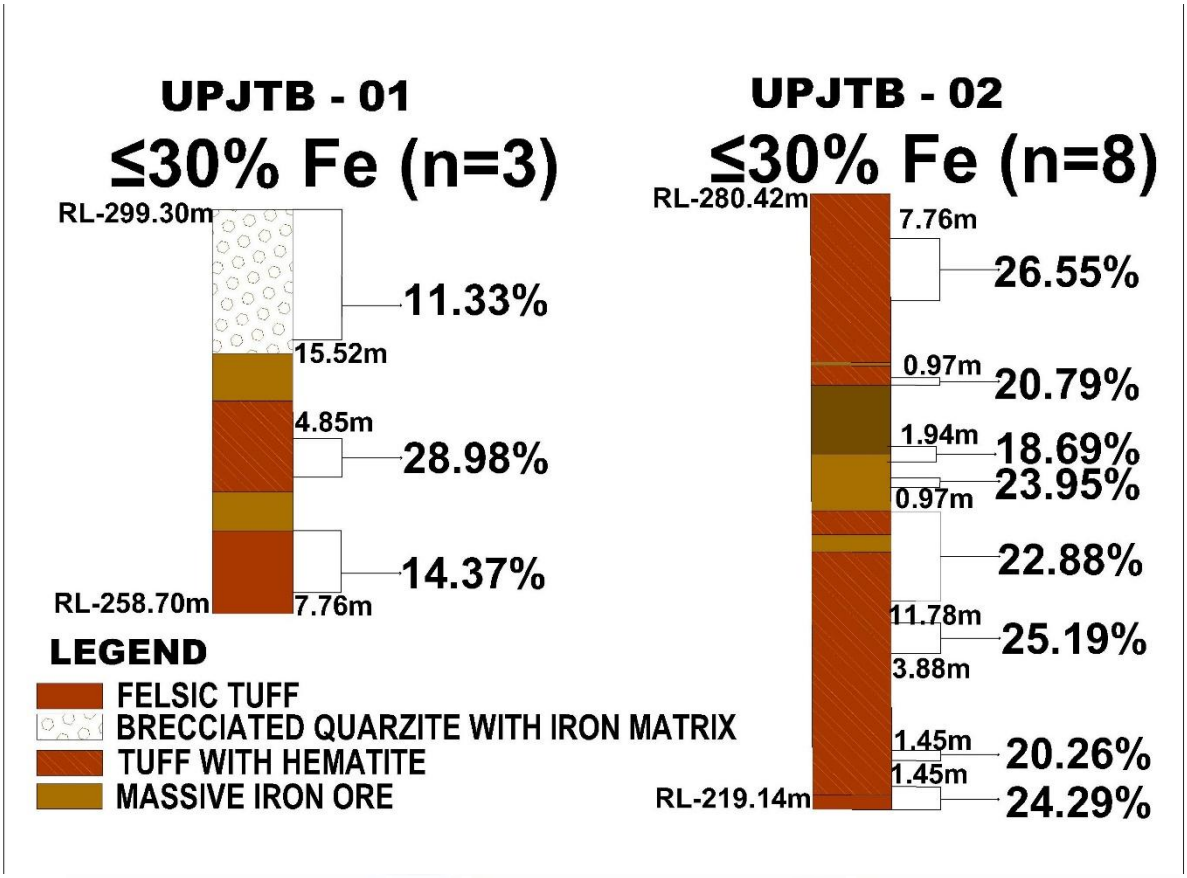
22.5.22 Lithological and Fe-grade profile of boreholes at ≤30% Fe in Block A1



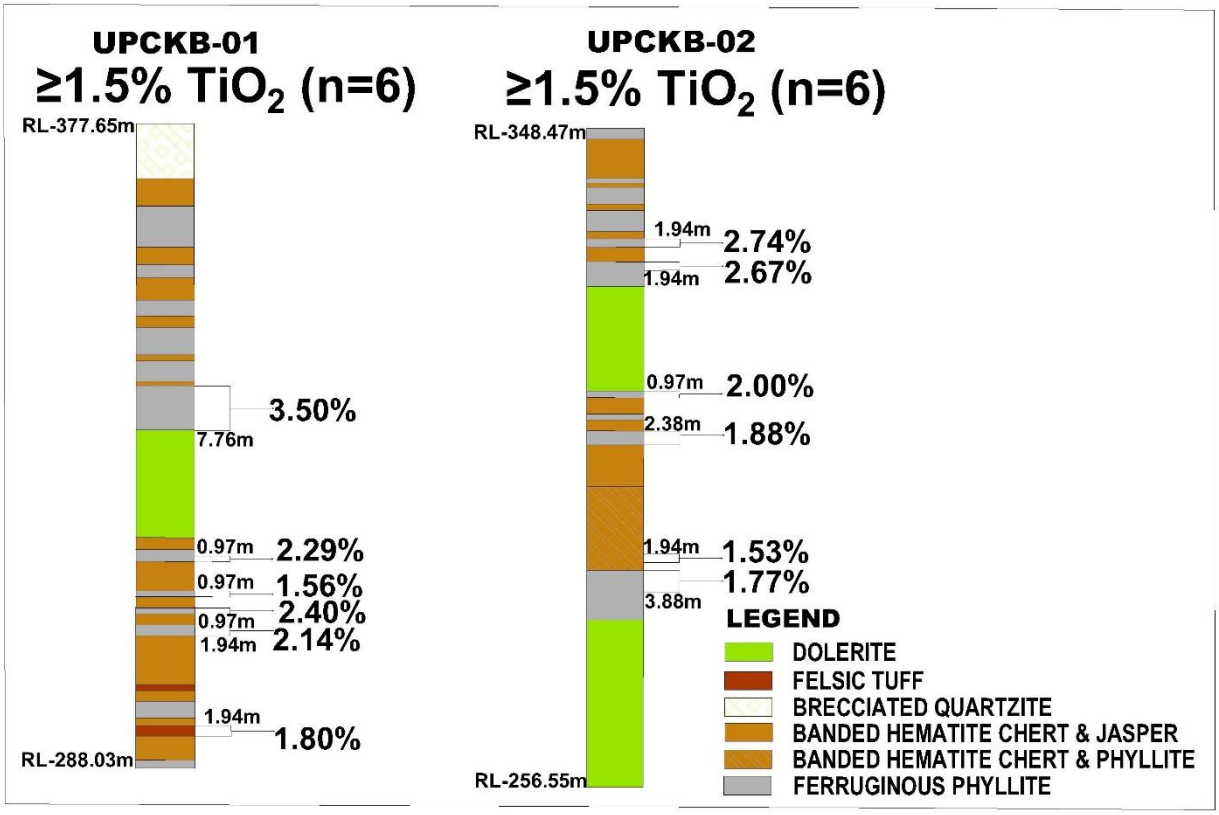

UPCKB-03
≤30% Fe (n=8)
RL-415.39m
3.88m
27.16%
4.85m
26.65%
0.97m
25.42%
3.88m
18.44%
11.64m
17.85%
0.97m
28.95%
1.54m
19.13%
4.85m
RL-341.08m
21.46%
UPCKB-04
≤30% Fe (n=6)
RL-363.65m
0.48m
18.37%
0.97m
25.77%
1.94m
26.43%
25.35%
2.91m
23.57%
5.82m
23.24%
RL-302.37m
4.85m
LEGEND
DOLERITE
BRECCIATED QUARTZITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
BANDED HEMATITE CHERT & PHYLLITE
FERRUGINOUS PHYLLITE

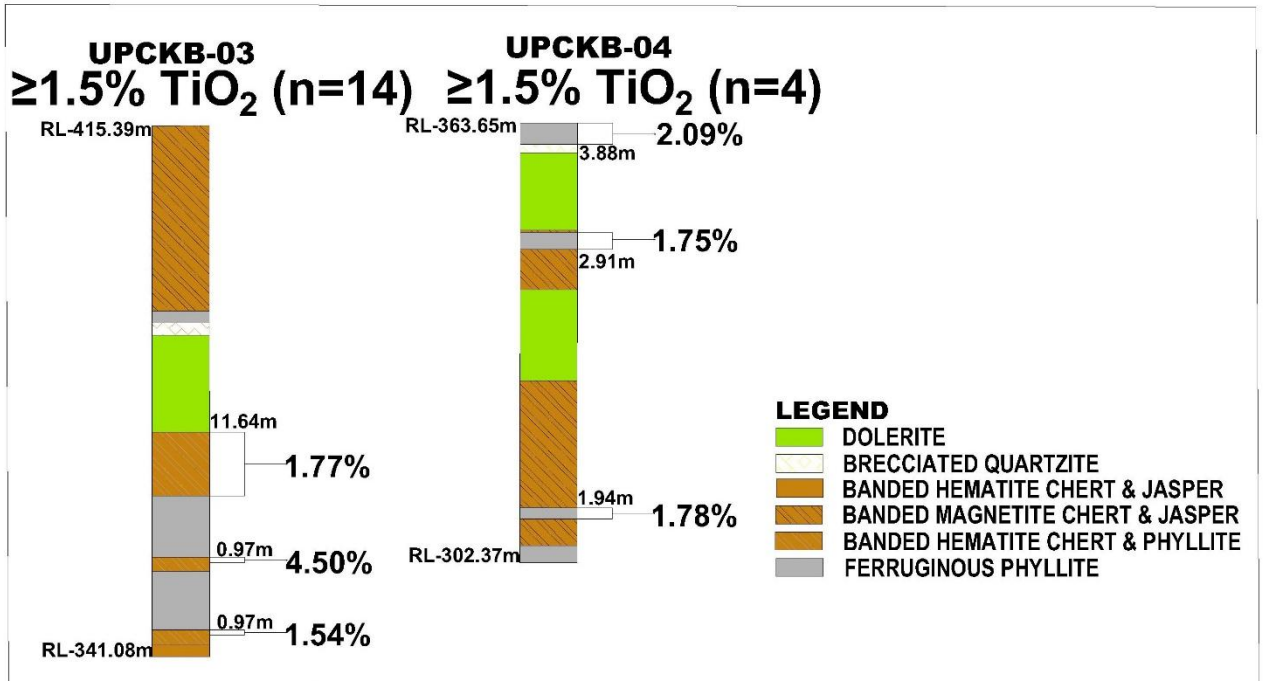

UPCKB-05
≤30% Fe (n=7)
RL-393.56m
0.97m
24.89%
1.54m
9.05%
7.76m
16.12%
1.54m
17.79%
11.64
18.26%
0.97m
12.39%
1.94m
23.32%
RL-316.96m
UPCKB-06
≤30% Fe (n=2)
RL-309.79m
0.97m
20.79%
21.08%
7.76m
RL-269.12m
LEGEND
DOLERITE
BRECCIATED QUARTZITE WITH HEMATITE
BANDED HEMATITE CHERT & JASPER
BANDED MAGNETITE CHERT & JASPER
BANDED HEMATITE WITH PHYLLITE
FERRUGINOUS PHYLLITE

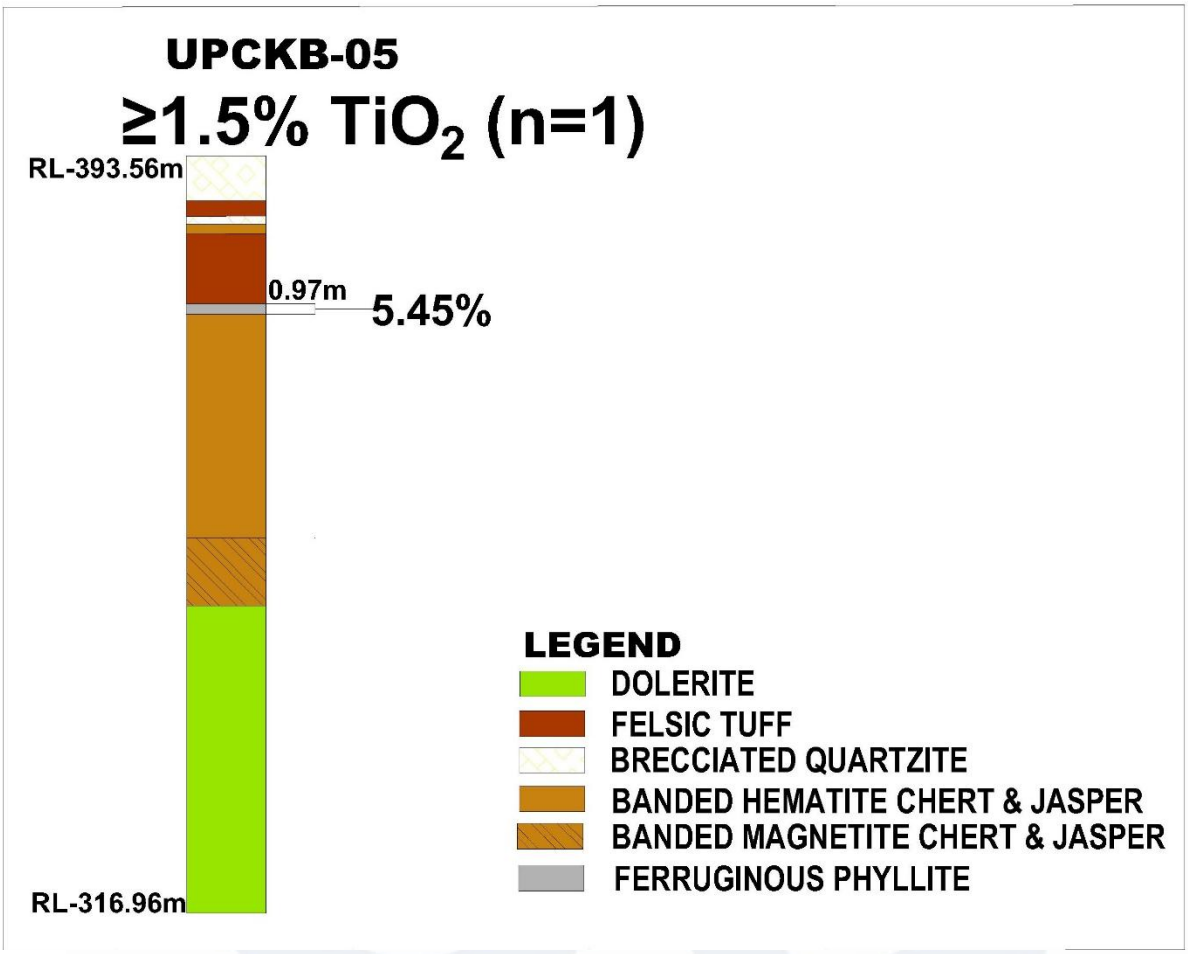
22.5.23 Lithological and Fe-grade profile of boreholes at ≤30% Fe in Block A2



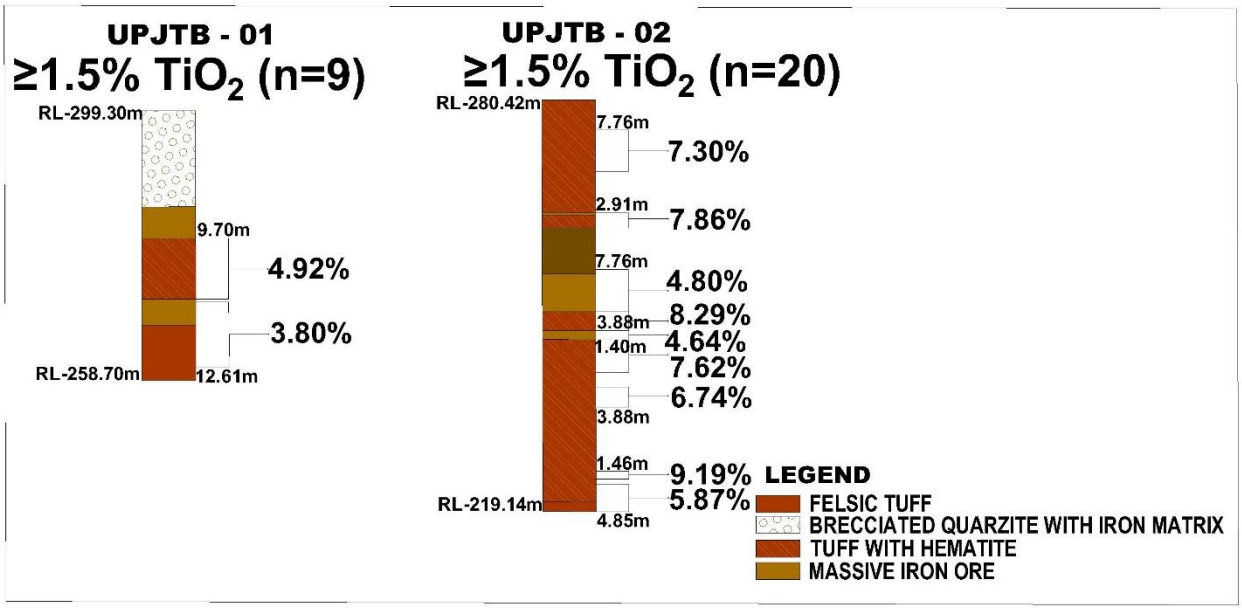
22.5.24 Mineralized intervals at ≥1.5% TiO2 is cut-off in Block A1



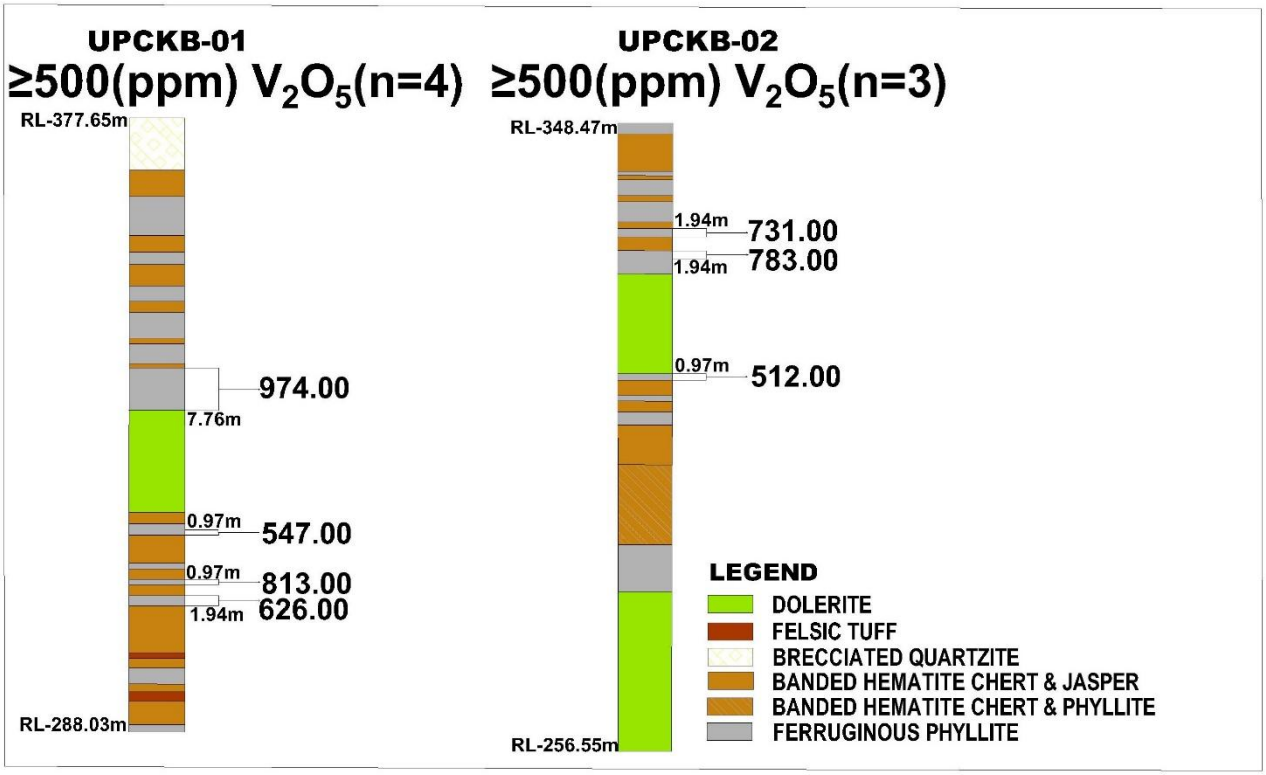


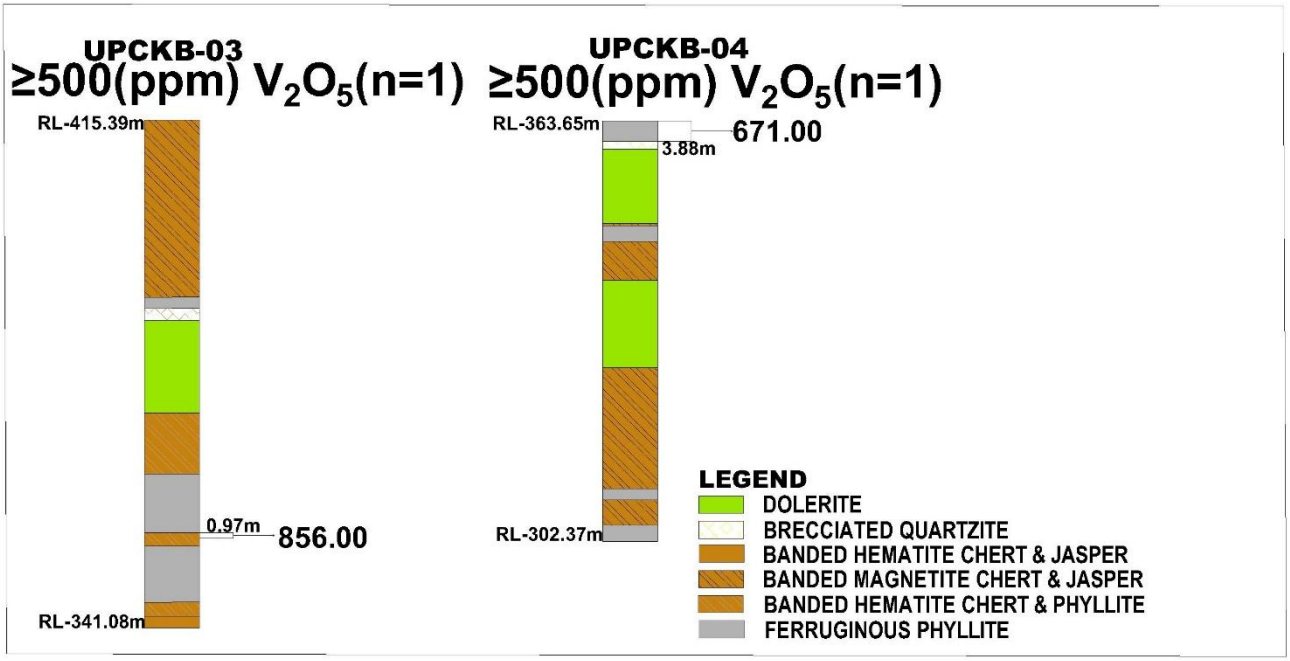


22.5.25 Mineralized intervals at ≥1.5% TiO2 is cut-off in Block A2

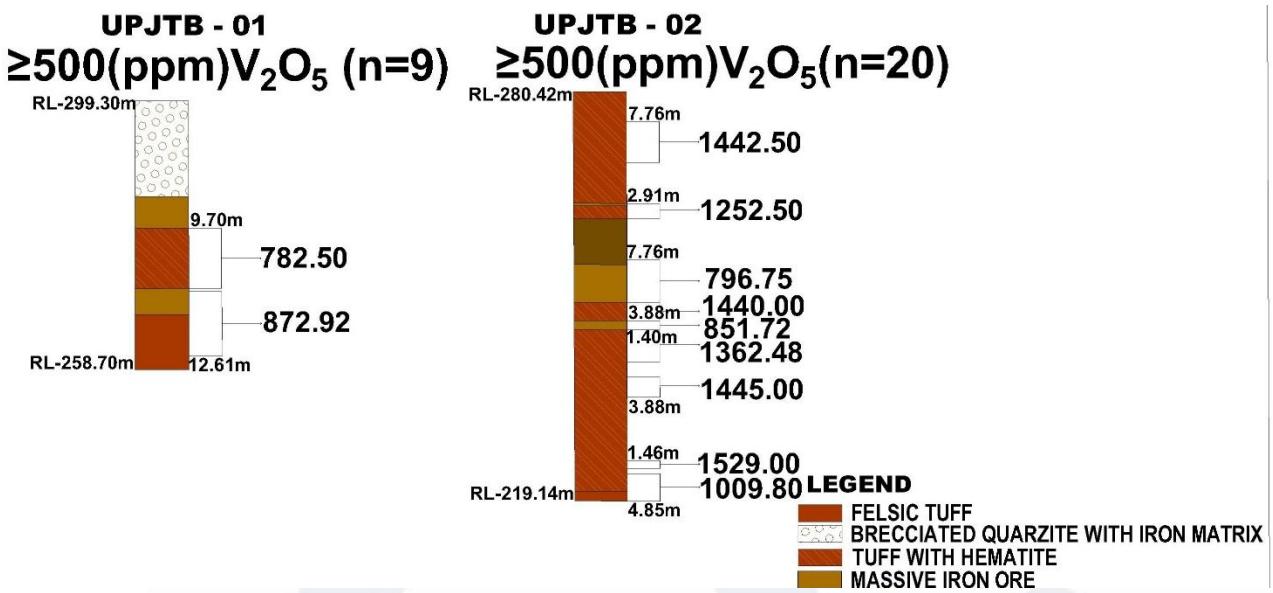


22.5.26 Mineralized intervals at ≥500ppm V2O5 is cut-off in Block A1

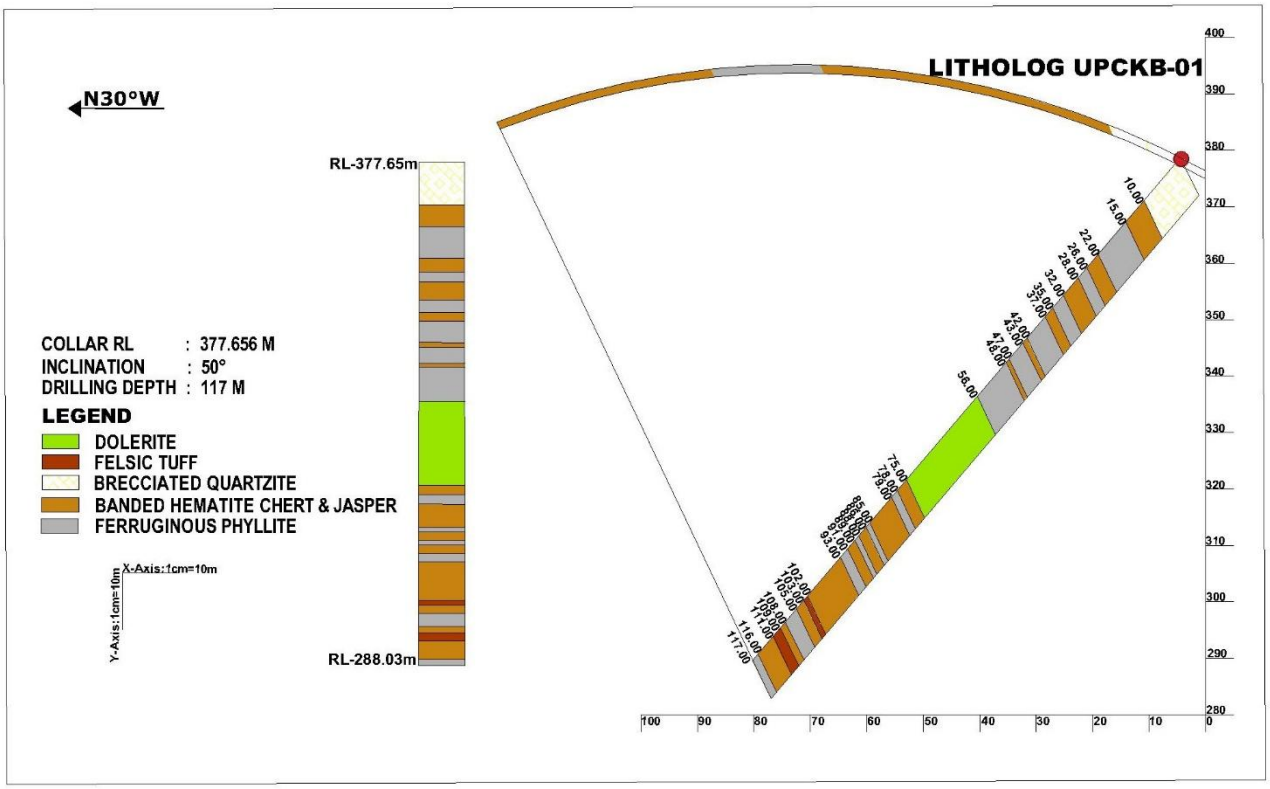




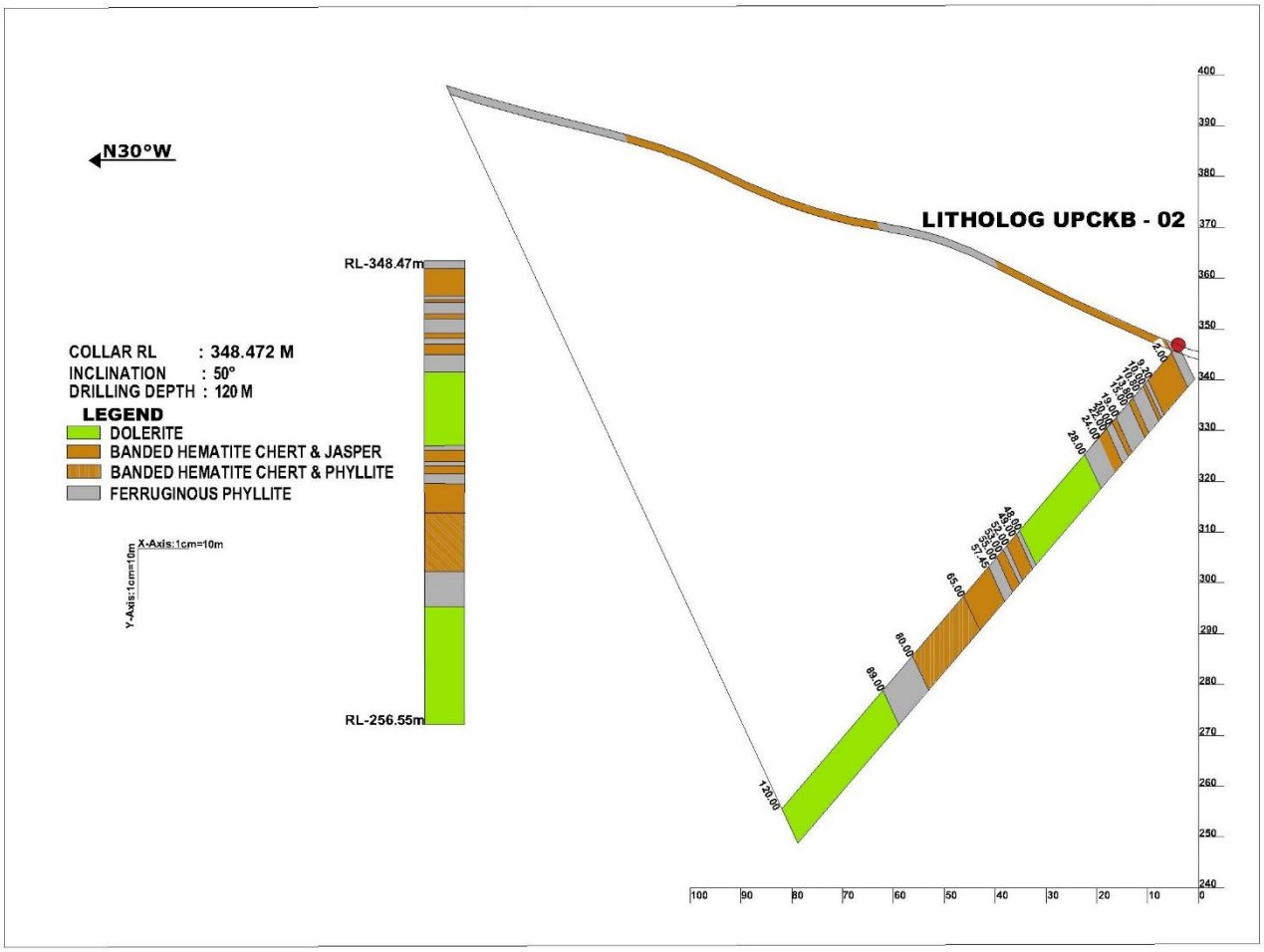
22.5.27 Mineralized intervals at ≥500ppm V2O5 is cut-off in Block A2



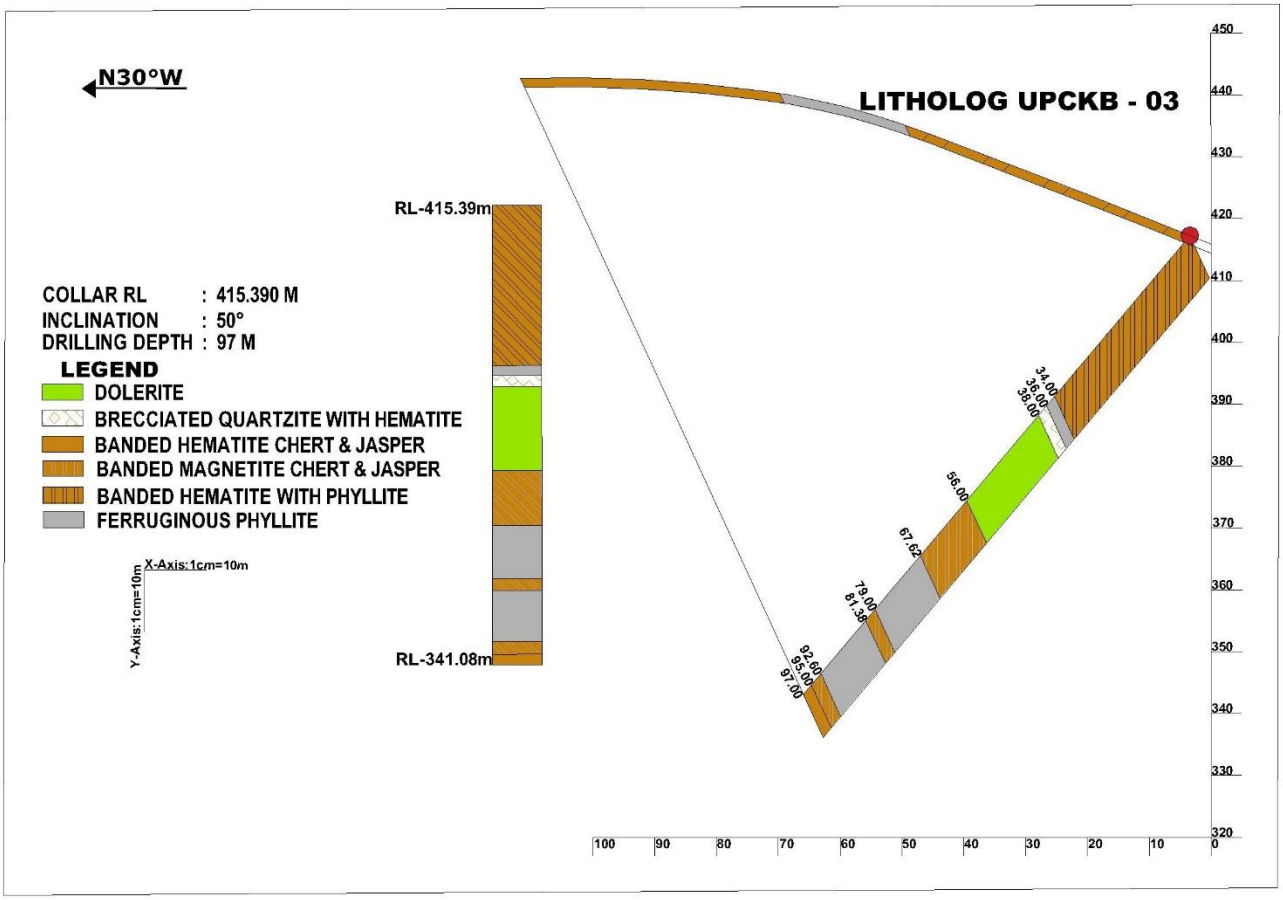
22.5.28 Showing downhole lithological distribution in borehole UPCKB-01



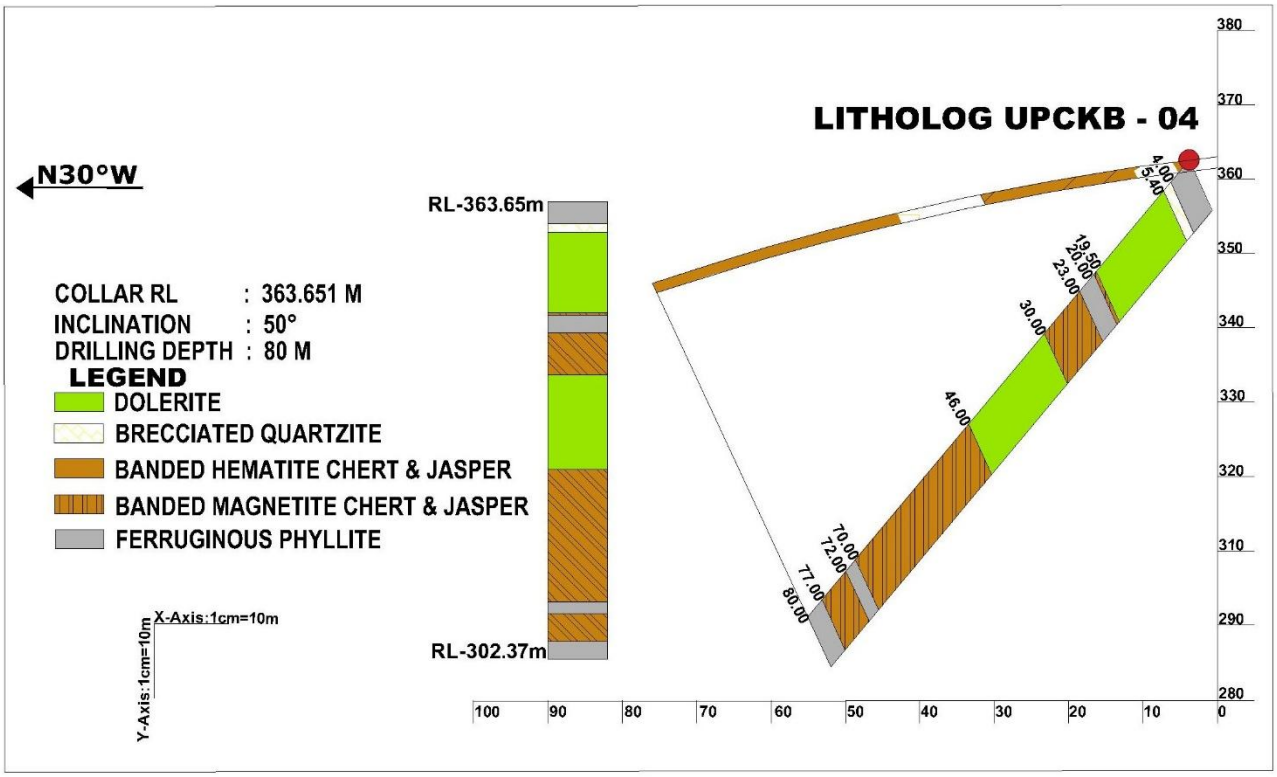
22.5.29 Showing downhole lithological distribution in borehole UPCKB-02



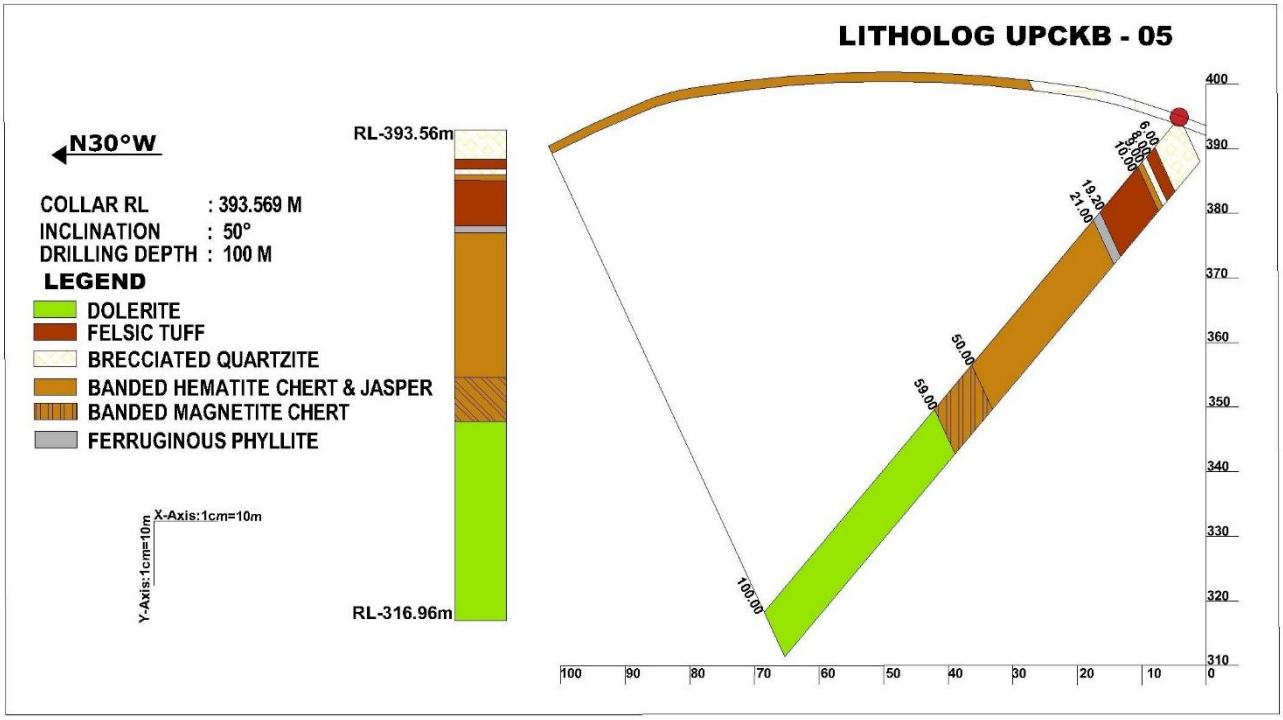
22.5.30 Showing downhole lithological distribution in borehole UPCKB-03



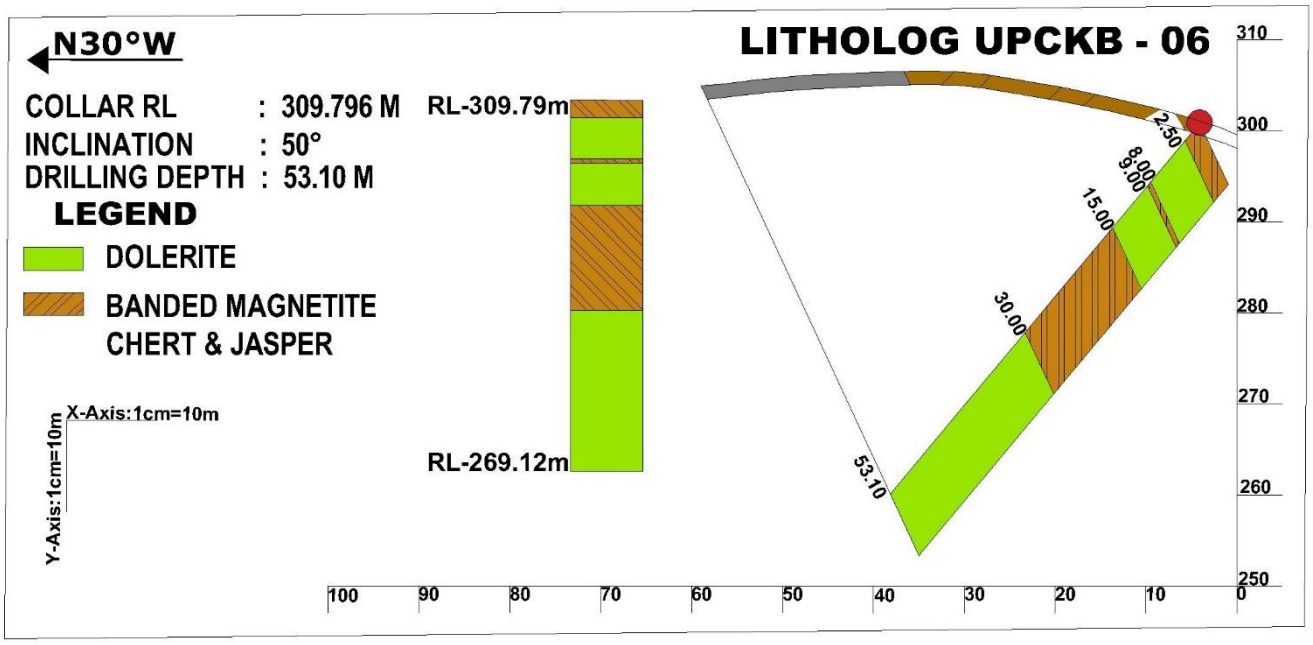
22.5.31 Showing downhole lithological distribution in borehole UPCKB-04



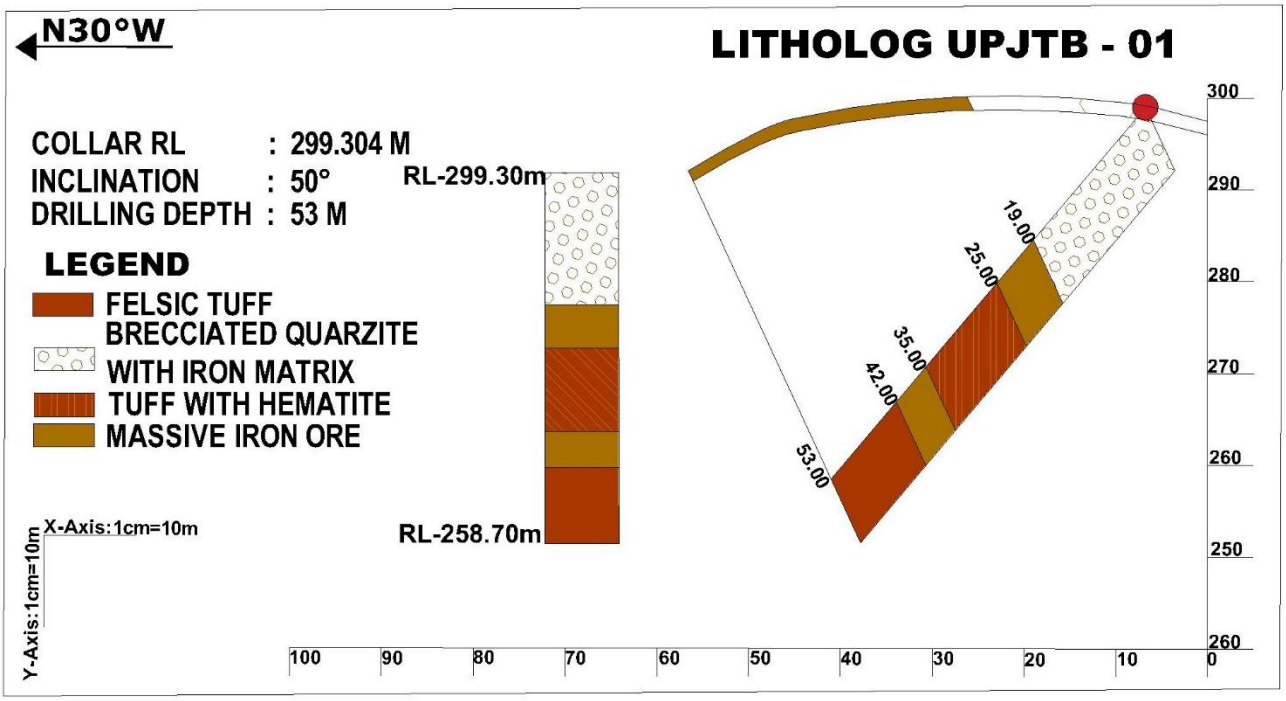
22.5.32 Showing downhole lithological distribution in borehole UPCKB-05



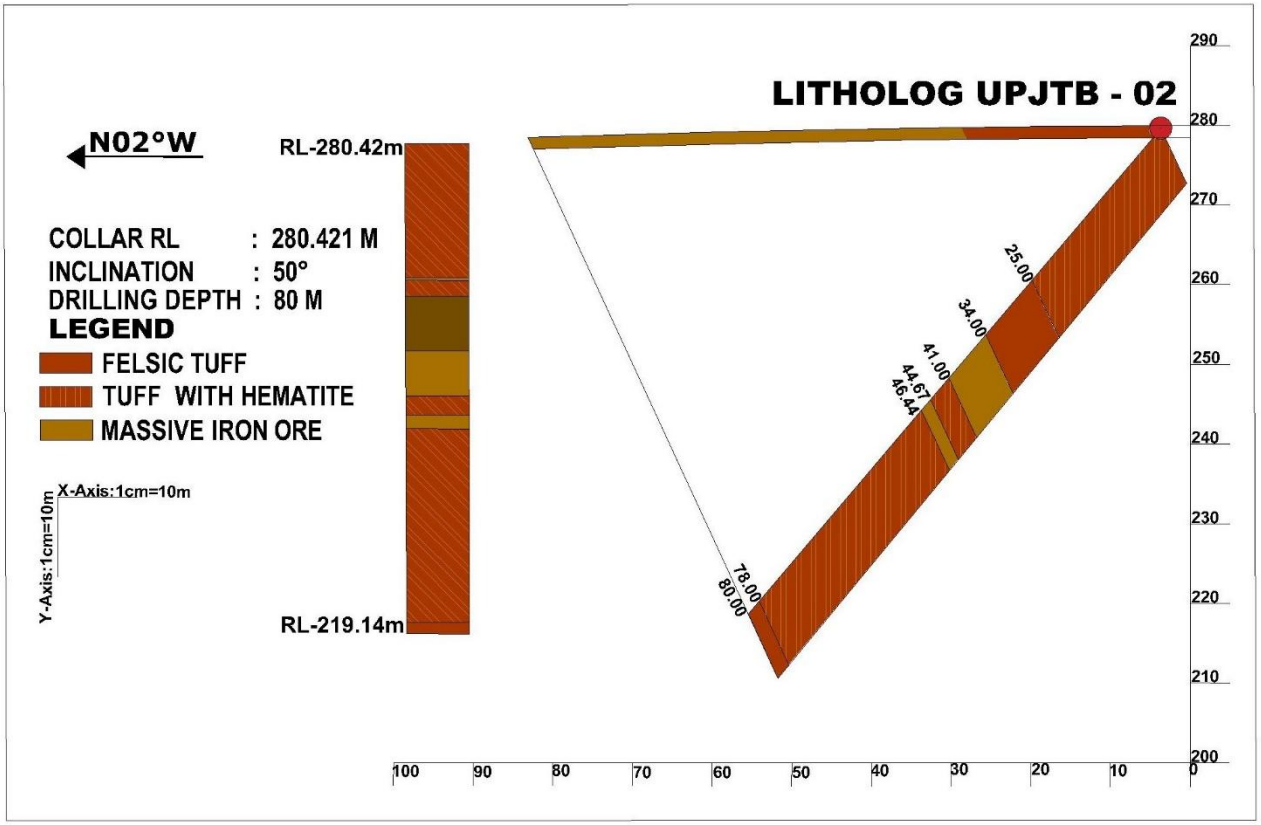
22.5.33 Showing downhole lithological distribution in borehole UPCKB-06



22.5.34 Showing downhole lithological distribution in borehole UPJTB-01



22.5.35 Showing downhole lithological distribution in borehole UPJTB-02



CHAPTER: 23 ANNEXURES OR ENCLOSURES TO THE REPORT

23.1 Annexure I: Bedrock sample description in Block A1

BRS Sample Description: Block A1									
S. No.	**Sample ID**	**Latitude**	**Longitude**	**Elev.**	**Strike**	**Dip Direction**	**Dip Amount**	**Lithology**	**Description**
1	UPCK/BRS-1/2024-25	N24° 33' 06.4"	E82° 51' 17.7"	344 m	140	50	80°E	BHC&J	2 Parallel bands are exposed around 2 m wide with 4-6 m length exposed top of the hill. With Limonitization & some Columnar structures are observed in hand specimen.
2	UPCK/BRS-2/2024-25	N24° 32' 47.0"	E82° 51' 16.3"	306 m				BHC&J	BMJ Band exposed around 5m length with width of around 40 cm.
3	UPCK/BRS-3/2024-25	N24° 32' 50.5"	E82° 51' 18.0"	273 m	70	160	80°S	BHC&J	BHC exposed top of the hill, Jasper layer varies from 1 cm to 3 cm & Hematite layer varies from 0.5 cm to 1 cm and quartzite layers varies from 1 cm to 4 cm in thickness.
4	UPCK/BRS-4/2024-25	N24° 32' 54.9"	E82° 51' 24.2"	341 m	70	160	35°S	BMC&J	BMC&J band exposed top of the next hill Length around 40m and width around 20m
5	UPCK/BRS-5/2024-25	N24° 32' 51.8"	E82° 51' 33.5"	303 m	55	145	70°S	BHC&J	Banded Hematite Quartzite and Banded Hematite Jasper extended around 500 m in length and around 60 meters with width with band of hematite varing in 0.5 cm to 2 cm in thickness. Quartzite and Jasper bands are thick compared to hematite bands. Its varing from 1 cm to 4.5 cm in thickness.
6	UPCK/BRS-6/2024-25	N24° 32' 56.3"	E82° 51' 44.1"	412 m	75	165	85°S	BHC&J	Banded Hematite Quartzite and Banded Hematite Jasper extended around 500 m in length and around 60 meters with width with band of hematite varing in 0.5 cm to 2 cm in thickness. Quartzite and Jasper bands are thick compared to hematite bands. Its varing from 1 cm to 4.5 cm in thickness.
7	UPCK/BRS-7/2024-25	N24° 32' 57.6"	E82° 51' 29.9"	283 m	75	165	60°S	BHC&J	Contact zone of greywacke & BHJ BHQ near nala cutting exposed.
8	UPCK/BRS-8/2024-25	N24° 32' 53.7"	E82° 51' 31.3"	267 m	70	160	75°S	BHC&J	BHJ & BHQ exposed near nala channel with foot of the hills.

9	UPCK/BRS-9/2024-25	N24° 32' 55.4	E82° 51' 45.8	399 m	80	170	72°S	BMC&J	Banded Magnetite Jasper & Banded Magnetite quartzite exposed in continuation of BHJ & BHQ.
10	UPCK/BRS-10/2024-25	N24° 33' 04.2	E82° 51' 27.6	291 m	70	160	60°S	Pyroclastic Rock	Grain size varies from 2 mm to 12 cm grey to greenish colour volcanic bombs. And quartz grain also vary 2mm to 5 mm in size.
11	UPCK/BRS-11/2024-25	N24° 33' 07.6"	E82° 51' 45.0"	334 m	80	170	70°S	BMC&J	BMJ & BMQ band exposed top of the next hill Length around 250m and width around 15m
12	UPCK/BRS-12/2024-25	N24° 33' 11.1"	E82° 52' 13.4"	386 m	60	150	65°S	BHC&J	BHJ BHQ exposed top of the hill, Jasper layer varies from 1 cm to 3 cm & Hematite layer varies from 0.5 cm to 1 cm and quartzite layers varies from 1 cm to 4 cm in thickness. This band thickness is around 30 m.
13	UPCK/BRS-13/2024-25	N24° 33' 06.6"	E82° 52' 16.0"	406 m	90	180	72°S	BHC&J	BHJ BHQ exposed top of the hill, Jasper layer varies from 1 cm to 3 cm & Hematite layer varies from 0.5 cm to 1 cm and quartzite layers varies from 1 cm to 4 cm in thickness. This band thickness is around 80 m.
14	UPCK/BRS-14/2024-25	N24° 33' 05.8"	E82° 52' 13.7"	421 m	80	170	80°S	BHC&J	BHJ & BHQ exposed on top of the hill Hematite is crystallize in nature with small crystal quartz are observed.
15	UPCK/BRS-15/2024-25	N24° 33' 05.1"	E82° 52' 17.6"	381 m	80	170	80°S	BHC&J	BHJ & BHQ exposed parallel to the phyllite band. Hematite layer is very thin compared to Jasper & quartzite.
16	UPCK/BRS-16/2024-25	N24° 33' 01.0"	E82° 52' 39.2"	385 m	70	160	45°S	Ferruginous Phyllite	Light grey to dark grey banded phyllite exposed all along the strike. Trend is almost N 70° E
17	UPCK/BRS-17/2024-25	N24° 33' 08.6"	E82° 52' 26.0"	392 m	70	160	70°S	BHC&J	Brecciated Quartzite all the Quartzite angulated grains varies from 1 cm to 6 cm thickness and 2 mm to 4mm Jasper & Hematite has been observed.
18	UPCK/BRS-18/2024-25	N24° 33' 12.3"	E82° 52' 36.4"	418 m	70	160	80°S	BHC&J	BHJ & BHQ with phyllite contact encountered on top of the hill. In this band Jasper layer is thick 1-7 cm, Hematite layer .5 to 2 cm.
19	UPCK/BRS-19/2024-25	N24° 33' 14.2"	E82° 52' 41.2"	438 m	75	165	70°S	BHC&J	BHJ & BHQ exposed on top of the hill with Jasper layer is wider than Hematite & quartzite
20	UPCK/BRS-20/2024-25	N24° 33' 16.2"	E82° 52' 41.7"	437 m	60	150	40°S	BMC&J	BMJ & BMQ thin band around 6 m exposed top of the hill. In this 2 mm to 1 cm of Magnetite layer has been observed. Jasper layer 2 mm to 3 mm.
21	UPCK/BRS-21/2024-25	N24° 33' 15.3"	E82° 52' 48.3"	454 m	75	165	65°S	BHC&J	BHJ & BHQ band exposed all along the Brecciated quartzite band with 40cm thick layer of Hematite with NE - SW trending.
22	UPCK/BRS-22/2024-25	N24° 33' 27.3"	E82° 53' 00.2"	401 m	70	160	60°S	BMC&J	Thin band of BMJ & BMQ observed on top of the small hill. Magnetite layer is 1 mm to 3 mm thick, Jasper &

									quartzite layers are 2mm to 6 mm extend width around 10 m.
23	UPCK/BRS-23/2024-25	N24° 33' 11.1"	E82° 53' 14.4"	313 m				Floated Goethite over Dolerite	Goethite exposed in the form of floated ore around 50x50m area over Dolerite.
24	UPCK/BRS-24/2024-25	N24° 33' 17.2"	E82° 52' 55.4"	451 m	75	165	85°S	BHC&J	BHJ & BHQ with Hematite layer varing from 2mm to 4 cm, Jasper layer 0.5 to 3 cm & quartzite layer 1 mm to 0.5 cm thick.
25	UPCK/BRS-25/2024-25	N24° 33' 20.8"	E82° 53' 06.4"	421 m	75	165	70°S	BHC&J	BHJ & BHQ with Hematite layer varing from 2mm to 4 cm, Jasper layer 0.5 to 3 cm & quartzite layer 1 mm to 0.5 cm thick. Bands are running parallel to the phyllite band.
26	UPCK/BRS-26/2024-25	N24° 33'27.2"	E82° 53' 27.7"	468 m	70	160	70°S	BHC&J	BHJ & BHQ exposed on top of the hill with Jasper layer is varing from 2mm to 1.5 cm hematite varing from 0.5 cm to 2 cm. Quartzite layer in very fine 1mm to 3mm.
27	UPCK/BRS-27/2024-25	N24° 33'23.3"	E82° 53' 22.7"	424 m	80	170	65°S	BHC&J	Contact of BHJ & BHQ with ferruginous Phyllite. In BHJ BHQ jasper layer is 2mm to 4 cm, Hematite layer is 2mm to 3cm & Quartzite layer 2mm to 0.5 cm by thickness. Redish brown to yellowish brown in colour with parallel 1.5 cm Hematite layers are also observed in the Phyllite.
28	UPCK/BRS-28/2024-25	N24° 33' 27.5"	E82° 53' 48.5"	299 m	80	170	82°S	BHC&J	BHJ & BHQ exposed in the nala channel with width of 40 m.
29	UPCK/BRS-29/2024-25	N24° 33' 36.4"	E82° 53' 43.8"	320 m	80	170	85°S	Dolerite	Dolerite medium to fine grained, greenish coloured due to pyroclastic material are present some epidotes minerals are observed in the sample.
30	UPCK/BRS-30/2024-25	N24° 33' 38.3"	E82° 53' 51.3"	358 m	70	160	65°S	BMC&J	BMJ & BMQ exposed top of the next small hill with around 8 m thick band extended along the strike length.
31	UPCK/BRS-31/2024-25	N24° 33' 29.5"	E82° 53' 40.6"	384 m	75	165	70°S	BHC&J	BHJ & BHQ exposed top of the hill around with width around 30m with Jasper layer varing from 2mm to 2 cm, quartzite varing 2mm to 4mm & Hematite varing 2mm to 7mm thickness.
32	UPCK/BRS-32/2024-25	N24° 33' 26.7"	E82° 53' 41.7"	382 m	80	170	70°S	BHC&J	Weathered brecciated quartzite exposed with BHJ & BHQ. In BQ Quartzite angulated grain are elongated by the strike. Jasper layer varing 0.5 cm to 3 cm. quartzite .5 to 4 cm and Hematite layer 0.5 to 3 cm thick.
33	UPCK/BRS-33/2024-25	N24° 33' 32.7"	E82° 53' 53.5"	407 m	80	170	75°S	BHC&J	In BQ Quartzite angulated grain are scattered form with 30% Iron matrix. In BHJ BHQ Jasper layer varing 0.5

									cm to 3 cm. quartzite .5 to 4 cm and Hematite layer 0.5 to 3 cm thick.
34	UPCK/BRS-34/2024-25	N24° 33' 34.9"	E82° 54' 03.6"	450 m	75	165	65°S	BMC&J	BMJ & BMQ exposed on the top of the hill with 1mm to 2mm Jasper layer with 2mm thick of quartz vein are parallel to the band. Exposed thickness around 15m.
35	UPCK/BRS-35/2024-25	N24° 33' 36.3"	E82° 54' 08.5"	457 m				BMC&J	BMJ & BMQ exposed on the top of the hill with Magnetite Layer Varing from 2mm to 0.5cm thick, 1mm to 2mm Jasper layer with 2mm thick of quartz vein are parallel to the band. Exposed thickness around 15m.
36	UPCK/BRS-36/2024-25	N24° 33' 26.1"	E82° 54' 13.4"	352 m	65	155	65°S	Contact of Phyllite & BMC&J	Dark brown to Black coloured Magnetite band exposed on top of the small hill with parallel to ferruginous Phyllite.
37	UPCK/BRS-37/2024-25	N24° 33' 36.5"	E82° 54' 14.6"	459 m	75	165	80°S	BIF	Off-white to yellowish brown to dark brown banded Iron formation exposed on top of the hill with B.Q. with width around 40m.
38	UPCK/BRS-38/2024-25	N24° 33' 37.6"	E82° 54' 14.5"	456 m	75	165	70°S	BMC&J	BMJ & BMQ exposed on one side of slop of the hill along BIF. Here Magnetite layer varing from 0.2 cm to 0.5 cm. with quartzite 0.1 cm to 1.5 cm & Jasper layer 0.1 cm to 0.3 cm.
39	UPCK/BRS-39/2024-25	N24° 33' 40.8"	E82° 54' 28.6"	401 m	70	160	60°S	BMC&J with Brecciated Quartzite	Banded Magnetite Quartzite & Jasper exposed on Magnetite layer varing 0.2 cm to 0.5 cm, Jasper & Quartzite layers are less 1mm to 2mm in thickness.
40	UPCK/BRS-40/2024-25	N24° 33' 40.4"	E82° 54' 36.1"	383 m	70	160	70°S	BHC&J	BHJ & BHQ exposed on top of the hill with Jasper layer varing from 2mm to 1cm, Quartzite layer varing from 2mm to 1.5 cm and Hematite layer varing from 2mm to 0.5 cm. with B.Q. extended towards North & towards south Phyllite band.
41	UPCK/BRS-41/2024-25	N24° 33' 50.6"	E82° 54' 30.1"	363 m	75	165	75°S	BMC&J	BMJ & BMQ exposed on slop of the hill with width 8m along the B.Q. & Phyllite bands. Magnetite layers varing 1 cm to 4 cm thick, Quartzite layer varing 0.5 cm to 2 cm thick & Jasper layer us minor 2mm to 0.5 cm.
42	UPCK/BRS-42/2024-25	N24° 33' 44.6	E82° 54' 53.1	341 m	60	150	70°S	BMC&J	BMJ & BMQ exposed on slop of the hill with width 8m along the B.Q. & Phyllite bands. Magnetite layers varing 1 cm to 4 cm thick, Quartzite layer varing 0.5 cm to 2 cm thick & Jasper layer us minor 2mm to 0.5 cm.
43	UPCK/BRS-43/2024-25	N24° 33' 46.7	E82° 54' 53.1	339 m	60	150	60°S	BMC&J	BMJ & BMQ exposed on slop of the hill with width 8m along the greywacke band. Magnetite layers varing 1

									cm to 4 cm thick, Quartzite layer varing 0.5 cm to 2 cm thick & Jasper layer us minor 2mm to 0.5 cm.
44	UPCK/BRS-44/2024-25	N24° 33' 50.4	E82° 54' 50.6	363 m	70	160	75°S	BHC&J	BHJ & BHQ exposed on the top of the hill with extent of 80m width parallel to Phyllite bands, Here Jasper layer varing from 2mm to 4 cm., Hematite layer 2mm to 2 cm.
45	UPCK/BRS-45/2024-25	N24° 33' 53.5	E82° 55' 01.5	371 m	75	165	80°S	Brecciated Quartzite	BHJ & BHQ found on top of the hill with Jasper layer thicker compared to Hematite & Quartzite layers.
46	UPCK/BRS-46/2024-25	N24° 33' 46.5	E82° 55' 03.1	391 m	70	160	65°S	BMC&J	BHJ BHQ exposed on top of the hill with Brecciated Quartzite. In B.Q. all quartzite & Jasper angular grains are scattered form with 20% Iron matrix.
47	UPCK/BRS-47/2024-25	N24° 33' 47.2"	E82° 55' 10.4"	310 m	85	175	70°S	BMC&J	BMJ & BMQ with BHJ & BHQ bands exposed within the greywacke band. Jasper layer varing 2mm to 2 cm and Quartzite layer varying 2 mm to 1.5 cm with Magnetite layers varying from 2mm to 1.5 cm thick & Hematite layer varying from 0.5 to 1.5 cm thick extending with a width of 10m
48	UPCK/BRS-48/2024-25	N24° 33' 47.0"	E82° 55' 07.3"	356 m	80	170	75°S	BHC&J	BHJ & BHQ exposed on the top of the hill with Nala channel along the Phyllite band, Here Jasper layer is thicker than Hematite & Quartzite layers
49	UPCK/BRS-49/2024-25	N24° 33' 55.1"	E82° 55' 10.9"	312 m	80	170	70°S	BMC&J	BMJ & BMQ observed on top of the hill towards south side of the slop with Ferruginous phyllite band. On the peek B.Q. exposed and towards Northern slop BHJ & BHQ exposed only on same hill,
50	UPCK/BRS-50/2024-25	N24° 34' 01.0"	E82° 55' 11.0"	332 m	80	170	75°S	BMC&J	BMJ & BMQ with high magnetite content exposed on top of the hill
51	UPCK/BRS-51/2024-25	N24° 33' 55.7"	E82° 55' 19.5"	269 m	75	165	70°S	BMC&J	BMJ & BMQ exposed in between of Phyllite bands with width of around 8 m magnetite layer 0.2 cm to 2 cm jasper band 0.2 to 0.4 cm & Quartzite layer 0.2 to 1.5 cm thick observed
52	UPCK/BRS-52/2024-25	N24° 33' 58.0"	E82° 55' 26.8"	314 m	70	160	55°S	BMC&J	BMJ & BMQ exposed with 10m width within Phyllite bands, Jasper layer is thick compared to Quartzite with highly magnetic in nature.
53	UPCK/BRS-53/2024-25	N24° 33' 59.2"	E82° 55' 25.4"	282 m	75	165	80°S	BMC&J	BMJ & BMQ band within Greywacke along the Nala channel exposed around 10m width. Magnetite layer is 0.2 cm to 3 Cm; Quartzite layer is 0.2 cm to 1 cm & Jasper layer is very thin 0.1-0.2 cm thick with highly fractured.
54	UPCK/BRS-54/2024-25	N24° 34' 04.3"	E82° 55' 25.2"	351 m	80	170	75°S	BHC&J	BHJ & BHQ exposed on top of the hill nearby boundary, it is contact with greywacke in BHJ & BHQ

									band in between Phyllite also observed. Hematite Layer thin compared to quartzite & Jasper Layer.
55	UPCK/BRS-55/2024-25	N24° 34' 03.5"	E82° 55' 33.0"	336 m	75	165	65°S	BMC&J	Two BMJ & BMQ bands are running parallel to each other within the Phyllite with highly magnetic in nature with width of around 15m.
56	UPCK/BRS-56/2024-25	N24° 33' 53.5"	E82° 55' 36.0"	294 m	75	165	80°S	BMC&J	BMJ & BMQ exposed on top of the hill with width of around 20m thick band along the Phyllite band is highly magnetic in nature with coffee brown cooler to dark black coloured with some layers are limonitized
57	UPCK/BRS-57/2024-25	N24° 33' 55.2"	E82° 55' 41.0"	298 m	60	150	65°S	BMC&J	BMJ & BMQ exposed in between of Phyllite & Greywacke with width of around 8 m magnetite layer 0.2 cm to 2 cm jasper band 0.2 to 0.4 cm & Quartzite layer 0.2 to 1.5 cm thick observed
58	UPCK/BRS-58/2024-25	N24° 34' 03.8"	E82° 55' 41.7"	307 m	75	165	75°S	BMC&J	BMJ & BMQ band exposed around 10m width on slop of the hill along the Phyllite Band with high magnetic in nature, magnetite layer 0.2 cm to 2 cm jasper band 0.2 to 0.4 cm & Quartzite layer 0.2 to 1.5 cm thick observed
59	UPCK/BRS-59/2024-25	N24° 34' 08.9"	E82° 55' 43.3"	315 m	70	160	75°S	BMC&J	BMJ & BMQ exposed on top of the hill with width of around 20m thick band along the Greywacke band is highly magnetic in nature with coffee brown colour to dark black colour
60	UPCK/BRS-60/2024-25	N24° 34' 08.4"	E82° 55' 54.6"	308 m	85	175	75°S	BMC&J	BMJ & BMQ exposed on top of the hill parallel to Greywacke band, highly magnetic in nature with black streak with Quartzite layer is thick & Jasper layer is very minor, Magnetite layer varing from 0.5 cm to 3 cm thick with quartz veinlet. BMJ & BMQ band thickness around 25m.
61	UPCK/BRS-61/2024-25	N24° 34' 06.3"	E82° 55' 55.9"	312 m	80	170	75°S	BMC&J	BMJ & BMQ exposed on top of the hill with 30m width along Phyllite band, Jasper layer is very less compared to Quartzite & Magnetite, here magnetite is very attractive to the Iron is highly magnetic in nature. Jasper layer 0.2 to 0.7 cm Magnetite layer 0.5 cm to 1.5 cm & Quartzite layer 0.4 cm to 1.5 cm thick.
62	UPCK/BRS-62/2024-25	N24° 34' 04.6"	E82° 55' 57.1"	280 m	70	160	70°S	BMC&J	BMJ & BMQ exposed with width of around 10m with high magnetic in nature, Magnetite layer varing from 0.3 cm to 1.8 cm thick, Quartzite 0.2 cm to 1.5 cm & Jasper layer is negligible 1mm to 2mm thick.

63	UPCK/BRS-63/2024-25	N24° 34' 06.6"	E82° 55' 58.7"	294 m	60	150	85°S	BMC&J	BMJ & BMQ found on top of the hill highly magnetic metallic lustre, Jasper layer is negligible as compared to Magnetitic layer & Quartzite layer with some folding
64	UPCK/BRS-64/2024-25	N24° 34' 13.8"	E82° 56' 03.7"	304 m	70	160	70°S	BMC&J	BMJ & BMQ found on top of the hill highly magnetic metallic lustre, Jasper layer is Thick as compared to Magnetitic & Hematite layer & Quartzite layer with width of around 8m Band.
65	UPCK/BRS-65/2024-25	N24° 34' 07.7"	E82° 56' 05.0"	268 m	70	160	85°S	BMC&J	BMJ & BMQ exposed of top of the hill with 30m width along Phyllite band, Jasper layer is very less compared to Quartzite & Magnetite, here magnetite is very attractive to the Iron is highly magnetic in nature. Jasper layer 0.2 to 0.7 cm Magnetite layer 0.5 cm to 1.5 cm & Quartzite layer 0.4 cm to 1.5 cm thick.
66	UPCK/BRS-66/2024-25	N24° 34' 09.1"	E82° 56' 10.4"	267 m	80	170	75°S	BMC&J	BMJ & BMQ fractured band exposed on slop of the hill with high magnetite content, Magnetite layer is varing from 0.4 cm to 1.2 cm, Jasper layer varing 0.1 cm to 0.3 cm & Quartzite layer varing 0.5 cm to 2.5 cm along the Phyllite band
67	UPCK/BRS-67/2024-25	N24° 34' 14.9"	E82° 56' 08.9"	286 m	80	170	75°S	BMC&J	Magnetite band is thin as compared to quartzite & Jasper Magnetite layer varing from 0.1 cm to 0.5 cm, Quartzite layer varing from 0.2 cm to 0.8 cm & Jasper layers varing from 0.2 cm to 2.5 cm

23.2 Annexure II: Bedrock sample description in Block A2

BRS Sample Description: Block A2									
S. No.	**Sample ID**	**Latitude**	**Longitude**	**Elev.**	**Strike**	**Dip Direction**	**Dip Amount**	**Lithology**	**Description**
1	UPJT/BRS-70/2024-2025	N24° 31' 07.4"	E82° 51' 28.6"	299 m	68	158	78°S	Massive iron ore	Around 20m thick band of hematite with cherry red streak exposed along the gritty sandstone
2	UPJT/BRS-71/2024-2025	N24° 31' 13.1"	E82° 51' 36.3"	289 m	62	152	68°S	Massive iron ore	fractured Hematite band exposed around 25m thick with parallel to Phyllite & B.Q. Brown to Black in colour with Brown streak
3	UPJT/BRS-72/2024-2025	N24° 30' 53.0"	E82° 51' 35.3"	277 m	85	355	82°N	Massive iron ore	BIF exposed on top of the hill with thin band of hematite parallel to Phyllite band
4	UPJT/BRS-73/2024-2025	N24° 31' 16.2"	E82° 51' 45.7"	285 m	64	154	82°S	Massive iron ore	Hematite band exposed Black colour with brown streak with parallel to B.Q. in massive form.
5	UPJT/BRS-74/2024-2025	N24° 30' 53.3"	E82° 51' 54.3"	275 m	114	204	74°S	Massive iron ore	Low grade BIF exposed on top of the hill with thin band of hematite parallel to Phyllite band
6	UPJT/BRS-78/2024-2025	N24° 30' 30.6"	E82° 52' 07.6"	212 m	135	225	72°S	Massive iron ore	Hematite band exposed on slope of the hill along the Phyllite band with thickness around 15m.
7	UPJT/BRS-81/2024-2025	N24° 31' 22.5"	E82° 52' 08.9"	241 m				Laterite	Laterite low grade Iron ore exposed with Limonitization
8	UPJT/BRS-82/2024-2025	N24° 30' 56.3"	E82° 52' 10.7"	269 m				Laterite	Laterite low grade Iron ore exposed with Limonitization
9	UPJT/BRS-84/2024-2025	N24° 30' 11.8"	E82° 52' 15.6"	246 m				Laterite/Brecciated Quartzite with Iron matrix	B.Q. with around 30% Iron matrix with lateritic soil covered
10	UPJT/BRS-85/2024-2025	N24° 30' 30.7"	E82° 52' 15.2"	279 m	38	128	62°SE	Massive iron ore	Hematite band exposed around 35m thick parallel to Phyllite band
11	UPJT/BRS-87/2024-2025	N24° 30' 40.7"	E82° 52' 30.0"	303 m	98	188	68°S	Massive iron ore	Hematite band exposed around 35m thick parallel to Phyllite band & brecciated Quartzite with Iron matrix
12	UPJT/BRS-88/2024-2025	N24° 30' 38.7"	E82° 52' 22.4"	275 m				BIF	Low grade BIF exposed on top of the hill with thin band of hematite parallel to Phyllite band
13	UPJT/BRS-89/2024-2025	N24° 31' 19.8"	E82° 52' 22.2"	234 m	43			Laterite	Laterite low grade Iron ore exposed with Limonitization

14	UPJT/BRS-91/2024-2025	N24° 31' 03.3"	E82° 52' 44.9"	226 m	66	156	63°S	BHC&J	Phyllite with low grade BIF exposed in small pit it is clearly visible and folding completely weathered
15	UPJT/BRS-92/2024-2025	N24° 30' 58.1"	E82° 52' 50.8"	230 m	68	158	66°S	Massive iron ore	Around 2m Low grade BIF exposed within the Phyllite bands
16	UPJT/BRS-93/2024-2025	N24° 30' 51.9"	E82° 52' 58.6"	219 m	53	163	72°S	BHC&J	Around 3 m thick band of BHJ-BHQ exposed nearby nala channel with ferruginous phyllite
17	UPJT/BRS-99/2024-2025	N24° 30' 56.2"	E82° 51' 44.0"	267 m	102			Massive iron ore	Hematite or low-grade iron exposed and covered by soil B.Q. fragments and boulders the band extending length around 25m width 15m
18	UPJT/BRS-100/2024-2025	N24° 30' 27.9"	E82° 51' 52.1"	233 m	71			Massive iron ore	Hematite or low-grade iron exposed and covered by soil B.Q. fragments and boulders the band extending length around 50m
19	UPJT/BRS-101/2024-2025	N24° 31' 22.5"	E82° 51' 49.3"	293 m				Laterite	Laterite low grade Iron ore exposed with Limonitization on top of the hill contact with B.Q. chert and jasper
20	UPJT/BRS-102/2024-2025	N24° 30' 11.2"	E82° 53' 59.7"	300 m	72			BHC&J	BHJ & BHQ band exposed with Brecciated Quartzite with Quartzite dominant with Iron matrix on top of the hill
21	UPJT/BRS-105/2024-2025	N24° 30' 28.3"	E82° 54' 24.9"	226 m	63			BHC&J	BHJ & BHQ exposed on slope of the hill with Phyllite band. In BHJ & BHQ Band Quartzite Layer varing from 0.5cm to 4 cm thick, Jasper layer is 0.5 cm to 3 cm thick & Hematite layer varing from 0.2 cm to 1.5 cm thick. Band thickness around 25m.
22	UPJT/BRS-107/2024-2025	N24° 30' 38.0"	E82° 55' 06.8"	273 m	63			Brecciated Quartzite with Iron matrix	Around 10m thick band of Hematite with Brecciated Quartzite exposed on top of the hill with Phyllite band
23	UPJT/BRS-109/2024-2025	N24° 31' 06.3"	E82° 56' 17.5"	208 m	81	171	78°S	Massive iron ore	Brecciated Quartzite with Hematite thin band exposed on top of the hill with quartz & Jasper medium grains poorly sorted
24	UPJT/BRS-110/2024-2025	N24° 31' 12.9"	E82° 56' 35.2"	221 m				Massive iron ore	Hematite band with Brecciated Quartzite-Chert-jasper

23.3 Annexure III: BRS analysis result description in Block A1

Test Report: BRS Block A1																	
	Customer Name	GeoExpOre Pvt Ltd 45-S 2nd A Main 2nd Cross, Chandra Layout Vijayanagar, Bengaluru- 560040															
	Discipline & Group	Chemical & Ores and Minerals.															
	Customer Ref.	Samples Received by Courier															
	Commodity	Geological Rock Samples															
	Lab ID	G8725															
	Date Received/Start of Analysis	15-Jun-24															
	Date Completed/ Report	22-Jun-24															
	Sample Count	67															
S.No.	Customer Code	Sample Description	METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/103
			DL	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.1
			UNITS	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
			Lab ID	Al2O3	CaO	Cr2O3	Fe2O3	Fe	K2O	MgO	MnO	Na2O	P2O5	SiO2	SO3	TiO2	V2O5	LOI
1	UPCK/BRS-01/2024-25	BHC&J	G8725-1	1.68	<0.05	<0.05	81.55	57.03	<0.05	<0.05	<0.05	<0.08	0.77	3.40	<0.05	0.39	<0.05	11.82
2	UPCK/BRS-02/2024-25	BMC&J	G8725-2	0.44	0.45	0.09	13.76	9.62	<0.05	0.09	<0.05	0.08	0.35	84.59	<0.05	<0.05	<0.05	<0.1
3	UPCK/BRS-03/2024-25	BHC&J	G8725-3	1.34	0.62	<0.05	30.63	21.42	0.11	0.29	0.42	<0.08	0.54	61.68	<0.05	0.09	<0.05	4.11
4	UPCK/BRS-04/2024-25	BMC&J	G8725-4	0.31	0.11	0.08	25.39	17.75	<0.05	<0.05	<0.05	0.08	0.09	73.81	<0.05	<0.05	<0.05	<0.1

5	UPCK/BRS-05/2024-25	BHC&J	G8725-5	0.65	0.66	<0.05	33.17	23.19	<0.05	<0.05	<0.05	0.08	0.56	64.24	<0.05	0.07	<0.05	0.43
6	UPCK/BRS-06/2024-25	BHC&J	G8725-6	0.16	<0.05	<0.05	67.96	47.53	<0.05	<0.05	<0.05	0.08	0.10	31.17	<0.05	<0.05	<0.05	0.36
7	UPCK/BRS-07/2024-25	BHC&J	G8725-7	0.36	<0.05	<0.05	26.46	18.50	<0.05	<0.05	<0.05	0.08	0.23	69.89	<0.05	<0.05	<0.05	2.83
8	UPCK/BRS-08/2024-25	BHC&J	G8725-8	1.88	0.97	<0.05	45.60	31.89	0.11	0.12	0.16	0.08	0.92	47.31	<0.05	0.15	<0.05	2.65
9	UPCK/BRS-09/2024-25	BMC&J	G8725-9	0.12	0.12	<0.05	48.13	33.66	<0.05	<0.05	<0.05	0.08	0.32	50.18	<0.05	<0.05	<0.05	0.90
10	UPCK/BRS-10/2024-25	Pyroclastic Rock	G8725-10	15.21	5.59	<0.05	14.74	10.30	0.78	4.88	0.16	4.32	0.37	46.63	0.05	2.34	<0.05	4.75
11	UPCK/BRS-11/2024-25	BMC&J	G8725-11	3.92	3.37	<0.05	27.54	19.26	<0.05	2.43	0.70	<0.08	0.90	56.43	<0.05	0.24	<0.05	4.32
12	UPCK/BRS-12/2024-25	BHC&J	G8725-12	0.40	0.22	<0.05	33.80	23.64	<0.05	<0.05	<0.05	0.08	0.30	64.11	<0.05	<0.05	<0.05	0.88
13	UPCK/BRS-13/2024-25	BHC&J	G8725-13	0.21	0.10	<0.05	40.33	28.21	<0.05	<0.05	<0.05	0.08	0.16	58.38	<0.05	<0.05	<0.05	0.60
14	UPCK/BRS-14/2024-25	BHC&J	G8725-14	0.49	<0.05	<0.05	94.20	65.88	<0.05	<0.05	<0.05	0.08	0.11	4.37	<0.05	<0.05	<0.05	0.67
15	UPCK/BRS-15/2024-25	BHC&J	G8725-15	0.35	0.26	0.07	16.27	11.37	<0.05	<0.05	<0.05	0.08	0.25	82.09	<0.05	<0.05	<0.05	0.51
16	UPCK/BRS-16/2024-25	Phyllite	G8725-16	9.94	0.06	<0.05	27.13	18.97	0.28	0.37	0.15	<0.08	<0.05	55.32	<0.05	0.68	<0.05	5.88
17	UPCK/BRS-17/2024-25	BHC&J	G8725-17	2.72	0.10	<0.05	26.74	18.70	<0.05	<0.05	<0.05	0.08	0.46	66.03	<0.05	0.14	<0.05	3.62
18	UPCK/BRS-18/2024-25	BHC&J	G8725-18	0.75	0.09	<0.05	36.73	25.68	<0.05	<0.05	<0.05	0.08	0.51	58.91	<0.05	0.08	<0.05	2.79
19	UPCK/BRS-19/2024-25	BHC&J	G8725-19	0.39	0.20	<0.05	52.65	36.82	<0.05	<0.05	<0.05	0.08	0.24	44.93	<0.05	<0.05	<0.05	1.37
20	UPCK/BRS-20/2024-25	BMC&J	G8725-20	0.39	0.06	<0.05	62.21	43.51	<0.05	<0.05	<0.05	<0.08	0.84	32.87	<0.05	<0.05	<0.05	3.43
21	UPCK/BRS-21/2024-25	BHC&J	G8725-21	1.49	0.11	<0.05	84.14	58.85	<0.05	<0.05	0.05	<0.08	1.03	6.13	<0.05	0.15	<0.05	6.74
22	UPCK/BRS-22/2024-25	BMC&J	G8725-22	0.88	0.12	<0.05	34.80	24.33	<0.05	<0.05	<0.05	0.08	0.16	62.99	<0.05	<0.05	<0.05	0.87
23	UPCK/BRS-23/2024-25	Floated Goethite over Dolerite	G8725-23	8.50	3.59	<0.05	49.79	34.82	1.23	0.88	12.29	0.08	1.66	18.09	0.05	0.62	<0.05	0.93

24	UPCK/BRS-24/2024-25	BHC&J	G8725-24	1.51	0.06	<0.05	46.31	32.38	<0.05	<0.05	0.07	<0.08	1.29	44.83	<0.05	0.12	<0.05	5.66
25	UPCK/BRS-25/2024-25	BHC&J	G8725-25	0.23	0.07	<0.05	33.08	23.13	<0.05	<0.05	0.12	0.08	0.20	65.24	<0.05	<0.05	<0.05	0.83
26	UPCK/BRS-26/2024-25	BHC&J	G8725-26	0.15	<0.05	<0.05	57.71	40.36	<0.05	<0.05	<0.05	0.08	0.26	40.81	<0.05	<0.05	<0.05	0.82
27	UPCK/BRS-27/2024-25	BHC&J	G8725-27	1.22	<0.05	<0.05	31.06	21.72	0.32	<0.05	<0.05	0.08	0.37	65.51	<0.05	0.11	<0.05	1.18
28	UPCK/BRS-28/2024-25	BHC&J	G8725-28	1.47	0.88	<0.05	36.99	25.87	0.06	0.19	0.49	<0.08	0.92	55.04	<0.05	0.10	<0.05	3.69
29	UPCK/BRS-29/2024-25	Dolerite	G8725-29	14.91	7.51	<0.05	16.89	11.81	1.61	6.24	0.19	2.13	0.29	44.95	0.19	2.12	<0.05	2.77
30	UPCK/BRS-30/2024-25	BMC&J	G8725-30	0.79	0.61	<0.05	54.41	38.05	0.07	0.08	0.06	<0.08	0.86	39.52	<0.05	0.05	<0.05	3.41
31	UPCK/BRS-31/2024-25	BHC&J	G8725-31	0.44	0.24	<0.05	52.49	36.71	<0.05	0.12	<0.05	0.08	0.16	45.39	<0.05	0.06	<0.05	0.91
32	UPCK/BRS-32/2024-25	BHC&J	G8725-32	2.92	0.54	<0.05	30.55	21.36	0.36	0.22	0.22	0.08	0.55	61.64	<0.05	0.17	<0.05	2.67
33	UPCK/BRS-33/2024-25	BHC&J	G8725-33	0.29	<0.05	0.07	44.33	31.00	<0.05	<0.05	<0.05	0.08	0.32	53.76	<0.05	<0.05	<0.05	1.04
34	UPCK/BRS-34/2024-25	BMC&J	G8725-34	0.24	0.30	<0.05	18.00	12.59	<0.05	<0.05	<0.05	0.08	0.27	80.25	<0.05	<0.05	<0.05	0.70
35	UPCK/BRS-35/2024-25	BMC&J	G8725-35	0.27	0.06	0.12	22.50	15.73	<0.05	<0.05	<0.05	0.08	0.20	75.74	<0.05	<0.05	<0.05	0.90
36	UPCK/BRS-36/2024-25	BMC&J	G8725-36	5.40	0.23	<0.05	65.20	45.60	0.46	0.78	2.00	<0.08	0.10	19.34	<0.05	0.83	<0.05	5.50
37	UPCK/BRS-37/2024-25	BIF	G8725-37	9.42	0.11	<0.05	27.76	19.41	0.07	<0.05	<0.05	<0.08	0.24	55.50	<0.05	0.99	<0.05	5.68
38	UPCK/BRS-38/2024-25	BMC&J	G8725-38	0.09	0.29	0.08	20.97	14.67	<0.05	<0.05	<0.05	0.08	0.40	77.03	<0.05	<0.05	<0.05	0.95
39	UPCK/BRS-39/2024-25	BMC&J	G8725-39	0.26	0.40	0.07	11.33	7.93	<0.05	<0.05	<0.05	0.08	0.35	87.18	<0.05	<0.05	<0.05	0.20
40	UPCK/BRS-40/2024-25	BHC&J	G8725-40	0.25	0.06	0.06	44.54	31.15	<0.05	<0.05	<0.05	0.08	0.60	51.95	<0.05	<0.05	<0.05	2.37
41	UPCK/BRS-41/2024-25	BMC&J	G8725-41	0.12	0.06	0.05	30.21	21.12	<0.05	<0.05	0.25	0.08	0.11	67.75	0.06	<0.05	<0.05	1.20
42	UPCK/BRS-42/2024-25	BMC&J	G8725-42	0.37	1.58	0.08	35.58	24.88	0.06	0.10	<0.05	0.08	1.10	60.14	<0.05	<0.05	<0.05	0.80
43	UPCK/BRS-43/2024-25	BMC&J	G8725-43	0.55	2.19	<0.05	37.77	26.41	0.13	0.86	0.18	0.08	1.35	55.11	<0.05	<0.05	<0.05	1.69

44	UPCK/BRS-44/2024-25	BHC&J	G8725-44	1.12	2.15	<0.05	66.34	46.39	0.14	0.17	0.50	0.08	1.76	25.46	<0.05	0.09	<0.05	2.13
45	UPCK/BRS-45/2024-25	Brecciated Quartzite	G8725-45	1.11	0.39	0.05	17.17	12.01	0.13	0.14	0.62	0.08	0.34	76.88	0.22	0.08	<0.05	2.66
46	UPCK/BRS-46/2024-25	BMC&J	G8725-46	1.30	0.17	0.07	21.63	15.12	<0.05	<0.05	<0.05	0.08	0.26	74.53	<0.05	0.07	<0.05	1.80
47	UPCK/BRS-47/2024-25	BMC&J	G8725-47	1.52	0.06	<0.05	54.65	38.22	<0.05	<0.05	<0.05	<0.08	0.54	39.19	<0.05	0.08	<0.05	3.79
48	UPCK/BRS-48/2024-25	BHC&J	G8725-48	2.31	0.10	<0.05	43.71	30.57	<0.05	<0.05	<0.05	<0.08	1.26	46.73	<0.05	0.15	<0.05	5.58
49	UPCK/BRS-49/2024-25	BMC&J	G8725-49	0.38	0.72	<0.05	64.33	44.99	<0.05	0.18	1.17	<0.08	0.61	25.62	<0.05	<0.05	<0.05	6.80
50	UPCK/BRS-50/2024-25	BMC&J	G8725-50	2.33	0.24	<0.05	77.47	54.18	0.06	<0.05	<0.05	<0.08	1.18	14.31	<0.05	0.14	<0.05	4.09
51	UPCK/BRS-51/2024-25	BMC&J	G8725-51	0.13	0.21	0.06	26.92	18.82	<0.05	<0.05	<0.05	0.08	0.24	71.73	<0.05	<0.05	<0.05	0.52
52	UPCK/BRS-52/2024-25	BMC&J	G8725-52	0.44	0.27	0.07	27.89	19.50	<0.05	<0.05	0.08	0.08	0.26	70.21	<0.05	<0.05	<0.05	0.61
53	UPCK/BRS-53/2024-25	BMC&J	G8725-53	2.02	1.75	<0.05	38.01	26.58	0.68	1.34	0.25	0.08	0.95	51.32	<0.05	0.08	<0.05	3.45
54	UPCK/BRS-54/2024-25	BMC&J	G8725-54	2.08	0.06	<0.05	61.74	43.18	<0.05	<0.05	<0.05	<0.08	0.83	27.20	<0.05	0.12	<0.05	7.78
55	UPCK/BRS-55/2024-25	BMC&J	G8725-55	0.37	0.97	<0.05	34.64	24.22	<0.05	<0.05	<0.05	0.08	0.78	62.25	0.10	<0.05	<0.05	0.64
56	UPCK/BRS-56/2024-25	BMC&J	G8725-56	0.29	1.85	<0.05	42.20	29.51	<0.05	0.08	0.33	0.08	1.48	51.97	<0.05	<0.05	<0.05	1.61
57	UPCK/BRS-57/2024-25	BMC&J	G8725-57	0.88	0.79	<0.05	38.62	27.01	0.10	0.09	0.09	0.08	0.62	57.96	<0.05	0.05	<0.05	0.62
58	UPCK/BRS-58/2024-25	BMC&J	G8725-58	0.51	0.05	0.05	48.46	33.89	<0.05	<0.05	<0.05	<0.08	0.51	46.17	<0.05	<0.05	<0.05	4.06
59	UPCK/BRS-59/2024-25	BMC&J	G8725-59	0.11	1.18	<0.05	26.07	18.23	<0.05	<0.05	0.18	0.08	1.00	70.02	0.22	<0.05	<0.05	1.02
60	UPCK/BRS-60/2024-25	BMC&J	G8725-60	0.49	1.86	0.07	44.10	30.84	0.11	0.07	<0.05	0.08	1.46	51.02	<0.05	<0.05	<0.05	0.62
61	UPCK/BRS-61/2024-25	BMC&J	G8725-61	0.08	2.47	0.06	58.18	40.69	<0.05	<0.05	0.05	0.08	1.90	36.54	<0.05	<0.05	<0.05	0.53
62	UPCK/BRS-62/2024-25	BMC&J	G8725-62	0.23	1.15	0.06	45.49	31.81	<0.05	<0.05	0.17	0.08	0.94	50.58	<0.05	<0.05	<0.05	1.14

63	UPCK/BRS-63/2024-25	BMC&J	G8725-63	0.14	1.32	<0.05	50.18	35.09	<0.05	<0.05	0.20	0.08	1.09	45.82	<0.05	<0.05	<0.05	0.99
64	UPCK/BRS-64/2024-25	BMC&J	G8725-64	0.34	0.20	0.05	28.05	19.62	<0.05	<0.05	<0.05	0.08	0.18	70.41	<0.05	<0.05	<0.05	0.59
65	UPCK/BRS-65/2024-25	BMC&J	G8725-65	0.11	0.31	0.05	53.50	37.41	<0.05	<0.05	0.06	0.08	0.37	43.53	<0.05	<0.05	<0.05	1.90
66	UPCK/BRS-66/2024-25	BMC&J	G8725-66	0.11	0.06	0.06	52.15	36.47	<0.05	<0.05	<0.05	0.08	0.10	46.98	<0.05	<0.05	<0.05	0.35
67	UPCK/BRS-67/2024-25	BMC&J	G8725-67	1.83	0.18	<0.05	27.62	19.31	<0.05	<0.05	<0.05	0.08	0.19	68.21	0.06	0.14	<0.05	1.59

Abbreviations:

SOP/OM/105: Borate Fusion Bead followed by WDXRF Finish

SOP/OM/103: Loss on Ignition followed by Gravimetry Finish

DL--Detection Limit

SATYANARAYANA - MANAGER - ORES & MINERALS - AUTHORIZED SIGNATORY.

** END OF THE REPORT **

23.4 Annexure IV: BRS analysis result description in Block A2

Test Report: BRS A2 Block	
Customer Name	GeoExpOre Pvt Ltd 45-S 2nd A Main 2nd Cross, Chandra Layout Vijayanagar, Bengaluru- 560040
Discipline & Group	Chemical & Ores and Minerals.
Customer Ref.	Samples Received by Courier
Commodity	Geological Rock Samples
Lab ID	G8938
Date Received/Start of Analysis	15-Jul-24
Date Completed/ Report	18-Jul-24
Sample Count	24

S. No.	Customer Code	Sample Description	METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/103
			DL	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05	0.1
			UNITS	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
			Lab ID	Al2O3	CaO	Cr2O3	Fe2O3	Fe	K2O	MgO	MnO	Na2O	P2O5	SiO2	SO3	TiO2	V2O5	LOI
1	UPJT/BRS-70/2024-25	Massive iron ore	G8938-1	0.28	0.13	<0.05	83.06	58.09	<0.05	<0.05	0.15	<0.08	1.75	2.70	<0.05	<0.05	<0.05	11.81
2	UPJT/BRS-71/2024-25	Massive iron ore	G8938-2	1.26	0.20	0.14	80.59	56.37	<0.05	0.07	0.07	<0.08	3.02	2.38	<0.05	0.18	<0.05	11.95
3	UPJT/BRS-72/2024-25	Massive iron ore	G8938-3	9.03	0.16	0.12	57.49	40.21	<0.05	0.07	<0.05	<0.08	0.71	20.88	<0.05	3.56	0.17	7.64
4	UPJT/BRS-73/2024-25	Massive iron ore	G8938-4	0.28	0.07	0.06	85.50	59.80	<0.05	<0.05	<0.05	<0.08	1.98	0.67	<0.05	<0.05	<0.05	11.27
5	UPJT/BRS-74/2024-25	Massive iron ore	G8938-5	1.46	0.15	0.09	70.85	49.56	0.06	0.06	0.13	<0.08	2.68	13.50	<0.05	0.33	<0.05	10.57

6	UPJT/BRS-78/2024-25	Massive iron ore	G8938-6	4.61	0.10	0.31	72.48	50.70	<0.05	<0.05	<0.05	<0.08	1.85	5.26	<0.05	2.78	0.06	12.43
7	UPJT/BRS-81/2024-25	Laterite	G8938-7	12.90	0.09	0.31	58.63	41.01	0.07	0.07	<0.05	<0.08	0.60	12.00	<0.05	3.20	0.11	11.91
8	UPJT/BRS-82/2024-25	Laterite	G8938-8	9.22	0.05	<0.05	59.13	41.36	<0.05	0.08	<0.05	<0.08	0.70	16.60	<0.05	1.59	0.06	12.42
9	UPJT/BRS-84/2024-25	Laterite	G8938-9	1.04	0.06	0.06	66.72	46.67	<0.05	0.24	1.50	<0.08	0.18	22.00	<0.05	0.17	<0.05	7.89
10	UPJT/BRS-85/2024-25	Massive iron ore	G8938-10	6.23	0.05	0.07	58.94	41.23	1.35	0.36	0.05	<0.08	1.72	21.52	<0.05	0.49	<0.05	9.13
11	UPJT/BRS-87/2024-25	Massive iron ore	G8938-11	2.39	0.27	0.06	75.93	53.11	0.70	0.23	0.21	<0.08	2.32	5.96	<0.05	0.16	<0.05	11.73
12	UPJT/BRS-88/2024-25	Massive iron ore	G8938-12	12.33	0.19	0.11	43.31	30.29	0.39	0.18	<0.05	<0.08	0.25	28.34	<0.05	6.03	0.09	8.62
13	UPJT/BRS-89/2024-25	Laterite	G8938-13	11.29	0.14	<0.05	62.28	43.56	0.17	0.08	0.06	<0.08	0.73	12.19	<0.05	1.13	<0.05	11.81
14	UPJT/BRS-91/2024-25	BHC&J	G8938-14	0.56	<0.05	<0.05	17.34	12.12	<0.05	<0.05	<0.05	<0.08	<0.05	80.66	<0.05	<0.05	<0.05	1.12
15	UPJT/BRS-92/2024-25	BHC&J	G8938-15	3.47	<0.05	<0.05	41.50	29.03	0.25	<0.05	<0.05	<0.08	0.22	49.76	<0.05	0.14	<0.05	4.47
16	UPJT/BRS-93/2024-25	BHC&J	G8938-16	0.93	0.11	<0.05	52.96	37.04	<0.05	<0.05	<0.05	<0.08	0.29	41.46	<0.05	<0.05	<0.05	3.94
17	UPJT/BRS-99/2024-25	Massive iron ore	G8938-17	6.29	0.21	0.25	69.63	48.70	<0.05	0.06	0.05	<0.08	1.36	9.09	<0.05	2.47	0.06	10.44
18	UPJT/BRS-100/2024-25	Massive iron ore	G8938-18	3.14	0.09	0.27	53.25	37.24	0.09	0.07	<0.05	<0.08	1.38	32.66	<0.05	0.83	<0.05	8.06
19	UPJT/BRS-101/2024-25	Massive iron ore	G8938-19	11.74	0.06	0.16	60.51	42.32	0.08	0.08	0.07	<0.08	0.91	11.04	<0.05	2.86	0.07	12.33
20	UPJT/BRS-102/2024-25	BHC&J	G8938-20	1.55	0.15	0.17	59.62	41.70	0.45	0.27	8.48	<0.08	0.82	18.17	<0.05	0.13	<0.05	10.09
21	UPJT/BRS-105/2024-25	BHC&J	G8938-21	1.98	<0.05	0.06	68.86	48.16	0.15	0.14	0.95	<0.08	0.22	22.95	<0.05	0.16	<0.05	4.39
22	UPJT/BRS-107/2024-25	BQ with Iron matrix	G8938-22	5.86	<0.05	0.06	69.90	48.89	1.36	0.35	0.39	<0.08	0.77	12.75	<0.05	0.34	<0.05	8.06
23	UPJT/BRS-109/2024-25	Massive iron ore	G8938-23	4.61	0.08	<0.05	56.04	39.20	0.66	0.15	0.23	<0.08	1.65	27.53	<0.05	0.44	<0.05	8.44
24	UPJT/BRS-110/2024-25	Massive iron ore	G8938-24	0.86	0.07	0.05	30.98	21.67	<0.05	<0.05	0.06	<0.08	0.91	62.62	<0.05	<0.05	<0.05	4.21

Abbreviations:	
SOP/OM/105: Borate Fusion Bead followed by WDXRF Finish	
SOP/OM/103: Loss On Ignition followed by Gravimetry Finish	
DL--Detection Limit	

SATYANARAYANA - MANAGER - ORES & MINERALS - AUTHORIZED SIGNATORY.

** END OF THE REPORT **

1. The results listed above pertain only to the tested samples and applicable parameters.2. Samples which are degradable will be disposed immediately after testing and others will be disposed after one month from the date of issue of test certificate unless otherwise specified. 3. Total liability of our laboratory is limited to the invoiced amount. 4.This report is not to be reproduced either wholly or in part and cannot be used as evidence in the Court of Law and should not be used in any advertising media without prior written permission.5. In case any reconfirmation of contents of this test certificate is required, please contact our office.6. Sampling is not done by us unless otherwise specified.7. Any discrepancy in the Test Certificate should be notified within 30 days.

23.5 Annexure V: Chemical analysis results of channel samples Block A1 & A2

TEST REPORT: Channel Samples Results																
Customer Name	GeoExpOre Pvt Ltd 45-S 2nd A Main 2nd Cross, Chandra Layout Vijayanagar, Bengaluru-560040															
Discipline & Group	Chemical & Ores and Minerals.															
Customer Ref.	Samples Received by courier															
Commodity	Geological Rock Samples															
Lab ID	G106															
Sample Receipt Date	19-Dec-24															
Analysis Completion Date	24-Dec-24															
Date of Reporting	24-Dec-24															
Sample Count	150															
S. No.	Customer Code	Sample Description	METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/103
			LOQ	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.10
			UNITS	%	%	%	%	%	%	%	%	%	%	%	%	%
			Lab ID	Al2O3	CaO	Fe (T)	Fe2O3	K2O	MgO	MnO	Na2O	SO3	SiO2	TiO2	P2O5	LOI
1	UPCK/BHC&J - 1/ CH-1/A1	Rock	G106-1	0.51	0.16	15.78	22.57	<0.05	<0.05	<0.05	<0.08	<0.05	73.74	<0.05	0.30	2.44
2	UPCK/BHC&J - 1/ CH-1/A2	Rock	G106-2	0.54	0.25	13.83	19.77	<0.05	<0.05	<0.05	<0.08	<0.05	75.83	<0.05	0.29	2.29
3	UPCK/BHC&J - 1/ CH-1/A3	Rock	G106-3	1.00	0.13	17.54	25.07	<0.05	<0.05	<0.05	<0.08	<0.05	69.51	0.18	0.37	3.15
4	UPCK/BHC&J - 1/ CH-1/A4	Rock	G106-4	1.84	0.11	26.46	37.83	<0.05	<0.05	<0.05	<0.08	<0.05	54.89	0.24	0.60	4.21
5	UPCK/BHC&J - 1/ CH-1/A5	Rock	G106-5	2.52	0.16	32.72	46.78	<0.05	<0.05	0.05	<0.08	<0.05	43.67	0.55	0.78	5.27
6	UPCK/BHC&J - 1/ CH-1/A6	Rock	G106-6	1.32	0.20	31.52	45.07	<0.05	<0.05	<0.05	<0.08	<0.05	46.19	0.55	0.82	5.55
7	UPCK/BHC&J - 1/ CH-1/A7	Rock	G106-7	2.54	0.14	38.93	55.66	<0.05	<0.05	0.08	<0.08	<0.05	31.55	0.39	1.10	8.30
8	UPCK/BHC&J - 1/ CH-1/A8	Rock	G106-8	1.89	0.12	33.38	47.73	<0.05	<0.05	<0.05	<0.08	<0.05	41.50	0.21	0.95	6.96

9	UPCK/BHC&J - 1/ CH-1/A9	Rock	G106-9	3.01	0.15	45.34	64.82	<0.05	<0.05	<0.05	<0.08	<0.05	21.51	0.21	1.28	8.82
10	UPCK/BHC&J - 1/ CH-1/A10	Rock	G106-10	3.30	0.10	50.04	71.54	<0.05	<0.05	0.37	<0.08	<0.05	12.91	0.24	1.33	10.04
11	UPCK/BHC&J - 1/ CH-1/A11	Rock	G106-11	2.07	0.20	39.08	55.88	0.07	<0.05	2.23	<0.08	<0.05	30.34	0.08	1.14	7.74
12	UPCK/BHC&J - 1/ CH-1/A12	Rock	G106-12	3.77	0.17	45.46	65.00	0.11	<0.05	2.43	<0.08	<0.05	17.94	0.19	1.09	8.98
13	UPCK/BHC&J - 1/ CH-2/B1	Rock	G106-13	2.05	<0.05	38.49	55.04	<0.05	<0.05	0.06	<0.08	<0.05	39.63	0.16	0.35	2.51
14	UPCK/BHC&J - 1/ CH-2/B2	Rock	G106-14	1.93	0.07	37.95	54.26	<0.05	<0.05	0.12	<0.08	<0.05	38.86	0.15	0.63	3.83
15	UPCK/BHC&J - 1/ CH-2/B3	Rock	G106-15	2.38	0.08	40.40	57.76	<0.05	<0.05	0.05	<0.08	<0.05	33.51	0.22	0.99	4.88
16	UPCK/BHC&J - 1/ CH-2/B4	Rock	G106-16	2.32	0.07	37.74	53.96	<0.05	<0.05	0.06	<0.08	<0.05	39.67	0.21	0.51	3.04
17	UPCK/BHC&J - 1/ CH-2/B5	Rock	G106-17	3.17	0.13	33.17	47.43	<0.05	<0.05	0.17	<0.08	<0.05	43.20	0.26	0.70	4.76
18	UPCK/BHC&J - 1/ CH-2/B6	Rock	G106-18	1.92	0.10	33.56	47.98	<0.05	<0.05	<0.05	<0.08	<0.05	46.87	0.15	0.32	2.45
19	UPCK/BHC&J - 1/ CH-2/B7	Rock	G106-19	2.36	0.12	31.98	45.72	<0.05	<0.05	<0.05	<0.08	<0.05	47.58	0.19	0.59	3.27
20	UPCK/BHC&J - 1/ CH-2/B8	Rock	G106-20	2.36	0.09	19.16	27.40	<0.05	<0.05	0.14	<0.08	<0.05	67.49	0.22	0.19	1.84
21	UPCK/BHC&J - 1/ CH-2/B9	Rock	G106-21	2.32	0.09	22.14	31.66	<0.05	<0.05	0.09	<0.08	<0.05	63.24	0.22	0.25	1.96
22	UPCK/BHC&J - 1/ CH-2/B10	Rock	G106-22	2.38	0.12	25.04	35.80	<0.05	<0.05	<0.05	<0.08	<0.05	58.84	0.21	0.30	2.10
23	UPCK/BHC&J - 1/ CH-2/B11	Rock	G106-23	1.96	0.12	30.92	44.20	<0.05	<0.05	<0.05	<0.08	<0.05	50.73	0.14	0.34	2.27
24	UPCK/BHC&J - 1/ CH-2/B12	Rock	G106-24	1.55	0.06	34.66	49.55	<0.05	<0.05	0.05	<0.08	<0.05	46.33	0.14	0.24	1.93
25	UPCK/BHC&J - 1/ CH-2/B13	Rock	G106-25	1.51	0.08	46.55	66.55	<0.05	<0.05	<0.05	<0.08	<0.05	29.97	0.12	0.20	1.47
26	UPCK/BHC&J - 1/ CH-2/B14	Rock	G106-26	1.41	0.09	34.04	48.66	<0.05	<0.05	<0.05	<0.08	<0.05	47.95	0.11	0.20	1.41
27	UPCK/BHC&J - 1/ CH-3/C1	Rock	G106-27	1.88	0.11	39.18	56.02	<0.05	0.07	0.15	<0.08	<0.05	34.40	0.20	0.52	6.48
28	UPCK/BHC&J - 1/ CH-3/C2	Rock	G106-28	2.09	0.08	40.67	58.15	<0.05	0.07	0.16	<0.08	<0.05	31.44	0.17	0.61	7.11

29	UPCK/BHC&J - 1/ CH-3/C3	Rock	G106-29	1.60	0.10	41.72	59.64	<0.05	0.07	0.19	<0.08	<0.05	30.28	0.16	0.62	7.21
30	UPCK/BHC&J - 1/ CH-3/C4	Rock	G106-30	2.27	0.07	37.59	53.74	<0.05	<0.05	0.08	<0.08	<0.05	37.70	0.22	0.46	5.32
31	UPCK/BHC&J - 1/ CH-3/C5	Rock	G106-31	1.28	0.09	49.92	71.37	<0.05	0.07	0.25	<0.08	<0.05	18.01	0.15	0.78	7.87
32	UPCK/BHC&J - 1/ CH-3/C6	Rock	G106-32	1.39	0.10	53.60	76.64	<0.05	0.09	0.49	<0.08	<0.05	11.07	0.14	1.00	8.96
33	UPCK/BHC&J - 1/ CH-3/C7	Rock	G106-33	2.87	0.08	35.61	50.92	<0.05	<0.05	<0.05	<0.08	<0.05	40.49	0.29	0.60	4.59
34	UPCK/BHC&J - 1/ CH-3/C8	Rock	G106-34	0.88	0.11	41.99	60.04	<0.05	<0.05	<0.05	<0.08	<0.05	34.88	<0.05	0.59	3.29
35	UPCK/BHC&J - 1/ CH-3/C9	Rock	G106-35	0.85	0.09	42.06	60.14	<0.05	<0.05	<0.05	<0.08	<0.05	35.12	0.06	0.39	3.18
36	UPCK/BHC&J - 1/ CH-3/C10	Rock	G106-36	1.02	0.11	45.09	64.46	<0.05	<0.05	<0.05	<0.08	<0.05	30.77	0.08	0.51	2.87
37	UPCK/BHC&J - 1/ CH-3/C11	Rock	G106-37	1.53	0.09	39.97	57.14	<0.05	<0.05	0.08	<0.08	<0.05	36.96	0.10	0.45	3.51
38	UPCK/BHC&J - 1/ CH-3/C12	Rock	G106-38	0.91	0.12	39.14	55.97	<0.05	<0.05	<0.05	<0.08	<0.05	37.97	0.07	0.54	4.24
39	UPCK/BHC&J - 1/ CH-3/C13	Rock	G106-39	0.91	0.08	41.15	58.83	<0.05	<0.05	<0.05	<0.08	<0.05	35.25	0.06	0.46	4.31
40	UPCK/BHC&J - 1/ CH-3/C14	Rock	G106-40	1.25	0.11	40.74	58.25	<0.05	<0.05	<0.05	<0.08	<0.05	35.48	0.05	0.43	4.03
41	UPCK/BHC&J - 1/ CH-3/C15	Rock	G106-41	0.73	0.10	44.50	63.62	<0.05	<0.05	<0.05	<0.08	<0.05	32.49	0.06	0.33	2.52
42	UPCK/BHC&J - 1/ CH-3/C16	Rock	G106-42	0.57	0.06	46.09	65.89	<0.05	<0.05	<0.05	<0.08	<0.05	31.27	0.06	0.22	1.77
43	UPCK/BHC&J - 1/ CH-3/C17	Rock	G106-43	0.79	0.07	45.42	64.94	<0.05	<0.05	<0.05	<0.08	<0.05	32.02	0.08	0.24	1.75
44	UPCK/BHC&J - 1/ CH-4/D1	Rock	G106-44	1.56	0.12	46.14	65.96	0.09	<0.05	<0.05	<0.08	<0.05	23.55	0.15	1.10	7.12
45	UPCK/BHC&J - 1/ CH-4/D2	Rock	G106-45	1.43	0.08	45.37	64.86	0.08	<0.05	<0.05	<0.08	<0.05	25.59	0.14	0.91	6.76
46	UPCK/BHC&J - 1/ CH-4/D3	Rock	G106-46	1.42	0.09	43.63	62.38	0.21	<0.05	<0.05	<0.08	<0.05	29.01	0.10	0.85	5.76
47	UPCK/BHC&J - 1/ CH-4/D4	Rock	G106-47	1.84	0.10	45.58	65.16	0.26	<0.05	<0.05	<0.08	<0.05	25.39	0.16	1.02	5.91
48	UPCK/BHC&J - 1/ CH-4/D5	Rock	G106-48	1.46	0.07	44.77	64.01	0.16	<0.05	<0.05	<0.08	<0.05	26.29	0.15	1.10	6.59

49	UPCK/BHC&J - 1/ CH-4/D6	Rock	G106-49	1.75	0.09	44.80	64.05	0.08	<0.05	<0.05	<0.08	<0.05	27.31	0.14	0.86	5.52
50	UPCK/BHC&J - 1/ CH-4/D7	Rock	G106-50	2.46	0.07	37.66	53.84	0.48	0.05	<0.05	<0.08	<0.05	38.29	0.22	0.52	3.94
51	UPCK/BHC&J - 1/ CH-4/D8	Rock	G106-51	1.66	0.08	39.71	56.78	0.19	<0.05	0.10	<0.08	<0.05	34.72	0.15	0.75	5.37
52	UPCK/BHC&J - 1/ CH-4/D9	Rock	G106-52	1.78	0.06	43.97	62.86	<0.05	<0.05	<0.05	<0.08	<0.05	30.44	0.16	0.59	3.90
53	UPCK/BHC&J - 1/ CH-4/D10	Rock	G106-53	1.85	0.09	42.05	60.12	0.29	<0.05	<0.05	<0.08	<0.05	31.71	0.18	0.77	4.80
54	UPCK/BHC&J - 1/ CH-5/E1	Rock	G106-54	1.11	0.09	32.93	47.08	<0.05	<0.05	0.90	<0.08	<0.05	43.88	0.08	0.96	5.64
55	UPCK/BHC&J - 1/ CH-5/E2	Rock	G106-55	1.77	0.15	35.85	51.25	<0.05	<0.05	0.08	<0.08	<0.05	38.80	0.12	1.51	6.11
56	UPCK/BHC&J - 1/ CH-5/E3	Rock	G106-56	1.81	0.09	36.45	52.11	<0.05	<0.05	0.08	<0.08	<0.05	37.13	0.13	1.60	6.84
57	UPCK/BHC&J - 1/ CH-5/E4	Rock	G106-57	2.00	0.14	38.88	55.59	<0.05	<0.05	0.08	<0.08	<0.05	33.79	0.14	1.69	6.44
58	UPCK/BHC&J - 1/ CH-5/E5	Rock	G106-58	2.08	0.12	39.83	56.95	<0.05	<0.05	0.26	<0.08	<0.05	31.58	0.14	1.65	7.03
59	UPCK/BHC&J - 1/ CH-5/E6	Rock	G106-59	1.79	0.13	39.68	56.72	<0.05	<0.05	0.15	<0.08	<0.05	32.12	0.14	1.71	7.09
60	UPCK/BHC&J - 1/ CH-5/E7	Rock	G106-60	0.92	0.07	24.86	35.54	<0.05	<0.05	1.13	<0.08	<0.05	57.24	0.06	0.54	4.27
61	UPCK/BHC&J - 1/ CH-5/E8	Rock	G106-61	1.39	0.08	33.52	47.92	<0.05	0.07	1.42	<0.08	<0.05	42.00	0.08	0.81	5.93
62	UPCK/BHC&J - 1/ CH-5/E9	Rock	G106-62	1.24	0.08	33.37	47.70	<0.05	<0.05	1.38	<0.08	<0.05	43.05	0.09	0.76	5.44
63	UPCK/BHC&J - 1/ CH-5/E10	Rock	G106-63	2.10	0.10	40.98	58.59	<0.05	<0.05	0.22	<0.08	<0.05	30.46	0.14	1.51	6.60
64	UPCK/BHC&J - 2/ CH-2/B2	Rock	G106-64	0.62	0.21	12.50	17.88	0.06	0.06	0.96	<0.08	<0.05	77.86	<0.05	0.22	1.85
65	UPCK/BHC&J - 2/ CH-2/B4	Rock	G106-65	0.98	0.19	22.10	31.60	0.07	0.13	2.27	<0.08	<0.05	60.65	<0.05	0.25	3.62
66	UPCK/BHC&J - 2/ CH-2/B6	Rock	G106-66	1.34	0.26	26.96	38.54	0.13	0.20	3.11	<0.08	<0.05	51.43	0.07	0.29	4.41
67	UPCK/BHC&J - 2/ CH-2/B8	Rock	G106-67	1.02	0.30	25.76	36.82	0.06	0.12	1.46	<0.08	<0.05	56.19	<0.05	0.35	3.46
68	UPCK/BHC&J - 2/ CH-2/B10	Rock	G106-68	1.90	0.30	32.24	46.09	0.17	0.26	3.00	<0.08	<0.05	42.11	0.10	0.38	5.46

69	UPCK/BHC&J - 2/ CH-3/C1	Rock	G106-69	3.08	0.31	47.91	68.49	0.07	<0.05	2.82	<0.08	<0.05	15.50	0.22	1.71	7.56
70	UPCK/BHC&J - 2/ CH-3/C2	Rock	G106-70	2.47	0.38	47.58	68.03	0.16	<0.05	6.36	<0.08	<0.05	12.47	0.21	1.56	7.91
71	UPCK/BHC&J - 2/ CH-3/C3	Rock	G106-71	2.76	0.35	45.69	65.33	0.20	<0.05	10.45	<0.08	<0.05	10.58	0.29	1.46	7.83
72	UPCK/BHC&J - 2/ CH-3/C4	Rock	G106-72	2.42	0.44	47.20	67.48	0.27	<0.05	10.44	<0.08	<0.05	11.17	0.23	1.17	5.75
73	UPCK/BHC&J - 2/ CH-3/C5	Rock	G106-73	1.93	0.33	51.15	73.13	0.11	<0.05	4.98	<0.08	<0.05	11.77	0.16	1.11	6.04
74	UPCK/BHC&J - 2/ CH-3/C6	Rock	G106-74	1.70	0.50	51.15	73.13	0.07	<0.05	2.40	<0.08	<0.05	16.44	0.12	1.13	4.27
75	UPCK/BHC&J - 2/ CH-3/C7	Rock	G106-75	2.67	0.34	46.48	66.45	0.26	0.05	9.40	<0.08	<0.05	11.84	0.25	1.11	7.05
76	UPCK/BHC&J - 2/ CH-3/C8	Rock	G106-76	2.22	0.23	45.85	65.55	0.25	<0.05	10.09	<0.08	<0.05	13.19	0.20	0.98	6.69
77	UPCK/BHC&J - 2/ CH-3/C9	Rock	G106-77	2.43	0.26	51.26	73.29	<0.05	<0.05	1.38	<0.08	<0.05	14.11	0.18	1.40	6.77
78	UPCK/BHC&J - 2/ CH-3/C10	Rock	G106-78	1.82	0.55	51.27	73.31	0.09	<0.05	4.62	<0.08	<0.05	13.45	0.17	1.04	4.55
79	UPCK/BHC&J - 2/ CH-3/C11	Rock	G106-79	2.14	0.36	52.05	74.42	<0.05	<0.05	0.70	<0.08	<0.05	15.70	0.16	1.21	5.14
80	UPCK/BHC&J - 2/ CH-3/C12	Rock	G106-80	4.61	0.32	47.05	67.27	0.11	0.10	4.56	<0.08	<0.05	11.70	0.38	1.75	8.91
81	UPCK/BHC&J - 2/ CH-3/C13	Rock	G106-81	2.35	0.53	52.62	75.23	0.09	<0.05	2.91	<0.08	<0.05	12.77	0.19	1.18	4.55
82	UPCK/BHC&J - 2/ CH-3/C14	Rock	G106-82	1.69	0.23	43.67	62.43	0.26	<0.05	8.93	<0.08	<0.05	18.92	0.15	0.93	5.91
83	UPCK/BHC&J - 2/ CH-3/C15	Rock	G106-83	2.09	0.21	46.60	66.63	0.12	<0.05	5.54	<0.08	<0.05	17.57	0.18	1.15	6.13
84	UPCK/BHC&J - 2/ CH-4/D2	Rock	G106-84	1.36	0.08	42.91	61.35	<0.05	<0.05	0.60	<0.08	<0.05	29.69	0.09	0.90	5.80
85	UPCK/BHC&J - 2/ CH-4/D4	Rock	G106-85	1.35	0.08	40.00	57.19	<0.05	<0.05	0.59	<0.08	<0.05	34.34	0.08	0.79	5.40
86	UPCK/BHC&J - 2/ CH-4/D6	Rock	G106-86	1.97	0.09	40.30	57.62	<0.05	<0.05	0.06	<0.08	<0.05	32.36	0.14	0.94	6.61
87	UPCK/BHC&J - 2/ CH-4/D8	Rock	G106-87	1.50	0.08	41.99	60.04	<0.05	<0.05	0.69	<0.08	<0.05	30.35	0.12	0.81	6.27
88	UPCK/BHC&J - 2/ CH-4/D10	Rock	G106-88	1.76	0.08	40.35	57.68	<0.05	<0.05	0.61	<0.08	<0.05	32.99	0.12	0.65	5.86

89	UPCK/BHC&J - 2/ CH-5/E2	Rock	G106-89	0.42	0.06	41.39	59.17	<0.05	<0.05	<0.05	<0.08	<0.05	38.58	<0.05	0.11	1.43
90	UPCK/BHC&J - 2/ CH-5/E4	Rock	G106-90	0.80	0.08	40.92	58.51	<0.05	<0.05	0.24	<0.08	<0.05	38.23	0.06	0.11	1.78
91	UPCK/BHC&J - 2/ CH-5/E6	Rock	G106-91	0.62	0.07	44.40	63.48	<0.05	<0.05	0.08	<0.08	<0.05	33.92	0.05	0.14	1.50
92	UPCK/BHC&J - 2/ CH-5/E8	Rock	G106-92	1.16	0.08	34.94	49.95	<0.05	<0.05	0.59	<0.08	<0.05	45.74	0.09	0.09	2.07
93	UPCK/BHC&J - 2/ CH-5/E10	Rock	G106-93	0.66	0.06	47.70	68.19	<0.05	<0.05	0.29	<0.08	<0.05	28.90	0.07	0.11	1.59
94	UPCK/BMC&J - 6/ CH-1/A1	Rock	G106-94	0.84	1.26	52.09	74.48	<0.05	0.07	1.50	<0.08	<0.05	16.78	<0.05	1.03	3.80
95	UPCK/BMC&J - 6/ CH-1/A2	Rock	G106-95	0.67	1.01	43.23	61.81	0.08	<0.05	0.43	<0.08	<0.05	32.42	0.05	0.95	2.34
96	UPCK/BMC&J - 6/ CH-1/A3	Rock	G106-96	0.49	0.67	33.55	47.97	<0.05	<0.05	1.09	<0.08	<0.05	46.43	<0.05	0.58	2.57
97	UPCK/BMC&J - 6/ CH-1/A4	Rock	G106-97	0.57	1.14	45.97	65.73	<0.05	<0.05	0.35	<0.08	<0.05	28.56	<0.05	1.04	2.40
98	UPCK/BMC&J - 6/ CH-1/A5	Rock	G106-98	0.43	0.67	27.96	39.98	<0.05	<0.05	0.43	<0.08	<0.05	56.04	<0.05	0.55	1.67
99	UPCK/BMC&J - 6/ CH-1/A6	Rock	G106-99	0.35	0.37	21.29	30.44	<0.05	<0.05	0.55	<0.08	<0.05	65.90	<0.05	0.34	1.86
100	UPCK/BMC&J - 6/ CH-1/A7	Rock	G106-100	0.51	0.98	41.59	59.46	<0.05	<0.05	0.52	<0.08	<0.05	35.15	<0.05	0.84	2.38
101	UPCK/BMC&J - 6/ CH-2/B1	Rock	G106-101	0.26	0.60	50.84	72.68	0.06	0.09	0.08	<0.08	<0.05	25.40	<0.05	0.37	0.34
102	UPCK/BMC&J - 6/ CH-2/B2	Rock	G106-102	0.29	1.32	35.89	51.31	<0.05	<0.05	0.12	<0.08	<0.05	45.17	<0.05	0.90	0.61
103	UPCK/BMC&J - 6/ CH-2/B3	Rock	G106-103	0.22	1.04	42.16	60.28	<0.05	<0.05	0.13	<0.08	<0.05	36.76	<0.05	0.70	0.69
104	UPCK/BMC&J - 6/ CH-2/B4	Rock	G106-104	0.32	1.48	36.15	51.69	<0.05	0.07	0.15	<0.08	<0.05	44.49	<0.05	0.98	0.56
105	UPCK/BMC&J - 6/ CH-2/B5	Rock	G106-105	0.29	1.02	34.29	49.03	<0.05	<0.05	0.16	<0.08	<0.05	47.73	<0.05	0.64	0.45
106	UPCK/BMC&J - 6/ CH-2/B6	Rock	G106-106	0.22	0.93	37.76	53.98	<0.05	0.07	0.16	<0.08	<0.05	42.96	<0.05	0.64	0.75
107	UPCK/BMC&J - 6/ CH-2/B7	Rock	G106-107	0.31	1.29	36.45	52.11	<0.05	0.08	0.12	<0.08	<0.05	43.85	<0.05	0.92	0.99
108	UPCK/BMC&J - 6/ CH-2/B8	Rock	G106-108	0.37	0.74	44.46	63.56	<0.05	<0.05	0.08	<0.08	<0.05	33.99	<0.05	0.46	0.34

109	UPCK/BMC&J -6/ CH-2/B9	Rock	G106-109	0.35	0.64	50.06	71.57	0.06	0.08	0.07	<0.08	<0.05	26.33	<0.05	0.41	0.37
110	UPCK/BMC&J -6/ CH-2/B10	Rock	G106-110	0.43	1.21	38.91	55.63	<0.05	0.07	0.08	<0.08	<0.05	40.58	<0.05	0.86	0.86
111	UPJT/HOB -1/ CH-1/A1	Rock	G106-111	1.80	0.15	46.84	66.96	0.23	0.08	0.15	<0.08	<0.05	18.16	0.25	2.08	9.94
112	UPJT/HOB -1/ CH-1/A2	Rock	G106-112	0.49	0.14	51.44	73.55	<0.05	<0.05	0.11	<0.08	<0.05	13.41	<0.05	1.67	10.39
113	UPJT/HOB -1/ CH-1/A3	Rock	G106-113	1.64	0.12	50.41	72.07	0.21	0.09	0.16	<0.08	<0.05	12.50	0.19	2.12	10.65
114	UPJT/HOB -1/ CH-1/A4	Rock	G106-114	1.13	0.11	51.55	73.70	0.05	<0.05	0.08	<0.08	<0.05	12.59	0.21	1.77	10.14
115	UPJT/HOB -1/ CH-1/A5	Rock	G106-115	1.10	0.13	49.71	71.07	0.06	<0.05	0.30	<0.08	<0.05	14.23	0.18	1.90	10.82
116	UPJT/HOB -1/ CH-1/A6	Rock	G106-116	1.26	0.10	47.24	67.55	0.09	<0.05	0.08	<0.08	<0.05	19.48	0.27	1.78	9.19
117	UPJT/HOB -1/ CH-1/A7	Rock	G106-117	1.44	0.13	52.58	75.18	0.09	0.05	0.17	<0.08	<0.05	9.16	0.32	2.15	11.12
118	UPJT/HOB -1/ CH-1/A8	Rock	G106-118	1.06	0.11	51.16	73.15	0.05	<0.05	0.09	<0.08	<0.05	12.77	0.22	1.90	10.47
119	UPJT/HOB -1/ CH-1/A9	Rock	G106-119	1.28	0.14	41.87	59.87	0.07	<0.05	0.22	<0.08	<0.05	28.13	0.18	1.71	8.14
120	UPJT/HOB -1/ CH-1/A10	Rock	G106-120	2.02	0.11	51.18	73.17	0.16	0.08	0.32	<0.08	<0.05	10.44	0.44	1.92	11.14
121	UPJT/HOB -1/ CH-1/A11	Rock	G106-121	1.81	0.11	53.66	76.72	0.11	0.06	0.06	<0.08	<0.05	7.22	0.29	2.14	11.30
122	UPJT/HOB -1/ CH-1/A12	Rock	G106-122	1.44	0.15	51.50	73.64	0.08	<0.05	0.23	<0.08	<0.05	11.46	0.30	2.20	10.32
123	UPJT/HOB -1/ CH-1/A13	Rock	G106-123	2.02	0.12	50.72	72.51	0.12	0.06	0.16	<0.08	<0.05	11.49	0.37	2.22	10.77
124	UPJT/HOB -1/ CH-1/A14	Rock	G106-124	0.98	0.14	52.73	75.39	0.05	<0.05	0.36	<0.08	<0.05	9.88	0.24	1.82	10.98
125	UPJT/HOB -1/ CH-1/A15	Rock	G106-125	1.87	0.12	50.10	71.63	0.13	0.07	0.27	<0.08	<0.05	13.25	0.33	1.95	10.17
126	UPJT/HOB -1/ CH-1/A16	Rock	G106-126	2.08	0.14	51.75	73.99	0.15	0.10	0.46	<0.08	<0.05	8.92	0.50	2.31	11.13
127	UPJT/HOB -1/ CH-1/A17	Rock	G106-127	2.05	0.13	49.54	70.83	0.43	0.14	0.19	<0.08	<0.05	13.29	0.17	2.19	10.32
128	UPJT/HOB -1/ CH-1/A18	Rock	G106-128	1.71	0.13	48.48	69.32	0.13	0.08	0.17	<0.08	<0.05	14.94	0.32	2.23	10.75

129	UPJT/HOB -1/ CH-1/A19	Rock	G106-129	2.09	0.12	47.42	67.80	0.14	0.08	0.13	<0.08	<0.05	16.91	0.38	2.11	10.02
130	UPJT/HOB -1/ CH-1/A20	Rock	G106-130	2.68	0.12	49.89	71.33	0.20	0.08	0.13	<0.08	<0.05	12.23	0.44	2.22	10.40
131	UPJT/HOB -2/ CH-1/A1	Rock	G106-131	4.52	0.12	49.70	71.05	<0.05	<0.05	<0.05	<0.08	<0.05	8.91	2.28	1.56	10.98
132	UPJT/HOB -2/ CH-1/A2	Rock	G106-132	1.80	0.11	55.76	79.72	<0.05	<0.05	0.37	<0.08	<0.05	4.18	0.87	1.41	11.26
133	UPJT/HOB -2/ CH-1/A3	Rock	G106-133	3.71	0.10	52.21	74.65	<0.05	<0.05	<0.05	<0.08	<0.05	7.18	2.15	1.58	10.27
134	UPJT/HOB -2/ CH-1/A4	Rock	G106-134	3.46	0.11	52.83	75.53	<0.05	<0.05	0.06	<0.08	<0.05	6.41	1.98	1.49	10.67
135	UPJT/HOB -2/ CH-1/A5	Rock	G106-135	4.05	0.12	51.20	73.20	<0.05	<0.05	0.10	<0.08	<0.05	7.74	2.13	1.60	10.76
136	UPJT/HOB -2/ CH-1/A6	Rock	G106-136	4.38	0.10	50.98	72.88	<0.05	<0.05	<0.05	<0.08	<0.05	7.98	2.61	1.44	10.29
137	UPJT/HOB -2/ CH-1/A7	Rock	G106-137	2.89	0.10	53.59	76.62	<0.05	<0.05	<0.05	<0.08	<0.05	7.20	1.90	1.34	9.70
138	UPJT/HOB -2/ CH-1/A8	Rock	G106-138	5.06	0.11	47.82	68.37	<0.05	<0.05	<0.05	<0.08	<0.05	12.02	3.10	1.28	9.73
139	UPJT/HOB -2/ CH-1/A9	Rock	G106-139	4.10	0.10	50.35	71.99	<0.05	<0.05	<0.05	<0.08	<0.05	9.32	2.36	1.43	10.42
140	UPJT/HOB -2/ CH-1/A10	Rock	G106-140	5.17	0.12	50.03	71.53	<0.05	0.06	0.32	<0.08	<0.05	8.88	2.84	1.33	9.48
141	UPJT/HOB -2/ CH-1/A11	Rock	G106-141	4.59	0.10	51.06	73.01	<0.05	<0.05	<0.05	<0.08	<0.05	8.60	2.46	1.25	9.66
142	UPJT/HOB -2/ CH-1/A12	Rock	G106-142	4.56	0.10	49.27	70.44	<0.05	<0.05	<0.05	<0.08	<0.05	9.88	2.69	1.43	10.36
143	UPJT/HOB -2/ CH-1/A13	Rock	G106-143	5.01	0.09	48.78	69.75	<0.05	0.05	0.05	<0.08	<0.05	10.33	2.61	1.38	10.38
144	UPJT/HOB -2/ CH-1/A14	Rock	G106-144	4.34	0.10	50.30	71.91	<0.05	0.06	0.12	<0.08	<0.05	8.50	2.30	1.47	10.90
145	UPJT/HOB -2/ CH-1/A15	Rock	G106-145	4.19	0.09	49.77	71.16	<0.05	<0.05	<0.05	<0.08	<0.05	8.87	2.51	1.69	11.08
146	UPJT/HOB -2/ CH-1/A16	Rock	G106-146	4.54	0.10	49.67	71.02	0.16	<0.05	0.10	<0.08	<0.05	10.22	2.36	1.28	9.71
147	UPJT/HOB -2/ CH-1/A17	Rock	G106-147	5.03	0.10	48.85	69.84	<0.05	<0.05	0.07	<0.08	<0.05	9.52	2.87	1.61	10.71
148	UPJT/HOB -2/ CH-1/A18	Rock	G106-148	5.84	0.10	45.52	65.08	<0.05	<0.05	<0.05	<0.08	<0.05	14.85	3.20	1.10	9.41

149	UPJT/HOB -2/ CH-1/A19	Rock	G106-149	5.62	0.10	46.88	67.02	<0.05	0.07	<0.05	<0.08	<0.05	12.30	2.88	1.36	10.38
150	UPJT/HOB -2/ CH-1/A20	Rock	G106-150	3.61	0.10	52.36	74.85	<0.05	<0.05	0.08	<0.08	<0.05	6.58	2.13	1.59	10.69
Abbreviations:									Accuracy, Precision, Matrix Method and instrument dependent.							
SOP/OM/105: Borate Fusion Bead followed by WDXRF Finish											AMIS0599: Certified Reference Material Standard					
SOP/OM/103: Loss on Ignition followed by Gravimetry Finish											AMIS0501: Certified Reference Material Standard					
Certi. -- Certified																
Meas. – Measured																
LOQ-Limit of Quantification																

23.6 Annexure VI: Logsheets of core drilling of Block A1 & A2

BORE HOLE NO	UPCKB-01		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	8/16/2025	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24°33' 03.3809"				DATE OF COMPLETION	9/23/2025	
	LONG	E82°52' 14.2664"						
RL OF COLLAR	377.656m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N15°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	117.00m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Chakdiya	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	2/8	
BH DEPTH	117.00m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN (m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	0.00	10.00	10.00	9.46	Brecciated quartzite	Moderately to Highly fractured brecciated quartzite contains irregularly oriented clasts of jasper, chert, and hematite, intermixed with phyllite. The hematite clasts are highly shiny in nature, and in a few places, Limonitization and oxidation have occurred.
2	**10.00**	**15.00**	**5.00**	**4.84**	**BHC & J**	**The Banded Hematite-Conglomerate (BHC) and Banded Hematite-Jasper (BHJ) are characterized by moderate to high fracture levels. The hematite layers have a shiny appearance, ranging from 0.4 mm to 1.5 cm in thickness. Quartzite varies in size from 0.2 mm to 4 cm, while chert measures about 2 cm. Additionally, jasper ranges from 0.2 mm to 1 cm. Both BHJ and BHC contain limonitized phyllite layers, and oxidation has been observed in the hematite layers.**

3	15.00	22.00	7.00	6.56	Ferruginous Phyllite	Moderately to highly fractured brecciated quartzite with hematite clasts are cherry reddish to brownish in colour, and ferruginous phyllite appears cherry reddish in colour, oxidized and limonitized.
4	**22.00**	**26.00**	**4.00**	**3.72**	**BHC&J**	**Reddish brown to white colour alternate bands of banded hematite chert & Jasper with varying thin hematite layers 2 mm to 8 mm & thick layers of chert and jasper 2 mm to 1.5 cm thick observed.**
5	26.00	28.00	2.00	1.81	Ferruginous Phyllite	Reddish brown to dark brown highly fractured ferruginous phyllite intermixed with hematite fragments observed.
6	**28.00**	**32.00**	**4.00**	**3.94**	**BHC&J**	**Reddish brown to white colour alternate bands of banded hematite chert & Jasper with varying thickness of hematite layers 4 mm to 4 cm & thick layers of chert and jasper 2 mm to 5 cm thick observed with Limonitization.**
7	32.00	35.00	3.00	2.80	Ferruginous Phyllite	Reddish brown to dark brown highly fractured ferruginous phyllite with hematite fragments.
8	**35.00**	**37.00**	**2.00**	**1.95**	**BHC&J**	**Reddish brown to white colour alternate bands of banded hematite chert & Jasper with varying thickness of hematite layers 4 mm to 2 cm & thick layers of chert and jasper 2 mm to 3.5 cm thick observed with Limonitization @35.70 meter we have observed sulphide clast around 2mm x 1cm in size.**
9	37.00	42.00	5.00	4.75	Ferruginous Phyllite	Reddish brown to dark brown highly fractured ferruginous phyllite with hematite fragments.
10	**42.00**	**43.00**	**1.00**	**0.95**	**BHC&J**	**Reddish brown to white colour brecciated quartzite with with greenish guartzite due to porphyritic alteration with non-oriented hematite clast also observed.**
11	43.00	47.00	4.00	3.79	Ferruginous Phyllite	Reddish brown to dark brown highly fractured ferruginous phyllite with hematite fragments.
12	**47.00**	**48.00**	**1.00**	**0.91**	**BHC&J**	**Brownish black to white colour alternate bands of banded hematite chert with varying thin hematite layers 5 mm to 2 cm thick & thin layers of chert 2 mm to 3.0 cm thick observed with hydrothermal alteration of specular hematite observed.**
13	48.00	56.00	8.00	7.85	Ferruginous Phyllite	Reddish brown to light green colour weekly fractured ferruginous phyllite with hematite fragments and quartz vein 1mm to 2 mm quartz crystals also observed.
14	56.00	75.00	19.00	18.43	Dolerite	Grey to greenish grey colour weekly fractured dolerite with 1mm to 3mm thick epidote vein@60.08m due to hydrothermal alteration along the fracture 3mm thick actinolite and pale green colour urilization @ 63m to 63.40m and width 1 mm to 1.5cm thick with disseminated pyrite also observed.
15	**75.00**	**78.00**	**3.00**	**2.76**	**BHC&J**	**Brownish black to white colour alternate bands of banded hematite chert with varying thin hematite layers 2 mm to 1.5 cm thick & thin layers of chert 2 mm to 3.0 cm thick observed.**
16	78.00	79.00	1.00	0.95	Ferruginous Phyllite	Reddish brown to dark brown weakly fractured ferruginous phyllite with banded hematite chert 3 cm thick @81.15 m and 5 cm chert layer @81.82.
17	**79.00**	**85.00**	**6.00**	**5.46**	**BHC&J**	**Reddish brown to red & black colour weakly fractured banded hematite chert & jasper, brecciated in nature at places Limonitization with hematite varing from 2mm to 1.5 cm thick with chert and jasper is dominant.**

18	85.00	86.00	1.00	0.92	Ferruginous Phyllite	Reddish brown to dark brown weakly fractured ferruginous phyllite with banded hematite chert 3 cm thick @81.15 m and 5 cm chert layer @81.82.
19	**86.00**	**88.00**	**2.00**	**1.90**	**BHC&J**	**Brownish black to red & white colour alternate bands of banded hematite chert & Jasper with varying thin hematite layers 5 mm to 6 cm thick & chert & Jasper layers varing from 2 mm to 1.5 cm thick observed.**
20	88.00	89.00	1.00	0.91	Ferruginous Phyllite	Reddish brown to dark brown weakly fractured ferruginous phyllite with banded hematite chert 3 cm thick @81.15 m and 5 cm chert layer @81.82.
21	**89.00**	**91.00**	**2.00**	**1.82**	**BHC&J**	**Brownish black to red & white colour alternate bands of banded hematite chert & Jasper with varying thin hematite layers 5 mm to 6 cm thick & chert & Jasper layers varing from 2 mm to 1.5 cm thick observed.**
22	91.00	93.00	2.00	1.90	Ferruginous Phyllite	Reddish brown to dark brown weakly fractured ferruginous phyllite with hematite fragments 5mm to 1cm thick observed.
23	**93.00**	**102.00**	**9.00**	**8.34**	**BHC&J**	**Brownish black to red & white colour alternate bands of banded hematite chert & Jasper & specular hematite with varying thin hematite layers 5 mm and to 6 cm thick & chert & Jasper layers varing from 5 mm to 2.4 cm thick with chalcopyrite staining @92.63 to 92.75m 2mm thick 3 veins and @ 94.00 to 94.10m and @94.62 to 94.65m disseminated sulphide observed.**
24	102.00	103.00	1.00	0.96	Felsic Tuff	Off white to cream colour highly fractured Tuff with Phyllite with @102.92m quartz vein 5mm to 1cm thick observed.
25	**103.00**	**105.00**	**2.00**	**1.93**	**BHC&J**	**Brownish black to red & off-white colour alternate bands of banded hematite chert & Jasper with specular hematite and brecciated in nature. Hematite layers 5 mm to 1.70 cm thick & chert & Jasper layers varing from 6 mm to 2.5 cm thick @104.63m 3mm thickness iron sulphide and @104.80m disseminated chalcopyrite staining observed.**
26	105.00	108.00	3.00	2.88	Ferruginous Phyllite	Reddish brown to dark brown weakly Tuffeous ferruginous phyllite with hematite fragments observed.
27	**108.00**	**109.00**	**1.00**	**0.93**	**BHC&J**	**Brownish black to red & off-white colour alternate bands of banded hematite chert & Jasper with specular hematite and brecciated in nature. at places Limonitization with hematite varing from 1 mm to 1 cm thick with chert @ 108.80 m 1 cm thick hematite & banded hematite chert & jasper interbedded with ferruginous phyllite.**
28	109.00	111.00	2.00	1.85	Felsic Tuff	Reddish yellow to off white in colour with highly to moderate fractured Tuffeous ferruginous phyllite intermixing of ferruginous phyllite and specular hematite chert and jasper observed.
29	**111.00**	**116.00**	**5.00**	**4.72**	**BHC&J**	**Brownish black to red & off-white colour Alternating bands of specular hematite chert & Jasper. This banded sequence is brecciated. The hematite layers vary in thickness from 1 mm to 5 cm, and the chert/jasper layers range from 5 mm to 3 cm. The iron sulphide staining is present at 111.90 m and 112.50 m. A planar, rough, and undulating joint with a 2 mm aperture was observed, and the cavity within the joint is filled with quartz veins.**

30	115.00	117.00	2.00	1.90	Ferruginous Phyllite	Brownish yellow to off white in colour with highly fractured phyllite intermixing of quartz fragments 5mm to 1 cm thick observed

BORE HOLE NO	UPCKB-02		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	11/4/2025	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24° 33' 16.4958"				DATE OF COMPLETION	12/1/2025	
	LONG	E82° 53' 03.3443"						
RL OF COLLAR	348.472 m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N15°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	120.00m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Murgidant	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	4/8	
BH DEPTH	120.00m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN (m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	0.00	2.00	2.00	1.80	Ferruginous Phyllite	Highly fractured ferruginous phyllite sandy in nature with fragments of brecciated quartzite & hematite.
2	**2.00**	**9.20**	**7.20**	**6.64**	**BHC&J**	**Brownish black to off white colour highly fractured brecciated quartzite and jasper with alternate banded hematite chert @ 6.20m, 4 cm thick has been observed.**
3	9.20	10.00	**0.80**	0.74	Ferruginous Phyllite	Brownish black to yellowish brown colour highly fractured ferruginous phyllite sludge of hematite varing from 1mm to 0.50 cm thick has been observed.
4	**10.00**	**10.80**	**0.80**	**0.75**	**BHC&J**	**Brownish black to off white colour highly fractured brecciated quartzite with banded hematite chert @ 8.25 M, 3 cm to 3.5cm thick has been observed.**

5	10.80	13.80	3.00	2.73	Ferruginous Phyllite	Reddish brown colour highly fractured ferruginous phyllite sludge with fragments size 5 mm to 1.5 cm thick &highly fractured banded phyllite with quartzite brecciated in nature has been observed.
6	**13.80**	**15.00**	**1.20**	**1.11**	**BHC&J**	**Brownish black to off white & red colour highly fractured alternate band of banded hematite chert & jasper brecciated in nature quartzite dominant with hematite layer varing from 5mm to 1.5 cm thick has been observed.**
7	15.00	19.00	4.00	3.68	Ferruginous Phyllite	Brownish yellow to off white in colour with highly fractured phyllite intermixing of quartz fragments 5mm to 1 cm thick observed
9	**19.00**	**20.00**	**1.00**	**0.93**	**BHC&J**	**Brownish black to yellowish brown colour alternate band of banded hematite chert highly fractured brecciated in nature has been observed.**
10	20.00	22.00	2.00	1.79	Ferruginous Phyllite	Reddish brown to yellowish brown colour ferruginous phyllite highly fractured @ 21.07m 2.5 cm thick hematite chert has been observed.
11	**22.00**	**24.00**	**2.00**	**1.85**	**BHC&J**	**Brownish black to off white colour alternate band of banded hematite chert with specular hematite highly fractured brecciated in nature @ 23.55 m 8.0 cm thick specular hematite has been observed.**
12	24.00	28.00	4.00	3.67	Dolerite	Greenish grey to grey colour highly fractured dolerite with 3.5 cm thick with staining of Arsenopyrite disseminated &chalcopyrite disseminated form @31.73m with minor stains of oxidized iron sulphide range from red to brown and some pale green olivine is observed.
14	48.00	49.00	1.00	0.92	Ferruginous Phyllite	Brownish yellow colour highly fractured ferruginous phyllite along with minor sand size hematite has been observed.
15	**49.00**	**52.00**	**3.00**	**2.74**	**BHC&J**	**Brownish black to off white & red colour highly fractured alternate band of banded hematite chert & jasper brecciated in nature with hematite layer varing from 5mm to 1.5 cm thick & at places 10 cm to 15 cm thick phyllite fragments has been observed.**
16	52.00	53.00	1.00	0.91	Ferruginous Phyllite	Brownish yellow colour highly fractured ferruginous phyllite sludge with fragments size 5 mm to 1.5 cm thick has been observed.
17	**53.00**	**55.00**	**2.00**	**1.83**	**BHC&J**	**Brownish black to off white & red colour highly fractured alternate band of banded hematite chert & jasper brecciated in nature quartzite dominant with hematite layer varing from 5mm to 1.5 cm thick has been observed.**
18	55.00	57.45	2.45	2.25	Ferruginous Phyllite	Yellowish brown to brownish yellow colour highly fractured ferruginous phyllite sludge sandy in nature with sandy hematite grain has been observed.
11	**57.45**	**65.00**	**7.55**	**702.15**	**BHC&J**	**Brownish black to off white, red & greenish grey colour alternate band of banded hematite chert & jasper intercolated with dolerite @ 60.60m to 60.67m 3 cm thick dolerite & hematite layer varing from 5mm to 1.5 cm thin layer weakly fractured in nature.**
14	65.00	80.00	15.00	14.01	BHC&J with phyllite	Brownish black to off white, red & greenish grey colour alternate band of banded hematite chert interbedded with grey phyllite. Hematite interspersed with the chert & jasper band. Hematite layer varing from 1mm to 5mm weakly fractured @ 65.60m 8mm thick chalcopyrite staining along the fracture has been observed. Hematite interspersed

						with the phyllite band. Hematite layer varing from 3 mm to 6 cm thick @ 70.52m thick specular hematite has been observed.
15	80.00	89.00	9.00	8.20	Ferruginous Phyllite	Brownish grey to off white & grey colour alternate band of banded ferruginous phyllite & grey phyllite with chert. & carbonate vein. @82.50m, 5mm thick & 7 cm long carbonate vein interspersed with the phyllite band. Ferruginous phyllite layer varing from 5 mm to 1.5 cm. Along chert veins Foliation has been observed.
16	89.00	120.00	31.00	28.76	Dolerite	Greenish grey to grey colour moderately fractured dolerite along the fracture minor 2mm thick epidote & dolerite with a quartz crystals vein 5mm thick around 75 cm long along the fracture chalcopyrite staining formed by hydrothermal activity has been observed. Dolerite along the foliation @118.35 m to 118.65 m 3 cm thick actinolite chlorite vein and @118.65m to 119.00m, 35 cm long chalcopyrite in the form of vein has been observed.

BORE HOLE NO	UPCKB-03		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	3/31/2026	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24°33'26.4735"				DATE OF COMPLETION		
	LONG	E82°53'39.0172"						
RL OF COLLAR	415.390m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N15°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	97.00m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Bhaghakur area	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	8/8	
BH DEPTH	97.00m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN (m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	**0.00**	**34.00**	**34.00**	**31.80**	**Banded Magnetite Chert & Jasper**	**Brownish black to off white and red colour alternate bands of banded Magnetite with hematite chert & jasper with varying layer of Magnetite 2 mm to 1.0 cm thick and chert varing layer of 5mm to 1.2 cm thick brecciated & Highly Magnetic in nature and highly fractured fragments has been observed.**
2	**34.00**	**35.00**	**1.00**	**0.94**	**Banded Hematite Chert with ferruginous Phyllite**	**Brownish black to off white and pale-yellow colour alternate bands of banded hematite chert interbedded with phyllite, weakly fractured, hematite layer varying from 2mm to 5mm thick and chert 5mm to 2 cm thick and ferruginous phyllite layer 2cm to 5cm thick has been observed.**
3	35.00	36.00	1.00	0.90	Ferruginous Phyllite	Yellowish brown to pinkish yellow colour alternate bands of banded ferruginous phyllite weakly fractured has been observed.
4	36.00	38.00	2.00	1.80	Brecciated quartzite with Phyllite	Yellowish brown to pinkish yellow & off-white colour alternate bands of banded ferruginous phyllite with brecciated quartzite has been observed.

5	38.00	56.00	18.00	17.10	Dolerite	Greenish grey to pale green & greenish black colour moderately fractured Dolerite with @ 51.50m epidote and quartz vein 2mm thick & micro-filling of quartz & hematite with joint aperture is 2mm has been observed.
6	**56.00**	**68.00**	**12.00**	**11.13**	**Banded Hematite Chert & Jasper with phyllite**	**Brownish to pale yellow, red & off-white colour moderately fractured alternate bands of banded hematite chert & jasper interbedded with phyllite. Hematite layer varing from 2mm to 5mm thick, chert & jasper layer varing from 5mm to 2cm thick and phyllite layers varing from 8mm to 3 cm thick has been observed.**
7	68.00	79.00	11.00	10.35	Banded Grey & Ferruginous Phyllite	Brownish grey to brownish pink & grey colour moderately fractured alternate bands of grey Phyllite & ferruginous phyllite. Ferruginous Phyllite layer varing from 5mm to 2 cm thick & grey phyllite 5 cm to 10 cm has been observed.
8	79.00	81.38	2.38	2.21	Banded Grey & Ferruginous Phyllite	Pinkish brown to reddish brown, off-white & grey colour moderately fractured alternate bands of BIF & ferruginous phyllite. The layer of hematite varing from 5mm to 1.5cm, chert varing from 1cm to 2.5 cm & Ferruginous Phyllite layer varying from 2cm to 12 cm thick has been observed.
9	81.38	92.00	10.62	9.66	Ferruginous phyllite	Pinkish brown & grey colour Highly fractured alternate bands of grey Phyllite & ferruginous phyllite. The grey Phyllite is the most dominant layer varying from 5cm to 11 cm thick has been observed.
10	**92.00**	**95.00**	**3.00**	**2.85**	**Banded Hematite Chert & Jasper with phyllite**	**Pinkish brown to reddish brown & grey colour weakly fractured alternate bands of BIF & ferruginous phyllite. The layer of hematite 2 mm to 5 mm thick & chert & jasper layer varying from 1cm to 3 cm thick & Ferruginous Phyllite layer varying from 1cm to 23 cm thick has been observed.**
11	**95.00**	**97.00**	**2.00**	**1.90**	**Banded Hematite Chert & Jasper**	**Brownish pink to reddish brown & off-white colour weakly fractured alternate bands of banded hematite chert & jasper brecciated in nature. Hematite layer varying from 2 cm to 5 cm thick, chert & jasper varying from 1 cm to 2 cm thick interbedded with 1 cm to 6 cm Ferruginous Phyllite has been observed.**

BORE HOLE NO	UPCKB-04		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	9/26/2025	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24°33'09.2571"				DATE OF COMPLETION	10/28/2025	
	LONG	E82°52'12.3878"						
RL OF COLLAR	363.651			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N15°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	80.00m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Chakdiya	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	3/8	
BH DEPTH	80.00m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN (m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	0.00	4.00	4.00	3.79	Ferruginous Phyllite	Highly fractured, reddish-brown ferruginous phyllite sludge intermingled with hematite, quartzite, and chert particles are observed.
2	4.00	5.40	1.40	1.35	Brecciated quartzite	Moderately to highly fractured brecciated quartzite exhibits an irregular pattern of jasper and chert clasts.
3	5.40	19.50	14.10	13.46	Dolerite	Greenish grey to grey colour moderately fractured dolerite with 1 mm to 2 mm thick epidote veins @ 14.25m, 14.70m to 14.85m observed
4	**19.50**	**20.00**	**0.50**	**0.46**	**BMC&J**	**Brownish black to off white colour alternate band of banded magnetite chert moderately fractured with varing layer of magnetite 5mm to 1cm & chert 2mm to 5mm thick observed.**
5	20.00	23.00	3.00	2.86	Ferruginous Phyllite	Pale yellow to pale brown colour highly fractured phyllite fragments observed.
6	**23.00**	**30.00**	**7.00**	**6.51**	**BMC&J**	**Brownish black to off white & red colour alternate band of banded magnetite chert & jasper weakly fractured with varing layer of magnetite 5mm to 2cm thick & chert 5mm to 1 cm thick & dolerite layer varing from 5mm to 4cm thick.**

7	30.00	46.00	16.00	15.32	Dolerite	Greenish grey to grey colour weakly fractured dolerite with 2 mm thick epidote vein @37.31m and @ 35.07m, 36.50m, 36.74m, 36.83m, 37.07m, 37.31m & 37.64m disseminated chalcopyrite staining observed.
8	**46.00**	**70.00**	**24.00**	**22.32**	**BHC&J**	**Brownish black to off white & red colour alternate band of banded hematite/magnetite chert & jasper highly fractured with varing layer of magnetite /hematite 2 mm to 1 cm thick & chert 2 mm to 1.2 cm and jasper varing from 5mm to 3.0 cm thick. @51.85m 4 cm thick grey colour clay & @52.05m, 3 cm Limonitization observed.**
9	70.00	72.00	2.00	1.90	Ferruginous Phyllite	Yellowish brown to brown colour highly fractured ferruginous phyllite with hematite fragments 2mm to 4mm in size as been observed.
10	**77.00**	**77.00**	**0.00**	**4.60**	**BHC&J**	**Brownish black to off white colour alternate band of banded hematite chert intermixed with with specular hematite brecciated & ferruginous phyllite @73.20m to 73.40m 20 cm thick and @73.68m to 73.90m 22 cm thick, highly fractured with @ 74.60m to 74.80m 20cm thick sludge of hematite & chert has been observed.**
11	77.00	80.00	3.00	2.70	Ferruginous Phyllite	Yellowish brown to brown colour sludge of phyllite claying in nature has been observed.

BORE HOLE NO	UPCKB-05		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	12/7/2025	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24° 33' 22.6162"				DATE OF COMPLETION	1/9/2026	
	LONG	E82° 53' 01.6135"						
RL OF COLLAR	393.569m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N15°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	100.00m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Murgidant	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	5/8	
BH DEPTH	100.00m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN (m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	0.00	6.00	6.00	5.46	Brecciated quartzite	Reddish brown to off white colour highly fractured brecciated quartzite sludge sandy in nature has been connected. & Brownish to off white colour highly fractured brecciated quartzite with iron fragments interbedded with Tuff bed sludge sandy in nature has been observed.
2	6.00	8.00	2.00	1.80	Felsic Tuff	Off-white to smoky white colour highly fractured Tuff bed fragments varing size of 5mm to 2cm has been observed.
3	8.00	9.00	1.00	0.90	Brecciated quartzite	Brownish to off white colour highly fractured brecciated quartzite with iron fragments interbedded with Tuff bed sludge sandy in nature has been observed.
4	**9.00**	**10.00**	**1.00**	**0.92**	**BHC&J**	**Brownish black to off-white colour alternate band of banded hematite chert moderately fractured brecciated in nature with hematite layers varing from 5mm to 1cm & Chert layer varing from 5mm to 1.5 cm thick has been observed.**

5	10.50	19.20	8.70	7.88	Felsic Tuff	Off-white to pinkish white colour highly fractured Tuff/Ash bed sludge sandy& smoky white colour highly fractured Tuff/Ash bed fragments varing from 5mm to 1.5 cm thick has been observed.
6	19.20	21.00	1.80	1.62	Ferruginous Phyllite	Reddish brown colour highly fractured ferruginous phyllite sludge sandy in nature has been observed.
9	**21.00**	**50.00**	**29.00**	**26.82**	**BHC&J**	**Brownish black to off-white & red colour alternate band of banded hematite chert & jasper sludge sandy in nature and @ 25.00m to 25.10 m highly fractured with hematite layers varing from 5mm to 2cm & chert layer 5mm to 1.5cm thick has intermittent with ferruginous phyllite &@42.18m to 42.25m and @42.43m to 42.50m 7cm each chalcopyrite staining has been observed.**
10	**50.00**	**59.00**	**9.00**	**8.55**	**BMC&J**	**Brownish black& Greenish grey to grey & off-white colour alternate bands of banded dolerite hematite & chert moderately fractured sludge sandy in nature with hematite layer 2 mm to 5 mm thick & chert varing from 2 mm to 1.0 cm thick and dolerite 5mm to 2.5 cm thick has been observed. Alternate bands of banded Magnetite chert moderately fractured with Magnetite layer 5 mm to 3.0 cm thick & chert varing from 5 mm to 1.2 cm thick along with @57.90 to 58.00m chalcopyrite staining has been observed.**
11	59.00	100.00	41.00	39.72	Dolerite	Greenish grey to grey colour weakly fractured dolerite with epidote vein@58.57m and @59.85m to 3mm to 1cm thick & @59.95m to 60.00m 5 cm thick chalcopyrite staining has been observed. Pyroxene dolerite with @ 81.50m 2cm thick chlorite-actinolite calcite veins 1.8cm to 3.0 cm thick and along the fracture silicon side has been observed. Pyroxene dolerite with @ 97.35 m to 97.60m pale green 5mm thick epidote veins and @98.00 m to 98.50m chalcopyrite staining. The joint orientation is planner rough & tapped rough. The aperture of joint 4mm softening filling has been observed.

BORE HOLE NO	UPCKB-06		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	7/13/2025	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24°34'05.8972"				DATE OF COMPLETION	7/27/2025	
	LONG	E82°55'55.5984"						
RL OF COLLAR	309.7964m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N15°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	53.10m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Bijaura area	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	1/8	
BH DEPTH	53.10m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN (m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	0.00	2.50	2.50	2.35	Ferruginous Phyllite	Highly fractured ferruginous phyllite, predominantly of a reddish brown in colour, moderately compact sand of highly fractured ferruginous phyllite with brecciated quartzite observed.
2	2.50	8.00	5.50	5.28	Dolerite	Greenish grey to dark grey fine to medium grain weathered dolerite sandy in nature observed. Along the fracture some quartz veinlet also observed.
3	**8.00**	**9.00**	**1.00**	**0.93**	**Banded Magnetite Chert**	**Weakly fractured Banded magnetite chert with alternate layer of magnetite & chert, magnetite layer varing from 2mm to 1.5 cm and chert layer varying from 3mm to 1.0 cm thick.**
4	9.00	15.00	6.00	5.54	Dolerite	Greenish grey to dark grey fine to medium grain dolerite with minor fragments of magnetite observed.
5	**15.00**	**30.00**	**15.00**	**14.26**	**Banded Magnetite Chert**	**Reddish to brownish in colour with Weakly to Highly fractured Banded magnetite chert with alternate layer of magnetite & chert, magnetite layer varing from 2mm to 2.2 cm and chert layer varying from 2 mm to 1.5 cm thick.**
7	30.00	53.10	23.10	22.81	Dolerite	Highly to weakly fractured greenish-grey dolerite shows chloritization and leaching, with iron sulphide veins highly oxidised observed.Between 50.20 and 50.40 m, quartz veins ranging from 1 mm to 5 mm in width are present, along with minor iron sulphide staining in some sections. Epidotized veins, also 1 mm to 5 mm wide, are observed in

						pale green colour. From 52.00 to 52.32 m, silver-grey sulphide stains are visible, surrounded by pink-coloured grains, indicating localized hydrothermal alteration.

BORE HOLE NO	UPJTB-01		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	1/15/2026	
TOPOSHEET NO	63L/14							
LOCATION	LAT	N24° 31' 14.4911"				DATE OF COMPLETION	1/28/2026	
	LONG	E82° 51' 42.9014"						
RL OF COLLAR	299.304m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.	
BH. ANGLE	50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra			
AZIMUTH	N30°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	53.00m	
INCLINATION	50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore			
LOCATION DETAILS	Jorba	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	7/8	
BH DEPTH	53.00 m			DRILL TYPE	Diamond Core Drilling			

S. No.	FROM (m)	TO (m)	RUN(m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION
1	0.00	19.00	17.30	17.86	Brecciated quartzite with Iron matrix	Brownish black to milky white & red moderately fractured brecciated quartzite with around 35% iron matrix brecciated in nature intruded with milky white quartz vein and sludge sandy in nature has been observed.
2	**19.00**	**25.00**	**6.00**	**5.50**	**Massive Iron Ore**	**Brownish black to brown and off-white coloured, moderately fractured hematite occurring as massive iron ore and ferruginous sludge, with a sandy texture. A thin band (~5 cm) of chalcopyrite staining is observed between 19.95 m and 20.00 m depth & hematite and goethite have occurred.**

3	25.00	35.00	10.00	94.50	Felsic Tuff with Hematite	Brownish black to smoky white & grey colour Highly fractured Ash bed/ferruginous phyllite with chert & jasper fragments up to 2 cm thick with 5cm thick limonite and jasper (radially structural) @31.18m-31.23m, and sludge sandy in nature has been observed.
4	**35.00**	**42.00**	**7.00**	**6.28**	**Massive Iron Ore**	**Brownish black to brown & yellow colour Highly fractured Hematite & limonite with ferruginous phyllite around 5% iron matrix in the form of oxidised iron ore & sludge sandy in nature has been observed.**
5	30.00	53.00	23.00	20.86	Felsic Tuff with phyllite	Brownish black to smoky white & grey colour Highly fractured Ash bed/ferruginous phyllite with chert & jasper fragments up to 2 cm thick with 5cm thick limonite and jasper (radially structural) @31.18m-31.23m, and sludge sandy in nature has been observed.

BORE HOLE NO		UPJTB-02		PROJECT NAME: Reconnaissance Survey (G-4) for Iron Ore Block (A1 & A2) in Mahakoshal group around Chakdiya, Kushniya, Jorba & Tusgaon area, Sonbhadra district, Uttar Pradesh.			DATE OF COMMENCEMENT	2/2/2026
TOPOSHEET NO		63L/14						
LOCATION		LAT	N24° 30' 28.5065"				DATE OF COMPLETION	2/14/2026
		LONG	E82° 52' 08.5887"					
RL OF COLLAR		280.421m			STATE	Uttar Pradesh	DRILLING AGENCY	GeoExpOre Pvt. Ltd.
BH. ANGLE		50°	BLOCK AREA	18.56 Sq.KM	DISTRICT	Sonbhadra		
AZIMUTH		N02°W	SUPER GROUP	-	BLOCK NAME	Jorba & Tusgaon Block	TOTAL DRILLING TARGET	80.00 m
INCLINATION		50°	GROUP	Mahakoshal group	COMMEDITY NAME	Iron Ore		
LOCATION DETAILS		Jorba	FORMATION	Agori formation	MINERAL BELT	Mahakoshal Belt	NO. OF BOREHOLES	8/8
BH DEPTH		80.00 m			DRILL TYPE	Diamond Core Drilling		
S. No.	FROM (m)	TO (m)	RUN(m)	CORE LENGTH (m)	ROCK TYPE	DESCRIPTION		
1	0.00	13.45	13.45	12.15	Felsic Tuff with Hematite	The rock is brownish to reddish-brown in colour due to enrichment of iron oxides. It is moderately fractured in nature. Ferruginous phyllite fragments of variable thickness, with		

						a thickness of about 15 cm, have been observed. The joints are planar to rough, and the presence of micro-fractures is also observed.
2	13.45	25.00	11.55	10.47	Felsic Tuff with Hematite	The brownish to reddish, smoky white, and Light yellowish due to iron oxide enrichment. The rock is highly fractured, with ferruginous phyllite, a sludge-like clayey material. A tuffaceous ash bed containing jasper fragments of variable thickness are, 5 cm, has been observed. Goethite crystals and limonite specks are present, and an iron-rich matrix constitutes approximately 10% of the rock mass. The joints are rough in nature and are infilled with gouge type nature has been observed.
3	25.00	34.00	9.00	8.17	Felsic Tuff	The Brownish Smoky white to brownish Black in colour with highly fractured with tuffaceous ash bed with disseminated limonite specks observed along the Sandy Sludge type in nature has been Observed.
4	**34.00**	**41.00**	**7.00**	**6.34**	**Massive Iron Ore**	**Brownish red to Brownish black with yellowish in colour with moderately Fractured in the form massive Hematite/Geothite with Jasper along with Iron Massive in nature has been observed. The Joint Orientation are Planner rough to Stepped rough and joint Filling is Gauge Type.**
5	41.00	44.67	3.67	3.44	Felsic Tuff with Hematite	Brownish yellowish to grey colour with highly fractured in nature with a tuffaceous ash bed with Massive Iron ore & limonite matrix are intercolated within tuffaceous bed. The Jasper thickness varying up to 5 cm & Limonite are to 10 cm thick are observed Tuffaceous Clay type Sludge are around 5% in nature has been observed.
6	**44.67**	**46.44**	**1.77**	**1.66**	**Massive iron ore**	**Brownish yellowish to brownish reddish in colour with weakly fractured with brecciated in nature. The hematite is infilling of microfracture, and limonite Spacks are also observed. The thickness of jasper is 2 cm with highly Massive in nature has been observed.**
7	46.44	78.00	31.56	29.50	Felsic Tuff with Hematite	Brownish Black to grey & off white in colour with highly fractured in nature with a tuffaceous ash bed with hematite/ goethite & Massive Iron ore are intercolated each other with disseminated limonite Spacks. The fragment of tuff is up to 60% rich with iron matrix.
11	78.00	80.00	2.00	1.82	Felsic Tuff	Brownish Black to grey & off white in colour with highly fractured in nature with a tuffaceous ash bed with hematite/ goethite & Massive Iron ore are intercolated each other with disseminated limonite Spacks. The fragment of tuff is up to 60% rich with iron matrix.

23.7 Annexure VII: Chemical analysis results of core samples Block A1 & A2

Customer Name	GeoExpOre Pvt Ltd
	45-S 2nd A Main 2nd Cross, Chandra Layout Vijayanagar, Bengaluru- 560040
Discipline & Group	Chemical & Ores and Minerals.
Customer Ref.	Samples Received by Courier
Commodity	Geological Rock Samples
Lab ID	G49449
Date Received/Start of Analysis	12-May-26
Date Completed/Report	15-Jun-26
Sample Count	309

						METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105
						DL	0.05	0.05	0.05	0.05	0.05
						UNITS	%	%	%	%	%
		Depth									
S.no.	Sample Id	From(m)	To(m)	Sample Length(m)	Lithology	Lab ID	Al2O3	BaO	CaO	Cr2O3	Fe (T)
1	UPCKB-01/01	10	1 1	1	BHC&J	G4949-1	4.56	0.05	0.65	0.05	32.08

2	UPCKB-01/02	11	12	1	BHC&J	G4949-2	2.63	0.05	0.21	0.05	21.49
3	UPCKB-01/03	12	13	1	BHC&J	G4949-3	2.97	0.05	0.32	0.05	28.28
4	UPCKB-01/04	13	14	1	BHC&J	G4949-4	1.71	0.05	0.57	0.05	24.99
5	UPCKB-01/05	14	15	1	BHC&J	G4949-5	2.97	0.05	0.36	0.05	16.19
6	UPCKB-01/06	15	17.8	2.8	Ferruginous Phyllite	G4949-6	3.38	0.05	1.23	0.05	10.59
7	UPCKB-01/07	18	20	1.82	Ferruginous Phyllite	G4949-7	2.83	0.05	0.84	0.05	9.2
8	UPCKB-01/08	20	22	2	Ferruginous Phyllite	G4949-8	4.14	0.05	1.64	0.05	8.96
9	UPCKB-01/09	22	23	1	BHC&J	G4949-9	4.31	0.05	0.33	0.05	18.09
10	UPCKB-01/10	23	24	1	BHC&J	G4949-10	6.93	0.05	0.23	0.05	27.59
11	UPCKB-01/11	24	25	1	BHC&J	G4949-11	4.36	0.05	0.28	0.05	34.18
12	UPCKB-01/12	25	26	1	BHC&J	G4949-12	3.38	0.05	0.18	0.05	37.48
13	UPCKB-01/13	26	28	2	Ferruginous Phyllite	G4949-13	5.12	0.05	2.91	0.05	7.63
14	UPCKB-01/14	28	29	1	BHC&J	G4949-14	4.61	0.05	0.47	0.05	27.29
15	UPCKB-01/15	29	30	1	BHC&J	G4949-15	3.14	0.05	0.26	0.05	25.29
16	UPCKB-01/16	30	31	1	BHC&J	G4949-16	2.42	0.05	0.1	0.05	33.58
17	UPCKB-01/17	31	32	1	BHC&J	G4949-17	2.1	0.05	0.08	0.05	34.12
18	UPCKB-01/18	32	35	3	Ferruginous Phyllite	G4949-18	4.1	0.05	2.57	0.05	12.88
19	UPCKB-01/19	35	36	1	BHC&J	G4949-19	1.1	0.05	0.14	0.05	42.71
20	UPCKB-01/20	36	37	1	BHC&J	G4949-20	2	0.05	0.22	0.05	20.79
21	UPCKB-01/21	37	42	5	Ferruginous Phyllite	G4949-21	3.74	0.05	2.25	0.05	12.59
22	UPCKB-01/22	42	43	1	BHC&J	G4949-22	4.51	0.05	0.22	0.05	19.99

23	UPCKB-01/23	43	47	4	Ferruginous Phyllite	G4949-23	4.19	0.05	2.56	0.05	15.09
24	UPCKB-01/24	47	48	1	BHC&J	G4949-24	2.61	0.05	0.38	0.05	12.09
25	UPCKB-01/25	48	56	8	Ferruginous Phyllite	G4949-25	15.26	0.05	0.53	0.05	22.79
26	UPCKB-01/26	75	76	1	BHC&J	G4949-26	8.56	0.05	0.11	0.05	21.49
27	UPCKB-01/27	76	77	1	BHC&J	G4949-27	4.19	0.05	0.05	0.05	15.46
28	UPCKB-01/28	77	78	1	BHC&J	G4949-28	3.72	0.05	0.09	0.05	22.11
29	UPCKB-01/29	78	79	1	Ferruginous Phyllite	G4949-29	11.86	0.05	0.45	0.1	15.21
30	UPCKB-01/30	79	80	1	BHC&J	G4949-30	6.35	0.05	0.21	0.05	32.28
31	UPCKB-01/31	82	83	1	BHC&J	G4949-31	5.21	0.05	0.13	0.05	18.81
32	UPCKB-01/32	83	84	1	BHC&J	G4949-32	6.38	0.05	0.12	0.05	25.49
33	UPCKB-01/33	84	85	1	BHC&J	G4949-33	12.94	0.09	0.4	0.05	14.11
34	UPCKB-01/34	85	86	1	Ferruginous Phyllite	G4949-34	13.34	0.05	0.58	0.05	15.79
35	UPCKB-01/35	86	87	1	BHC&J	G4949-35	3.74	0.05	0.09	0.05	27.99
36	UPCKB-01/36	87	88	1	BHC&J	G4949-36	4.34	0.05	0.08	0.07	24.43
37	UPCKB-01/37	88	89	1	Ferruginous Phyllite	G4949-37	13.39	0.05	1.71	0.05	19.06
38	UPCKB-01/38	89	90	1	BHC&J	G4949-38	5.27	0.05	0.1	0.05	23.79
39	UPCKB-01/39	90	91	1	BHC&J	G4949-39	4.21	0.05	0.1	0.05	32.28
40	UPCKB-01/40	91	93	2	Ferruginous Phyllite	G4949-40	12.69	0.05	3.5	0.05	17.49
41	UPCKB-01/41	93	94	1	BHC&J	G4949-41	2.15	0.05	0.09	0.05	23.99
42	UPCKB-01/42	94	95	1	BHC&J	G4949-42	2.64	0.05	0.09	0.05	30.67
43	UPCKB-01/43	95	96	1	BHC&J	G4949-43	4.76	0.05	0.1	0.05	34.74

44	UPCKB-01/44	96	97	1	BHC&J	G4949-44	2.08	0.05	0.11	0.05	28.19
45	UPCKB-01/45	97	98	1	BHC&J	G4949-45	3.02	0.05	0.11	0.05	26.89
46	UPCKB-01/46	98	99	1	BHC&J	G4949-46	5.21	0.05	0.1	0.05	21.61
47	UPCKB-01/47	99	100	1	BHC&J	G4949-47	3.44	0.05	0.12	0.05	28.47
48	UPCKB-01/48	100	101	1	BHC&J	G4949-48	2.51	0.05	0.1	0.05	23.39
49	UPCKB-01/49	101	102	1	BHC&J	G4949-49	3.78	0.05	0.1	0.05	21.39
50	UPCKB-01/50	102	103	1	Tuff	G4949-50	7.25	0.05	0.09	0.05	4.19
51	UPCKB-01/51	103	104	1	BHC&J	G4949-51	3.85	0.05	0.08	0.05	23.73
52	UPCKB-01/52	104	105	1	BHC&J	G4949-52	2.64	0.05	0.11	0.05	31.28
53	UPCKB-01/53	105	108	3	Ferruginous Phyllite	G4949-53	4.53	0.05	2.07	0.05	19.09
54	UPCKB-01/54	108	109	1	BHC&J	G4949-54	1.3	0.05	0.08	0.05	23.19
55	UPCKB-01/55	109	111	2	Tuff	G4949-55	18.06	0.05	0.13	0.05	8.04
56	UPCKB-01/56	111	112	1	BHC&J	G4949-56	2.04	0.05	0.11	0.05	19.29
57	UPCKB-01/57	112	114	2	BHC&J	G4949-57	4.19	0.05	0.11	0.05	22.25
58	UPCKB-01/58	114	115	1	BHC&J	G4949-58	1.56	0.05	0.05	0.05	11.39
59	UPCKB-01/59	115	116	1	BHC&J	G4949-59	5.16	0.05	0.07	0.05	15.39
60	UPCKB-01/60	116	117	1	Ferruginous Phyllite	G4949-60	5.29	0.05	0.11	0.05	10.69
61	UPCKB-02/01	2	3	1	BHC&J	G4949-61	3.49	0.06	0.35	0.05	16.19
62	UPCKB-02/02	3	4	1	BHC&J	G4949-62	3.42	0.05	0.42	0.05	18.19
63	UPCKB-02/03	4	5	1	BHC&J	G4949-63	2.38	0.05	0.36	0.05	22.89
64	UPCKB-02/04	5	6	1	BHC&J	G4949-64	5.59	0.05	0.19	0.05	22.89

65	UPCKB-02/05	6	7	1	BHC&J	G4949-65	4.55	0.05	0.34	0.05	28.78
66	UPCKB-02/06	7	8	1	BHC&J	G4949-66	5.86	0.05	0.62	0.05	23.79
67	UPCKB-02/07	8	9.2	1.2	BHC&J	G4949-67	4.31	0.05	1.2	0.05	31.48
68	UPCKB-02/08	10	10.8	0.8	BHC&J	G4949-68	5.38	0.05	0.87	0.05	25.49
69	UPCKB-02/09	14	15	1.2	BHC&J	G4949-69	3.57	0.05	0.25	0.05	22.49
70	UPCKB-02/10	19	20	1	BHC&J	G4949-70	4.87	0.05	1.2	0.05	29.58
71	UPCKB-02/11	20	22	2	Ferruginous Phyllite	G4949-71	13.43	0.05	0.36	0.05	22.39
72	UPCKB-02/12	22	23	1	BHC&J	G4949-72	1.3	0.05	1.11	0.05	31.61
73	UPCKB-02/13	23	24	1	BHC&J	G4949-73	3.8	0.05	1.4	0.05	35.91
74	UPCKB-02/14	24	26	2	Ferruginous Phyllite	G4949-74	13.43	0.07	2.55	0.05	17.39
75	UPCKB-02/15	26	28	2	Ferruginous Phyllite	G4949-75	6.2	0.05	5.43	0.05	21.64
76	UPCKB-02/16	48	49	1	Ferruginous Phyllite	G4949-76	10.67	0.05	3.95	0.05	17.89
77	UPCKB-02/17	49	50	1	BHC&J	G4949-77	3.76	0.05	0.78	0.05	24.99
78	UPCKB-02/18	50	51	1	BHC&J	G4949-78	2.4	0.08	0.79	0.05	24.09
79	UPCKB-02/19	51	52	1	BHC&J	G4949-79	4	0.05	0.57	0.05	23.38
80	UPCKB-02/20	52	53	1	Ferruginous Phyllite	G4949-80	11.01	0.05	1.41	0.05	16.39
81	UPCKB-02/21	53	54	1	BHC&J	G4949-81	4.78	0.05	0.84	0.05	24.39
82	UPCKB-02/22	54	55	1	BHC&J	G4949-82	4.33	0.13	1.23	0.05	23.69
83	UPCKB-02/23	55	57.5	2.45	Ferruginous Phyllite	G4949-83	18.29	0.27	0.19	0.05	10.99
84	UPCKB-02/24	57	59.5	2	BHC&J	G4949-84	5.78	0.05	0.58	0.05	23.99
85	UPCKB-02/25	60	61	1	BHC&J	G4949-85	10.18	0.05	0.81	0.05	19.69

86	UPCKB-02/26	61	62	1	BHC&J	G4949-86	10.18	0.05	0.42	0.05	20.99
87	UPCKB-02/27	62	63	1	BHC&J	G4949-87	8.84	0.05	0.56	0.05	14.69
88	UPCKB-02/28	63	64	1	BHC&J	G4949-88	8.93	0.05	0.73	0.05	19.07
89	UPCKB-02/29	64	65	1	BHC&J	G4949-89	3.25	0.05	0.95	0.05	22.39
90	UPCKB-02/30	65	67	2	BHC&J with Phyllite	G4949-90	9.94	0.19	3.83	0.05	21.09
91	UPCKB-02/31	67	69	2	BHC&J with Phyllite	G4949-91	9.84	0.05	2.32	0.05	18.01
92	UPCKB-02/32	69	71	2	BHC&J with Phyllite	G4949-92	5.67	0.05	3.69	0.05	30.28
93	UPCKB-02/33	71	73	2	BHC&J with Phyllite	G4949-93	3.91	0.05	5.52	0.1	34.97
94	UPCKB-02/34	73	75	2	BHC&J with Phyllite	G4949-94	6.04	0.05	5.16	0.05	28.59
95	UPCKB-02/35	75	77	2	BHC&J with Phyllite	G4949-95	7.9	0.05	2.18	0.05	19.29
96	UPCKB-02/36	77	79	2	BHC&J with Phyllite	G4949-96	10.48	0.06	2.28	0.05	20.27
97	UPCKB-02/37	79	80	1	BHC&J with Phyllite	G4949-97	6.5	0.05	4.74	0.05	26.99
98	UPCKB-02/38	80	84	4	Ferruginous Phyllite	G4949-98	14.75	0.1	0.3	0.05	12.96
99	UPCKB-02/39	84	89	5	Ferruginous Phyllite	G4949-99	9.63	0.05	2.18	0.05	24.3
100	UPCKB-03/01	1	3	2	BMC&J	G4931-1	4.98	0.05	0.41	0.05	32.87
101	UPCKB-03/02	3	4	1	BMC&J	G4931-2	5.04	0.05	0.64	0.05	33.16
102	UPCKB-03/03	4	5	1	BMC&J	G4931-3	3.58	0.05	1.23	0.05	34.66

103	UPCKB-03/04	5	6	1	BMC&J	G4931-4	5.94	0.05	3.05	0.05	26.3
104	UPCKB-03/05	6	7	1	BMC&J	G4931-5	5.68	0.05	2.99	0.05	26.62
105	UPCKB-03/06	7	8	1	BMC&J	G4931-6	5.64	0.05	3.09	0.05	27.88
106	UPCKB-03/07	8	9	1	BMC&J	G4931-7	4.43	0.05	1.45	0.05	27.83
107	UPCKB-03/08	9	10	1	BMC&J	G4931-8	3.77	0.05	1.25	0.05	33.7
108	UPCKB-03/09	10	12	2	BMC&J	G4931-9	3.09	0.05	0.71	0.05	33.22
109	UPCKB-03/10	12	14	2	BMC&J	G4931-10	4.07	0.05	0.64	0.05	39.02
110	UPCKB-03/11	14	15	1	BMC&J	G4931-11	3.68	0.05	1.18	0.05	36.51
111	UPCKB-03/12	15	16	1	BMC&J	G4931-12	0.55	0.05	0.07	0.05	43.17
112	UPCKB-03/13	16	18	2	BMC&J	G4931-13	3.34	0.05	0.57	0.05	30.43
113	UPCKB-03/14	18	19	1	BMC&J	G4931-14	2.33	0.06	0.82	0.05	36.09
114	UPCKB-03/15	19	20	1	BMC&J	G4931-15	1.99	0.05	0.51	0.05	43.61
115	UPCKB-03/16	20	21	1	BMC&J	G4931-16	1.58	0.05	0.17	0.05	49.01
116	UPCKB-03/17	21	22	1	BMC&J	G4931-17	3.37	0.05	0.87	0.05	33.8
117	UPCKB-03/18	22	23	1	BMC&J	G4931-18	3	0.05	0.85	0.05	38.02
118	UPCKB-03/19	23	24	1	BMC&J	G4931-19	2.47	0.05	0.78	0.05	43.33
119	UPCKB-03/20	24	25	1	BMC&J	G4931-20	2.6	0.05	0.86	0.05	42.53
120	UPCKB-03/21	25	26	1	BMC&J	G4931-21	4.68	0.05	0.5	0.05	33.44
121	UPCKB-03/22	26	27	1	BMC&J	G4931-22	8	0.05	0.63	0.05	28.82
122	UPCKB-03/23	27	28	1	BMC&J	G4931-23	6.36	0.05	0.73	0.05	26.72
123	UPCKB-03/24	28	29	1	BMC&J	G4931-24	3.62	0.05	1.04	0.05	24.01

124	UPCKB-03/25	29	30	1	BMC&J	G4931-25	5.11	0.05	0.96	0.05	29.3
125	UPCKB-03/26	30	31	1	BMC&J	G4931-26	7.15	0.07	2.49	0.05	24.41
126	UPCKB-03/27	31	32	1	BMC&J	G4931-27	7.06	0.05	2.29	0.05	30.71
127	UPCKB-03/28	32	33	1	BMC&J	G4931-28	5.19	0.05	1.62	0.05	33.05
128	UPCKB-03/29	33	34	1	BMC&J	G4931-29	9.06	0.05	1.51	0.05	25.42
129	UPCKB-03/30	34	36	2	BHC&J	G4931-30	11.21	0.05	0.36	0.05	18.12
130	UPCKB-03/31	36	38	2	BHC&J	G4931-31	9.25	0.05	0.48	0.05	18.74
131	UPCKB-03/32	56	57	1	BHC&J	G4931-32	9	0.07	0.42	0.05	15.92
132	UPCKB-03/33	57	58	1	BHC&J	G4931-33	11.16	0.08	0.95	0.05	14.43
133	UPCKB-03/34	58	59	1	BHC&J	G4931-34	14.24	0.15	0.43	0.05	16.17
134	UPCKB-03/35	59	60	1	BHC&J	G4931-35	13.82	0.09	0.52	0.05	18.06
135	UPCKB-03/36	60	61	1	BHC&J	G4931-36	13.78	0.08	0.58	0.05	17.26
136	UPCKB-03/37	61	62	1	BHC&J	G4931-37	13.25	0.09	1.51	0.05	18.75
137	UPCKB-03/38	62	63	1	BHC&J	G4931-38	10.63	0.06	1.31	0.05	26.36
138	UPCKB-03/39	63	64	1	BHC&J	G4931-39	11.33	0.07	0.7	0.05	19.05
139	UPCKB-03/40	64	65	1	BHC&J	G4931-40	11.01	0.08	0.77	0.05	20.86
140	UPCKB-03/41	65	66	1	BHC&J	G4931-41	13.37	0.08	0.51	0.05	14.16
141	UPCKB-03/42	66	67	1	BHC&J	G4931-42	11.27	0.07	0.4	0.05	16.94
142	UPCKB-03/43	67	68	1	BHC&J	G4931-43	13.61	0.06	0.46	0.05	16.23
143	UPCKB-03/44	79	80	1	BHC&J	G4931-44	5.62	0.09	0.05	0.38	28.95
144	UPCKB-03/45	80	81	1	BHC&J	G4931-45	4.09	0.05	2.47	0.05	30.44

145	UPCKB-03/46	81	82	1	BHC&J	G4931-46	4.15	0.05	0.76	0.05	19.64
146	UPCKB-03/47	82	83	1	BHC&J	G4931-47	9.87	0.05	0.8	0.05	18.62
147	UPCKB-03/48	92	93	1	BHC&J	G4931-48	10.65	0.05	0.76	0.05	18.42
148	UPCKB-03/49	93	94	1	BHC&J	G4931-49	9.48	0.05	1.23	0.05	22.63
149	UPCKB-03/50	94	95	1	BHC&J	G4931-50	6.85	0.06	0.39	0.05	16.24
150	UPCKB-03/51	95	96	1	BHC&J	G4931-51	8.27	0.05	1.09	0.05	24.02
151	UPCKB-03/52	96	97	1	BHC&J	G4931-52	8.93	0.05	1.28	0.05	25.94
152	UPCKB-04/01	0	2	2	Ferruginous Phyllite	G4949-100	10.07	0.1	2.88	0.05	16.73
153	UPCKB-04/02	2	4	2	Ferruginous Phyllite	G4949-101	11.07	0.07	2.76	0.05	17.02
154	UPCKB-04/03	20	20	0.5	BMC&J	G4949-102	2.51	0.05	2.22	0.05	18.37
155	UPCKB-04/04	20	23	3	Ferruginous Phyllite	G4949-103	17	0.08	0.11	0.05	11.99
156	UPCKB-04/05	23	24	1	BMC&J	G4949-104	3.14	0.05	2.25	0.05	33.28
157	UPCKB-04/06	24	25	1	BMC&J	G4949-105	2.02	0.05	6.46	0.05	25.77
158	UPCKB-04/07	25	26	1	BMC&J	G4949-106	0.8	0.05	4.49	0.05	35.6
159	UPCKB-04/08	26	27	1	BMC&J	G4949-107	0.46	0.05	9.18	0.05	33.58
160	UPCKB-04/09	27	28	1	BMC&J	G4949-108	3.21	0.05	3.44	0.05	32.08
161	UPCKB-04/10	28	29	1	BMC&J	G4949-109	3	0.05	3.57	0.05	34.67
162	UPCKB-04/11	29	30	1	BMC&J	G4949-110	3.48	0.05	3.65	0.05	32.68
163	UPCKB-04/12	46	47	1	BMC&J	G4949-111	1.74	0.05	3.67	0.05	38.6
164	UPCKB-04/13	47	48	1	BMC&J	G4949-112	2.58	0.07	2.57	0.05	35.68
165	UPCKB-04/14	48	49	1	BMC&J	G4949-113	2.95	0.11	2.87	0.05	34.78

166	UPCKB-04/15	49	50	1	BMC&J	G4949-114	2.06	0.17	2.63	0.05	35.88
167	UPCKB-04/16	50	51	1	BMC&J	G4949-115	3.12	0.05	4.45	0.05	27.75
168	UPCKB-04/17	51	52	1	BMC&J	G4949-116	1.91	0.05	0.96	0.05	25.11
169	UPCKB-04/18	52	53	1	BMC&J	G4949-117	2.21	0.05	2.01	0.05	34.26
170	UPCKB-04/19	53	54	1	BMC&J	G4949-118	1.8	0.05	2.52	0.05	35.08
171	UPCKB-04/20	54	55	1	BMC&J	G4949-119	2.13	0.05	2.13	0.05	32.48
172	UPCKB-04/21	55	56	1	BMC&J	G4949-120	4.63	0.05	1.47	0.05	30.23
173	UPCKB-04/22	56	57	1	BMC&J	G4949-121	3.06	0.05	1.57	0.05	33.48
174	UPCKB-04/23	57	58	1	BMC&J	G4949-122	4.17	0.05	1.71	0.05	26.99
175	UPCKB-04/24	58	59	1	BMC&J	G4949-123	4.38	0.05	1.25	0.05	25.49
176	UPCKB-04/25	59	60	1	BMC&J	G4949-124	6.71	0.05	1.99	0.05	23.59
177	UPCKB-04/26	60	61	1	BMC&J	G4949-125	5.01	0.05	1.4	0.05	32.21
178	UPCKB-04/27	61	62	1	BMC&J	G4949-126	2.23	0.05	2.03	0.05	33.73
179	UPCKB-04/28	62	63	1	BMC&J	G4949-127	4.12	0.05	1.43	0.05	32.98
180	UPCKB-04/29	63	64	1	BMC&J	G4949-128	3.72	0.05	1.36	0.05	33.57
181	UPCKB-04/30	64	65	1	BMC&J	G4949-129	4.17	0.05	1.04	0.05	23.88
182	UPCKB-04/31	65	66	1	BMC&J	G4949-130	4.82	0.05	1.06	0.05	22.79
183	UPCKB-04/32	66	67	1	BMC&J	G4949-131	6.2	0.05	1.76	0.05	21.49
184	UPCKB-04/33	67	68	1	BMC&J	G4949-132	5.14	0.05	1.45	0.05	22.49
185	UPCKB-04/34	68	69	1	BMC&J	G4949-133	2.38	0.05	0.99	0.05	26.09
186	UPCKB-04/35	69	70	1	BMC&J	G4949-134	5.1	0.05	1.3	0.05	24.69

187	UPCKB-04/36	70	72	2	Ferruginous Phyllite	G4949-135	11.73	0.05	2.5	0.05	13.09
188	UPCKB-04/37	72	73	1	BMC&J	G4949-136	3.27	0.05	1.06	0.05	22.38
189	UPCKB-04/38	73	74	1	BMC&J	G4949-137	4.23	0.05	1.26	0.05	26.59
190	UPCKB-04/39	74	75	1	BMC&J	G4949-138	8.01	0.05	1.26	0.05	23.99
191	UPCKB-04/40	75	76	1	BMC&J	G4949-139	7.63	0.05	1.54	0.05	21.96
192	UPCKB-04/41	76	77	1	BMC&J	G4949-140	6.31	0.05	1.4	0.05	21.29
193	UPCKB-04/42	77	80	3	Ferruginous Phyllite	G4949-141	12.35	0.24	2.06	0.05	19.39
194	UPCKB-05/01	9	10	1	BHC&J	G4949-142	0.93	0.05	0.11	0.05	24.89
195	UPCKB-05/02	21	22	1	BHC&J	G4949-143	1.32	0.05	0.2	0.05	7.59
196	UPCKB-05/03	22	23	1	BHC&J	G4949-144	1.29	0.05	0.19	0.06	10.51
197	UPCKB-05/04	23	24	1	BHC&J	G4949-145	33.09	0.05	0.05	0.25	39.88
198	UPCKB-05/05	25	26	1	BHC&J	G4949-146	4.04	0.05	5.34	0.05	12.09
199	UPCKB-05/06	26	27	1	BHC&J	G4949-147	5.19	0.06	10.39	0.05	11.09
200	UPCKB-05/07	27	28	1	BHC&J	G4949-148	4.44	0.05	8.18	0.05	14.79
201	UPCKB-05/08	28	29	1	BHC&J	G4949-149	3.97	0.05	7.55	0.05	21.89
202	UPCKB-05/09	29	30	1	BHC&J	G4949-150	3.29	0.05	4.76	0.05	15.37
203	UPCKB-05/10	30	31	1	BHC&J	G4949-151	3.19	0.05	4.57	0.06	15.49
204	UPCKB-05/11	31	32	1	BHC&J	G4949-152	2.93	0.05	2.6	0.05	18.53
205	UPCKB-05/12	32	33	1	BHC&J	G4949-153	3.36	0.05	0.85	0.05	19.69
206	UPCKB-05/13	33	34	1	BHC&J	G4949-154	1.67	0.05	0.82	0.05	34.58
207	UPCKB-05/14	34	35	1	BHC&J	G4949-155	5.36	0.05	0.07	0.05	54.33

208	UPCKB-05/15	35	36	1	BHC&J	G4949-156	0.54	0.05	0.1	0.05	19.19
209	UPCKB-05/16	36	37	1	BHC&J	G4949-157	3.44	0.05	6.86	0.05	16.39
210	UPCKB-05/17	37	38	1	BHC&J	G4949-158	0.72	0.05	0.13	0.05	40.98
211	UPCKB-05/18	38	39	1	BHC&J	G4949-159	2.38	0.05	4.78	0.05	32.19
212	UPCKB-05/19	39	40	1	BHC&J	G4949-160	3.65	0.05	5.92	0.05	12.39
213	UPCKB-05/20	40	41	1	BHC&J	G4949-161	3.29	0.05	6.44	0.05	12.29
214	UPCKB-05/21	41	42	1	BHC&J	G4949-162	2.63	0.05	5.02	0.05	13.19
215	UPCKB-05/22	42	43	1	BHC&J	G4949-163	3.21	0.05	6.27	0.05	23.57
216	UPCKB-05/23	43	44	1	BHC&J	G4949-164	4.57	0.05	8.2	0.05	21.29
217	UPCKB-05/24	44	45	1	BHC&J	G4949-165	6.63	0.05	6.79	0.05	21.51
218	UPCKB-05/25	45	46	1	BHC&J	G4949-166	5.33	0.05	7	0.05	15.29
219	UPCKB-05/26	46	47	1	BHC&J	G4949-167	5.36	0.05	8.7	0.05	20.89
220	UPCKB-05/27	47	48	1	BHC&J	G4949-168	6.78	0.05	8.81	0.05	22.36
221	UPCKB-05/28	48	49	1	BHC&J	G4949-169	5.38	0.05	8.14	0.05	20.29
222	UPCKB-05/29	49	50	1	BHC&J	G4949-170	5.65	0.05	8.32	0.05	17.79
223	UPCKB-05/30	50	51	1	BMC&J	G4949-171	3.91	0.05	3.97	0.05	12.39
224	UPCKB-05/31	51	52	1	BMC&J	G4949-172	4.74	0.05	5.3	0.05	33.28
225	UPCKB-05/32	52	53	1	BMC&J	G4949-173	6.99	0.05	5.48	0.05	20.19
226	UPCKB-05/33	53	54	1	BMC&J	G4949-174	2.36	0.05	4.42	0.05	26.45
227	UPCKB-05/34	54	55	1	BMC&J	G4949-175	0.91	0.05	5.78	0.05	35.78
228	UPCKB-05/35	55	56	1	BMC&J	G4949-176	0.91	0.05	5.42	0.05	35.15

229	UPCKB-05/36	56	57	1	BMC&J	G4949-177	1	0.05	5.27	0.05	40.21
230	UPCKB-05/37	57	58	1	BMC&J	G4949-178	1.27	0.05	5.4	0.05	35.38
231	UPCKB-05/38	58	59	1	BMC&J	G4949-179	1.03	0.05	5.02	0.05	33.48
232	UPCKB-06/01	0	2.5	2.5	BHC&J	G4949-180	7.97	0.07	1.03	0.05	35.68
233	UPCKB-06/02	8	9	1	BMC&J	G4949-181	1.24	0.05	4.16	0.05	20.79
234	UPCKB-06/03	15	16	1	BMC&J	G4949-182	1.26	0.05	2.18	0.05	36.68
235	UPCKB-06/04	16	17	1	BMC&J	G4949-183	0.9	0.05	2.14	0.05	41.48
236	UPCKB-06/05	17	18	1	BMC&J	G4949-184	1.45	0.05	2.42	0.05	38.78
237	UPCKB-06/06	18	19	1	BMC&J	G4949-185	2.13	0.05	1.97	0.05	35.78
238	UPCKB-06/07	19	20	1	BMC&J	G4949-186	1.95	0.05	1.65	0.05	35.98
239	UPCKB-06/08	20	21	1	BMC&J	G4949-187	1.33	0.05	1.58	0.05	39.88
240	UPCKB-06/09	21	22	1	BMC&J	G4949-188	0.46	0.05	0.68	0.05	12.79
241	UPCKB-06/10	22	23	1	BMC&J	G4949-189	0.73	0.05	2.25	0.07	22.79
242	UPCKB-06/11	23	24	1	BMC&J	G4949-190	0.29	0.05	1.48	0.05	23.69
243	UPCKB-06/12	24	25	1	BMC&J	G4949-191	0.43	0.05	1.59	0.07	24.69
244	UPCKB-06/13	25	26	1	BMC&J	G4949-192	1.46	0.05	1.37	0.05	19.19
245	UPCKB-06/14	26	27	1	BMC&J	G4949-193	0.57	0.05	1.41	0.08	22.42
246	UPCKB-06/15	27	28	1	BMC&J	G4949-194	0.45	0.05	0.86	0.06	19.19
247	UPCKB-06/16	28	29	1	BMC&J	G4949-195	0.78	0.05	1.16	0.06	23.89
248	UPCKB-06/17	29	30	1	BMC&J	G4949-196	4.95	0.05	1.38	0.05	33.88

249	UPJTB-01/01	1	2	1	BQ with Iron Matrix	G4949-197	1.62	0.05	0.1	0.09	7.88
250	UPJTB-01/02	2	3	1	BQ with Iron Matrix	G4949-198	1.1	0.05	0.11	0.05	13.93
251	UPJTB-01/03	3	4	1	BQ with Iron Matrix	G4949-199	0.76	0.05	0.09	0.12	11.02
252	UPJTB-01/04	4	5	1	BQ with Iron Matrix	G4949-200	0.54	0.05	0.07	0.09	10.75
253	UPJTB-01/05	5	6	1	BQ with Iron Matrix	G4949-201	0.77	0.05	0.59	0.09	11.6
254	UPJTB-01/06	6	7	1	BQ with Iron Matrix	G4949-202	0.91	0.05	0.93	0.05	10.07
255	UPJTB-01/07	7	8	1	BQ with Iron Matrix	G4949-203	0.79	0.05	1.11	0.09	12.03
256	UPJTB-01/08	8	9	1	BQ with Iron Matrix	G4949-204	0.85	0.05	0.2	0.2	7.34
257	UPJTB-01/09	9	10	1	BQ with Iron Matrix	G4949-205	0.79	0.05	0.24	0.08	10.5
258	UPJTB-01/10	10	11	1	BQ with Iron Matrix	G4949-206	0.64	0.05	0.22	0.07	10.75
259	UPJTB-01/11	11	12	1	BQ with Iron Matrix	G4949-207	0.81	0.05	0.29	0.1	11.35
260	UPJTB-01/12	12	13	1	BQ with Iron Matrix	G4949-208	0.67	0.05	0.25	0.07	12.99
261	UPJTB-01/13	13	14	1	BQ with Iron Matrix	G4949-209	1.16	0.05	1.02	0.1	9.88
262	UPJTB-01/14	14	15	1	BQ with Iron Matrix	G4949-210	0.93	0.05	1.33	0.05	10.91

263	UPJTB-01/15	15	16	1	BQ with Iron Matrix	G4949-211	0.64	0.05	1.37	0.07	10.25
264	UPJTB-01/16	16	17	1	BQ with Iron Matrix	G4949-212	1.13	0.05	0.22	0.08	19.99
265	UPJTB-01/17	17	18	1	BQ with Iron Matrix	G4949-213	1.18	0.05	0.18	0.09	38.28
266	UPJTB-01/18	18	19	1	BQ with Iron Matrix	G4949-214	2.46	0.05	0.23	0.1	34.18
267	UPJTB-01/19	19	20	1	Massive Iron Ore	G4949-215	1.56	0.05	0.23	0.18	34.28
268	UPJTB-01/20	20	21	1	Massive Iron Ore	G4949-216	2.55	0.05	0.26	0.15	47.17
269	UPJTB-01/21	21	22	1	Massive Iron Ore	G4949-217	3.37	0.1	0.33	0.11	48.31
270	UPJTB-01/22	22	23	1	Massive Iron Ore	G4949-218	0.66	0.05	0.2	0.13	57.18
271	UPJTB-01/23	23	24	1	Massive Iron Ore	G4949-219	1.37	0.05	0.28	0.08	56
272	UPJTB-01/24	24	25	1	Massive Iron Ore	G4949-220	4.91	0.08	0.26	0.08	47.52
273	UPJTB-01/25	25	30	5	Tuff with Phyllite	G4949-221	4.12	0.05	0.35	0.15	42.38
274	UPJTB-01/26	25	30	5	Tuff with Phyllite	G4949-222	9.01	0.05	0.97	0.24	31.58
275	UPJTB-01/27	30	35	5	Tuff with Phyllite	G4949-223	13.47	0.05	1.18	0.28	28.98
276	UPJTB-01/28	37	38	1	Massive Iron Ore	G4949-224	7.84	0.05	0.18	0.17	40.78
277	UPJTB-01/29	38	39	1	Massive Iron Ore	G4949-225	5.16	0.05	0.18	0.15	48.27
278	UPJTB-01/30	39	40	1	Massive Iron Ore	G4949-226	5.44	0.05	0.14	0.14	38.78
279	UPJTB-01/31	40	41	1	Massive Iron Ore	G4949-227	6.46	0.05	0.48	0.12	48.6
280	UPJTB-01/32	41	42	1	Massive Iron Ore	G4949-228	4.55	0.15	0.15	0.09	46.57
281	UPJTB-01/33	42	46	4	Tuff	G4949-229	11.83	0.05	0.14	0.34	13.24

282	UPJTB-01/34	46	50	4	Tuff	G4949-230	14.21	0.05	0.1	0.15	15.49
283	UPJTB-02/01	6	8	2	Felsic Tuff with Hematite	G4949-231	19.46	0.21	0.27	0.05	21.53
284	UPJTB-02/02	8	10	2	Felsic Tuff with Hematite	G4949-232	16.94	0.05	1.68	0.07	27.29
285	UPJTB-02/03	10	12	2	Felsic Tuff with Hematite	G4949-233	14.65	0.3	0.59	0.06	28.69
286	UPJTB-02/04	12	14	2	Felsic Tuff with Hematite	G4949-234	15.8	0.24	0.56	0.05	28.69
287	UPJTB-02/05	22	22.5	0.5	Massive Iron ore	G4949-235	7.25	0.05	0.22	0.08	43.87
288	UPJTB-02/06	23	24	1.5	Tuff with Hematite	G4949-236	11.54	0.05	0.8	0.1	34.18
289	UPJTB-02/07	24	25	1	Tuff with Hematite	G4949-237	25.31	0.51	0.27	0.05	20.79
290	UPJTB-02/08	33	35	2	Massive Iron ore	G4949-238	20.97	0.37	0.11	0.09	18.69
291	UPJTB-02/09	35	36	1	Massive Iron ore	G4949-239	5.61	0.05	0.11	0.69	33.38
292	UPJTB-02/10	36	37	1	Massive Iron ore	G4949-240	6.16	0.05	0.11	0.64	34.38
293	UPJTB-02/11	37	38	1	Massive Iron ore	G4949-241	5.7	0.06	0.05	0.58	23.95
294	UPJTB-02/12	38	39	1	Massive Iron ore	G4949-242	8.71	0.05	0.1	0.41	35.68
295	UPJTB-02/13	39	40	1	Massive Iron ore	G4949-243	5.1	0.05	0.08	0.65	33.08
296	UPJTB-02/14	40	41	1	Massive Iron ore	G4949-244	9.97	0.22	0.08	0.22	32.57
297	UPJTB-02/15	41	43	2	Felsic Tuff with Hematite	G4949-245	13.38	0.17	0.48	0.13	27.99
298	UPJTB-02/16	43	45	2	Felsic Tuff with Hematite	G4949-246	17.59	0.43	0.48	0.21	23.59
299	UPJTB-02/17	45	46	1	Massive Iron ore	G4949-247	8.22	0.15	0.08	0.85	23.29

300	UPJTB-02/18	46	46.4	0.44	Massive Iron ore	G4949-248	9.12	0.2	0.06	0.64	22.99
301	UPJTB-02/19	46	48.5	2.06	Felsic Tuff with Hematite	G4949-249	18.49	0.17	0.3	0.23	17.99
302	UPJTB-02/20	49	51.7	2.68	Felsic Tuff with Hematite	G4949-250	18.1	0.18	0.15	0.24	20.59
303	UPJTB-02/21	52	52.5	0.82	Felsic Tuff with Hematite	G4949-251	16.21	0.42	0.11	0.18	24.69
304	UPJTB-02/22	53	53.1	0.64	Felsic Tuff with Hematite	G4949-252	17.64	0.05	0.13	0.19	21.89
305	UPJTB-02/23	56	60	4	Felsic Tuff with Hematite	G4949-253	14.26	0.09	0.11	0.14	25.19
306	UPJTB-02/24	73	74	1.5	Felsic Tuff with Hematite	G4949-254	20.07	0.34	0.1	0.05	20.26
307	UPJTB-02/25	75	76.5	1.5	Felsic Tuff with Hematite	G4949-255	10.5	0.05	0.06	0.28	30.35
308	UPJTB-02/26	77	78	1.5	Felsic Tuff with Hematite	G4949-256	12.45	0.05	0.11	0.24	28.98
309	UPJTB-02/27	78	80	2	Felsic Tuff	G4949-257	14.15	0.09	0.11	0.21	19.59
						METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105
						DL	0.05	0.05	0.05	0.05	0.05
						UNITS	%	%	%	%	%
S.no.	Sample Id	From(m)	To(m)	Sample Length(m)	Lithology	Lab ID	Feo	Fe3O4	Fe2O3	K2O	MgO
1	UPCKB-01/01	10	1	1	BHC&J	G4949-1	0.18	0.57	45.28	0.05	0.09
2	UPCKB-01/02	11	12	1	BHC&J	G4949-2	0.18	0.57	30.13	0.05	0.05

3	UPCKB-01/03	12	13	1	BHC&J	G4949-3	0.1	0.28	40.13	0.05	0.05
4	UPCKB-01/04	13	14	1	BHC&J	G4949-4	0.1	0.29	35.43	0.05	0.11
5	UPCKB-01/05	14	15	1	BHC&J	G4949-5	0.27	0.86	22.26	0.05	0.08
6	UPCKB-01/06	15	17.8	2.8	Ferruginous Phyllite	G4949-6	0.72	2.31	12.76	0.06	0.21
7	UPCKB-01/07	18	20	1.82	Ferruginous Phyllite	G4949-7	0.45	1.44	11.66	0.05	0.14
8	UPCKB-01/08	20	22	2	Ferruginous Phyllite	G4949-8	0.62	2.01	10.72	0.07	0.27
9	UPCKB-01/09	22	23	1	BHC&J	G4949-9	0.18	0.57	25.27	0.05	0.05
10	UPCKB-01/10	23	24	1	BHC&J	G4949-10	0.45	1.44	37.95	0.05	0.05
11	UPCKB-01/11	24	25	1	BHC&J	G4949-11	0.1	0.28	48.58	0.05	0.05
12	UPCKB-01/12	25	26	1	BHC&J	G4949-12	0.45	1.44	52.1	0.05	0.12
13	UPCKB-01/13	26	28	2	Ferruginous Phyllite	G4949-13	0.54	1.73	9.11	0.09	0.45
14	UPCKB-01/14	28	29	1	BHC&J	G4949-14	0.18	0.57	38.42	0.05	0.05
15	UPCKB-01/15	29	30	1	BHC&J	G4949-15	0.36	1.15	34.96	0.05	0.05
16	UPCKB-01/16	30	31	1	BHC&J	G4949-16	0.18	0.58	47.42	0.05	0.05
17	UPCKB-01/17	31	32	1	BHC&J	G4949-17	0.27	0.86	47.89	0.05	0.05
18	UPCKB-01/18	32	35	3	Ferruginous Phyllite	G4949-18	1.16	3.75	14.54	0.09	0.4
19	UPCKB-01/19	35	36	1	BHC&J	G4949-19	0.54	1.72	59.28	0.05	0.05
20	UPCKB-01/20	36	37	1	BHC&J	G4949-20	0.89	2.88	26.75	0.05	0.1
21	UPCKB-01/21	37	42	5	Ferruginous Phyllite	G4949-21	1.43	4.62	13.23	0.08	0.4
22	UPCKB-01/22	42	43	1	BHC&J	G4949-22	0.54	1.73	26.79	0.05	0.11
23	UPCKB-01/23	43	47	4	Ferruginous Phyllite	G4949-23	2.42	7.79	13.52	0.09	0.52

24	UPCKB-01/24	47	48	1	BHC&J	G4949-24	1.25	4.03	13.12	0.05	0.39
25	UPCKB-01/25	48	56	8	Ferruginous Phyllite	G4949-25	2.24	7.22	25.1	0.08	4.03
26	UPCKB-01/26	75	76	1	BHC&J	G4949-26	0.27	0.86	29.83	0.05	0.05
27	UPCKB-01/27	76	77	1	BHC&J	G4949-27	0.27	0.86	21.21	0.05	0.05
28	UPCKB-01/28	77	78	1	BHC&J	G4949-28	0.18	0.57	31.02	0.05	0.08
29	UPCKB-01/29	78	79	1	Ferruginous Phyllite	G4949-29	3.22	10.38	11	0.05	3.43
30	UPCKB-01/30	79	80	1	BHC&J	G4949-30	0.27	0.86	45.26	0.05	0.18
31	UPCKB-01/31	82	83	1	BHC&J	G4949-31	0.18	0.57	26.3	0.05	0.1
32	UPCKB-01/32	83	84	1	BHC&J	G4949-32	0.1	0.29	36.14	0.05	0.07
33	UPCKB-01/33	84	85	1	BHC&J	G4949-33	0.18	0.57	19.59	0.05	0.4
34	UPCKB-01/34	85	86	1	Ferruginous Phyllite	G4949-34	0.36	1.15	21.38	0.05	0.66
35	UPCKB-01/35	86	87	1	BHC&J	G4949-35	0.18	0.57	39.42	0.05	0.05
36	UPCKB-01/36	87	88	1	BHC&J	G4949-36	0.1	0.29	34.63	0.05	0.05
37	UPCKB-01/37	88	89	1	Ferruginous Phyllite	G4949-37	1.97	6.35	20.68	0.28	3.35
38	UPCKB-01/38	89	90	1	BHC&J	G4949-38	0.1	0.28	33.72	0.05	0.05
39	UPCKB-01/39	90	91	1	BHC&J	G4949-39	0.1	0.1	46.16	0.05	0.07
40	UPCKB-01/40	91	93	2	Ferruginous Phyllite	G4949-40	2.51	8.08	16.65	0.6	2.85
41	UPCKB-01/41	93	94	1	BHC&J	G4949-41	0.27	0.86	33.4	0.05	0.05
42	UPCKB-01/42	94	95	1	BHC&J	G4949-42	0.27	0.86	42.97	0.05	0.05
43	UPCKB-01/43	95	96	1	BHC&J	G4949-43	0.1	0.1	49.67	0.05	0.05
44	UPCKB-01/44	96	97	1	BHC&J	G4949-44	0.54	1.73	38.51	0.05	0.05

45	UPCKB-01/45	97	98	1	BHC&J	G4949-45	0.71	2.3	36.05	0.05	0.06
46	UPCKB-01/46	98	99	1	BHC&J	G4949-46	0.18	0.58	30.3	0.05	0.05
47	UPCKB-01/47	99	100	1	BHC&J	G4949-47	0.1	0.1	40.71	0.05	0.05
48	UPCKB-01/48	100	101	1	BHC&J	G4949-48	0.36	1.15	32.25	0.05	0.05
49	UPCKB-01/49	101	102	1	BHC&J	G4949-49	0.18	0.57	29.99	0.05	0.05
50	UPCKB-01/50	102	103	1	Tuff	G4949-50	0.1	0.28	5.69	0.05	0.05
51	UPCKB-01/51	103	104	1	BHC&J	G4949-51	0.1	0.29	33.63	0.05	0.05
52	UPCKB-01/52	104	105	1	BHC&J	G4949-52	0.1	0.28	44.43	0.05	0.05
53	UPCKB-01/53	105	108	3	Ferruginous Phyllite	G4949-53	0.98	3.17	24.02	0.08	0.46
54	UPCKB-01/54	108	109	1	BHC&J	G4949-54	0.36	1.15	31.96	0.05	0.05
55	UPCKB-01/55	109	111	2	Tuff	G4949-55	0.1	0.29	11.19	0.05	0.05
56	UPCKB-01/56	111	112	1	BHC&J	G4949-56	0.36	1.15	26.39	0.05	0.05
57	UPCKB-01/57	112	114	2	BHC&J	G4949-57	0.1	0.1	31.81	0.05	0.05
58	UPCKB-01/58	114	115	1	BHC&J	G4949-58	0.54	1.73	14.5	0.05	0.05
59	UPCKB-01/59	115	116	1	BHC&J	G4949-59	0.1	0.1	22.01	0.05	0.05
60	UPCKB-01/60	116	117	1	Ferruginous Phyllite	G4949-60	0.1	0.1	15.29	0.05	0.05
61	UPCKB-02/01	2	3	1	BHC&J	G4949-61	0.1	0.1	23.15	0.14	0.34
62	UPCKB-02/02	3	4	1	BHC&J	G4949-62	0.1	0.1	26.01	0.13	0.41
63	UPCKB-02/03	4	5	1	BHC&J	G4949-63	0.27	0.86	31.83	0.05	0.07
64	UPCKB-02/04	5	6	1	BHC&J	G4949-64	0.1	0.28	32.43	0.15	0.24
65	UPCKB-02/05	6	7	1	BHC&J	G4949-65	0.72	2.31	38.76	0.05	0.14

66	UPCKB-02/06	7	8	1	BHC&J	G4949-66	0.18	0.57	33.42	0.16	0.49
67	UPCKB-02/07	8	9.2	1.2	BHC&J	G4949-67	0.1	0.1	45.01	0.14	0.66
68	UPCKB-02/08	10	10.8	0.8	BHC&J	G4949-68	0.1	0.1	36.44	0.27	1.02
69	UPCKB-02/09	14	15	1.2	BHC&J	G4949-69	0.1	0.1	32.15	0.06	0.28
70	UPCKB-02/10	19	20	1	BHC&J	G4949-70	0.1	0.1	42.3	0.16	0.73
71	UPCKB-02/11	20	22	2	Ferruginous Phyllite	G4949-71	1.52	4.9	26.93	0.63	2.65
72	UPCKB-02/12	22	23	1	BHC&J	G4949-72	0.1	0.1	45.2	0.05	0.14
73	UPCKB-02/13	23	24	1	BHC&J	G4949-73	0.1	0.1	51.34	0.05	0.21
74	UPCKB-02/14	24	26	2	Ferruginous Phyllite	G4949-74	1.79	5.76	18.9	0.97	2.72
75	UPCKB-02/15	26	28	2	Ferruginous Phyllite	G4949-75	0.1	0.29	30.64	0.29	1.23
76	UPCKB-02/16	48	49	1	Ferruginous Phyllite	G4949-76	0.54	1.73	23.79	0.24	1.72
77	UPCKB-02/17	49	50	1	BHC&J	G4949-77	0.18	0.57	35.13	0.15	0.6
78	UPCKB-02/18	50	51	1	BHC&J	G4949-78	0.1	0.1	34.44	0.1	0.37
79	UPCKB-02/19	51	52	1	BHC&J	G4949-79	0.1	0.1	33.42	0.1	0.64
80	UPCKB-02/20	52	53	1	Ferruginous Phyllite	G4949-80	0.36	1.15	22.25	0.23	0.37
81	UPCKB-02/21	53	54	1	BHC&J	G4949-81	0.1	0.1	34.87	0.1	0.54
82	UPCKB-02/22	54	55	1	BHC&J	G4949-82	1.16	3.74	30	0.14	0.89
83	UPCKB-02/23	55	57.5	2.45	Ferruginous Phyllite	G4949-83	0.1	0.1	15.72	0.12	0.05
84	UPCKB-02/24	57	59.5	2	BHC&J	G4949-84	0.45	1.44	32.81	0.06	0.47
85	UPCKB-02/25	60	61	1	BHC&J	G4949-85	2.15	6.92	21	0.84	1.23
86	UPCKB-02/26	61	62	1	BHC&J	G4949-86	2.95	9.5	20.18	1.71	1.59

87	UPCKB-02/27	62	63	1	BHC&J	G4949-87	2.42	7.79	12.95	0.87	1.27
88	UPCKB-02/28	63	64	1	BHC&J	G4949-88	0.54	1.73	25.47	0.48	0.75
89	UPCKB-02/29	64	65	1	BHC&J	G4949-89	2.68	8.64	23.07	0.37	0.61
90	UPCKB-02/30	65	67	2	BHC&J with Phyllite	G4949-90	12	N. A	17.47	3.6	2.54
91	UPCKB-02/31	67	69	2	BHC&J with Phyllite	G4949-91	9.38	N.A	15.85	4.15	1.81
92	UPCKB-02/32	69	71	2	BHC&J with Phyllite	G4949-92	14.44	N.A	28.05	2.24	2.04
93	UPCKB-02/33	71	73	2	BHC&J with Phyllite	G4949-93	16.31	N. A	32.76	1.08	1.72
94	UPCKB-02/34	73	75	2	BHC&J with Phyllite	G4949-94	14.14	N. A	25.93	1.84	2.01
95	UPCKB-02/35	75	77	2	BHC&J with Phyllite	G4949-95	10.29	N. A	16.73	2.89	1.77
96	UPCKB-02/36	77	79	2	BHC&J with Phyllite	G4949-96	9.23	N. A	19.25	4.36	2.09
97	UPCKB-02/37	79	80	1	BHC&J with Phyllite	G4949-97	14.06	N. A	23.72	1.95	2.04
98	UPCKB-02/38	80	84	4	Ferruginous Phyllite	G4949-98	6.43	N. A	11.76	7.11	1.76
99	UPCKB-02/39	84	89	5	Ferruginous Phyllite	G4949-99	22.61	N. A	10.88	2.04	2.3
100	UPCKB-03/01	1	3	2	BMC&J	G4931-1	0.1	0.1	46.99	0.13	0.33
101	UPCKB-03/02	3	4	1	BMC&J	G4931-2	0.1	0.1	47.41	0.11	0.4
102	UPCKB-03/03	4	5	1	BMC&J	G4931-3	0.1	0.1	49.55	0.09	0.39
103	UPCKB-03/04	5	6	1	BMC&J	G4931-4	0.1	0.1	37.61	0.15	0.66

104	UPCKB-03/05	6	7	1	BMC&J	G4931-5	0.1	0.1	38.06	0.15	0.64
105	UPCKB-03/06	7	8	1	BMC&J	G4931-6	0.1	0.1	39.86	0.14	0.66
106	UPCKB-03/07	8	9	1	BMC&J	G4931-7	0.1	0.1	39.79	0.12	0.5
107	UPCKB-03/08	9	10	1	BMC&J	G4931-8	0.1	0.1	48.18	0.09	0.4
108	UPCKB-03/09	10	12	2	BMC&J	G4931-9	0.1	0.1	47.5	0.08	0.29
109	UPCKB-03/10	12	14	2	BMC&J	G4931-10	0.1	0.23	55.55	0.07	0.32
110	UPCKB-03/11	14	15	1	BMC&J	G4931-11	0.1	0.1	52.19	0.1	0.37
111	UPCKB-03/12	15	16	1	BMC&J	G4931-12	0.1	0.29	61.42	0.05	0.23
112	UPCKB-03/13	16	18	2	BMC&J	G4931-13	0.1	0.29	43.21	0.08	0.34
113	UPCKB-03/14	18	19	1	BMC&J	G4931-14	0.1	0.1	51.6	0.09	0.31
114	UPCKB-03/15	19	20	1	BMC&J	G4931-15	0.1	0.29	62.05	0.07	0.28
115	UPCKB-03/16	20	21	1	BMC&J	G4931-16	0.1	0.1	70.07	0.05	0.23
116	UPCKB-03/17	21	22	1	BMC&J	G4931-17	0.1	0.1	48.32	0.11	0.32
117	UPCKB-03/18	22	23	1	BMC&J	G4931-18	0.1	0.1	54.36	0.11	0.33
118	UPCKB-03/19	23	24	1	BMC&J	G4931-19	0.1	0.29	61.65	0.08	0.33
119	UPCKB-03/20	24	25	1	BMC&J	G4931-20	0.1	0.1	60.81	0.09	0.32
120	UPCKB-03/21	25	26	1	BMC&J	G4931-21	0.1	0.29	47.5	0.37	0.43
121	UPCKB-03/22	26	27	1	BMC&J	G4931-22	0.1	0.1	41.21	0.72	0.56
122	UPCKB-03/23	27	28	1	BMC&J	G4931-23	0.1	0.29	37.91	0.63	0.48
123	UPCKB-03/24	28	29	1	BMC&J	G4931-24	0.1	0.1	34.33	0.37	0.57
124	UPCKB-03/25	29	30	1	BMC&J	G4931-25	0.18	0.58	41.3	0.54	0.66

125	UPCKB-03/26	30	31	1	BMC&J	G4931-26	0.1	0.29	34.6	0.54	0.76
126	UPCKB-03/27	31	32	1	BMC&J	G4931-27	0.18	0.57	43.31	0.79	0.92
127	UPCKB-03/28	32	33	1	BMC&J	G4931-28	0.18	0.58	46.66	0.25	0.56
128	UPCKB-03/29	33	34	1	BMC&J	G4931-29	0.54	1.73	34.55	1.31	1.41
129	UPCKB-03/30	34	36	2	BHC&J	G4931-30	0.45	1.44	24.41	1.46	1.19
130	UPCKB-03/31	36	38	2	BHC&J	G4931-31	0.27	0.87	25.89	0.86	1.07
131	UPCKB-03/32	56	57	1	BHC&J	G4931-32	0.98	3.17	19.48	2.06	1.33
132	UPCKB-03/33	57	58	1	BHC&J	G4931-33	0.63	2.02	18.55	3.69	0.79
133	UPCKB-03/34	58	59	1	BHC&J	G4931-34	1.07	3.44	19.56	8.23	1.09
134	UPCKB-03/35	59	60	1	BHC&J	G4931-35	2.14	6.9	18.69	6.47	1.45
135	UPCKB-03/36	60	61	1	BHC&J	G4931-36	3.14	10.11	14.21	6.06	1.62
136	UPCKB-03/37	61	62	1	BHC&J	G4931-37	1.07	3.45	23.24	5.45	1.32
137	UPCKB-03/38	62	63	1	BHC&J	G4931-38	2.14	6.91	30.53	5.3	1.01
138	UPCKB-03/39	63	64	1	BHC&J	G4931-39	2.68	8.65	18.29	5.81	1.09
139	UPCKB-03/40	64	65	1	BHC&J	G4931-40	2.33	7.5	22.07	5.66	1.06
140	UPCKB-03/41	65	66	1	BHC&J	G4931-41	1.34	4.32	15.77	6.53	1.15
141	UPCKB-03/42	66	67	1	BHC&J	G4931-42	1.7	5.49	18.54	5.7	0.99
142	UPCKB-03/43	67	68	1	BHC&J	G4931-43	3.05	9.82	13.04	5.8	1.69
143	UPCKB-03/44	79	80	1	BHC&J	G4931-44	0.1	0.29	41.1	0.42	0.16
144	UPCKB-03/45	80	81	1	BHC&J	G4931-45	2.87	9.24	33.97	0.64	1.08
145	UPCKB-03/46	81	82	1	BHC&J	G4931-46	1.71	5.5	22.4	0.91	0.95

146	UPCKB-03/47	82	83	1	BHC&J	G4931-47	1.34	4.33	22.14	4.04	1.41
147	UPCKB-03/48	92	93	1	BHC&J	G4931-48	1.17	3.76	22.44	3.16	1.56
148	UPCKB-03/49	93	94	1	BHC&J	G4931-49	2.59	8.36	23.7	3.19	1.72
149	UPCKB-03/50	94	95	1	BHC&J	G4931-50	2.23	7.18	15.79	2.3	1.31
150	UPCKB-03/51	95	96	1	BHC&J	G4931-51	2.06	6.64	27.48	1.75	1.71
151	UPCKB-03/52	96	97	1	BHC&J	G4931-52	1.34	4.32	32.62	2.12	1.53
152	UPCKB-04/01	0	2	2	Ferruginous Phyllite	G4949-100	1.16	3.75	20.04	1.17	2.91
153	UPCKB-04/02	2	4	2	Ferruginous Phyllite	G4949-101	1.25	4.03	20.16	1.07	3.16
154	UPCKB-04/03	20	20	0.5	BMC&J	G4949-102	3.84	12.38	13.46	0.3	1.58
155	UPCKB-04/04	20	23	3	Ferruginous Phyllite	G4949-103	0.18	0.57	16.56	1.4	0.22
156	UPCKB-04/05	23	24	1	BMC&J	G4949-104	5.99	19.29	27.62	0.5	2.39
157	UPCKB-04/06	24	25	1	BMC&J	G4949-105	5.82	18.77	17.42	0.35	2.17
158	UPCKB-04/07	25	26	1	BMC&J	G4949-106	4.21	13.56	36.86	0.06	0.17
159	UPCKB-04/08	26	27	1	BMC&J	G4949-107	6.81	21.94	25.31	0.1	0.53
160	UPCKB-04/09	27	28	1	BMC&J	G4949-108	12.72	41	3.45	0.51	2.6
161	UPCKB-04/10	28	29	1	BMC&J	G4949-109	13.63	43.92	4.13	0.51	3.07
162	UPCKB-04/11	29	30	1	BMC&J	G4949-110	12.81	41.3	3.99	0.43	4.11
163	UPCKB-04/12	46	47	1	BMC&J	G4949-111	15.82	51	2.41	0.35	1.77
164	UPCKB-04/13	47	48	1	BMC&J	G4949-112	13.27	42.78	6.75	0.24	1.31
165	UPCKB-04/14	48	49	1	BMC&J	G4949-113	19	N.A	29.65	0.4	1.59
166	UPCKB-04/15	49	50	1	BMC&J	G4949-114	11.54	37.19	12.82	0.19	1.35

167	UPCKB-04/16	50	51	1	BMC&J	G4949-115	8.94	28.8	9.87	0.27	2.98
168	UPCKB-04/17	51	52	1	BMC&J	G4949-116	0.53	1.72	34.11	0.1	0.28
169	UPCKB-04/18	52	53	1	BMC&J	G4949-117	0.1	0.1	48.98	0.15	0.37
170	UPCKB-04/19	53	54	1	BMC&J	G4949-118	3.3	10.65	39.14	0.22	0.25
171	UPCKB-04/20	54	55	1	BMC&J	G4949-119	1.25	4.03	42.27	0.21	0.28
172	UPCKB-04/21	55	56	1	BMC&J	G4949-120	0.1	0.1	43.22	0.76	0.52
173	UPCKB-04/22	56	57	1	BMC&J	G4949-121	0.1	0.1	47.87	0.61	0.48
174	UPCKB-04/23	57	58	1	BMC&J	G4949-122	0.1	0.1	38.58	0.84	0.54
175	UPCKB-04/24	58	59	1	BMC&J	G4949-123	0.1	0.1	36.44	1.19	0.51
176	UPCKB-04/25	59	60	1	BMC&J	G4949-124	0.1	0.29	33.43	0.11	1.26
177	UPCKB-04/26	60	61	1	BMC&J	G4949-125	0.1	0.28	45.76	0.25	0.49
178	UPCKB-04/27	61	62	1	BMC&J	G4949-126	0.1	0.1	48.23	0.14	0.46
179	UPCKB-04/28	62	63	1	BMC&J	G4949-127	0.1	0.1	47.15	0.18	0.5
180	UPCKB-04/29	63	64	1	BMC&J	G4949-128	0.1	0.29	47.7	0.13	0.52
181	UPCKB-04/30	64	65	1	BMC&J	G4949-129	0.1	0.1	34.14	0.09	0.62
182	UPCKB-04/31	65	66	1	BMC&J	G4949-130	0.1	0.1	32.58	0.31	0.66
183	UPCKB-04/32	66	67	1	BMC&J	G4949-131	0.1	0.1	30.72	0.3	1.08
184	UPCKB-04/33	67	68	1	BMC&J	G4949-132	0.36	1.15	30.96	0.22	0.91
185	UPCKB-04/34	68	69	1	BMC&J	G4949-133	0.1	0.29	37	0.11	0.5
186	UPCKB-04/35	69	70	1	BMC&J	G4949-134	0.1	0.1	35.3	0.29	1
187	UPCKB-04/36	70	72	2	Ferruginous Phyllite	G4949-135	0.62	2.01	16.64	0.27	0.61

188	UPCKB-04/37	72	73	1	BMC&J	G4949-136	0.1	0.1	32	0.14	0.74
189	UPCKB-04/38	73	74	1	BMC&J	G4949-137	0.1	0.1	38.01	0.18	0.92
190	UPCKB-04/39	74	75	1	BMC&J	G4949-138	0.1	0.28	34	0.56	1.42
191	UPCKB-04/40	75	76	1	BMC&J	G4949-139	0.1	0.28	31.1	0.52	1.28
192	UPCKB-04/41	76	77	1	BMC&J	G4949-140	0.18	0.57	29.84	0.33	1.74
193	UPCKB-04/42	77	80	3	Ferruginous Phyllite	G4949-141	6.09	19.63	7.42	0.55	2.35
194	UPCKB-05/01	9	10	1	BHC&J	G4949-142	0.1	0.29	35.29	0.05	0.11
195	UPCKB-05/02	21	22	1	BHC&J	G4949-143	0.36	1.15	9.66	0.05	0.05
196	UPCKB-05/03	22	23	1	BHC&J	G4949-144	0.18	0.57	14.44	0.05	0.05
197	UPCKB-05/04	23	24	1	BHC&J	G4949-145	0.1	0.1	57.02	0.05	0.14
198	UPCKB-05/05	25	26	1	BHC&J	G4949-146	2.33	7.5	9.53	0.23	0.76
199	UPCKB-05/06	26	27	1	BHC&J	G4949-147	1.34	4.32	11.4	0.28	0.94
200	UPCKB-05/07	27	28	1	BHC&J	G4949-148	1.61	5.19	15.78	0.26	0.81
201	UPCKB-05/08	28	29	1	BHC&J	G4949-149	3.04	9.8	21.15	0.53	1.16
202	UPCKB-05/09	29	30	1	BHC&J	G4949-150	1.43	4.61	17.21	0.17	0.55
203	UPCKB-05/10	30	31	1	BHC&J	G4949-151	1.43	4.61	17.38	0.25	0.69
204	UPCKB-05/11	31	32	1	BHC&J	G4949-152	1.52	4.9	21.42	0.14	0.4
205	UPCKB-05/12	32	33	1	BHC&J	G4949-153	0.45	1.44	26.66	0.05	0.12
206	UPCKB-05/13	33	34	1	BHC&J	G4949-154	0.36	1.15	48.25	0.05	0.1
207	UPCKB-05/14	34	35	1	BHC&J	G4949-155	0.45	1.44	76.18	0.05	0.05
208	UPCKB-05/15	35	36	1	BHC&J	G4949-156	0.18	0.57	26.84	0.05	0.05

209	UPCKB-05/16	36	37	1	BHC&J	G4949-157	0.36	1.15	22.24	0.17	0.51
210	UPCKB-05/17	37	38	1	BHC&J	G4949-158	0.1	0.29	58.29	0.05	0.07
211	UPCKB-05/18	38	39	1	BHC&J	G4949-159	0.18	0.57	45.43	0.11	0.35
212	UPCKB-05/19	39	40	1	BHC&J	G4949-160	0.36	1.15	16.53	0.12	0.48
213	UPCKB-05/20	40	41	1	BHC&J	G4949-161	1.25	4.03	13.41	0.29	0.74
214	UPCKB-05/21	41	42	1	BHC&J	G4949-162	1.97	6.34	12.31	0.32	0.77
215	UPCKB-05/22	42	43	1	BHC&J	G4949-163	3.03	9.78	23.58	0.46	1.52
216	UPCKB-05/23	43	44	1	BHC&J	G4949-164	4.47	14.4	15.54	0.85	1.72
217	UPCKB-05/24	44	45	1	BHC&J	G4949-165	5.27	16.98	13.19	0.46	1.99
218	UPCKB-05/25	45	46	1	BHC&J	G4949-166	5.37	17.32	3.94	0.46	1.71
219	UPCKB-05/26	46	47	1	BHC&J	G4949-167	6.72	21.66	7.46	0.48	1.87
220	UPCKB-05/27	47	48	1	BHC&J	G4949-168	6.88	22.17	9.03	0.47	1.89
221	UPCKB-05/28	48	49	1	BHC&J	G4949-169	8.23	26.53	1.56	0.48	1.81
222	UPCKB-05/29	49	50	1	BHC&J	G4949-170	6.81	21.94	2.73	0.4	1.66
223	UPCKB-05/30	50	51	1	BMC&J	G4949-171	7.7	N.A	9.61	0.57	1.86
224	UPCKB-05/31	51	52	1	BMC&J	G4949-172	14.21	45.79	0.2	0.5	2.34
225	UPCKB-05/32	52	53	1	BMC&J	G4949-173	11.61	N.A	16.6	0.8	3.03
226	UPCKB-05/33	53	54	1	BMC&J	G4949-174	11.73	N.A	25.45	0.3	1.96
227	UPCKB-05/34	54	55	1	BMC&J	G4949-175	14.93	48.11	1.38	0.17	1.09
228	UPCKB-05/35	55	56	1	BMC&J	G4949-176	15.4	N.A	33.99	0.18	1.15
229	UPCKB-05/36	56	57	1	BMC&J	G4949-177	17.89	N.A	38.58	0.19	1.49

230	UPCKB-05/37	57	58	1	BMC&J	G4949-178	17.72	N.A	31.88	0.17	1.26
231	UPCKB-05/38	58	59	1	BMC&J	G4949-179	14.28	46.02	0.25	0.23	1.12
232	UPCKB-06/01	0	2.5	2.5	BHC&J	G4949-180	0.27	0.86	50.11	0.31	0.75
233	UPCKB-06/02	8	9	1	BMC&J	G4949-181	1.34	4.32	25.25	0.05	0.27
234	UPCKB-06/03	15	16	1	BMC&J	G4949-182	0.98	3.16	49.17	0.05	0.16
235	UPCKB-06/04	16	17	1	BMC&J	G4949-183	1.43	4.6	54.54	0.05	0.1
236	UPCKB-06/05	17	18	1	BMC&J	G4949-184	0.1	0.1	55.44	0.05	0.14
237	UPCKB-06/06	18	19	1	BMC&J	G4949-185	0.1	0.1	51.16	0.05	0.48
238	UPCKB-06/07	19	20	1	BMC&J	G4949-186	0.36	1.15	50.25	0.05	0.43
239	UPCKB-06/08	20	21	1	BMC&J	G4949-187	0.1	0.28	56.72	0.05	0.26
240	UPCKB-06/09	21	22	1	BMC&J	G4949-188	0.18	0.57	17.7	0.05	0.09
241	UPCKB-06/10	22	23	1	BMC&J	G4949-189	0.45	1.44	31.09	0.05	0.17
242	UPCKB-06/11	23	24	1	BMC&J	G4949-190	2.06	6.63	27.01	0.05	0.1
243	UPCKB-06/12	24	25	1	BMC&J	G4949-191	1.79	5.77	29.33	0.05	0.1
244	UPCKB-06/13	25	26	1	BMC&J	G4949-192	1.16	3.75	23.56	0.05	0.53
245	UPCKB-06/14	26	27	1	BMC&J	G4949-193	1.43	4.6	27.29	0.05	0.09
246	UPCKB-06/15	27	28	1	BMC&J	G4949-194	1.34	4.33	22.96	0.05	0.11
247	UPCKB-06/16	28	29	1	BMC&J	G4949-195	1.6	5.17	28.8	0.05	0.16
248	UPCKB-06/17	29	30	1	BMC&J	G4949-196	0.71	2.3	46.06	0.23	1.34
249	UPJTB-01/01	1	2	1	BQ with Iron Matrix	G4949-197	0.27	0.86	10.38	0.09	0.09

250	UPJTB-01/02	2	3	1	BQ with Iron Matrix	G4949-198	0.1	0.28	19.62	0.05	0.1
251	UPJTB-01/03	3	4	1	BQ with Iron Matrix	G4949-199	0.45	1.44	14.27	0.05	0.05
252	UPJTB-01/04	4	5	1	BQ with Iron Matrix	G4949-200	0.8	2.58	12.7	0.05	0.05
253	UPJTB-01/05	5	6	1	BQ with Iron Matrix	G4949-201	0.1	0.29	16.29	0.05	0.13
254	UPJTB-01/06	6	7	1	BQ with Iron Matrix	G4949-202	0.1	0.1	14.4	0.05	0.18
255	UPJTB-01/07	7	8	1	BQ with Iron Matrix	G4949-203	0.1	0.1	17.2	0.06	0.17
256	UPJTB-01/08	8	9	1	BQ with Iron Matrix	G4949-204	0.1	0.1	10.49	0.05	0.05
257	UPJTB-01/09	9	10	1	BQ with Iron Matrix	G4949-205	0.1	0.29	14.72	0.05	0.08
258	UPJTB-01/10	10	11	1	BQ with Iron Matrix	G4949-206	0.1	0.1	15.38	0.05	0.07
259	UPJTB-01/11	11	12	1	BQ with Iron Matrix	G4949-207	0.1	0.1	16.23	0.05	0.07
260	UPJTB-01/12	12	13	1	BQ with Iron Matrix	G4949-208	0.18	0.57	17.98	0.05	0.07
261	UPJTB-01/13	13	14	1	BQ with Iron Matrix	G4949-209	0.1	0.1	14.12	0.06	0.18
262	UPJTB-01/14	14	15	1	BQ with Iron Matrix	G4949-210	0.1	0.1	15.6	0.06	0.17
263	UPJTB-01/15	15	16	1	BQ with Iron Matrix	G4949-211	0.36	1.15	13.47	0.05	0.17

264	UPJTB-01/16	16	17	1	BQ with Iron Matrix	G4949-212	0.1	0.1	28.58	0.05	0.07
265	UPJTB-01/17	17	18	1	BQ with Iron Matrix	G4949-213	0.62	2.01	52.65	0.05	0.05
266	UPJTB-01/18	18	19	1	BQ with Iron Matrix	G4949-214	0.1	0.29	48.57	0.07	0.28
267	UPJTB-01/19	19	20	1	Massive Iron Ore	G4949-215	0.27	0.86	48.12	0.06	0.09
268	UPJTB-01/20	20	21	1	Massive Iron Ore	G4949-216	0.1	0.1	67.44	0.08	0.09
269	UPJTB-01/21	21	22	1	Massive Iron Ore	G4949-217	0.1	0.29	68.78	0.08	0.09
270	UPJTB-01/22	22	23	1	Massive Iron Ore	G4949-218	0.1	0.1	81.75	0.06	0.05
271	UPJTB-01/23	23	24	1	Massive Iron Ore	G4949-219	0.1	0.1	80.06	0.07	0.05
272	UPJTB-01/24	24	25	1	Massive Iron Ore	G4949-220	0.1	0.1	67.94	0.05	0.06
273	UPJTB-01/25	25	30	5	Tuff with Phyllite	G4949-221	0.1	0.1	60.59	0.34	0.18
274	UPJTB-01/26	25	30	5	Tuff with Phyllite	G4949-222	0.1	0.1	45.15	0.35	1.42
275	UPJTB-01/27	30	35	5	Tuff with Phyllite	G4949-223	0.1	0.1	41.43	0.14	1.24
276	UPJTB-01/28	37	38	1	Massive Iron Ore	G4949-224	0.1	0.28	58	0.08	0.11
277	UPJTB-01/29	38	39	1	Massive Iron Ore	G4949-225	0.1	0.1	69.01	0.19	0.09
278	UPJTB-01/30	39	40	1	Massive Iron Ore	G4949-226	0.1	0.28	55.15	0.09	0.09
279	UPJTB-01/31	40	41	1	Massive Iron Ore	G4949-227	0.1	0.1	69.48	0.1	0.08
280	UPJTB-01/32	41	42	1	Massive Iron Ore	G4949-228	0.1	0.1	66.59	0.13	0.07
281	UPJTB-01/33	42	46	4	Tuff	G4949-229	0.1	0.1	18.93	0.06	0.05
282	UPJTB-01/34	46	50	4	Tuff	G4949-230	0.1	0.1	22.15	1.11	0.29

283	UPJTB-02/01	6	8	2	Felsic Tuff with Hematite	G4949-231	0.27	0.86	29.89	0.13	0.09
284	UPJTB-02/02	8	10	2	Felsic Tuff with Hematite	G4949-232	0.1	0.28	38.72	0.16	0.11
285	UPJTB-02/03	10	12	2	Felsic Tuff with Hematite	G4949-233	0.53	1.72	39.23	0.08	0.07
286	UPJTB-02/04	12	14	2	Felsic Tuff with Hematite	G4949-234	0.54	1.73	39.23	0.09	0.09
287	UPJTB-02/05	22	22.5	0.5	Massive Iron ore	G4949-235	0.1	0.1	62.72	0.06	0.05
288	UPJTB-02/06	23	24	1.5	Tuff with Hematite	G4949-236	0.8	2.59	46.18	0.08	0.05
289	UPJTB-02/07	24	25	1	Tuff with Hematite	G4949-237	0.18	0.57	29.13	0.17	0.12
290	UPJTB-02/08	33	35	2	Massive Iron ore	G4949-238	0.1	0.1	26.72	0.05	0.05
291	UPJTB-02/09	35	36	1	Massive Iron ore	G4949-239	0.1	0.1	47.73	0.31	0.08
292	UPJTB-02/10	36	37	1	Massive Iron ore	G4949-240	0.1	0.29	48.86	0.27	0.07
293	UPJTB-02/11	37	38	1	Massive Iron ore	G4949-241	0.1	0.28	33.94	0.14	0.05
294	UPJTB-02/12	38	39	1	Massive Iron ore	G4949-242	0.1	0.1	51.01	0.11	0.05
295	UPJTB-02/13	39	40	1	Massive Iron ore	G4949-243	0.1	0.1	47.3	0.24	0.07
296	UPJTB-02/14	40	41	1	Massive Iron ore	G4949-244	0.1	0.1	46.57	0.05	0.05
297	UPJTB-02/15	41	43	2	Felsic Tuff with Hematite	G4949-245	0.1	0.29	39.72	0.05	0.05
298	UPJTB-02/16	43	45	2	Felsic Tuff with Hematite	G4949-246	0.1	0.29	33.43	0.05	0.05
299	UPJTB-02/17	45	46	1	Massive Iron ore	G4949-247	0.1	0.1	33.3	0.78	0.22
300	UPJTB-02/18	46	46.4	0.44	Massive Iron ore	G4949-248	0.1	0.1	32.87	0.74	0.22

301	UPJTB-02/19	46	48.5	2.06	Felsic Tuff with Hematite	G4949-249	0.1	0.28	25.43	0.23	0.07
302	UPJTB-02/20	49	51.7	2.68	Felsic Tuff with Hematite	G4949-250	0.1	0.1	29.44	1.33	0.34
303	UPJTB-02/21	52	52.5	0.82	Felsic Tuff with Hematite	G4949-251	0.1	0.1	35.3	0.06	0.05
304	UPJTB-02/22	53	53.1	0.64	Felsic Tuff with Hematite	G4949-252	0.1	0.1	31.3	0.05	0.05
305	UPJTB-02/23	56	60	4	Felsic Tuff with Hematite	G4949-253	0.1	0.29	35.72	0.05	0.05
306	UPJTB-02/24	73	74	1.5	Felsic Tuff with Hematite	G4949-254	0.1	0.28	28.67	0.05	0.05
307	UPJTB-02/25	75	76.5	1.5	Felsic Tuff with Hematite	G4949-255	0.18	0.57	42.8	0.77	0.17
308	UPJTB-02/26	77	78	1.5	Felsic Tuff with Hematite	G4949-256	0.1	0.28	41.14	0.05	0.05
309	UPJTB-02/27	78	80	2	Felsic Tuff	G4949-257	0.1	0.29	27.71	0.05	0.05
						METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105	SOP/OM/105
						DL	0.05	0.08	0.05	0.05	0.05
						UNITS	%	%	%	%	%
S.no.	Sample Id	From (m)	To (m)	Sample Length (m)	Lithology	Lab ID	MnO	Na2O	P2O5	SO3	SiO2
1	UPCKB-01/01	10	1 / 1	1	BHC&J	G4949-1	0.05	0.08	0.96	0.05	43.01
2	UPCKB-01/02	11	12	1	BHC&J	G4949-2	0.05	0.08	0.48	0.05	64.02
3	UPCKB-01/03	12	13	1	BHC&J	G4949-3	0.05	0.08	0.52	0.05	52.88

4	UPCKB-01/04	13	14	1	BHC&J	G4949-4	0.05	0.08	0.83	0.05	59.42
5	UPCKB-01/05	14	15	1	BHC&J	G4949-5	0.05	0.08	0.78	0.05	70.44
6	UPCKB-01/06	15	17.8	2.8	Ferruginous Phyllite	G4949-6	0.05	0.08	0.39	0.06	76.43
7	UPCKB-01/07	18	20	1.82	Ferruginous Phyllite	G4949-7	0.05	0.08	0.31	0.05	80.21
8	UPCKB-01/08	20	22	2	Ferruginous Phyllite	G4949-8	0.05	0.08	0.37	0.08	76.79
9	UPCKB-01/09	22	23	1	BHC&J	G4949-9	0.05	0.08	1.31	0.05	64.2
10	UPCKB-01/10	23	24	1	BHC&J	G4949-10	0.05	0.08	0.77	0.05	48.07
11	UPCKB-01/11	24	25	1	BHC&J	G4949-11	0.05	0.08	0.76	0.05	42.89
12	UPCKB-01/12	25	26	1	BHC&J	G4949-12	0.05	0.08	0.59	0.05	38.5
13	UPCKB-01/13	26	28	2	Ferruginous Phyllite	G4949-13	0.05	0.08	0.4	0.14	74.63
14	UPCKB-01/14	28	29	1	BHC&J	G4949-14	0.08	0.08	1.26	0.05	51.31
15	UPCKB-01/15	29	30	1	BHC&J	G4949-15	0.05	0.08	0.79	0.05	57.09
16	UPCKB-01/16	30	31	1	BHC&J	G4949-16	0.07	0.08	0.59	0.05	44.46
17	UPCKB-01/17	31	32	1	BHC&J	G4949-17	0.05	0.08	0.6	0.07	44.06
18	UPCKB-01/18	32	35	3	Ferruginous Phyllite	G4949-18	0.05	0.08	0.53	0.14	69.34
19	UPCKB-01/19	35	36	1	BHC&J	G4949-19	0.05	0.08	0.3	0.05	36.04
20	UPCKB-01/20	36	37	1	BHC&J	G4949-20	0.05	0.08	0.28	0.06	66.05
21	UPCKB-01/21	37	42	5	Ferruginous Phyllite	G4949-21	0.05	0.08	0.48	0.09	70.61
22	UPCKB-01/22	42	43	1	BHC&J	G4949-22	0.05	0.08	0.41	0.05	63.14
23	UPCKB-01/23	43	47	4	Ferruginous Phyllite	G4949-23	0.05	0.08	0.45	0.09	65.73
24	UPCKB-01/24	47	48	1	BHC&J	G4949-24	0.05	0.08	0.23	0.09	76.17

25	UPCKB-01/25	48	56	8	Ferruginous Phyllite	G4949-25	0.22	0.08	0.1	0.05	32.4
26	UPCKB-01/26	75	76	1	BHC&J	G4949-26	0.05	0.08	0.19	0.05	56
27	UPCKB-01/27	76	77	1	BHC&J	G4949-27	0.05	0.08	0.13	0.05	70.94
28	UPCKB-01/28	77	78	1	BHC&J	G4949-28	0.05	0.08	0.17	0.05	60.96
29	UPCKB-01/29	78	79	1	Ferruginous Phyllite	G4949-29	0.18	0.08	0.06	0.05	50.62
30	UPCKB-01/30	79	80	1	BHC&J	G4949-30	0.05	0.08	0.14	0.05	40.82
31	UPCKB-01/31	82	83	1	BHC&J	G4949-31	0.05	0.08	0.15	0.05	62.41
32	UPCKB-01/32	83	84	1	BHC&J	G4949-32	0.05	0.08	0.17	0.05	51.57
33	UPCKB-01/33	84	85	1	BHC&J	G4949-33	0.05	0.08	0.12	0.05	57.11
34	UPCKB-01/34	85	86	1	Ferruginous Phyllite	G4949-34	0.05	0.08	0.12	0.05	51.95
35	UPCKB-01/35	86	87	1	BHC&J	G4949-35	0.05	0.08	0.2	0.05	51.14
36	UPCKB-01/36	87	88	1	BHC&J	G4949-36	0.05	0.08	0.17	0.05	55.73
37	UPCKB-01/37	88	89	1	Ferruginous Phyllite	G4949-37	0.2	0.08	0.17	0.06	41.73
38	UPCKB-01/38	89	90	1	BHC&J	G4949-38	0.05	0.08	0.41	0.05	55.66
39	UPCKB-01/39	90	91	1	BHC&J	G4949-39	0.06	0.08	0.48	0.05	42.05
40	UPCKB-01/40	91	93	2	Ferruginous Phyllite	G4949-40	0.13	0.08	0.24	0.09	44.34
41	UPCKB-01/41	93	94	1	BHC&J	G4949-41	0.05	0.08	0.33	0.05	60.05
42	UPCKB-01/42	94	95	1	BHC&J	G4949-42	0.05	0.08	0.81	0.05	47.91
43	UPCKB-01/43	95	96	1	BHC&J	G4949-43	0.06	0.08	0.56	0.05	38.5
44	UPCKB-01/44	96	97	1	BHC&J	G4949-44	0.05	0.08	0.58	0.05	53.84
45	UPCKB-01/45	97	98	1	BHC&J	G4949-45	0.05	0.08	0.46	0.05	55.31

46	UPCKB-01/46	98	99	1	BHC&J	G4949-46	0.05	0.08	0.3	0.05	60.32
47	UPCKB-01/47	99	100	1	BHC&J	G4949-47	0.09	0.08	0.69	0.05	49.84
48	UPCKB-01/48	100	101	1	BHC&J	G4949-48	0.05	0.08	0.24	0.05	60.56
49	UPCKB-01/49	101	102	1	BHC&J	G4949-49	0.09	0.08	0.55	0.05	59.23
50	UPCKB-01/50	102	103	1	Tuff	G4949-50	0.05	0.08	0.27	0.05	82.36
51	UPCKB-01/51	103	104	1	BHC&J	G4949-51	0.08	0.08	0.34	0.05	57.64
52	UPCKB-01/52	104	105	1	BHC&J	G4949-52	0.15	0.08	1.12	0.05	44.71
53	UPCKB-01/53	105	108	3	Ferruginous Phyllite	G4949-53	0.12	0.08	0.52	0.07	59.17
54	UPCKB-01/54	108	109	1	BHC&J	G4949-54	0.09	0.08	0.56	0.05	61.37
55	UPCKB-01/55	109	111	2	Tuff	G4949-55	0.05	0.08	0.17	0.05	61.02
56	UPCKB-01/56	111	112	1	BHC&J	G4949-56	0.05	0.08	0.42	0.05	66.57
57	UPCKB-01/57	112	114	2	BHC&J	G4949-57	0.05	0.08	0.68	0.05	56.68
58	UPCKB-01/58	114	115	1	BHC&J	G4949-58	0.05	0.08	0.17	0.05	80.17
59	UPCKB-01/59	115	116	1	BHC&J	G4949-59	0.08	0.08	0.36	0.05	67.86
60	UPCKB-01/60	116	117	1	Ferruginous Phyllite	G4949-60	0.05	0.08	0.56	0.05	74.1
61	UPCKB-02/01	2	3	1	BHC&J	G4949-61	0.41	0.08	0.43	0.05	66.29
62	UPCKB-02/02	3	4	1	BHC&J	G4949-62	0.44	0.08	0.47	0.05	63.42
63	UPCKB-02/03	4	5	1	BHC&J	G4949-63	0.09	0.08	0.75	0.05	59.57
64	UPCKB-02/04	5	6	1	BHC&J	G4949-64	0.12	0.08	0.57	0.05	54.21
65	UPCKB-02/05	6	7	1	BHC&J	G4949-65	0.05	0.08	0.39	0.05	49.63
66	UPCKB-02/06	7	8	1	BHC&J	G4949-66	0.38	0.08	0.66	0.05	50.35

67	UPCKB-02/07	8	9.2	1.2	BHC&J	G4949-67	2.23	0.08	1.11	0.1	37.45
68	UPCKB-02/08	10	10.8	0.8	BHC&J	G4949-68	2.31	0.08	0.65	0.07	45.69
69	UPCKB-02/09	14	15	1.2	BHC&J	G4949-69	0.89	0.08	0.48	0.05	57.35
70	UPCKB-02/10	19	20	1	BHC&J	G4949-70	2.25	0.08	0.77	0.09	39.54
71	UPCKB-02/11	20	22	2	Ferruginous Phyllite	G4949-71	0.24	0.08	0.09	0.05	37.65
72	UPCKB-02/12	22	23	1	BHC&J	G4949-72	2.58	0.08	0.91	0.07	43.42
73	UPCKB-02/13	23	24	1	BHC&J	G4949-73	2.45	0.08	1.01	0.05	32.3
74	UPCKB-02/14	24	26	2	Ferruginous Phyllite	G4949-74	0.39	0.08	0.22	0.08	41.82
75	UPCKB-02/15	26	28	2	Ferruginous Phyllite	G4949-75	0.54	0.08	0.77	0.13	43.85
76	UPCKB-02/16	48	49	1	Ferruginous Phyllite	G4949-76	0.22	0.08	0.38	0.13	43.48
77	UPCKB-02/17	49	50	1	BHC&J	G4949-77	1.55	0.08	0.95	0.09	49.47
78	UPCKB-02/18	50	51	1	BHC&J	G4949-78	1.59	0.08	0.66	0.05	54.34
79	UPCKB-02/19	51	52	1	BHC&J	G4949-79	1.39	0.08	0.78	0.13	53.06
80	UPCKB-02/20	52	53	1	Ferruginous Phyllite	G4949-80	0.09	0.08	0.33	0.07	54.45
81	UPCKB-02/21	53	54	1	BHC&J	G4949-81	1.02	0.08	0.74	0.05	50.66
82	UPCKB-02/22	54	55	1	BHC&J	G4949-82	1.24	0.35	0.7	0.12	52.27
83	UPCKB-02/23	55	57.5	2.45	Ferruginous Phyllite	G4949-83	0.05	0.08	0.23	0.05	56.02
84	UPCKB-02/24	57	59.5	2	BHC&J	G4949-84	0.27	0.08	0.44	0.05	52.97
85	UPCKB-02/25	60	61	1	BHC&J	G4949-85	0.79	0.08	0.66	0.06	49.54
86	UPCKB-02/26	61	62	1	BHC&J	G4949-86	0.28	0.08	0.39	0.06	48.61
87	UPCKB-02/27	62	63	1	BHC&J	G4949-87	0.18	0.08	0.43	0.06	60.64

88	UPCKB-02/28	63	64	1	BHC&J	G4949-88	0.31	0.08	0.42	0.05	54.33
89	UPCKB-02/29	64	65	1	BHC&J	G4949-89	0.22	0.08	0.87	0.08	58.6
90	UPCKB-02/30	65	67	2	BHC&J with Phyllite	G4949-90	0.26	0.68	0.69	0.07	46.01
91	UPCKB-02/31	67	69	2	BHC&J with Phyllite	G4949-91	0.2	0.63	0.47	0.09	52.72
92	UPCKB-02/32	69	71	2	BHC&J with Phyllite	G4949-92	0.36	0.33	0.95	0.06	40.37
93	UPCKB-02/33	71	73	2	BHC&J with Phyllite	G4949-93	0.34	0.67	1.14	0.05	35.89
94	UPCKB-02/34	73	75	2	BHC&J with Phyllite	G4949-94	0.34	0.97	1.09	0.06	41.13
95	UPCKB-02/35	75	77	2	BHC&J with Phyllite	G4949-95	0.22	0.31	0.61	0.05	54.27
96	UPCKB-02/36	77	79	2	BHC&J with Phyllite	G4949-96	0.3	0.49	0.52	0.08	47.05
97	UPCKB-02/37	79	80	1	BHC&J with Phyllite	G4949-97	0.3	1.03	1.14	0.05	43.62
98	UPCKB-02/38	80	84	4	Ferruginous Phyllite	G4949-98	0.12	0.09	0.2	0.07	52.14
99	UPCKB-02/39	84	89	5	Ferruginous Phyllite	G4949-99	0.99	0.08	1.3	0.05	36.36
100	UPCKB-03/01	1	3	2	BMC&J	G4931-1	1.24	0.05	0.36	0.05	38.28
101	UPCKB-03/02	3	4	1	BMC&J	G4931-2	1.36	0.05	0.38	0.05	36.63
102	UPCKB-03/03	4	5	1	BMC&J	G4931-3	1.21	0.05	0.57	0.05	36.43
103	UPCKB-03/04	5	6	1	BMC&J	G4931-4	1.05	0.05	0.6	0.05	42.44
104	UPCKB-03/05	6	7	1	BMC&J	G4931-5	1.06	0.05	0.55	0.05	42.49

105	UPCKB-03/06	7	8	1	BMC&J	G4931-6	1.09	0.05	0.55	0.05	40.77
106	UPCKB-03/07	8	9	1	BMC&J	G4931-7	0.95	0.05	0.63	0.05	45.45
107	UPCKB-03/08	9	10	1	BMC&J	G4931-8	1.25	0.05	0.52	0.05	37.58
108	UPCKB-03/09	10	12	2	BMC&J	G4931-9	0.97	0.05	0.39	0.05	41.82
109	UPCKB-03/10	12	14	2	BMC&J	G4931-10	1.25	0.05	0.46	0.05	30.33
110	UPCKB-03/11	14	15	1	BMC&J	G4931-11	1.23	0.05	0.55	0.05	34.02
111	UPCKB-03/12	15	16	1	BMC&J	G4931-12	2.27	0.05	0.47	0.05	28.55
112	UPCKB-03/13	16	18	2	BMC&J	G4931-13	0.97	0.05	0.41	0.05	44.37
113	UPCKB-03/14	18	19	1	BMC&J	G4931-14	1.88	0.05	0.42	0.05	35.86
114	UPCKB-03/15	19	20	1	BMC&J	G4931-15	1.09	0.05	0.34	0.05	28.37
115	UPCKB-03/16	20	21	1	BMC&J	G4931-16	1.23	0.05	0.41	0.05	20.94
116	UPCKB-03/17	21	22	1	BMC&J	G4931-17	0.86	0.05	0.35	0.05	40.75
117	UPCKB-03/18	22	23	1	BMC&J	G4931-18	1.25	0.05	0.37	0.05	34.14
118	UPCKB-03/19	23	24	1	BMC&J	G4931-19	1.34	0.05	0.36	0.05	27.03
119	UPCKB-03/20	24	25	1	BMC&J	G4931-20	1.32	0.05	0.37	0.05	27.65
120	UPCKB-03/21	25	26	1	BMC&J	G4931-21	0.67	0.05	0.28	0.05	39.75
121	UPCKB-03/22	26	27	1	BMC&J	G4931-22	0.61	0.05	0.21	0.05	41.97
122	UPCKB-03/23	27	28	1	BMC&J	G4931-23	0.46	0.05	0.21	0.05	47.52
123	UPCKB-03/24	28	29	1	BMC&J	G4931-24	0.44	0.05	0.27	0.05	55.12
124	UPCKB-03/25	29	30	1	BMC&J	G4931-25	0.52	0.05	0.26	0.05	44.48
125	UPCKB-03/26	30	31	1	BMC&J	G4931-26	0.9	0.05	0.44	0.05	44.18

126	UPCKB-03/27	31	32	1	BMC&J	G4931-27	0.84	0.05	0.47	0.05	35.78
127	UPCKB-03/28	32	33	1	BMC&J	G4931-28	1.24	0.05	0.51	0.05	36.36
128	UPCKB-03/29	33	34	1	BMC&J	G4931-29	0.54	0.05	0.27	0.05	40.99
129	UPCKB-03/30	34	36	2	BHC&J	G4931-30	0.3	0.05	0.16	0.05	50.15
130	UPCKB-03/31	36	38	2	BHC&J	G4931-31	0.18	0.05	0.25	0.05	52
131	UPCKB-03/32	56	57	1	BHC&J	G4931-32	0.08	0.05	0.23	0.05	56.5
132	UPCKB-03/33	57	58	1	BHC&J	G4931-33	0.06	0.05	0.61	0.05	55.01
133	UPCKB-03/34	58	59	1	BHC&J	G4931-34	0.21	0.06	0.2	0.05	44.82
134	UPCKB-03/35	59	60	1	BHC&J	G4931-35	0.16	0.06	0.3	0.05	43.97
135	UPCKB-03/36	60	61	1	BHC&J	G4931-36	0.16	0.05	0.38	0.05	45.57
136	UPCKB-03/37	61	62	1	BHC&J	G4931-37	0.37	0.06	0.28	0.05	43.25
137	UPCKB-03/38	62	63	1	BHC&J	G4931-38	0.19	0.06	1	0.05	38.5
138	UPCKB-03/39	63	64	1	BHC&J	G4931-39	0.11	0.15	0.53	0.05	48.67
139	UPCKB-03/40	64	65	1	BHC&J	G4931-40	0.09	0.06	0.56	0.05	46.36
140	UPCKB-03/41	65	66	1	BHC&J	G4931-41	0.17	0.05	0.47	0.05	51.44
141	UPCKB-03/42	66	67	1	BHC&J	G4931-42	0.28	0.1	0.43	0.05	51.84
142	UPCKB-03/43	67	68	1	BHC&J	G4931-43	0.08	0.07	0.34	0.05	48.22
143	UPCKB-03/44	79	80	1	BHC&J	G4931-44	0.24	0.05	0.32	0.05	41.84
144	UPCKB-03/45	80	81	1	BHC&J	G4931-45	0.51	0.06	1.99	0.05	41.75
145	UPCKB-03/46	81	82	1	BHC&J	G4931-46	0.54	0.05	0.68	0.05	60.53
146	UPCKB-03/47	82	83	1	BHC&J	G4931-47	0.36	0.06	0.53	0.05	50.06

147	UPCKB-03/48	92	93	1	BHC&J	G4931-48	0.47	0.06	0.52	0.05	48.99
148	UPCKB-03/49	93	94	1	BHC&J	G4931-49	0.39	0.07	0.97	0.05	45.21
149	UPCKB-03/50	94	95	1	BHC&J	G4931-50	0.74	0.11	0.42	0.05	60.22
150	UPCKB-03/51	95	96	1	BHC&J	G4931-51	0.63	0.06	0.79	0.05	44.68
151	UPCKB-03/52	96	97	1	BHC&J	G4931-52	0.78	0.05	0.92	0.05	40.34
152	UPCKB-04/01	0	2	2	Ferruginous Phyllite	G4949-100	0.4	0.5	0.18	0.05	46.17
153	UPCKB-04/02	2	4	2	Ferruginous Phyllite	G4949-101	0.31	0.49	0.15	0.05	43.15
154	UPCKB-04/03	20	20	0.5	BMC&J	G4949-102	0.09	0.08	0.72	0.08	62.78
155	UPCKB-04/04	20	23	3	Ferruginous Phyllite	G4949-103	0.05	0.08	0.19	0.05	54.17
156	UPCKB-04/05	23	24	1	BMC&J	G4949-104	0.13	0.08	0.82	0.05	39.09
157	UPCKB-04/06	24	25	1	BMC&J	G4949-105	0.17	0.08	0.74	0.06	45.96
158	UPCKB-04/07	25	26	1	BMC&J	G4949-106	0.08	0.08	0.72	0.05	39.63
159	UPCKB-04/08	26	27	1	BMC&J	G4949-107	0.13	0.08	0.83	0.08	36.37
160	UPCKB-04/09	27	28	1	BMC&J	G4949-108	0.16	0.08	0.88	0.2	41.47
161	UPCKB-04/10	28	29	1	BMC&J	G4949-109	0.21	0.15	0.93	0.05	37.4
162	UPCKB-04/11	29	30	1	BMC&J	G4949-110	0.23	0.1	0.82	0.05	38.54
163	UPCKB-04/12	46	47	1	BMC&J	G4949-111	0.19	0.19	1.09	0.08	36.58
164	UPCKB-04/13	47	48	1	BMC&J	G4949-112	0.22	0.08	1.39	0.05	40.1
165	UPCKB-04/14	48	49	1	BMC&J	G4949-113	0.23	0.16	1.48	0.1	39.99
166	UPCKB-04/15	49	50	1	BMC&J	G4949-114	0.28	0.1	1.21	0.08	38.69
167	UPCKB-04/16	50	51	1	BMC&J	G4949-115	0.31	0.13	1.09	0.05	44.92

168	UPCKB-04/17	51	52	1	BMC&J	G4949-116	1.48	0.08	0.74	0.05	53.42
169	UPCKB-04/18	52	53	1	BMC&J	G4949-117	1.99	0.08	1.47	0.06	36.1
170	UPCKB-04/19	53	54	1	BMC&J	G4949-118	1.06	0.09	1.76	0.07	39.05
171	UPCKB-04/20	54	55	1	BMC&J	G4949-119	1.68	0.08	1.47	0.05	40.7
172	UPCKB-04/21	55	56	1	BMC&J	G4949-120	2.31	0.08	0.96	0.07	36.87
173	UPCKB-04/22	56	57	1	BMC&J	G4949-121	3.12	0.08	0.94	0.05	34.55
174	UPCKB-04/23	57	58	1	BMC&J	G4949-122	2	0.08	1.03	0.05	43.42
175	UPCKB-04/24	58	59	1	BMC&J	G4949-123	2.47	0.08	0.79	0.05	45.99
176	UPCKB-04/25	59	60	1	BMC&J	G4949-124	1.82	0.08	0.76	0.07	43.46
177	UPCKB-04/26	60	61	1	BMC&J	G4949-125	3.07	0.08	0.91	0.06	32.81
178	UPCKB-04/27	61	62	1	BMC&J	G4949-126	2.36	0.08	1.44	0.05	36.15
179	UPCKB-04/28	62	63	1	BMC&J	G4949-127	2.31	0.08	0.87	0.06	34.97
180	UPCKB-04/29	63	64	1	BMC&J	G4949-128	1.7	0.08	0.98	0.05	36.96
181	UPCKB-04/30	64	65	1	BMC&J	G4949-129	1.15	0.08	0.82	0.05	50.85
182	UPCKB-04/31	65	66	1	BMC&J	G4949-130	2	0.08	0.74	0.06	49.55
183	UPCKB-04/32	66	67	1	BMC&J	G4949-131	1.2	0.08	0.75	0.06	47.92
184	UPCKB-04/33	67	68	1	BMC&J	G4949-132	0.9	0.08	0.82	0.05	50.85
185	UPCKB-04/34	68	69	1	BMC&J	G4949-133	2.03	0.08	0.8	0.06	50.27
186	UPCKB-04/35	69	70	1	BMC&J	G4949-134	2.31	0.08	0.79	0.06	45.35
187	UPCKB-04/36	70	72	2	Ferruginous Phyllite	G4949-135	0.68	0.14	0.34	0.09	55.25
188	UPCKB-04/37	72	73	1	BMC&J	G4949-136	3.03	0.08	0.74	0.08	52.62

189	UPCKB-04/38	73	74	1	BMC&J	G4949-137	3.68	0.08	0.98	0.06	41.8
190	UPCKB-04/39	74	75	1	BMC&J	G4949-138	2.36	0.08	0.62	0.06	40.44
191	UPCKB-04/40	75	76	1	BMC&J	G4949-139	2.38	0.08	0.88	0.07	45.13
192	UPCKB-04/41	76	77	1	BMC&J	G4949-140	3.59	0.08	0.59	0.06	45.01
193	UPCKB-04/42	77	80	3	Ferruginous Phyllite	G4949-141	0.44	0.15	0.34	0.14	45.46
194	UPCKB-05/01	9	10	1	BHC&J	G4949-142	0.16	0.08	0.56	0.05	57.3
195	UPCKB-05/02	21	22	1	BHC&J	G4949-143	0.05	0.08	0.08	0.05	86.33
196	UPCKB-05/03	22	23	1	BHC&J	G4949-144	0.05	0.08	0.05	0.05	82.37
197	UPCKB-05/04	23	24	1	BHC&J	G4949-145	0.05	0.08	0.39	0.07	2.49
198	UPCKB-05/05	25	26	1	BHC&J	G4949-146	0.18	0.84	0.24	0.13	66.65
199	UPCKB-05/06	26	27	1	BHC&J	G4949-147	0.15	0.2	0.23	0.2	58.2
200	UPCKB-05/07	27	28	1	BHC&J	G4949-148	0.16	0.29	0.29	0.19	57.63
201	UPCKB-05/08	28	29	1	BHC&J	G4949-149	0.23	0.56	0.56	0.24	48.06
202	UPCKB-05/09	29	30	1	BHC&J	G4949-150	0.11	0.25	0.28	0.16	63.53
203	UPCKB-05/10	30	31	1	BHC&J	G4949-151	0.16	0.34	0.3	0.16	63.83
204	UPCKB-05/11	31	32	1	BHC&J	G4949-152	0.12	0.28	0.33	0.12	63.1
205	UPCKB-05/12	32	33	1	BHC&J	G4949-153	0.1	0.08	0.43	0.05	62.05
206	UPCKB-05/13	33	34	1	BHC&J	G4949-154	0.1	0.08	0.61	0.07	42.4
207	UPCKB-05/14	34	35	1	BHC&J	G4949-155	0.33	0.08	1.37	0.05	4.19
208	UPCKB-05/15	35	36	1	BHC&J	G4949-156	0.09	0.08	0.49	0.05	67.85
209	UPCKB-05/16	36	37	1	BHC&J	G4949-157	0.1	0.08	0.31	0.17	58.42

210	UPCKB-05/17	37	38	1	BHC&J	G4949-158	0.14	0.08	0.9	0.05	31.01
211	UPCKB-05/18	38	39	1	BHC&J	G4949-159	0.11	0.08	0.58	0.12	37.43
212	UPCKB-05/19	39	40	1	BHC&J	G4949-160	0.06	0.08	0.29	0.16	66.08
213	UPCKB-05/20	40	41	1	BHC&J	G4949-161	0.14	0.32	0.32	0.19	65.49
214	UPCKB-05/21	41	42	1	BHC&J	G4949-162	0.2	0.7	0.36	0.19	67.7
215	UPCKB-05/22	42	43	1	BHC&J	G4949-163	0.37	0.92	0.55	0.17	49.08
216	UPCKB-05/23	43	44	1	BHC&J	G4949-164	0.37	1.14	0.6	0.26	47.18
217	UPCKB-05/24	44	45	1	BHC&J	G4949-165	0.42	3.28	0.56	0.17	45.91
218	UPCKB-05/25	45	46	1	BHC&J	G4949-166	0.38	2.31	0.47	0.2	57.47
219	UPCKB-05/26	46	47	1	BHC&J	G4949-167	0.38	2.26	0.66	0.21	46.9
220	UPCKB-05/27	47	48	1	BHC&J	G4949-168	0.38	3.06	0.63	0.21	42.45
221	UPCKB-05/28	48	49	1	BHC&J	G4949-169	0.4	2.21	0.66	0.19	48.86
222	UPCKB-05/29	49	50	1	BHC&J	G4949-170	0.34	2.59	0.55	0.2	51.94
223	UPCKB-05/30	50	51	1	BMC&J	G4949-171	0.38	1.87	0.48	0.06	68.25
224	UPCKB-05/31	51	52	1	BMC&J	G4949-172	0.35	2.56	1.12	0.05	36.42
225	UPCKB-05/32	52	53	1	BMC&J	G4949-173	0.41	2.9	0.6	0.06	48.25
226	UPCKB-05/33	53	54	1	BMC&J	G4949-174	0.3	1.24	1.36	0.08	50.52
227	UPCKB-05/34	54	55	1	BMC&J	G4949-175	0.3	0.25	1.44	0.06	40.42
228	UPCKB-05/35	55	56	1	BMC&J	G4949-176	0.29	0.37	1.12	0.05	40.83
229	UPCKB-05/36	56	57	1	BMC&J	G4949-177	0.3	0.12	1.41	0.05	33.65
230	UPCKB-05/37	57	58	1	BMC&J	G4949-178	0.29	0.21	1.34	0.05	40.17

231	UPCKB-05/38	58	59	1	BMC&J	G4949-179	0.35	0.32	1.17	0.06	43.97
232	UPCKB-06/01	0	2.5	2.5	BHC&J	G4949-180	0.52	0.08	0.52	0.05	26.19
233	UPCKB-06/02	8	9	1	BMC&J	G4949-181	0.26	0.08	3.28	0.06	57.83
234	UPCKB-06/03	15	16	1	BMC&J	G4949-182	0.52	0.08	1.74	0.07	37.55
235	UPCKB-06/04	16	17	1	BMC&J	G4949-183	0.8	0.08	1.56	0.05	30.29
236	UPCKB-06/05	17	18	1	BMC&J	G4949-184	1.96	0.08	1.83	0.07	30.89
237	UPCKB-06/06	18	19	1	BMC&J	G4949-185	1.16	0.08	1.44	0.07	33.56
238	UPCKB-06/07	19	20	1	BMC&J	G4949-186	0.39	0.08	1.15	0.06	37.2
239	UPCKB-06/08	20	21	1	BMC&J	G4949-187	0.86	0.08	1.16	0.06	31.62
240	UPCKB-06/09	21	22	1	BMC&J	G4949-188	0.15	0.08	0.53	0.05	78.6
241	UPCKB-06/10	22	23	1	BMC&J	G4949-189	0.56	0.08	1.93	0.05	58.85
242	UPCKB-06/11	23	24	1	BMC&J	G4949-190	0.09	0.08	1.23	0.05	61.33
243	UPCKB-06/12	24	25	1	BMC&J	G4949-191	0.1	0.08	1.3	0.06	59.31
244	UPCKB-06/13	25	26	1	BMC&J	G4949-192	0.21	0.08	0.99	0.06	65.03
245	UPCKB-06/14	26	27	1	BMC&J	G4949-193	0.35	0.08	1.22	0.05	62.46
246	UPCKB-06/15	27	28	1	BMC&J	G4949-194	0.1	0.08	0.68	0.05	69
247	UPCKB-06/16	28	29	1	BMC&J	G4949-195	0.27	0.08	0.86	0.05	59.37
248	UPCKB-06/17	29	30	1	BMC&J	G4949-196	0.35	0.08	0.44	0.05	32.57
249	UPJTB-01/01	1	2	1	BQ with Iron Matrix	G4949-197	0.08	0.08	0.14	0.05	85.01
250	UPJTB-01/02	2	3	1	BQ with Iron Matrix	G4949-198	0.12	0.08	0.3	0.05	76.03

251	UPJTB-01/03	3	4	1	BQ with Iron Matrix	G4949-199	0.06	0.08	0.21	0.06	80.8
252	UPJTB-01/04	4	5	1	BQ with Iron Matrix	G4949-200	0.05	0.08	0.24	0.07	81.51
253	UPJTB-01/05	5	6	1	BQ with Iron Matrix	G4949-201	0.11	0.11	0.33	0.06	78.75
254	UPJTB-01/06	6	7	1	BQ with Iron Matrix	G4949-202	0.33	0.09	0.34	0.1	80.02
255	UPJTB-01/07	7	8	1	BQ with Iron Matrix	G4949-203	0.56	0.11	0.43	0.1	76.38
256	UPJTB-01/08	8	9	1	BQ with Iron Matrix	G4949-204	0.72	0.08	0.27	0.05	85.01
257	UPJTB-01/09	9	10	1	BQ with Iron Matrix	G4949-205	0.12	0.1	0.35	0.07	80.88
258	UPJTB-01/10	10	11	1	BQ with Iron Matrix	G4949-206	0.25	0.1	0.45	0.05	80.1
259	UPJTB-01/11	11	12	1	BQ with Iron Matrix	G4949-207	0.15	0.09	0.35	0.05	79.21
260	UPJTB-01/12	12	13	1	BQ with Iron Matrix	G4949-208	0.13	0.08	0.46	0.05	76.5
261	UPJTB-01/13	13	14	1	BQ with Iron Matrix	G4949-209	0.17	0.09	0.39	0.09	79.3
262	UPJTB-01/14	14	15	1	BQ with Iron Matrix	G4949-210	0.24	0.08	0.27	0.08	78.08
263	UPJTB-01/15	15	16	1	BQ with Iron Matrix	G4949-211	0.08	0.08	0.23	0.09	80.05
264	UPJTB-01/16	16	17	1	BQ with Iron Matrix	G4949-212	0.53	0.08	0.81	0.06	63.42

265	UPJTB-01/17	17	18	1	BQ with Iron Matrix	G4949-213	0.55	0.08	1.57	0.05	33.16
266	UPJTB-01/18	18	19	1	BQ with Iron Matrix	G4949-214	0.52	0.08	1.06	0.05	38.87
267	UPJTB-01/19	19	20	1	Massive Iron Ore	G4949-215	0.39	0.08	1.21	0.05	37.88
268	UPJTB-01/20	20	21	1	Massive Iron Ore	G4949-216	0.48	0.08	1.27	0.07	16.39
269	UPJTB-01/21	21	22	1	Massive Iron Ore	G4949-217	0.6	0.08	1.3	0.07	12.17
270	UPJTB-01/22	22	23	1	Massive Iron Ore	G4949-218	0.91	0.08	2.27	0.05	1.77
271	UPJTB-01/23	23	24	1	Massive Iron Ore	G4949-219	0.85	0.08	2.13	0.05	2.68
272	UPJTB-01/24	24	25	1	Massive Iron Ore	G4949-220	0.43	0.08	1.32	0.06	12.59
273	UPJTB-01/25	25	30	5	Tuff with Phyllite	G4949-221	0.32	0.08	1.55	0.13	19.91
274	UPJTB-01/26	25	30	5	Tuff with Phyllite	G4949-222	0.67	0.08	0.44	0.06	28.26
275	UPJTB-01/27	30	35	5	Tuff with Phyllite	G4949-223	0.67	0.08	0.59	0.07	24.81
276	UPJTB-01/28	37	38	1	Massive Iron Ore	G4949-224	0.07	0.08	0.46	0.06	16.08
277	UPJTB-01/29	38	39	1	Massive Iron Ore	G4949-225	0.1	0.08	0.69	0.06	9.51
278	UPJTB-01/30	39	40	1	Massive Iron Ore	G4949-226	0.12	0.08	0.81	0.07	23.36
279	UPJTB-01/31	40	41	1	Massive Iron Ore	G4949-227	0.16	0.08	1.22	0.05	8.03
280	UPJTB-01/32	41	42	1	Massive Iron Ore	G4949-228	0.96	0.08	1.41	0.08	12.42
281	UPJTB-01/33	42	46	4	Tuff	G4949-229	0.05	0.09	0.44	0.07	57.41
282	UPJTB-01/34	46	50	4	Tuff	G4949-230	0.16	0.13	0.22	0.08	50.86
283	UPJTB-02/01	6	8	2	Felsic Tuff with Hematite	G4949-231	0.24	0.08	0.25	0.07	31.95

284	UPJTB-02/02	8	10	2	Felsic Tuff with Hematite	G4949-232	0.2	0.08	0.54	0.05	23.45
285	UPJTB-02/03	10	12	2	Felsic Tuff with Hematite	G4949-233	0.35	0.08	0.33	0.07	25.01
286	UPJTB-02/04	12	14	2	Felsic Tuff with Hematite	G4949-234	0.32	0.08	0.42	0.05	25.44
287	UPJTB-02/05	22	22.5	0.5	Massive Iron ore	G4949-235	0.05	0.08	0.48	0.05	14.95
288	UPJTB-02/06	23	24	1.5	Tuff with Hematite	G4949-236	0.38	0.08	0.5	0.06	22.62
289	UPJTB-02/07	24	25	1	Tuff with Hematite	G4949-237	0.21	0.08	0.65	0.06	22.08
290	UPJTB-02/08	33	35	2	Massive Iron ore	G4949-238	0.18	0.08	0.31	0.05	36.16
291	UPJTB-02/09	35	36	1	Massive Iron ore	G4949-239	0.05	0.08	0.1	0.05	35.7
292	UPJTB-02/10	36	37	1	Massive Iron ore	G4949-240	0.05	0.08	0.15	0.06	33.3
293	UPJTB-02/11	37	38	1	Massive Iron ore	G4949-241	0.13	0.08	0.18	0.05	49
294	UPJTB-02/12	38	39	1	Massive Iron ore	G4949-242	0.11	0.08	0.11	0.06	27.38
295	UPJTB-02/13	39	40	1	Massive Iron ore	G4949-243	0.05	0.08	0.13	0.05	37.17
296	UPJTB-02/14	40	41	1	Massive Iron ore	G4949-244	0.05	0.08	0.33	0.05	29
297	UPJTB-02/15	41	43	2	Felsic Tuff with Hematite	G4949-245	0.14	0.08	0.47	0.05	28.99
298	UPJTB-02/16	43	45	2	Felsic Tuff with Hematite	G4949-246	0.08	0.08	0.45	0.06	29.32
299	UPJTB-02/17	45	46	1	Massive Iron ore	G4949-247	0.71	0.08	0.12	0.07	46.1
300	UPJTB-02/18	46	46.4	0.44	Massive Iron ore	G4949-248	0.19	0.08	0.13	0.07	46.71
301	UPJTB-02/19	46	48.5	2.06	Felsic Tuff with Hematite	G4949-249	0.08	0.08	0.33	0.05	39.79

302	UPJTB-02/20	49	51.7	2.68	Felsic Tuff with Hematite	G4949-250	0.12	0.08	0.39	0.05	34.54
303	UPJTB-02/21	52	52.5	0.82	Felsic Tuff with Hematite	G4949-251	0.36	0.08	0.37	0.05	33.06
304	UPJTB-02/22	53	53.1	0.64	Felsic Tuff with Hematite	G4949-252	0.05	0.08	0.41	0.05	35.05
305	UPJTB-02/23	56	60	4	Felsic Tuff with Hematite	G4949-253	0.05	0.08	0.37	0.05	34.37
306	UPJTB-02/24	73	74	1.5	Felsic Tuff with Hematite	G4949-254	0.36	0.08	0.19	0.05	31.19
307	UPJTB-02/25	75	76.5	1.5	Felsic Tuff with Hematite	G4949-255	0.05	0.08	0.26	0.05	32.94
308	UPJTB-02/26	77	78	1.5	Felsic Tuff with Hematite	G4949-256	0.06	0.08	0.32	0.05	32.4
309	UPJTB-02/27	78	80	2	Felsic Tuff	G4949-257	0.07	0.08	0.33	0.05	42.66
						METHOD	SOP/OM/105	SOP/OM/105	SOP/OM/105		
						DL	0.05	0.05	0.05		
						UNITS	%	%	%		
S.no.	Sample Id	From(m)	To(m)	Sample Length(m)	Lithology	Lab ID	TiO2	V2O5	LOI		
1	UPCKB-01/01	10	1 1	1	BHC&J	G4949-1	0.42	<0.05	4.35		
2	UPCKB-01/02	11	12	1	BHC&J	G4949-2	0.13	<0.05	1.5		
3	UPCKB-01/03	12	13	1	BHC&J	G4949-3	0.25	<0.05	2.56		
4	UPCKB-01/04	13	14	1	BHC&J	G4949-4	0.07	<0.05	1.31		
5	UPCKB-01/05	14	15	1	BHC&J	G4949-5	0.18	<0.05	1.78		

6	UPCKB-01/06	15	17.8	2.8	Ferruginous Phyllite	G4949-6	0.3	<0.05	2.34		
7	UPCKB-01/07	18	20	1.82	Ferruginous Phyllite	G4949-7	0.25	<0.05	1.68		
8	UPCKB-01/08	20	22	2	Ferruginous Phyllite	G4949-8	0.37	<0.05	3.06		
9	UPCKB-01/09	22	23	1	BHC&J	G4949-9	0.22	<0.05	3.45		
10	UPCKB-01/10	23	24	1	BHC&J	G4949-10	0.37	<0.05	3.85		
11	UPCKB-01/11	24	25	1	BHC&J	G4949-11	0.15	<0.05	2.37		
12	UPCKB-01/12	25	26	1	BHC&J	G4949-12	0.28	<0.05	3.01		
13	UPCKB-01/13	26	28	2	Ferruginous Phyllite	G4949-13	0.44	<0.05	4.42		
14	UPCKB-01/14	28	29	1	BHC&J	G4949-14	0.25	<0.05	2.79		
15	UPCKB-01/15	29	30	1	BHC&J	G4949-15	0.21	<0.05	2.05		
16	UPCKB-01/16	30	31	1	BHC&J	G4949-16	0.21	<0.05	3.89		
17	UPCKB-01/17	31	32	1	BHC&J	G4949-17	0.16	<0.05	3.83		
18	UPCKB-01/18	32	35	3	Ferruginous Phyllite	G4949-18	0.41	<0.05	3.98		
19	UPCKB-01/19	35	36	1	BHC&J	G4949-19	0.09	<0.05	1.21		
20	UPCKB-01/20	36	37	1	BHC&J	G4949-20	0.13	<0.05	1.22		
21	UPCKB-01/21	37	42	5	Ferruginous Phyllite	G4949-21	0.39	<0.05	3.61		
22	UPCKB-01/22	42	43	1	BHC&J	G4949-22	0.36	<0.05	2.35		
23	UPCKB-01/23	43	47	4	Ferruginous Phyllite	G4949-23	0.74	<0.05	4.12		
24	UPCKB-01/24	47	48	1	BHC&J	G4949-24	0.24	<0.05	2.39		
25	UPCKB-01/25	48	56	8	Ferruginous Phyllite	G4949-25	3.5	974	11.35		
26	UPCKB-01/26	75	76	1	BHC&J	G4949-26	0.7	<0.05	3.43		

27	UPCKB-01/27	76	77	1	BHC&J	G4949-27	0.36	<0.05	1.86		
28	UPCKB-01/28	77	78	1	BHC&J	G4949-28	0.37	<0.05	2.78		
29	UPCKB-01/29	78	79	1	Ferruginous Phyllite	G4949-29	2.29	547	9.16		
30	UPCKB-01/30	79	80	1	BHC&J	G4949-30	0.82	<0.05	5.05		
31	UPCKB-01/31	82	83	1	BHC&J	G4949-31	0.61	<0.05	4.17		
32	UPCKB-01/32	83	84	1	BHC&J	G4949-32	0.66	<0.05	4.35		
33	UPCKB-01/33	84	85	1	BHC&J	G4949-33	1.31	<0.05	7.07		
34	UPCKB-01/34	85	86	1	Ferruginous Phyllite	G4949-34	1.56	<0.05	8.83		
35	UPCKB-01/35	86	87	1	BHC&J	G4949-35	0.32	<0.05	4.2		
36	UPCKB-01/36	87	88	1	BHC&J	G4949-36	0.4	<0.05	4.27		
37	UPCKB-01/37	88	89	1	Ferruginous Phyllite	G4949-37	2.4	813	9.48		
38	UPCKB-01/38	89	90	1	BHC&J	G4949-38	0.51	<0.05	3.74		
39	UPCKB-01/39	90	91	1	BHC&J	G4949-39	0.43	<0.05	6.12		
40	UPCKB-01/40	91	93	2	Ferruginous Phyllite	G4949-40	2.14	626	8.5		
41	UPCKB-01/41	93	94	1	BHC&J	G4949-41	0.17	<0.05	2.63		
42	UPCKB-01/42	94	95	1	BHC&J	G4949-42	0.21	<0.05	4.06		
43	UPCKB-01/43	95	96	1	BHC&J	G4949-43	0.43	<0.05	5.69		
44	UPCKB-01/44	96	97	1	BHC&J	G4949-44	0.13	<0.05	2.66		
45	UPCKB-01/45	97	98	1	BHC&J	G4949-45	0.18	<0.05	2.1		
46	UPCKB-01/46	98	99	1	BHC&J	G4949-46	0.36	<0.05	2.43		
47	UPCKB-01/47	99	100	1	BHC&J	G4949-47	0.28	<0.05	4.5		

48	UPCKB-01/48	100	101	1	BHC&J	G4949-48	0.25	<0.05	2.69		
49	UPCKB-01/49	101	102	1	BHC&J	G4949-49	0.32	<0.05	4.99		
50	UPCKB-01/50	102	103	1	Tuff	G4949-50	0.56	<0.05	3.11		
51	UPCKB-01/51	103	104	1	BHC&J	G4949-51	0.3	<0.05	3.57		
52	UPCKB-01/52	104	105	1	BHC&J	G4949-52	0.18	<0.05	6.13		
53	UPCKB-01/53	105	108	3	Ferruginous Phyllite	G4949-53	0.45	<0.05	4.92		
54	UPCKB-01/54	108	109	1	BHC&J	G4949-54	0.06	<0.05	3.16		
55	UPCKB-01/55	109	111	2	Tuff	G4949-55	1.8	500	6.81		
56	UPCKB-01/56	111	112	1	BHC&J	G4949-56	0.12	<0.05	2.9		
57	UPCKB-01/57	112	114	2	BHC&J	G4949-57	0.31	<0.05	5.79		
58	UPCKB-01/58	114	115	1	BHC&J	G4949-58	0.1	<0.05	1.43		
59	UPCKB-01/59	115	116	1	BHC&J	G4949-59	0.41	<0.05	3.78		
60	UPCKB-01/60	116	117	1	Ferruginous Phyllite	G4949-60	0.32	<0.05	3.91		
61	UPCKB-02/01	2	3	1	BHC&J	G4949-61	0.39	<0.05	4.65		
62	UPCKB-02/02	3	4	1	BHC&J	G4949-62	0.32	<0.05	4.7		
63	UPCKB-02/03	4	5	1	BHC&J	G4949-63	0.17	<0.05	3.63		
64	UPCKB-02/04	5	6	1	BHC&J	G4949-64	0.53	<0.05	5.43		
65	UPCKB-02/05	6	7	1	BHC&J	G4949-65	0.43	<0.05	3.06		
66	UPCKB-02/06	7	8	1	BHC&J	G4949-66	0.54	<0.05	6.69		
67	UPCKB-02/07	8	9.2	1.2	BHC&J	G4949-67	0.39	<0.05	7.16		
68	UPCKB-02/08	10	10.8	0.8	BHC&J	G4949-68	0.5	<0.05	6.56		

69	UPCKB-02/09	14	15	1.2	BHC&J	G4949-69	0.28	<0.05	4.44		
70	UPCKB-02/10	19	20	1	BHC&J	G4949-70	0.36	<0.05	7.57		
71	UPCKB-02/11	20	22	2	Ferruginous Phyllite	G4949-71	2.74	731	9.77		
72	UPCKB-02/12	22	23	1	BHC&J	G4949-72	0.09	<0.05	4.94		
73	UPCKB-02/13	23	24	1	BHC&J	G4949-73	0.26	<0.05	6.93		
74	UPCKB-02/14	24	26	2	Ferruginous Phyllite	G4949-74	2.67	783	9.88		
75	UPCKB-02/15	26	28	2	Ferruginous Phyllite	G4949-75	0.68	<0.05	9.64		
76	UPCKB-02/16	48	49	1	Ferruginous Phyllite	G4949-76	2	512	11.27		
77	UPCKB-02/17	49	50	1	BHC&J	G4949-77	0.34	<0.05	6.29		
78	UPCKB-02/18	50	51	1	BHC&J	G4949-78	0.2	<0.05	4.78		
79	UPCKB-02/19	51	52	1	BHC&J	G4949-79	0.31	<0.05	5.38		
80	UPCKB-02/20	52	53	1	Ferruginous Phyllite	G4949-80	1.13	<0.05	7.2		
81	UPCKB-02/21	53	54	1	BHC&J	G4949-81	0.36	<0.05	5.92		
82	UPCKB-02/22	54	55	1	BHC&J	G4949-82	0.51	<0.05	4.1		
83	UPCKB-02/23	55	57.5	2.45	Ferruginous Phyllite	G4949-83	1.88	<0.05	6.95		
84	UPCKB-02/24	57	59.5	2	BHC&J	G4949-84	0.48	<0.05	4.48		
85	UPCKB-02/25	60	61	1	BHC&J	G4949-85	1.05	<0.05	6.44		
86	UPCKB-02/26	61	62	1	BHC&J	G4949-86	1.14	<0.05	5.8		
87	UPCKB-02/27	62	63	1	BHC&J	G4949-87	0.99	<0.05	4.94		
88	UPCKB-02/28	63	64	1	BHC&J	G4949-88	0.86	<0.05	5.59		
89	UPCKB-02/29	64	65	1	BHC&J	G4949-89	0.32	<0.05	2.58		

90	UPCKB-02/30	65	67	2	BHC&J with Phyllite	G4949-90	1.15	<0.05	1.39		
91	UPCKB-02/31	67	69	2	BHC&J with Phyllite	G4949-91	1.15	<0.05	1.25		
92	UPCKB-02/32	69	71	2	BHC&J with Phyllite	G4949-92	0.66	<0.05	0.94		
93	UPCKB-02/33	71	73	2	BHC&J with Phyllite	G4949-93	0.37	<0.05	0.15		
94	UPCKB-02/34	73	75	2	BHC&J with Phyllite	G4949-94	0.61	<0.05	0.51		
95	UPCKB-02/35	75	77	2	BHC&J with Phyllite	G4949-95	0.97	<0.05	1.69		
96	UPCKB-02/36	77	79	2	BHC&J with Phyllite	G4949-96	1.53	<0.05	2.12		
97	UPCKB-02/37	79	80	1	BHC&J with Phyllite	G4949-97	0.62	<0.05	0.1		
98	UPCKB-02/38	80	84	4	Ferruginous Phyllite	G4949-98	1.77	<0.05	3.26		
99	UPCKB-02/39	84	89	5	Ferruginous Phyllite	G4949-99	1.17	<0.05	10.25		
100	UPCKB-03/01	1	3	2	BMC&J	G4931-1	0.36	<0.05	6.62		
101	UPCKB-03/02	3	4	1	BMC&J	G4931-2	0.36	<0.05	7.37		
102	UPCKB-03/03	4	5	1	BMC&J	G4931-3	0.25	<0.05	6.4		
103	UPCKB-03/04	5	6	1	BMC&J	G4931-4	0.45	<0.05	7.83		
104	UPCKB-03/05	6	7	1	BMC&J	G4931-5	0.45	<0.05	7.72		
105	UPCKB-03/06	7	8	1	BMC&J	G4931-6	0.43	<0.05	7.48		
106	UPCKB-03/07	8	9	1	BMC&J	G4931-7	0.33	<0.05	6.18		

107	UPCKB-03/08	9	10	1	BMC&J	G4931-8	0.29	<0.05	6.44		
108	UPCKB-03/09	10	12	2	BMC&J	G4931-9	0.24	<0.05	4.75		
109	UPCKB-03/10	12	14	2	BMC&J	G4931-10	0.27	<0.05	6.59		
110	UPCKB-03/11	14	15	1	BMC&J	G4931-11	0.29	<0.05	6.2		
111	UPCKB-03/12	15	16	1	BMC&J	G4931-12	0.06	<0.05	5.79		
112	UPCKB-03/13	16	18	2	BMC&J	G4931-13	0.32	<0.05	5.98		
113	UPCKB-03/14	18	19	1	BMC&J	G4931-14	0.27	<0.05	6.16		
114	UPCKB-03/15	19	20	1	BMC&J	G4931-15	0.18	<0.05	4.66		
115	UPCKB-03/16	20	21	1	BMC&J	G4931-16	0.13	<0.05	5.02		
116	UPCKB-03/17	21	22	1	BMC&J	G4931-17	0.28	<0.05	4.55		
117	UPCKB-03/18	22	23	1	BMC&J	G4931-18	0.28	<0.05	5.14		
118	UPCKB-03/19	23	24	1	BMC&J	G4931-19	0.2	<0.05	5.3		
119	UPCKB-03/20	24	25	1	BMC&J	G4931-20	0.22	<0.05	5.62		
120	UPCKB-03/21	25	26	1	BMC&J	G4931-21	0.49	<0.05	4.89		
121	UPCKB-03/22	26	27	1	BMC&J	G4931-22	0.92	<0.05	4.97		
122	UPCKB-03/23	27	28	1	BMC&J	G4931-23	0.76	<0.05	4.44		
123	UPCKB-03/24	28	29	1	BMC&J	G4931-24	0.43	<0.05	3.61		
124	UPCKB-03/25	29	30	1	BMC&J	G4931-25	0.58	<0.05	4.75		
125	UPCKB-03/26	30	31	1	BMC&J	G4931-26	0.67	<0.05	7.7		
126	UPCKB-03/27	31	32	1	BMC&J	G4931-27	0.63	<0.05	7.09		
127	UPCKB-03/28	32	33	1	BMC&J	G4931-28	0.4	<0.05	6.47		

128	UPCKB-03/29	33	34	1	BMC&J	G4931-29	0.93	<0.05	7.4		
129	UPCKB-03/30	34	36	2	BHC&J	G4931-30	1.37	<0.05	7.63		
130	UPCKB-03/31	36	38	2	BHC&J	G4931-31	1.35	<0.05	7.57		
131	UPCKB-03/32	56	57	1	BHC&J	G4931-32	1.38	<0.05	5.98		
132	UPCKB-03/33	57	58	1	BHC&J	G4931-33	1.82	<0.05	5		
133	UPCKB-03/34	58	59	1	BHC&J	G4931-34	2.24	<0.05	5.14		
134	UPCKB-03/35	59	60	1	BHC&J	G4931-35	2.15	<0.05	5.08		
135	UPCKB-03/36	60	61	1	BHC&J	G4931-36	2.07	<0.05	4.9		
136	UPCKB-03/37	61	62	1	BHC&J	G4931-37	1.64	<0.05	5.87		
137	UPCKB-03/38	62	63	1	BHC&J	G4931-38	1.44	<0.05	2.73		
138	UPCKB-03/39	63	64	1	BHC&J	G4931-39	1.48	<0.05	2.73		
139	UPCKB-03/40	64	65	1	BHC&J	G4931-40	1.44	<0.05	3.03		
140	UPCKB-03/41	65	66	1	BHC&J	G4931-41	2	<0.05	3.86		
141	UPCKB-03/42	66	67	1	BHC&J	G4931-42	1.48	<0.05	3.1		
142	UPCKB-03/43	67	68	1	BHC&J	G4931-43	2.09	<0.05	4.23		
143	UPCKB-03/44	79	80	1	BHC&J	G4931-44	4.5	856	4.76		
144	UPCKB-03/45	80	81	1	BHC&J	G4931-45	0.59	<0.05	3.17		
145	UPCKB-03/46	81	82	1	BHC&J	G4931-46	0.46	<0.05	2.78		
146	UPCKB-03/47	82	83	1	BHC&J	G4931-47	1.37	<0.05	4.68		
147	UPCKB-03/48	92	93	1	BHC&J	G4931-48	1.54	<0.05	5.8		
148	UPCKB-03/49	93	94	1	BHC&J	G4931-49	1.16	<0.05	4.05		

149	UPCKB-03/50	94	95	1	BHC&J	G4931-50	0.9	<0.05	3.34		
150	UPCKB-03/51	95	96	1	BHC&J	G4931-51	0.96	<0.05	5.55		
151	UPCKB-03/52	96	97	1	BHC&J	G4931-52	0.96	<0.05	5.9		
152	UPCKB-04/01	0	2	2	Ferruginous Phyllite	G4949-100	2.09	<0.05	9.64		
153	UPCKB-04/02	2	4	2	Ferruginous Phyllite	G4949-101	2.09	671	10.92		
154	UPCKB-04/03	20	20	0.5	BMC&J	G4949-102	0.26	<0.05	3.52		
155	UPCKB-04/04	20	23	3	Ferruginous Phyllite	G4949-103	1.75	<0.05	7.67		
156	UPCKB-04/05	23	24	1	BMC&J	G4949-104	0.31	<0.05	4.39		
157	UPCKB-04/06	24	25	1	BMC&J	G4949-105	0.15	<0.05	5.7		
158	UPCKB-04/07	25	26	1	BMC&J	G4949-106	0.07	<0.05	3.52		
159	UPCKB-04/08	26	27	1	BMC&J	G4949-107	0.05	<0.05	5.02		
160	UPCKB-04/09	27	28	1	BMC&J	G4949-108	0.26	<0.05	2.79		
161	UPCKB-04/10	28	29	1	BMC&J	G4949-109	0.3	<0.05	2.71		
162	UPCKB-04/11	29	30	1	BMC&J	G4949-110	0.33	<0.05	2.92		
163	UPCKB-04/12	46	47	1	BMC&J	G4949-111	0.14	<0.05	0.74		
164	UPCKB-04/13	47	48	1	BMC&J	G4949-112	0.1	<0.05	1.72		
165	UPCKB-04/14	48	49	1	BMC&J	G4949-113	0.12	<0.05	1.21		
166	UPCKB-04/15	49	50	1	BMC&J	G4949-114	0.18	<0.05	3.02		
167	UPCKB-04/16	50	51	1	BMC&J	G4949-115	0.26	<0.05	3.37		
168	UPCKB-04/17	51	52	1	BMC&J	G4949-116	0.16	<0.05	4.83		
169	UPCKB-04/18	52	53	1	BMC&J	G4949-117	0.21	<0.05	6.34		

170	UPCKB-04/19	53	54	1	BMC&J	G4949-118	0.13	<0.05	3.24		
171	UPCKB-04/20	54	55	1	BMC&J	G4949-119	0.19	<0.05	4.5		
172	UPCKB-04/21	55	56	1	BMC&J	G4949-120	0.52	<0.05	8.47		
173	UPCKB-04/22	56	57	1	BMC&J	G4949-121	0.23	<0.05	7.35		
174	UPCKB-04/23	57	58	1	BMC&J	G4949-122	0.35	<0.05	7.21		
175	UPCKB-04/24	58	59	1	BMC&J	G4949-123	0.4	<0.05	6.39		
176	UPCKB-04/25	59	60	1	BMC&J	G4949-124	0.54	<0.05	9.4		
177	UPCKB-04/26	60	61	1	BMC&J	G4949-125	0.46	<0.05	9.36		
178	UPCKB-04/27	61	62	1	BMC&J	G4949-126	0.16	<0.05	6.6		
179	UPCKB-04/28	62	63	1	BMC&J	G4949-127	0.38	<0.05	7.96		
180	UPCKB-04/29	63	64	1	BMC&J	G4949-128	0.22	<0.05	6.17		
181	UPCKB-04/30	64	65	1	BMC&J	G4949-129	0.37	<0.05	6.48		
182	UPCKB-04/31	65	66	1	BMC&J	G4949-130	0.38	<0.05	7.69		
183	UPCKB-04/32	66	67	1	BMC&J	G4949-131	0.68	<0.05	9.09		
184	UPCKB-04/33	67	68	1	BMC&J	G4949-132	0.39	<0.05	6.86		
185	UPCKB-04/34	68	69	1	BMC&J	G4949-133	0.19	<0.05	5.15		
186	UPCKB-04/35	69	70	1	BMC&J	G4949-134	0.47	<0.05	7.85		
187	UPCKB-04/36	70	72	2	Ferruginous Phyllite	G4949-135	1.78	<0.05	7.62		
188	UPCKB-04/37	72	73	1	BMC&J	G4949-136	0.26	<0.05	5.83		
189	UPCKB-04/38	73	74	1	BMC&J	G4949-137	0.34	<0.05	8.44		
190	UPCKB-04/39	74	75	1	BMC&J	G4949-138	0.71	<0.05	10.03		

191	UPCKB-04/40	75	76	1	BMC&J	G4949-139	0.76	<0.05	8.18		
192	UPCKB-04/41	76	77	1	BMC&J	G4949-140	0.55	<0.05	9.81		
193	UPCKB-04/42	77	80	3	Ferruginous Phyllite	G4949-141	1.29	<0.05	7.55		
194	UPCKB-05/01	9	10	1	BHC&J	G4949-142	0.07	<0.05	5		
195	UPCKB-05/02	21	22	1	BHC&J	G4949-143	0.09	<0.05	0.83		
196	UPCKB-05/03	22	23	1	BHC&J	G4949-144	0.12	<0.05	0.66		
197	UPCKB-05/04	23	24	1	BHC&J	G4949-145	5.45	2310	0.8		
198	UPCKB-05/05	25	26	1	BHC&J	G4949-146	0.38	<0.05	4.14		
199	UPCKB-05/06	26	27	1	BHC&J	G4949-147	0.5	<0.05	7.89		
200	UPCKB-05/07	27	28	1	BHC&J	G4949-148	0.41	<0.05	6.32		
201	UPCKB-05/08	28	29	1	BHC&J	G4949-149	0.34	<0.05	5.81		
202	UPCKB-05/09	29	30	1	BHC&J	G4949-150	0.29	<0.05	4.42		
203	UPCKB-05/10	30	31	1	BHC&J	G4949-151	0.27	<0.05	3.78		
204	UPCKB-05/11	31	32	1	BHC&J	G4949-152	0.26	<0.05	3.02		
205	UPCKB-05/12	32	33	1	BHC&J	G4949-153	0.31	<0.05	4.27		
206	UPCKB-05/13	33	34	1	BHC&J	G4949-154	0.2	<0.05	4.32		
207	UPCKB-05/14	34	35	1	BHC&J	G4949-155	0.59	<0.05	10.38		
208	UPCKB-05/15	35	36	1	BHC&J	G4949-156	0.05	<0.05	3.11		
209	UPCKB-05/16	36	37	1	BHC&J	G4949-157	0.31	<0.05	6.03		
210	UPCKB-05/17	37	38	1	BHC&J	G4949-158	0.09	<0.05	8.13		
211	UPCKB-05/18	38	39	1	BHC&J	G4949-159	0.23	<0.05	7.63		

212	UPCKB-05/19	39	40	1	BHC&J	G4949-160	0.29	<0.05	4.99		
213	UPCKB-05/20	40	41	1	BHC&J	G4949-161	0.29	<0.05	4.69		
214	UPCKB-05/21	41	42	1	BHC&J	G4949-162	0.2	<0.05	3.25		
215	UPCKB-05/22	42	43	1	BHC&J	G4949-163	0.23	<0.05	3.78		
216	UPCKB-05/23	43	44	1	BHC&J	G4949-164	0.37	<0.05	4.75		
217	UPCKB-05/24	44	45	1	BHC&J	G4949-165	0.46	<0.05	3.12		
218	UPCKB-05/25	45	46	1	BHC&J	G4949-166	0.39	<0.05	3.03		
219	UPCKB-05/26	46	47	1	BHC&J	G4949-167	0.41	<0.05	3.61		
220	UPCKB-05/27	47	48	1	BHC&J	G4949-168	0.5	<0.05	3.58		
221	UPCKB-05/28	48	49	1	BHC&J	G4949-169	0.39	<0.05	3.32		
222	UPCKB-05/29	49	50	1	BHC&J	G4949-170	0.43	<0.05	3.23		
223	UPCKB-05/30	50	51	1	BMC&J	G4949-171	0.36	<0.05	0.76		
224	UPCKB-05/31	51	52	1	BMC&J	G4949-172	0.28	<0.05	0.14		
225	UPCKB-05/32	52	53	1	BMC&J	G4949-173	2.07	<0.05	0.92		
226	UPCKB-05/33	53	54	1	BMC&J	G4949-174	0.1	<0.05	0.1		
227	UPCKB-05/34	54	55	1	BMC&J	G4949-175	0.06	<0.05	0.1		
228	UPCKB-05/35	55	56	1	BMC&J	G4949-176	0.06	<0.05	0.1		
229	UPCKB-05/36	56	57	1	BMC&J	G4949-177	0.05	<0.05	0.1		
230	UPCKB-05/37	57	58	1	BMC&J	G4949-178	0.05	<0.05	0.1		
231	UPCKB-05/38	58	59	1	BMC&J	G4949-179	0.05	<0.05	0.1		
232	UPCKB-06/01	0	2.5	2.5	BHC&J	G4949-180	1.16	<0.05	10.2		

233	UPCKB-06/02	8	9	1	BMC&J	G4949-181	0.07	<0.05	2.91		
234	UPCKB-06/03	15	16	1	BMC&J	G4949-182	0.08	<0.05	3.86		
235	UPCKB-06/04	16	17	1	BMC&J	G4949-183	0.06	<0.05	4.61		
236	UPCKB-06/05	17	18	1	BMC&J	G4949-184	0.07	<0.05	5.57		
237	UPCKB-06/06	18	19	1	BMC&J	G4949-185	0.17	<0.05	7.67		
238	UPCKB-06/07	19	20	1	BMC&J	G4949-186	0.15	<0.05	5.39		
239	UPCKB-06/08	20	21	1	BMC&J	G4949-187	0.1	<0.05	5.9		
240	UPCKB-06/09	21	22	1	BMC&J	G4949-188	0.05	<0.05	0.96		
241	UPCKB-06/10	22	23	1	BMC&J	G4949-189	0.05	<0.05	2.65		
242	UPCKB-06/11	23	24	1	BMC&J	G4949-190	0.05	<0.05	1.31		
243	UPCKB-06/12	24	25	1	BMC&J	G4949-191	0.05	<0.05	1.52		
244	UPCKB-06/13	25	26	1	BMC&J	G4949-192	0.09	<0.05	2.54		
245	UPCKB-06/14	26	27	1	BMC&J	G4949-193	0.05	<0.05	1.58		
246	UPCKB-06/15	27	28	1	BMC&J	G4949-194	0.05	<0.05	1.14		
247	UPCKB-06/16	28	29	1	BMC&J	G4949-195	0.05	<0.05	2.91		
248	UPCKB-06/17	29	30	1	BMC&J	G4949-196	0.7	<0.05	9.17		
249	UPJTB-01/01	1	2	1	BQ with Iron Matrix	G4949-197	0.06	0.05	1.22		
250	UPJTB-01/02	2	3	1	BQ with Iron Matrix	G4949-198	0.06	0.05	1.84		
251	UPJTB-01/03	3	4	1	BQ with Iron Matrix	G4949-199	0.05	0.05	1.8		

252	UPJTB-01/04	4	5	1	BQ with Iron Matrix	G4949-200	0.05	0.05	1.64		
253	UPJTB-01/05	5	6	1	BQ with Iron Matrix	G4949-201	0.05	0.05	2.08		
254	UPJTB-01/06	6	7	1	BQ with Iron Matrix	G4949-202	0.05	0.05	2.21		
255	UPJTB-01/07	7	8	1	BQ with Iron Matrix	G4949-203	0.05	0.05	2.64		
256	UPJTB-01/08	8	9	1	BQ with Iron Matrix	G4949-204	0.05	0.05	2.16		
257	UPJTB-01/09	9	10	1	BQ with Iron Matrix	G4949-205	0.05	0.05	2.02		
258	UPJTB-01/10	10	11	1	BQ with Iron Matrix	G4949-206	0.05	0.05	2.39		
259	UPJTB-01/11	11	12	1	BQ with Iron Matrix	G4949-207	0.05	0.05	2.32		
260	UPJTB-01/12	12	13	1	BQ with Iron Matrix	G4949-208	0.05	0.05	2.8		
261	UPJTB-01/13	13	14	1	BQ with Iron Matrix	G4949-209	0.06	0.05	2.95		
262	UPJTB-01/14	14	15	1	BQ with Iron Matrix	G4949-210	0.07	0.05	2.61		
263	UPJTB-01/15	15	16	1	BQ with Iron Matrix	G4949-211	0.06	0.05	2.13		
264	UPJTB-01/16	16	17	1	BQ with Iron Matrix	G4949-212	0.07	0.05	4.51		
265	UPJTB-01/17	17	18	1	BQ with Iron Matrix	G4949-213	0.06	0.05	8.41		

266	UPJTB-01/18	18	19	1	BQ with Iron Matrix	G4949-214	0.11	0.05	7.09		
267	UPJTB-01/19	19	20	1	Massive Iron Ore	G4949-215	0.17	0.05	8.74		
268	UPJTB-01/20	20	21	1	Massive Iron Ore	G4949-216	0.16	0.05	10.65		
269	UPJTB-01/21	21	22	1	Massive Iron Ore	G4949-217	0.12	0.05	12.15		
270	UPJTB-01/22	22	23	1	Massive Iron Ore	G4949-218	0.07	0.05	12.18		
271	UPJTB-01/23	23	24	1	Massive Iron Ore	G4949-219	0.14	0.05	12.3		
272	UPJTB-01/24	24	25	1	Massive Iron Ore	G4949-220	0.07	0.05	11.89		
273	UPJTB-01/25	25	30	5	Tuff with Phyllite	G4949-221	0.19	0.05	11.8		
274	UPJTB-01/26	25	30	5	Tuff with Phyllite	G4949-222	4.17	0.07	8.98		
275	UPJTB-01/27	30	35	5	Tuff with Phyllite	G4949-223	5.67	0.09	10.1		
276	UPJTB-01/28	37	38	1	Massive Iron Ore	G4949-224	3.44	0.09	12.76		
277	UPJTB-01/29	38	39	1	Massive Iron Ore	G4949-225	2.4	0.05	12.05		
278	UPJTB-01/30	39	40	1	Massive Iron Ore	G4949-226	1.9	0.05	12.1		
279	UPJTB-01/31	40	41	1	Massive Iron Ore	G4949-227	1.77	0.05	12.06		
280	UPJTB-01/32	41	42	1	Massive Iron Ore	G4949-228	1.4	0.05	11.78		
281	UPJTB-01/33	42	46	4	Tuff	G4949-229	4.17	0.09	6.12		
282	UPJTB-01/34	46	50	4	Tuff	G4949-230	5.45	0.15	4.74		
283	UPJTB-02/01	6	8	2	Felsic Tuff with Hematite	G4949-231	7.09	0.12	9.03		
284	UPJTB-02/02	8	10	2	Felsic Tuff with Hematite	G4949-232	7.68	0.13	10.02		

285	UPJTB-02/03	10	12	2	Felsic Tuff with Hematite	G4949-233	7.91	0.14	9.07		
286	UPJTB-02/04	12	14	2	Felsic Tuff with Hematite	G4949-234	6.54	0.19	8.73		
287	UPJTB-02/05	22	22.5	0.5	Massive Iron ore	G4949-235	4.34	0.06	9.44		
288	UPJTB-02/06	23	24	1.5	Tuff with Hematite	G4949-236	7.54	0.13	7.41		
289	UPJTB-02/07	24	25	1	Tuff with Hematite	G4949-237	10.11	0.16	10.21		
290	UPJTB-02/08	33	35	2	Massive Iron ore	G4949-238	6.77	0.12	7.79		
291	UPJTB-02/09	35	36	1	Massive Iron ore	G4949-239	3.94	0.08	5.38		
292	UPJTB-02/10	36	37	1	Massive Iron ore	G4949-240	4.34	0.06	5.43		
293	UPJTB-02/11	37	38	1	Massive Iron ore	G4949-241	3.85	0.06	5.68		
294	UPJTB-02/12	38	39	1	Massive Iron ore	G4949-242	4.64	0.06	6.96		
295	UPJTB-02/13	39	40	1	Massive Iron ore	G4949-243	3.25	0.05	5.55		
296	UPJTB-02/14	40	41	1	Massive Iron ore	G4949-244	4.82	0.09	8.33		
297	UPJTB-02/15	41	43	2	Felsic Tuff with Hematite	G4949-245	7.71	0.14	8.01		
298	UPJTB-02/16	43	45	2	Felsic Tuff with Hematite	G4949-246	8.87	0.15	8.31		
299	UPJTB-02/17	45	46	1	Massive Iron ore	G4949-247	4.62	0.08	4.4		
300	UPJTB-02/18	46	46.4	0.44	Massive Iron ore	G4949-248	4.69	0.1	4.08		
301	UPJTB-02/19	46	48.5	2.06	Felsic Tuff with Hematite	G4949-249	7.82	0.14	6.39		
302	UPJTB-02/20	49	51.7	2.68	Felsic Tuff with Hematite	G4949-250	7.71	0.13	7.03		

303	UPJTB-02/21	52	52.5	0.82	Felsic Tuff with Hematite	G4949-251	6.96	0.14	6.55		
304	UPJTB-02/22	53	53.1	0.64	Felsic Tuff with Hematite	G4949-252	7.44	0.15	7.3		
305	UPJTB-02/23	56	60	4	Felsic Tuff with Hematite	G4949-253	6.74	0.14	7.44		
306	UPJTB-02/24	73	74	1.5	Felsic Tuff with Hematite	G4949-254	9.19	0.15	9.06		
307	UPJTB-02/25	75	76.5	1.5	Felsic Tuff with Hematite	G4949-255	4.82	0.08	6.38		
308	UPJTB-02/26	77	78	1.5	Felsic Tuff with Hematite	G4949-256	5.82	0.12	6.74		
309	UPJTB-02/27	78	80	2	Felsic Tuff	G4949-257	6.69	0.1	7.35		

23.8 Annexure VIII: Bulk density results of core samples Block A1 & A2

Sl. No.	Customer Code	Latitude	Longitude	Sample Description	Depth (m)	Method	SOP/OM/094
						Units	gm/cm3
						Lab ID	Bulk Density
1	UPCKB-01/BD/01	N24°33'03.3809"	E82°52'14.2664"	BHC&J	12	G4949-258	2.86
2	UPCKB-01/BD/02			BHC	30	G4949-259	2.92
3	UPCKB-01/BD/03			BHC	84	G4949-260	2.63
4	UPCKB-01/BD/04			BHC&J	94	G4949-261	2.49
5	UPCKB-02/BD/05	N24°33'16.4958"	E82°53'03.3443"	BHC	22	G4949-262	2.6
6	UPCKB-02/BD/06			BHC	49	G4949-263	3.12
7	UPCKB-03/BD/07	N24°33'26.4735"	E82°53'39.0172"	BMC&J	30	G4949-264	2.38
8	UPCKB-04/BD/08	N24°33'09.2571"	E82°52'12.3878"	BMC	28	G4949-265	3.4
9	UPCKB-04/BD/09			BHC	25	G4949-266	2.59
10	UPCKB-04/BD/10			BHC	48	G4949-267	2.56
11	UPCKB-04/BD/11			BHC&J	76	G4949-268	3.05
12	UPCKB-05/BD/12	N24°33'22.6162"	E82°53'01.6135"	BHC	27	G4949-269	2.74
13	UPCKB-05/BD/13			BHC&J	48	G4949-270	2.65
14	UPCKB-05/BD/14			BMC&J	52	G4949-271	3.32
15	UPCKB-05/BD/15			BMC&J	54	G4949-272	3.32
16	UPCKB-06/BD/16	N24°34'05.5200"	E82°55'55.8480"	BMC&J	17	G4949-273	3.71
17	UPJTB-01/BD/17	N24°31'14.4911"	E82°51'42.9014"	BHQ with Iron matrix	4	G4949-274	2.73
18	UPJTB-01/BD/18			Massive Iron Ore	16	G4949-275	3.5
19	UPJTB-02/BD/19	N24°30'28.5065"	N24°30'28.5065"	Massive Iron Ore	36	G4949-276	3.55
20	UPJTB-02/BD/20			Massive Iron Ore	45	G4949-277	3.06

23.9 Annexure IX: By fire assay method for precious metal results of core samples Block A1 & A2

Sl. No.	Lab ID	Customer Code	Latitude	Longitude	From	To	Lithology	Au (ppm)	Au (ppb)
1	G4949-278	UPCKB-01/PM/02	N24°33'03.3809"	E82°52'14.2664"	30	31	BHC	0.01	14
2	G4949-279	UPCKB-01/PM/03	N24°33'03.3809"	E82°52'14.2664"	42	43	BHC	<0.01	<10
3	G4949-280	UPCKB-01/PM/04	N24°33'03.3809"	E82°52'14.2664"	62	65	Dolerite	0.01	13
4	G4949-281	UPCKB-01/PM/05	N24°33'03.3809"	E82°52'14.2664"	65	70	Dolerite	0.01	11
5	G4949-282	UPCKB-02/PM/07	N24°33'16.4958"	E82°53'03.3443"	51	52	BHC	<0.01	<10
6	G4949-283	UPCKB-02/PM/08	N24°33'16.4958"	E82°53'03.3443"	82	83	BHC	<0.01	<10
7	G4949-284	UPCKB-02/PM/09	N24°33'16.4958"	E82°53'03.3443"	90	92	Dolerite	0.01	10
8	G4949-285	UPCKB-04/PM/11	E82°53'03.3443"	E82°52'12.3878"	61	62	BHC	<0.01	<10
9	G4949-286	UPCKB-05/PM/13	N24°33'22.6162"	E82°53'01.6135"	68	70	Dolerite	0.01	13
10	G4949-287	UPJTB-01/PM/16	N24°31'14.4911"	E82°51'42.9014"	15	16	BHQ with Iron Matrix	<0.01	<10

23.10 Annexure X: By AAS method for precious metal results of core samples Block A1 & A2

							Units	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)	ppm (mg/kg)
							LOQ	1	5	5	10	5	5	5	5	100
S.no.	Sample Id	Lithology	Latitude	Longitude	From	To	Lab ID	Ag	Ni	Co	Cr	Cu	Pb	Zn	V	Ti
1	UPCK/BRS-112/2024-25	BHC&J	24.55157	82.87049			G958-1	<0.01	36	45	73	126	20	133	274	<50
2	UPCK/BRS-113/2024-25	BHC&J	24.55157	82.87049			G958-2	0.08	201	60	348	210	29	157	260	<50
3	UPCK/BRS-114/2024-25	Dolerite	24.56012	82.89550			G958-3	<0.01	418	32	759	64	36	318	84	<50
4	UPCK/BRS-69/2024-25	Carbonated Metabasalt	24.51364	82.85782			G958-4	<0.01	335	74	686	83	7	138	263	97
5	UPCKB-01/PM/01	BHC	24.55094	82.87063	24	25	G4949-288	<1	24	11	64	20	6	33	46	1041
6	UPCKB-02/PM/06	BHC	24.55458	82.88426	49	50	G4949-289	<1	19	11	11	61	18	47	52	160
7	UPCKB-04/PM/10	BHC	24.55257	82.87011	48	49	G4949-290	<1	11	<5	<10	60	27	26	40	456
8	UPCKB-05/PM/12	Dolerite	24.55628	82.88378	63	65	G4949-291	<1	65	50	79	167	10	148	292	14407
9	UPCKB-06/PM/14	BMC	24.56820	82.93218	17	18	G4949-292	<1	18	16	21	<5	14	29	17	<100
10	UPJTB-01/PM/15	BHQ with Iron Matrix	24.52069	82.86192	7	8	G4949-293	<1	33	<5	90	10	<5	21	9	176

23.11 Annexure XI: Petrography report core samples

S.No.	Sample ID	Latitude	Longitude	From	To	Rock Type
1	UPCKB-01/CH/01	24.55094	82.87063	74	75	Ferruginous Phyllite
2	UPCKB-02/CH/02	24.55458	82.88426	50	51	Banded Hematite Chert & Jasper
3	UPCKB-06/CH/03	24.56820	82.93218	18	19	Banded Magnetite Chert & Jasper
4	UPCKB-05/CH/04	24.55628	82.88378	98	99	Dolerite
5	UPJTB-01/CH/04	24.52069	82.86192	17	18	Massive Iron

23.12 Annexure XII: Petrography Report –BRS & core samples

15 BRS samples & 05 Core Sample studies have been carried out at Petrology Laboratory of GSI, Bengaluru.

Petrography/mineralographic description of rocks:

23.12.1PETROGRAPHY/MINERALGRAPHIC DESCRIPTION OF BRS SAMPLE

I) Sample no. UPCK/BRS-7/24-25 (Banded Ferruginous Chert (BFC))

In hand specimen, the sample no. UPCK/BRS-7/24-25 is characterized by alterations of dark and light color bands/layers **(Fig. 1a).** The light color bands show fine-grained, gray color, and massive, while dark to reddish-brown color minerals are attributed to the ferruginous layers/laminae. The light color bands are also known as chert, and their thickness is much more than the ferruginous layers/laminae as found in this sample.

Under a microscope, the light-coloured band is consisting mainly of fine-grained microcrystalline quartz, also called chert. In plane-polarized view, light yellow to light gray interference colour and wavy extinction are seen in the microcrystalline quartz grains. The xenomorphic to Hy idiomorphic quartz grains are characterized by polygonal in nature and sharp grain boundaries with triple junctions that indicate metamorphism. At places, the intergranular micropore spaces are also filled with iron oxide. Magnetite and goethite ore minerals are chiefly associated with the ferruginous layer**.** In reflected light, magnetite is grey (shape), while a greyish-blue tint with reddish to orange internal reflectance developed in the goethite. Most of the magnetite is replaced by goethite. Fine blades of hematite (also called specular hematite) are often associated with the goethite and quartz (Fig.1d). Two generations of micro-quartz veinlets intrude across the primary banding (Fig 1b & c). Off-sets of micro-quartz veins are also seen at places. According to the mineral assemblages, the rock name is therefore classified as banded ferruginous chert.



Fig.1a. Hand sample of Banded Ferruginous Chert (BFC)(Sample no. UPCK/BRS-7/24-25).

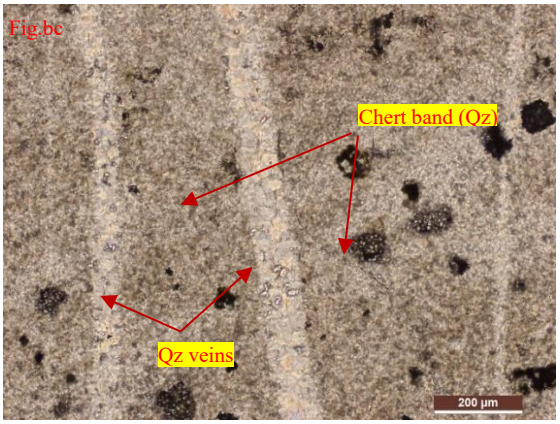


Fig.1b. Photomicrograph showing multiple quartz vein intruded into chert band under PPL image (Sample no. UPCK/BRS-7/24-25).

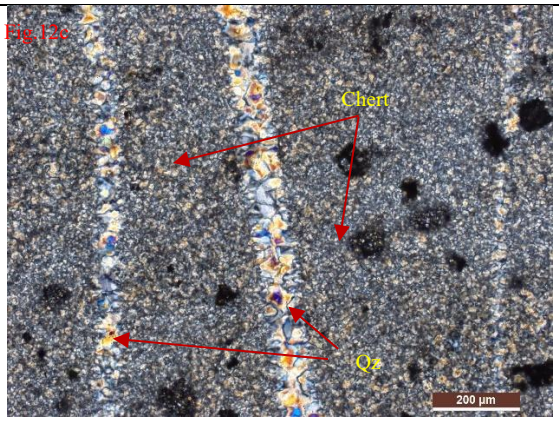


Fig.1c. Photomicrograph showing multiple quartz (Qtz) vein intruded into chert band under XPL image (Sample no. UPCK/BRS-7/24-25).

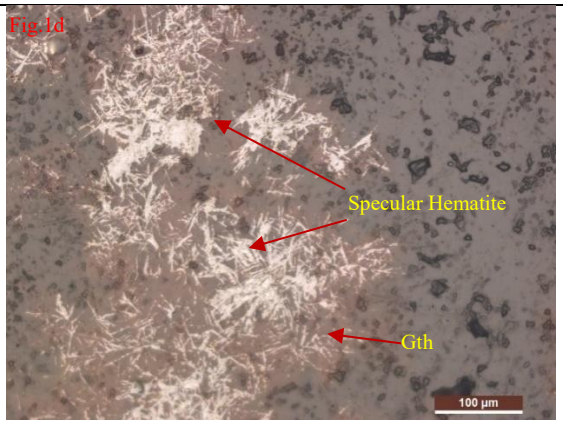


Fig.1d. Photomicrograph showing Specular Hematite in association with goethite (Gth) ore under reflected light (Sample no. UPCK/BRS-7/24-25).

ii) Sample no. UPCK/BRS-16/24-25 (Jaspilite or Jaspilite)

In hand specimen, the sample UPCK/BRS-16/24-25 is reddish in colour, fine-grained, and massive in character (Fig.2a). It is a quite iron-rich rock due to its reddish colour with high specific gravity. The rock is a mixture of iron oxides and quartz. Accordingly, the rock name thus be categorized as Jaspilite or Jaspilite.

Under microscope, the rock (UPCK/BRS-16/24-25) is composed mainly of reddish quartz, quartz, hematite, and magnetite, goethite are accessories (Fig 2b & c). The quartz grains show equigranularity in character. At places, quartz grains and jasper are altogether associated with the iron oxides. The quartz grains show reddish in colour due to the impurity of iron as found in the plane-polarized light. Under reflected light, subhedral to euhedral forms of hematite are randomly distributed in this rock, which shows moderate reflectivity, is weakly pleochroic, and is anisotropic with blood-red internal reflection (Fig 2d).



Fig.2a. Hand sample of Jaspilite (Sample no. UPCK/BRS-16/24-25).

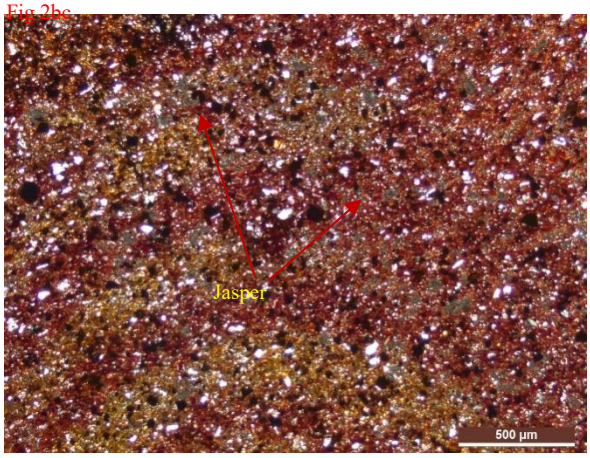


Fig.2b. Photomicrograph showing Jasper with iron oxide under transmitted light (Sample no. UPCK/BRS-16/24-25).

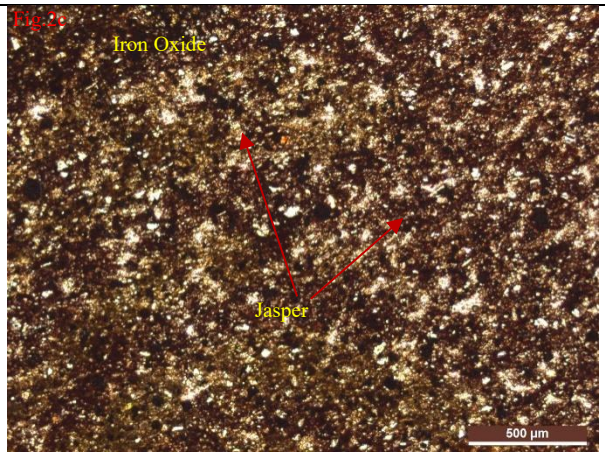


Fig.2c. Photomicrograph showing Jasper with iron oxide under XPL image (Sample no. UPCK/BRS-16/24-25).

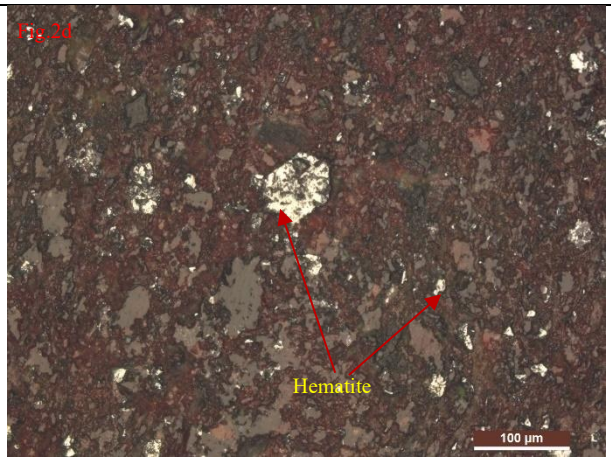


Fig.2d. Photomicrograph showing subhedral to euhedral Hematite under reflected light (Sample no. UPCK/BRS-16/24-25).

iii) Sample no. UPCK/BRS-52/24-25(Ferruginous Chert)

In hand specimen, the sample UPCK/BRS-52/24-25 is a fine-grained rock, grey colour showing massive character (Fig. 3a).

Petrographic study reveals that the rock is mainly composed of microcrystalline quartz and iron oxides (Fig 3b & c). The iron oxides include magnetite, hematite, and goethite. Accordingly, the rock name thus be categorized as ferruginous chert. Under plane polarized light, the quartz grains show colourless to light yellow colour, and fine granules exhibit granulose texture. The intergranular micropore spaces of quartz grains are also filled with the iron oxide. Magnetite grains are randomly associated with the quartz matrix. All magnetite occurs in euhedral form in different sizes. Hematite ores are marginally altered to magnetite and subsequently replaced by goethite. On the other hand, needle- or blade-like hematite (specular hematite) is often associated with the goethite and quartz matrix, where the quartz grains are replaced by the hematite as well (Fig.3d).

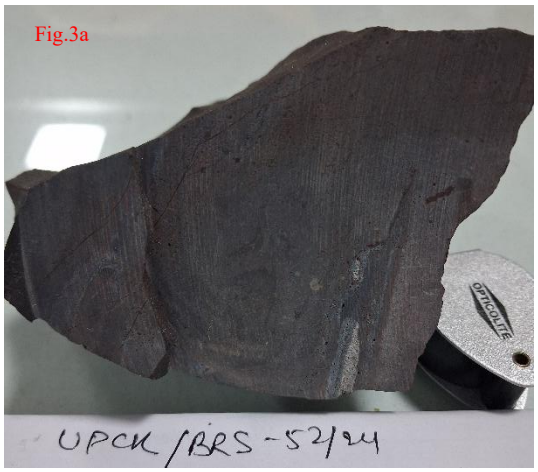


Fig.3a. Hand sample of ferruginous chert (Sample no. UPCK/BRS-52/24-25).

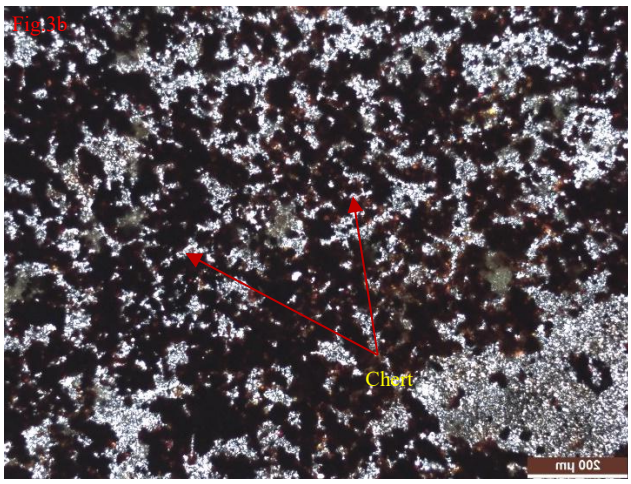


Fig.3b. Photomicrograph of Ferruginous chert showing Chert with iron oxide under XPL image (Sample no. UPCK/BRS-52/24-25).

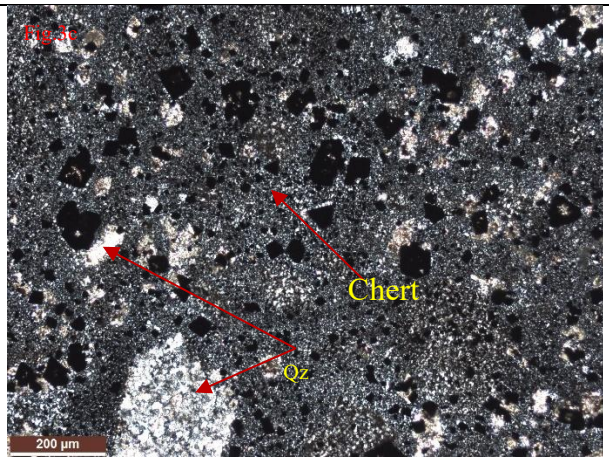


Fig.3c. Photomicrograph of Ferruginous chert showing Chert and quartz clast along with iron oxide under XPL image (Sample no. UPCK/BRS-52/24-25).

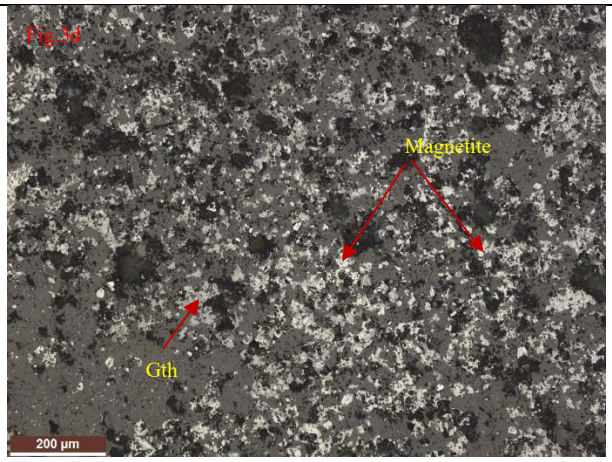


Fig.3d. Photomicrograph showing replacement of magnetite by goethite under reflected light (Sample no. UPCK/BRS-52/24-25).

iv) Sample no. UPCK/BRS-91/24-25 (Banded Ferruginous Chert (BFC)

In hand specimen, the sample UPCK/BRS-91/24-25 is characterized by alternate light and dark colour bands defined by (Fig.4a).

In thin polished section, the sample UPCK/BRS-91/24-25, characterized by alternate bands of iron oxide and silicate minerals of varying thickness, defines primary banding (Fig 4b). The light-coloured (or siliceous) bands are essentially made up of microcrystalline quartz, which is known as chert. The microcrystalline quartz shows xenomorphic to hybidiomorphic characteristics, characterized by polygonal nature in plane polarized light. In the cross-polar view, the quartz grains show equigranularity with wavy extinction. In reflected light, iron oxides in the ferruginous bands/layers are mainly attributed to magnetite. A massive magnetite band is well preserved in this sample interspersed within the chert band (Fig 4c). The siliceous or chert band also contains euhedral magnetite, which are distributed randomly (Fig.4d). Some of the magnetite is replaced by goethite, which is mostly occupied in the intergranular quartz. According to the mineral assemblages and their primary banding, the rock may thus be categorized as banded magnetite-hematite chert.



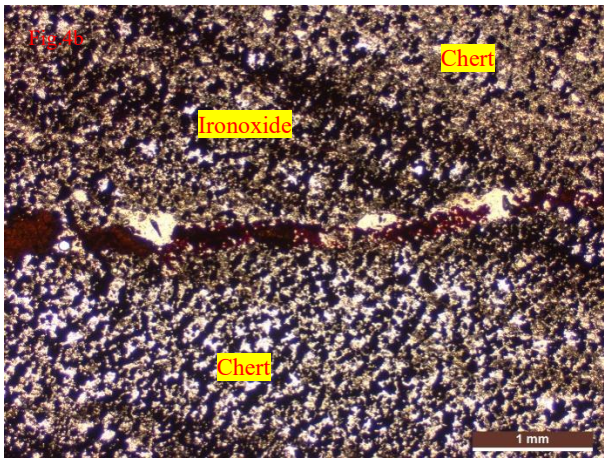
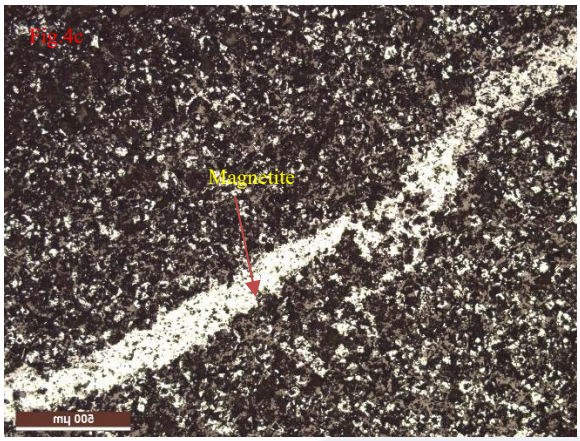


Fig.4a. Hand sample of Banded Ferruginous chert (Sample no. UPCK/BRS-91/24-25).

Fig.4b. Photomicrograph of Banded Ferruginous Chert showing alternate chert and iron oxides banding under XPL image (Sample no. UPCK/BRS-91/24-25).



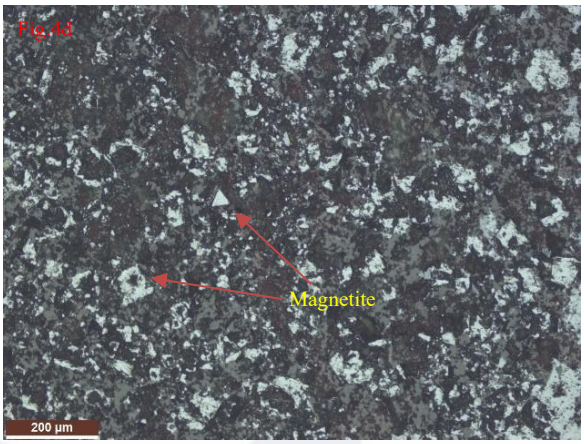


Fig.4c. Photomicrograph of Banded Ferruginous chert showing massive magnetite band interspersed within the chert band ((Sample no. UPCK/BRS-91/24-25).

Fig.4d. Photomicrograph showing euhedral magnetite under reflected light view (Sample no. UPCK/BRS-91/24-25).

v) Sample no. UPCK/BRS- 93/24-25 (Banded Magnetite Jasper/Chert (BMJ/BMC)

In hand specimen, the sample UPCK/BRS-93/24-25is characterized by alternate ferruginous and silicate bands that define primary banding (Fig.5a). Within the ferruginous bands, dark and light brown colours are represented by iron oxides, jasper, and quartz. Grey colour chert band occurs as discontinuous and parallel to the bedding. Offsets of ferruginous and chert bands are well preserved in this sample.

Under microscope, the sample shows alternations of ferruginous and siliceous bands/layers defining primary banding (Fig.5b). The siliceous band is also known as chert and jasper. It consists mainly of microcrystalline quartz (colourless) and reddish-coloured quartz (jasper). Under transmitted light, the quartz in the chert band is characterized by polygonal in nature, exhibiting a granulose texture. The jasper shows quite reddish in colour due to impurities of iron. In reflected light, ferruginous bands are mainly composed of magnetite and goethite altogether formed into massive bands (Fig 5c). Magnetite is partly altered by goethite at places (Fig 5d). Based on the mineral assemblages in both ferruginous and siliceous bands/layers, the rock name is therefore classified as banded hematite chert/jasper.



Fig.5a. Hand sample of Banded Ferruginous Chert/Jasper (BHJ/BHC) (Sample no. UPCK/BRS-93/24-25).

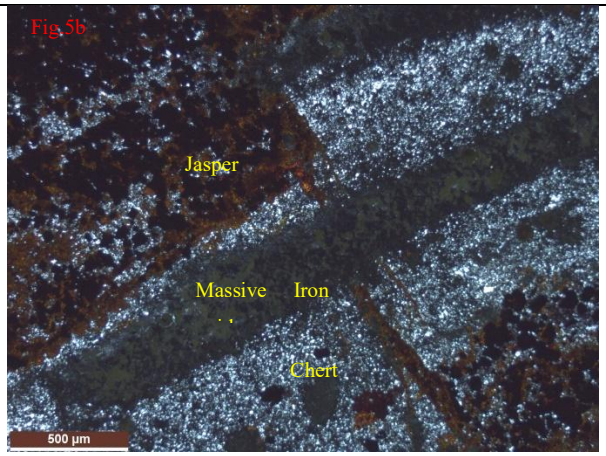


Fig.5b. Photomicrograph of Banded Ferruginous chert/jasper showing massive magnetite band interspersed with the chert and jasper bands ((Sample no. UPCK/BRS-93/24-25).

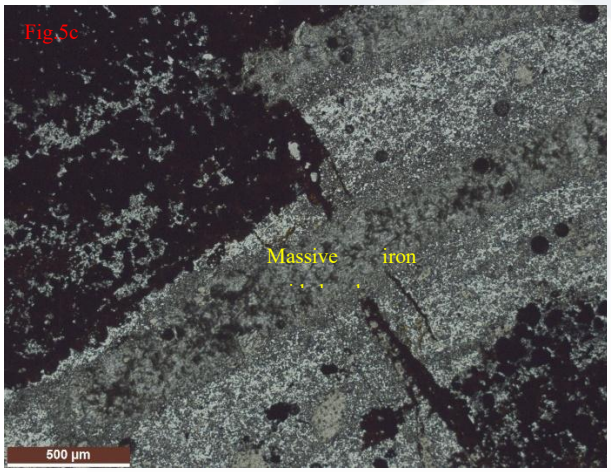


Fig.5c. Photomicrograph of massive magnetite band interspersed with Jasper/chert bands in BMC/BMJ (Sample no. UPCK/BRS-93/24-25).

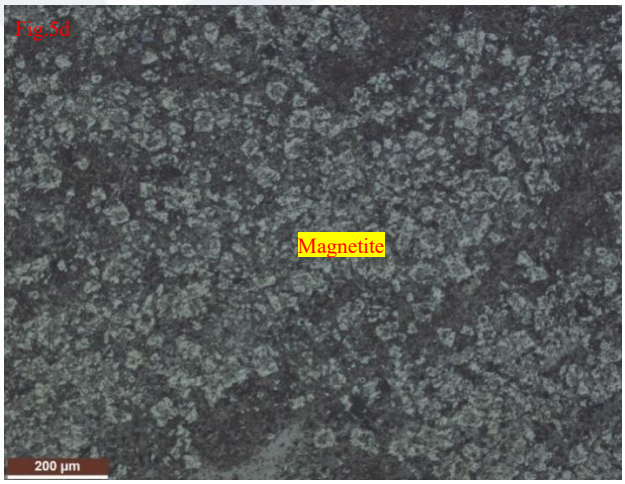


Fig.5d. Photomicrograph showing Magnetite partly altered by goethite at places under reflected light view (Sample no. UPCK/BRS-93/24-25).

vi) Sample no. UPCK/BRS-14/24-25 (Massive iron ore)

In hand specimen, the rock is a massive ore iron consists predominantly of hematite and goethite (Fig 6a).

Under reflected light, the major proportion of the massive iron ore is hematite, and goethite. Goethite shows bluish grey having deep reddish to orange internal reflections (Fig. 6b). At places, partial alteration of hematite by goethite is observed along the boundary of hematite. Two types of hematite ores have been observed; the first one is granular and bladed as the second one. The bladed hematite is characterized by fine grains in association with the goethite. This type of hematite is also called as specula rite. Whereas the euhedral to subhedral granular hematite shows moderate reflectivity, greyish white, weakly pleochroic, anisotropic and has blood red internal reflection.



Fig.6a. Hand sample of massive iron ore (Sample no. UPCK/BRS-14/24-25).

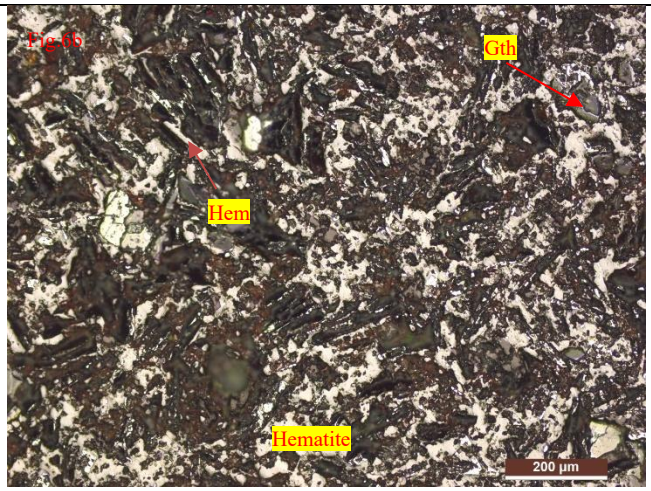


Fig.6b. Photomicrograph showing blade like hematite (Hem)replaced by goethite in massive iron ore under reflected light (Sample no. UPCK/BRS-14/24-25).

vii) Sample no. UPCK/BRS-61/24-25 (BHC/BHJ)

In hand specimen, the sample UPCK/BRS-61/24-25 is a fine-grained rock with an alternation of iron oxide and jasper with cherty quartz bands that exhibit primary banding (Fig.7a).

Under microscope, the sample UPCK/BRS-61/24-25is characterized by alternate dark and light colour bands that are attributed to thick hematite and microcrystalline quartz-jasper, respectively. The siliceous band is mainly of cherty quartz and jasper, showing microcrystalline in nature (Fig. 7b). Under transmitted light, the light grey to yellow quartz grains shows xenomorphic to hypidiomorphic with polygonal character. The jasper is quite reddish in colour due to impurities of iron. The dark bands are mainly consisting of hematite, where the hematite formed as blade- and needle-like forms. A few hematite granules are also present within in it. Whereas the fine hematite needles are also associated with the intergranular spaces of quartz and jasper. The secondary hematite is also called specular hematite (Fig.7c).



Fig.7a. Hand sample of Banded Hematite Chert/Jasper (Sample no. UPCK/BRS-61/24-25).

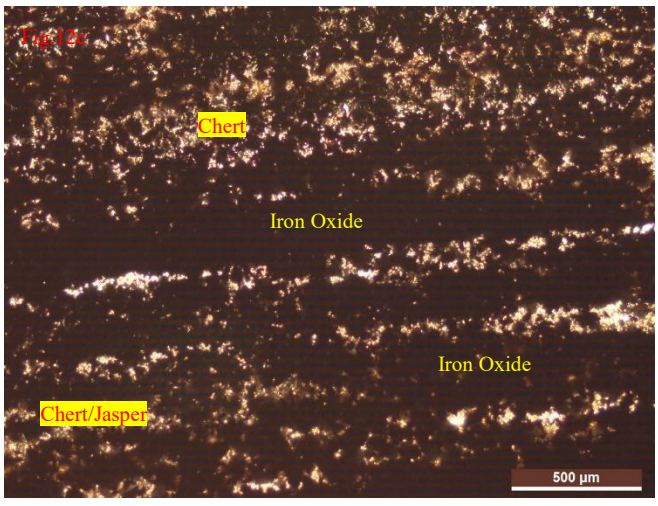


Fig.7b. Photomicrograph of BHJ/BHC showing alternation of ferruginous and chert/jasper bands under PPL view (UPCK/BRS-61/24-25).

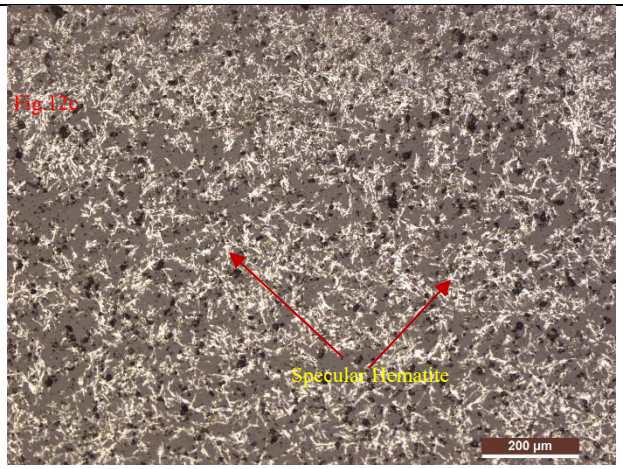


Fig.7c. Photomicrograph of Specular hematite replacing magnetite and quartz under reflected light view (UPCK/BRS-61/24-25).

viii) Sample no. UPCK/BRS-74/24-25 (Oxidized Iron ore)

A representative sample UPCK/BRS-74/24-25 contains large to small sizes of quartz that vary from a few mm to 2 cm, showing angular to sub-angular, embedded in the iron oxide cementing material. The cementing material is mainly of goethite. Accordingly, the rock name thus be categorized as goethite ore (Fig.8a).

Under microscope, the matrix is fully made up of goethite ore, and magnetite is less common. The internal reflectance of goethite, which is grey with a bluish hue, ranges from deep red to orange when exposed to reflected light (Fig 8b). This sample contains angular to sub-angular quartz clasts (Fig.8c).



Fig.8a. Hand sample of Detailed Iron ore (Sample no. UPCK/BRS-74/24-25).

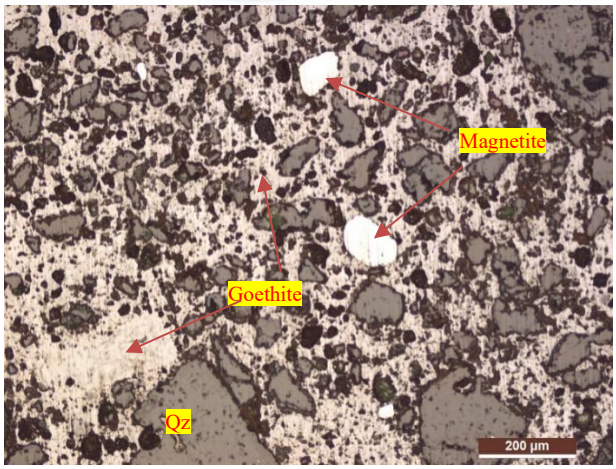


Fig.8b. Photomicrograph of goethite with few grains of magnetite under reflected light (Sample no. UPCK/BRS-74/24-25).

Iron Oxide

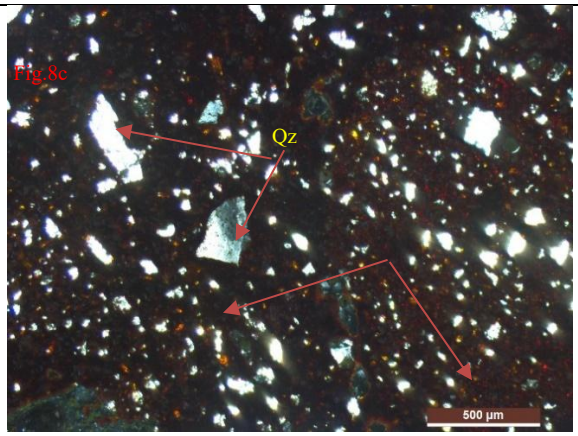


Fig.8c. Photomicrograph of goethite ore showing quartz clasts cemented by goethite under XPL image (Sample no. UPCK/BRS-74/24-25).

ix) Sample no. UPCK/BRS-94/24-25 (BHJ)

An alternation of jasper and ferruginous bands with varying thicknesses is observed in the hand sampleno. UPCK/BRS-94/24-25 (Fig 9a).

Under microscope, the sample UPCK/BRS-94/24-25 is characterized by alternate bands of ferruginous and siliceous with various thicknesses (Fig 9b). The siliceous band is also called jasper bands, which are composed mainly of microcrystalline quartz. Under transmitted light, light grey to yellow in colour and wavy extinctions of quartz, there are profuse amounts of fine granules of reddish-coloured jasper present in the jasper band because of iron impurities. The ferruginous band is essentially made up of hematite, and magnetite is less common (Fig. 9c & d). Relics of magnetite are preserved in some of the hematite, indicating alteration. Amorphous secondary hematite is filled with the intergranular hematite and jasper. Based on the petrography, the rock name is therefore classified as banded hematite jasper. Two generations of micro-quartz veins are observed in this sample. The first one is occurring parallel to the primary bandings of quartz grains are also developed at places. and the second one is crosscutting the bands. Off sets of quartz grains are also developed. Veins of quartz show polygonal in character formed due to intergranular deformation and metamorphism.



Fig.9a. Hand sample of Banded ferruginous chert (Sample no. UPCK/BRS-94/24-25).

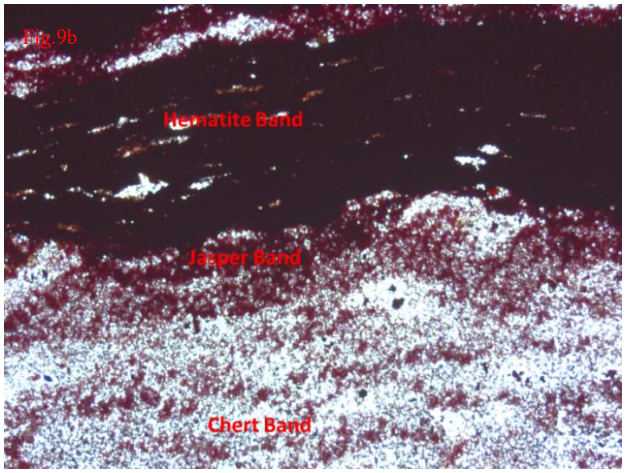


Fig.9b. Photomicrograph of banded hematite jasper (BHJ)/BHC showing alternations of hematite, jasper and

siliceous (cherty) bands/ layers under XPL image (Sample no. UPCK/BRS-94/24-25).

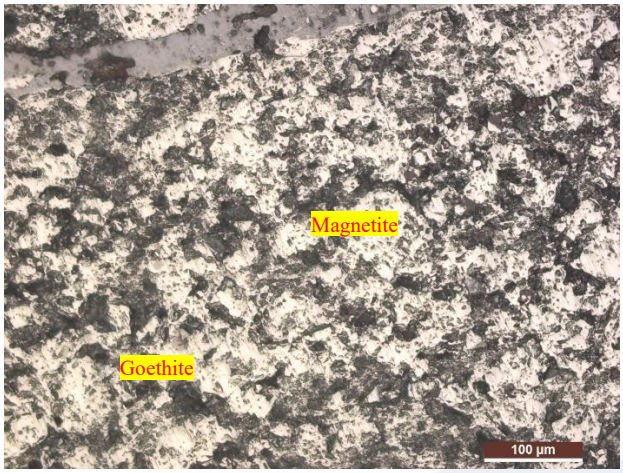


Fig.9c. Photomicrograph of massive magnetite ore alterations under reflected light (Sample no. UPCK/BRS-94/24-25).

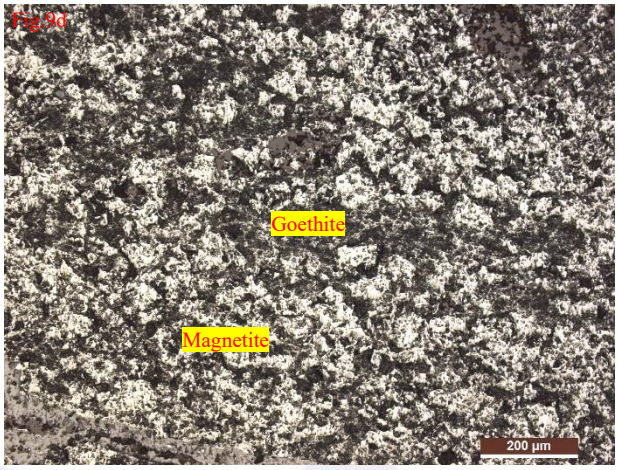


Fig.9d. Photomicrograph of massive magnetite ore replaced by goethite under reflected light (Sample no. UPCK/BRS-94/24-25).

x) Sample no. UPCK/BRS-102/24-25(Goethite ore)

In hand specimen, the sample is a dark brownish goethite ore zone that contains a discontinuous chert band. Colloform structure is well preserved in the goethite ore zone (Fig.10a).

Under microscope, the ferruginous materials are mainly attributed to hematite, goethite, and magnetite in the sample UPCK/BRS-102/24-25. Colloform structure is well preserved in this sample defined by hematite-goethite (Fig.10c&d). Goethite is greyish blue-tinted with reddish to yellowish internal reflectance. At places, magnetite is partially altered by hematite due to martitization. Martite-hematite is partially replaced by goethite in the BHC, resulting in desilicification through the action of hydrothermal fluids. The silica is also present in this sample, which is composed of microcrystalline quartz (Fig.10b). Fracture-filling iron oxides are also seen in places. Accordingly, the rock name thus be classified as hematite chert/jasper. Under transmitted light, light grey to yellowish in colour quartz is in the chert band, while reddish in colour jasper grains are observed in the jasper band. Two generations of micro-quartz veins are observed, where the first one is parallel to the primary banding and the second one is crosscutting the bands. Off sets of quartz grains are also developed at places. Veins of quartz show polygonal in character, formed due to intergranular deformation and metamorphism.



Fig.10a. Hand sample of Goethite ore (Sample no. UPCK/BRS-102/24-24).

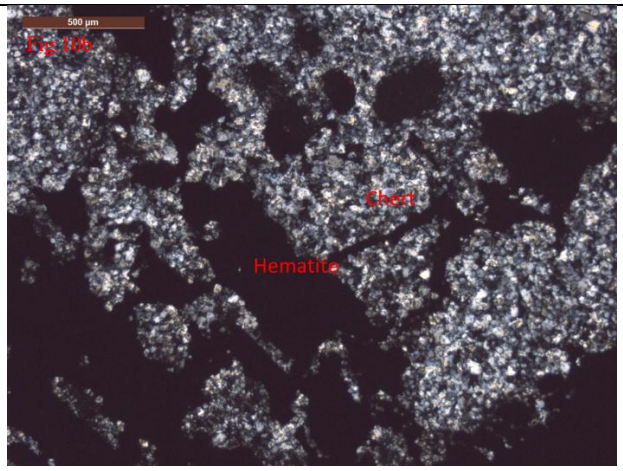


Fig.10b. Photomicrograph of goethite ore showing fracture filling iron ore (hematite-goethite)in the chert band XPL image (Sample no. UPCK/BRS-102/24-24).

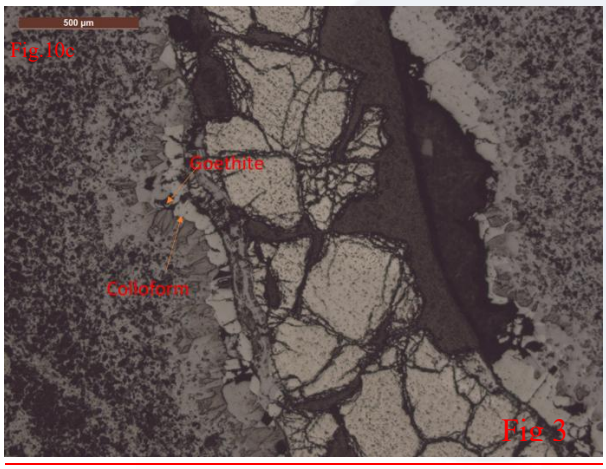


Fig.10c. Photomicrograph of BHC showing partly alteration of martite-hematite band by goethite exhibit colloform structure under reflected light view (Sample no. UPCK/BRS-102/24-25.

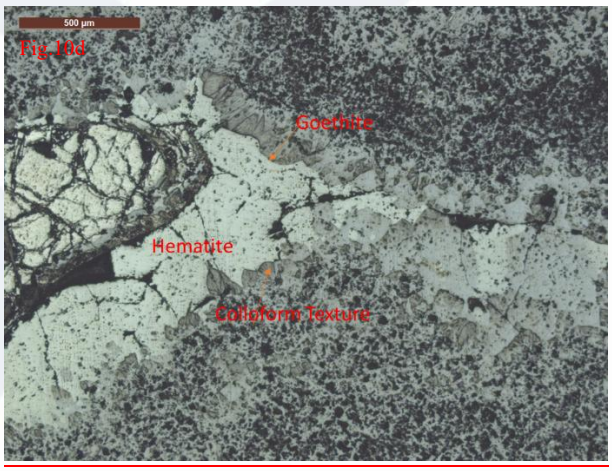


Fig.10d. Photomicrograph showing massive martite-hematite ore band replaced by goethite resulting desilicification through the action of hydrothermal fluids under reflected light view (Sample no. UPCK/BRS-102/24-25).

xi)Sample no. UPCK/BRS-68/24-25 (Goethite ore)

In hand specimen, the sample UPCK/BRS-68/24-25 is a dark brownish ore having a botryoidal structure. It also contains clasts of chert and quartz varying in size from a few mm to 4 cm (Fig.11a). Under the reflected light, cauliflower-like goethite bands are well preserved in this sample that exhibit colloform structure (Fig.11b). Goethite is grey with a bluish tint with internal reflectance of red to orange colour. At the rim, hematite bands were replaced by goethite. Few grains of hematite are also observed.



Fig.11a. Hand sample of botryoidal goethite ore (Sample no. UPCK/BRS-68/24-25).

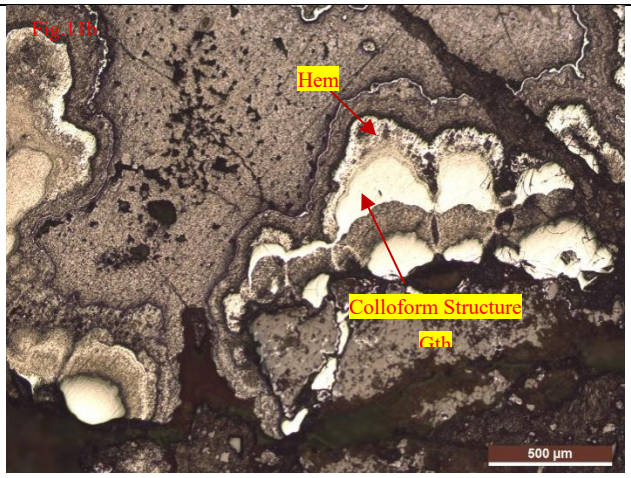
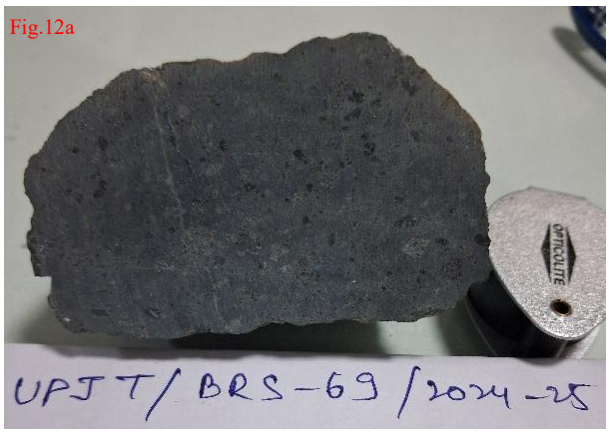


Fig.11b. Photomicrograph showing Colloform structure defined by hematite-goethite under reflected light. (Sample no. UPCK/BRS-68/24-25).

xii) Sample no. UPCK/BRS-69/24-25 (Carbonated metabasalt)

The hand sample, UPCK/BRS-69/24-25, is a fine-grained rock with a greenish-grey colour that displays mafic mineral, plagioclase and epidote phenocrysts (Fig.12a).

In this section, the sample UPCK/BRS-69/24-25is composed chiefly of clinopyroxene, plagioclase, and olivine; amphibole, chlorite, carbonates, and opaques are the accessories. Olivine, plagioclase, epidote, and clinopyroxene occur as phenocrysts embedded in the ground mass of plagioclase, clinopyroxene, and carbonates (Fig. 12b& d). Acicular clinopyroxenes are altered by amphibole and subsequently by chlorite. The carbonate materials are profusely occurring interstitial to the mafic silicates. The texture is microlite (Fig. 12c). The euhedral olivine shows colourless to pale yellow, weakly pleochroic, and higher-order interference colour with parallel extinction as seen in the cross-polar view. Chlorite and amphiboles are the altered products of clinopyroxenes, while sericite alterations in the plagioclase indicate metasomatic hydrothermal alteration. Whereas plagioclase occurs as laths that exhibit polysynthetic lamellar twinning under cross-polar view. At places, sericite alteration in the plagioclases is observed. The sericite shows a flaky nature and bluish grey in colour as seen in the cross-polar view. According to the mineral assemblages, the rock may thus be classified as carbonated metabasalt.



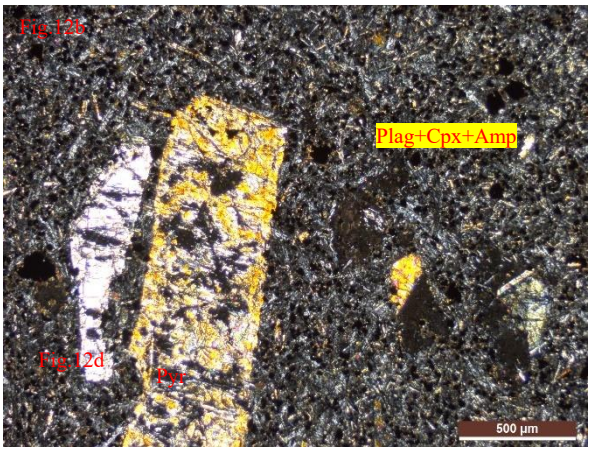


Fig.12a. Hand sample of Carbonate metabasalt. (Sample no. UPCK/BRS-69/24-25).

Fig.12b. Photomicrograph of carbonated metabasalt showing fine grained ground mass of plagioclase, clinopyroxene, amphibole and Pl phenocryst under XPL image (sample no. UPCK/BRS-69/24-25).

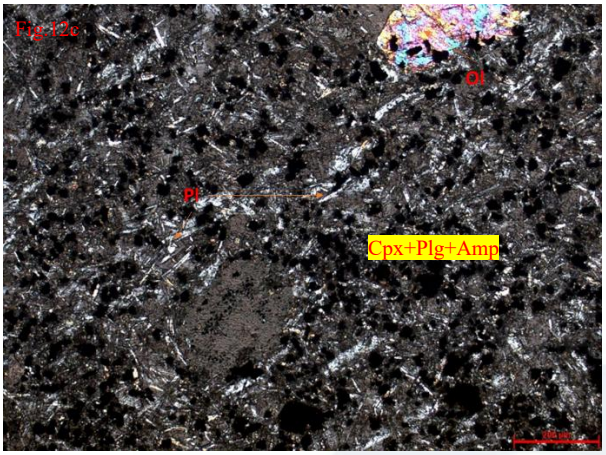




Fig.12c. Photomicrograph of carbonated metabasalt showing microlite texture under XPL image (sample no. UPCK/BRS-69/24-25).

Fig.12d. Photomicrograph showing Olivine phenocryst in the Carbonated Metabasalt under XPL image (sample no. UPCK/BRS-69/24-25).

xiii) Sample no. UPCK/BRS-10/24-25 (Pyroclastic rock)

A representative hand sample of UPCK/BRS-10/24-25 shows dark grey colour and fine-grained rock. Clasts of lithic fragments, quartz, and calcite are the phenocrysts embedded in the amphibole-chlorite-quartz groundmass (Fig. 13a).

In thin section, the major portion of the groundmass is composed predominantly of plagioclase, amphibole, and quartz. Calcite, chlorite, and opaques are accessories. The amphiboles are partly to completely altered into the chlorite, where relict acicular amphiboles are present. The lithic fragments show angular to sub-angular shapes, and a few of them show spindle shapes (Fig 13b). Accordingly, the rock may thus be categorized as pyroclastic rock. Plagioclase occurs as fine laths exhibiting polysynthetic lamellar twinning (Fig.13c). Sericite alterations commonly occurred in the plagioclase. The opaques are magnetite, which are commonly associated with the chlorite and plagioclase as seen in the reflected light (Fig.13d).



Fig.13a. Hand sample of pyroclastic rock (Sample no. UPCK/BRS-10/24-25).

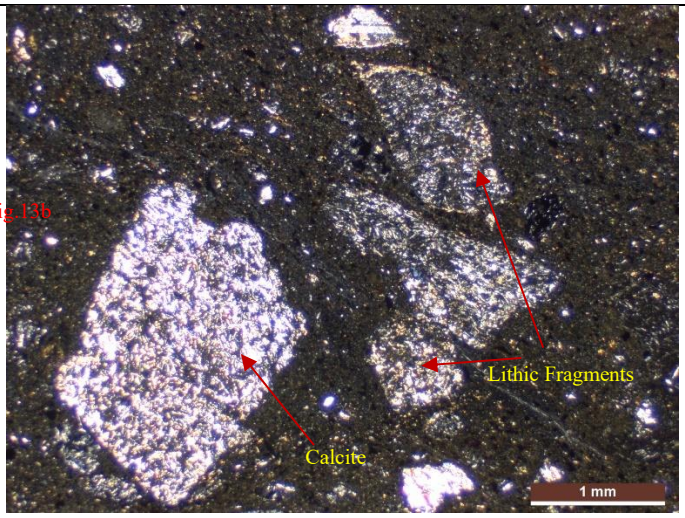


Fig.13b. Photomicrograph showing lithic fragments, calcite embedded in the groundmass in pyroclastic rock under XPL image (Sample no. UPCK/BRS-10/24-25).

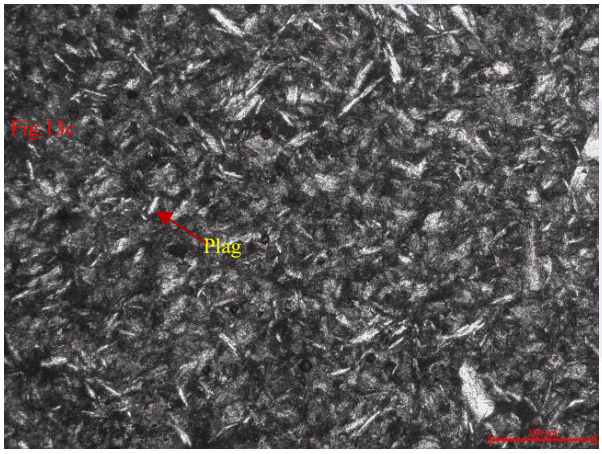


Fig.13c. Photomicrograph showing plagioclase, amphibole and chlorite groundmass in the pyroclastic rock under XPL image (Sample no. UPCK/BRS-10/24-25).

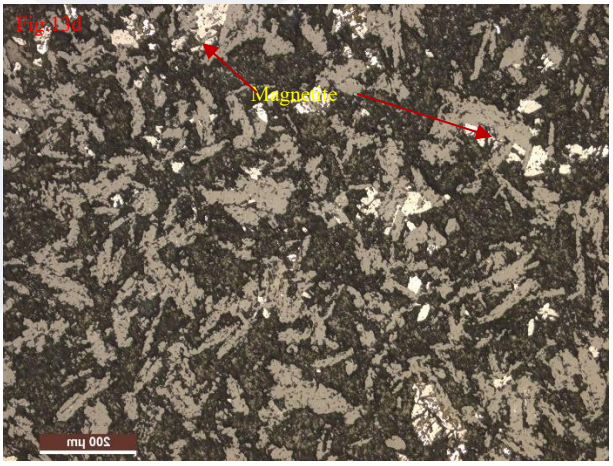


Fig.13d. Photomicrograph showing magnetite under reflected light (Sample no. UPCK/BRS-10/24-25).

xiv) Sample no. UPCK/BRS-75/24-25 (meta tuff)

In hand specimen, the sample is a fine-grained rock with vesicles filled with quartz and feldspars. Aphanitic in nature. On the fresh surface, conchoidal fracture and waxy on the weathered surface are observed (Fig 14a).

Under microscope, the rock consists mainly of quartz, and feldspars occurring in the devitrified glassy groundmass (14b). The irregularly shaped glass shards have also been noticed, though not clearly distinguishable. Besides, the opaques are magnetite and goethite (14c).



Fig.14a. Hand sample of Meta tuff (Sample no. UPCK/BRS-75/24-25).

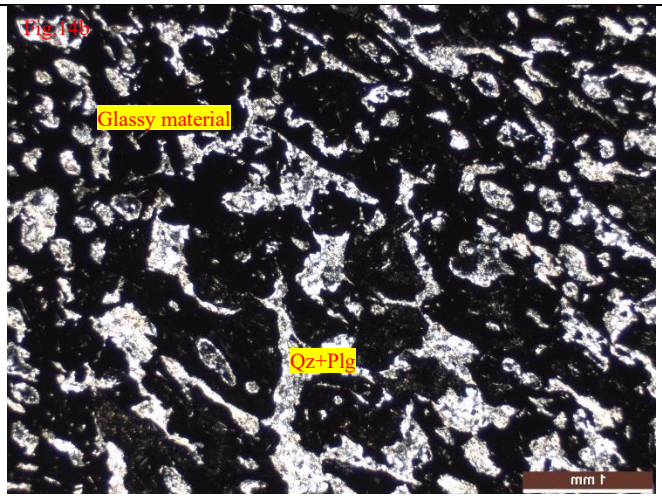


Fig.14b. Photomicrograph of tuff showing glassy material with iron oxide under XPL image (sample no.UPCK/BRS-75/24-25).

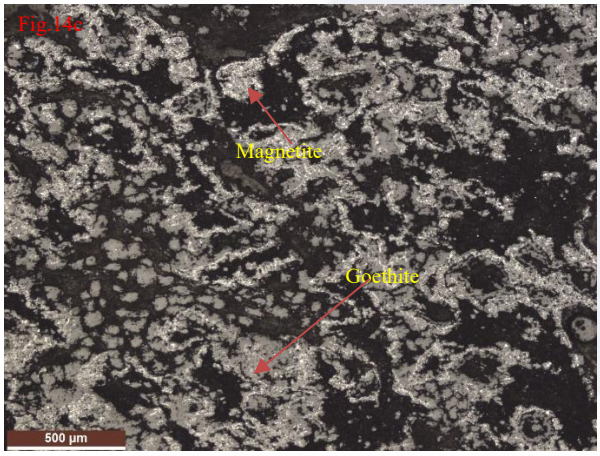


Fig.14c. Photomicrograph showing goethite with magnetite under reflected light view (Sample no. UPCK/BRS-75/24-25).

xv) Sample no. UPCK/BRS-29/24-25 (Dolerite)

The rock in the hand specimen is fine-grained and dark green in colour (Fig. 15a).

Petrographically, the rock is composed chiefly of plagioclase, clinopyroxene, and opaque as an accessory. A large clinopyroxene (augite) is partially to fully enclosed by the plagioclases that exhibit ophitic to sub-ophitic texture (Fig. 15b & c). Under plane polarized light, the plagioclase laths show polysynthetic lamellar twinning distinctly. Sericite moderately alters the plagioclases at certain locations. Augite shows subhedral to euhedral, pale yellowish colour and inclined extinctions. The opaques are mostly magnetite in association with the augite and plagioclase as seen in the reflected light (15d).



Fig.15a. Hand sample of Dolerite (Sample no. UPCK/BRS-29/24-25).

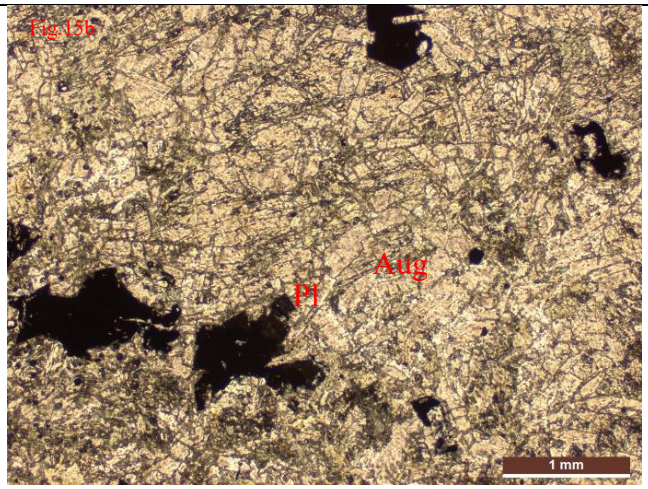


Fig.15b. Photomicrograph showing sb-ophitic texture defined by laths of plagioclases enclosing clinopyroxene in dolerite under PPL image (Sample no. UPCK/BRS-29/24-25).

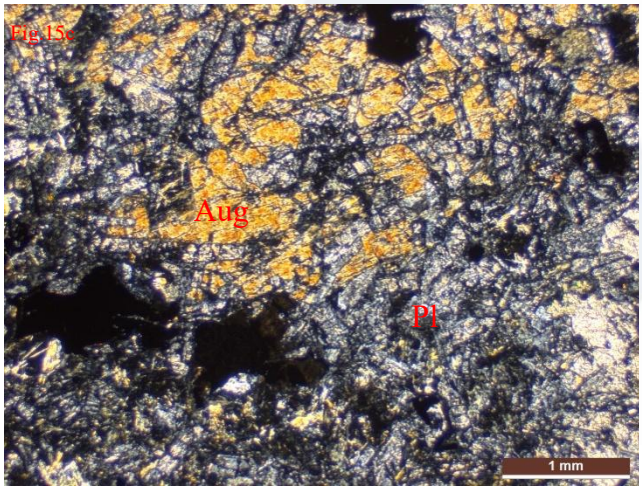


Fig.15c. Photomicrograph showing ophitic texture defined by laths of plagioclases enclosing clinopyroxene in dolerite under XPL image (Sample no. UPCK/BRS-29/24-25).

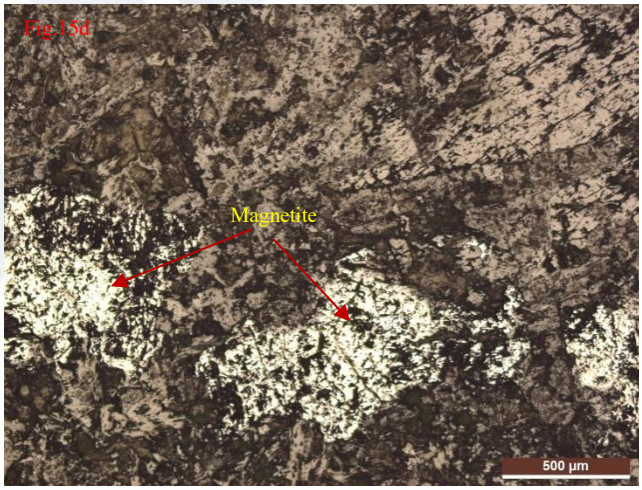


Fig. 15d. Photomicrograph showing magnetite under reflected light view (Sample no. UPCK/BRS-29/24-25).

23.12.2PETROGRAPHY/MINERALGRAPHIC DESCRIPTION OF CORE SAMPLE.

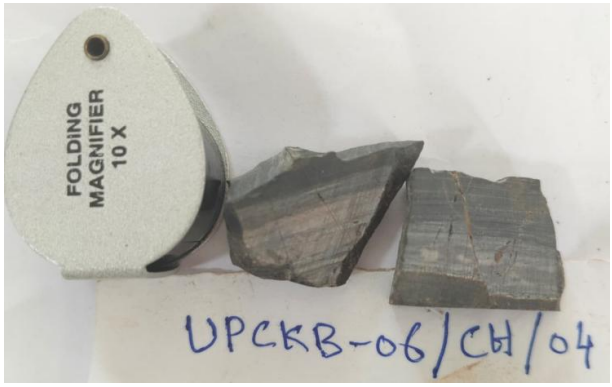
I) Sample no. UPCKB-06/CH/04 (Banded Magnetite Hematite Chert (BMHC))

In the hand specimen, sample no. UPCKB-06/CH/04 is characterized by alternating dark and light-colored bands (Fig. 1a). The light-colored bands are fine-grained, and massive, while dark to reddish-brown color minerals are attributed to the ferruginous bands. The light-colored bands are siliceous bands, and their thickness is more than the ferruginous bands found in this sample. The differential thickness could be possibly attributed to the difference in influx of siliceous and ferruginous material. Under the microscope, the rock is characterized by alternating iron oxide and silica-rich bands, constituting both light and dark-coloured bands or layers, respectively. The primary sedimentary banding is continuous over the entire section and is defined by hematite, magnetite and goethite in

the dark-coloured band and quartz grains in the light-coloured band. The ferruginous bands are opaque and appear as dark bands in transmitted light. Quartz appears as colourless, low relief, anhedral to subhedral grains with low first order interference colours under crossed polar view. Quartz shows granulose texture. Elongated lenticular quartz are observed aligned parallel to the bedding (Fig. 1c). Secondary micro quartz veins are observed cross cutting the primary bedding, indicating a post-depositional event (Fig. 1b). Stilpnomelane occurs as platy, scaly and fibrous with sheaf-like aggregates, showing moderate to high relief, yellowish to dark brown colour in plane polarized light and second-to-third order interference colors under crossed polar views (Fig. 1 d). The occurrence of Stilpnomelane as platy, scaly, fibrous, and sheaf-like aggregates indicate metamorphic recrystallization of Fe- and Si-rich chemical sediment under greenschist-facies conditions.

Under the reflected light, the dark bands are composed predominantly of hematite with subordinate magnetite and goethite. These oxides constitute and form the continuous bands (Fig. 1e-f). Hematite appears bluish gray, with moderate reflectance and blood-red internal reflection. Magnetite appears as a light gray to pink tint with lower reflectance than hematite. Goethite is bluish gray, with lower reflectance and reddish orange internal reflections. At places, the primary ferruginous bands crosscut by goethite veins, representing a post-depositional hydrothermal event. Specks of sulphide are also present with the silicate gangues (Fig. 1g). Since these are very minute and could not be identified under a microscope, it is recommended to use a scanning electron microscope for further confirmation.

Based on petrographic observations, the BIF sample records multiple stages of mineralogical evolution. The primary iron oxide phase was magnetite, preserved as coarse to medium-grained crystals within a fine-grained iron oxide matrix. The occurrence of these larger magnetite grains suggests that they crystallized during the initial chemical precipitation and diagenetic to low-grade metamorphic recrystallization of the BIF. Subsequently, magnetite underwent martitization, where hematite replaced magnetite. This indicates oxidation under relatively oxidizing conditions after the formation of primary magnetite. Two generations of goethite are recognized: an earlier generation replacing magnetite and hematite during hydration and oxidation, and a later generation vein, representing secondary hydrothermal activity, which happened as a post-depositional event and was accompanied by siliceous influx, resulting in Quartz vein cross-cutting the primary banding.



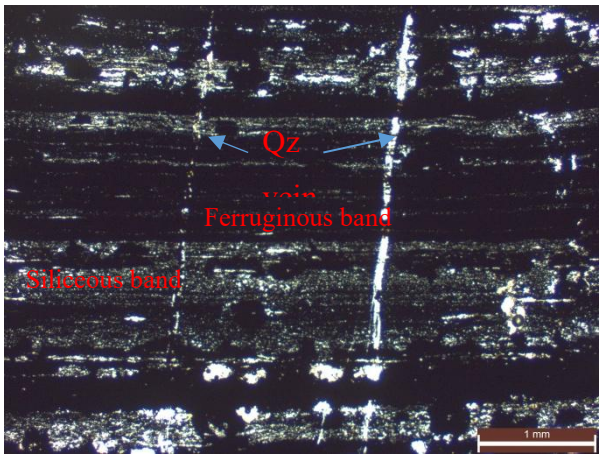
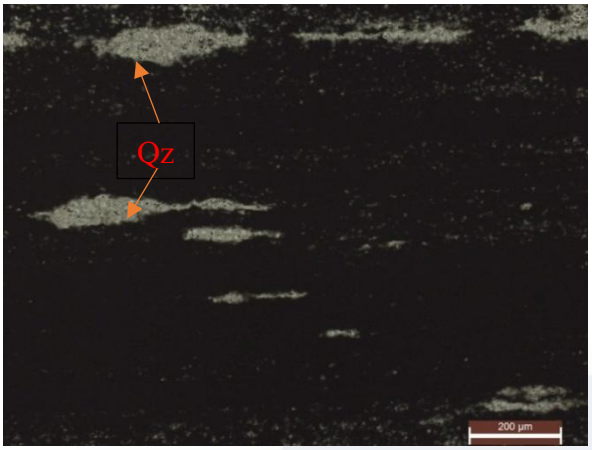


Fig.1a. Hand sample of banded magnetite-quartzite chert/quartzite displaying alternating of ferruginous and siliceous layers/bands defining primary bedding (Sample no. UPCKB-06/CH/04).

Fig.1b. Photomicrograph showing multiple quartz vein (Qtz) cross-cutting the primary banding under PPL (Sample no. UPCKB-06/CH/04).



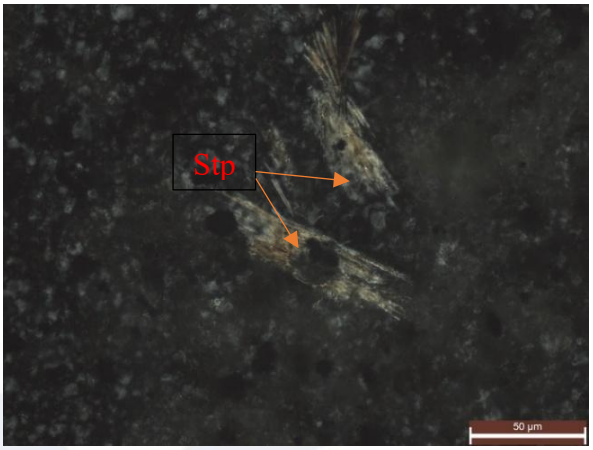
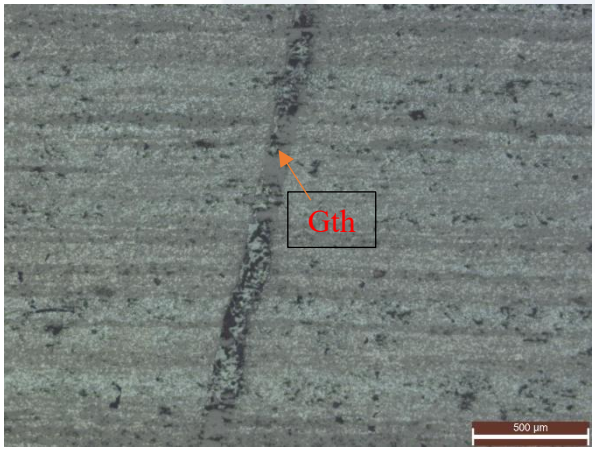


Fig.1c. Photomicrograph showing elongated lenticular quartz (Qtz) bands aligned parallel to the primary bedding under PPL view (Sample no. UPCKB-06/CH/04)

Fig. 1d. Photomicrograph of BMHC showing fibrous with sheaf-like aggregates of Stilpnomelane (Stp) associated with the quartz and iron oxides under the CPL view (Sample no. UPCKB-06/CH/04).



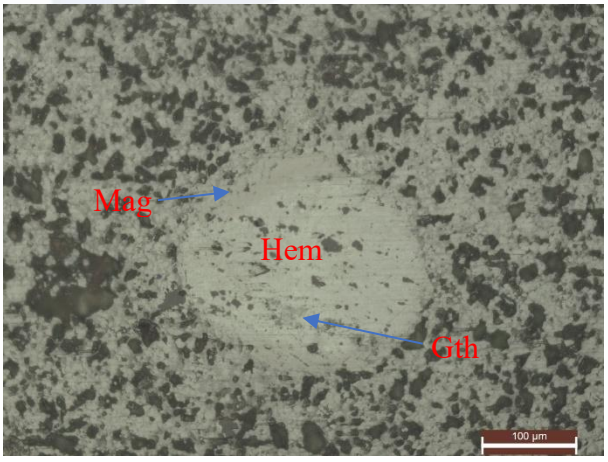


Fig. 1 e. Photomicrograph showing goethite (Gth) veinlet) cross-cutting the primary ferruginous and silicious bands under the reflected light view and silicious bands under the reflected light view (Sample no. UPCKB-06/CH/04).

Fig.1f. Photomicrograph of BMHC featuring a large magnetite crystal. The grain preserves a paragenetic sequence showing hydrothermal alteration to hematite (martitization), followed by overprinting by surficial goethite under the reflected view (Sample no. UPCKB-06/CH/04).

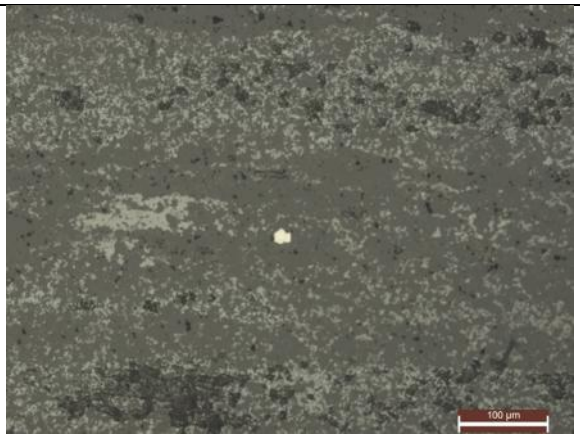


Fig. 1 g. Photomicrograph showing a tiny speck of bright phase (sulphide) occurs in the silicate gangue under the reflected light view (Sample no. UPCKB-06/CH/04).

ii) Sample no. UPCKB-02/CH/02 (Banded Ferruginous Chert (BFC))

In the hand specimen, sample UPCKB-02/CH/02 is brownish in colour, fine-grained, and displays intercalations of quartz and iron oxide bands (Fig.2a). The chert bands are discontinuous and exhibit variable thickness indicate either diagenesis during sedimentary deposition or a subsequent deformation event.

Under transmitted light, the drill core sample of ferruginous chert is characterized by the alternating chert and iron oxides bands, which are cross-cut by numerous ferruginous (hematite-goethite) veins (Fig. 2b). The chert band occurs cryptocrystalline quartz grains, whereas the ferruginous bands appear dark and contain primarily hematite-goethite (Fig. 2c). The presence of granular secondary quartz within the ferruginous bands indicates the metamorphic recrystallization (Fig. 2c). In reflected light, hematite exhibits a light gray to bluish gray colour with moderate reflectance and distinct blood-red internal reflections. It occurs as bladed and platy aggregates that are frequently associated with goethite bands or veins. Goethite displays a bluish-grey hue, lower reflectance, and reddish-orange internal reflections. Additionally, specular hematite occurs as needle-shaped and bladed aggregates (Fig. 2d). This morphological variety of hematite is referred to as specularite which forms under either metamorphic recrystallization or hydrothermal activity. It is found that the specularite is highly valued both as a primary source of industrial metal and for specialized commercial applications.



Fig. 2a. Hand sample of Banded Ferruginous Chert

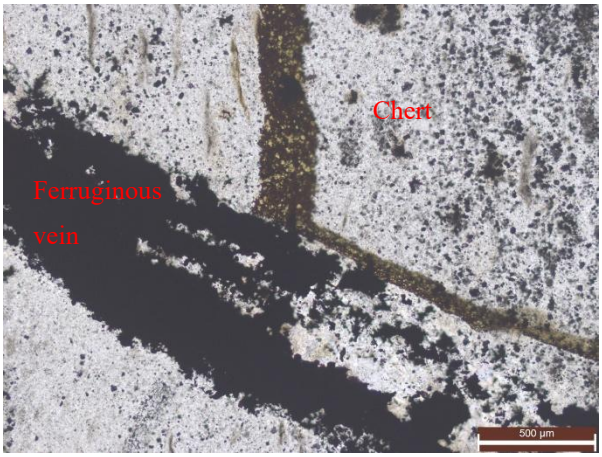


Fig. 2b. Photomicrograph showing a ferruginous vein

(UPCKB-02/CH/02)

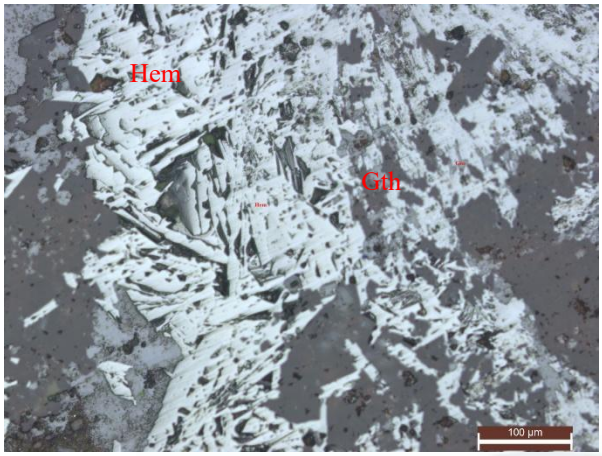


Fig.2c. Photomicrograph of BFC showing hematite (Hem) (platy-bladed)-goethite (Gth) within the ferruginous bands under the reflected light (Sample no. UPCKB-02/CH/02).

crosscutting the chert band under transmitted light (PPL) (UPCKB-02/CH/02)

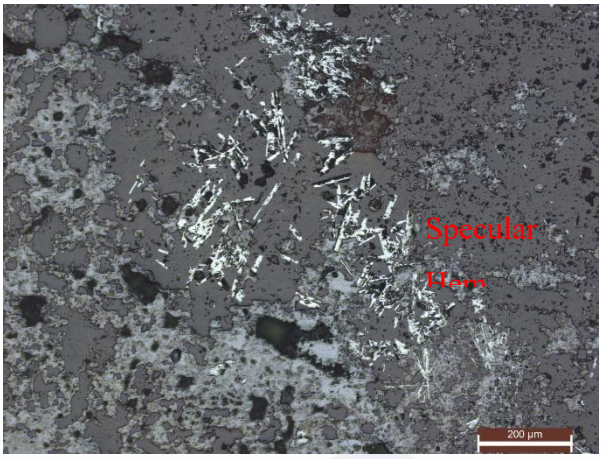


Fig.2d. Photomicrograph showing bladed to needle like hematite (also referred to as specularite) occurs interlayered associated between the goethite and quartz bands under reflected light (Sample no. UPCKB-02/CH/02).

iii) Sample no. UPJTB-01/CH/05 (Brecciated Ferruginous Chert)

In the hand specimen, sample UPJTB-01/CH/05 is fine-grained, brown to dark brown coloured, and consists of angular to sub-angular clasts of chert and quartz within the fine-matrix (Fig. 3a). Petrographic study reveals that the rock is mainly composed of iron oxides, consisting of brecciated quartz clasts and chert (Fig. 3b). Under plane polarized light, the quartz grains show colourless to light yellow colour in plane polarised light and have angular to sub-angular shape. The cherts are cryptocrystalline and show mottled texture, with opaques representing iron oxides. The iron oxides consist mostly of goethite (Fig. 3c). In reflected light, goethite appears bluish-grey with lower reflectance and exhibits reddish-orange internal reflections and colloform texture. The iron oxide has undergone pervasive Limonitization (Fig. 3d), mostly representing alteration due to weathering.



Fig.3a. Hand sample of Brecciated Ferruginous Chert

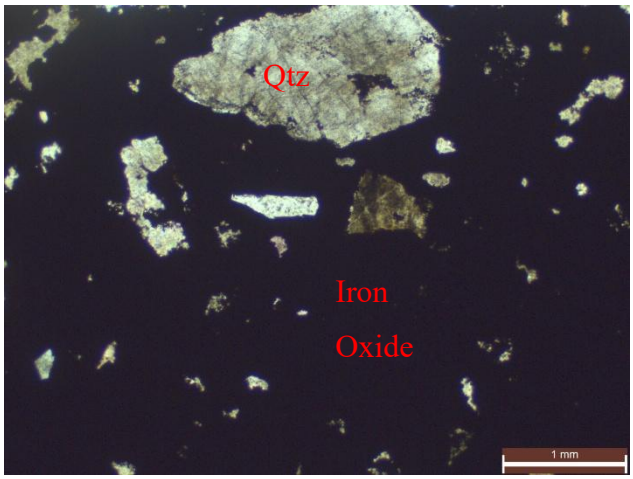


Fig.3b. Photomicrograph of Brecciated Ferruginous Chert

(Sample no. UPJTB-01/CH/05).

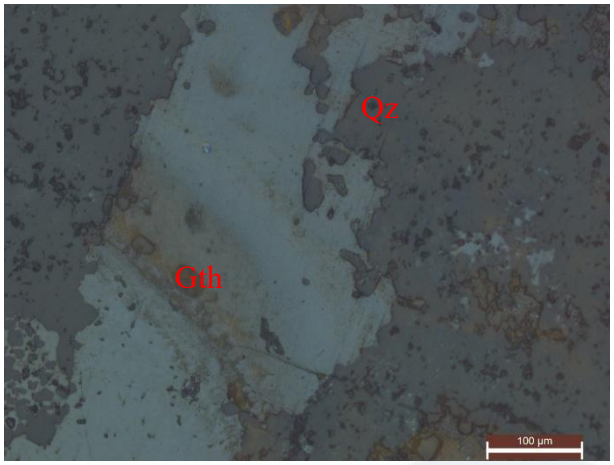


Fig.3c. Photomicrograph showing Goethite (Gth) under reflected light view (Sample no. UPJTB-01/CH/05).

showing brecciated quartz (Qtz) clasts in darker Iron oxide, under PPL image (Sample no. UPJTB-01/CH/05).

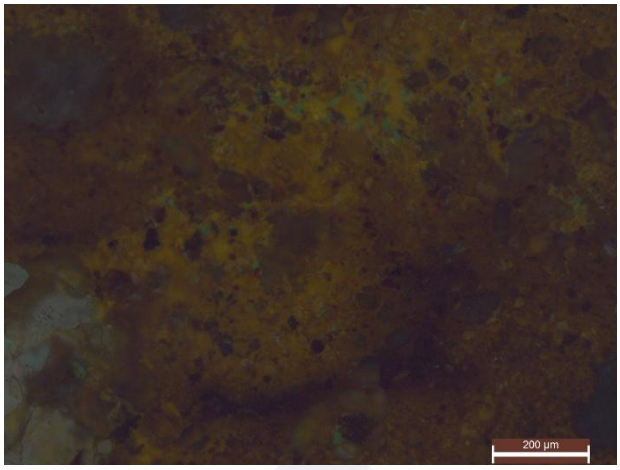


Fig.3d. Photomicrograph showing Limonitization of iron oxide matrix under reflected light view (Sample no. UPJTB-01/CH/05).

iv)Sample no. UPCKB-01/CH/01 (Ferruginous shale)

In hand specimen, sample no. UPCKB-01/CH/01 is a very fine-grained rock, reddish-brown-colored rock (Fig. 4a).

Petrographic study reveals that the rock is composed mainly of quartz and iron oxide (Fig. 4b & c). Fine-grained quartz occurs as the principal siliceous constituent, while occasional quartz clasts are embedded within the matrix, indicating a clastic component. The iron oxides occur predominantly as hematite, which is disseminated throughout the groundmass, imparting the characteristic ferruginous nature to the rock (Fig. 4d). The hematite exhibits moderate reflectivity, greyish-white colour, weak pleochroism, distinct anisotropy, along with a characteristic blood-red internal reflection.

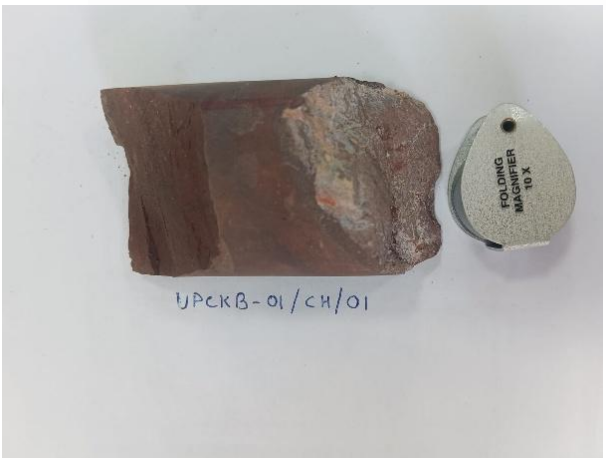


Fig.4a. Hand sample of ferruginous shale (Sample no. UPCKB-01/CH/01) showing a very fine-grained quartz and iron oxides

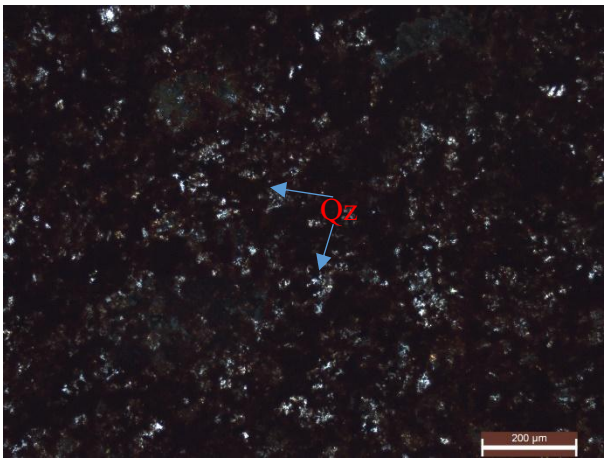


Fig.4b. Photomicrograph of Ferruginous showing a very fine-grained quartz and iron oxide under XPL view (Sample no. UPCKB-01/CH/01).

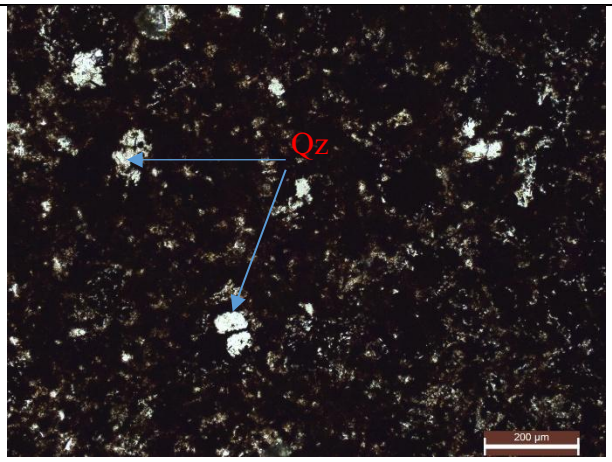


Fig.4c. Photomicrograph of Ferruginous showing a very fine-grained quartz with few quartz clast and iron oxide under XPL view (Sample no. UPCKB-01/CH/01).

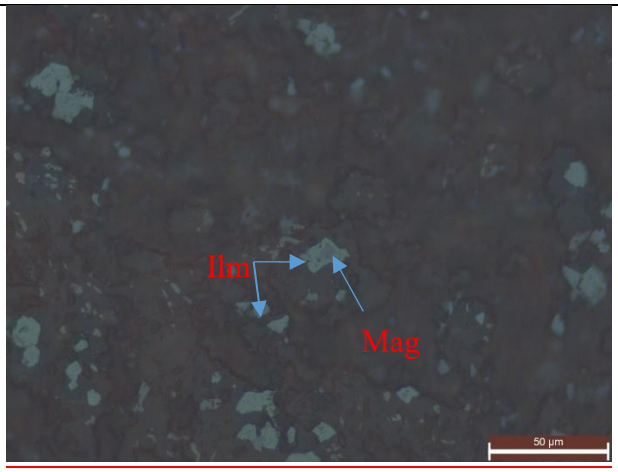


Fig.4d. Photomicrograph of Ilmenite (Ilm) and Magnetite (Mag) under reflected light view (Sample no. UPCKB-01/CH/01).

v**) Sample no. UPCKB-05/CH/03 (**Meta-dolerite)

In hand specimen, the rock (UPCKB-05/CH/03) is coarse to medium grained, dark green in colour (Fig. 5a). It consist of laths of plagioclase and pyroxene and other mafic minerals. Quartz vein intruded the

Petrographically, the rock consists predominantly of plagioclase, clinopyroxene, orthopyroxene and chlorite, titanite, and minor opaques as accessory phases. The rock exhibits a well-developed sub-ophitic texture, characterized by large orthopyroxene crystals that are partially to completely enclose by plagioclase laths (Fig. 5b). Under crossed the plagioclase displays distinct polysynthetic lamellar twinning and is locally affected by moderate sericitization, indicating post-magmatic hydrothermal alteration. Orthopyroxene occurs as subhedral to euhedral crystals, exhibiting pale yellow to pale yellow pleochroic colours. Clinopyroxene occurs as subhedral to euhedral crystal between the plagioclase laths. In several places, the clinopyroxene framework is preserved as skeletal or relict crystals, with the interstitial spaces subsequently infilled by plagioclase, suggesting recrystallization during the early to late magmatic process. Plagioclase is locally altered to sericite, whereas clinopyroxene is partially replaced by chlorite, particularly along grain boundaries and cleavage planes. Additionally, a late-stage quartz-chlorite veins crosscuts the primary mineral assemblage, accompanied by thin quartz veinlets (Fig. 5c) Micro-veinlets of epidote crosscut the quartz grains, indicating a subsequent, lower-temperature hydrothermal event (Fig. 5d). Titanite occurs as characteristic elongated, lozenge-shaped (diamond-shaped) crystals. Petrographic studies reveal that the rock has undergone a low-temperature hydrothermal event, as evidenced by sericitization, chloritization, epidotization, and silicification.

Under reflected light, the opaques minerals consist mostly of chalcopyrite, pyrite, ilmenite (Fig.5e). Based on the photomicrograph, skeletal chalcopyrite and subhedral to euhedral pyrite is preserved.



Fig.5a. Hand sample of Meta-dolerite (Sample no. UPCKB-05/CH/03).

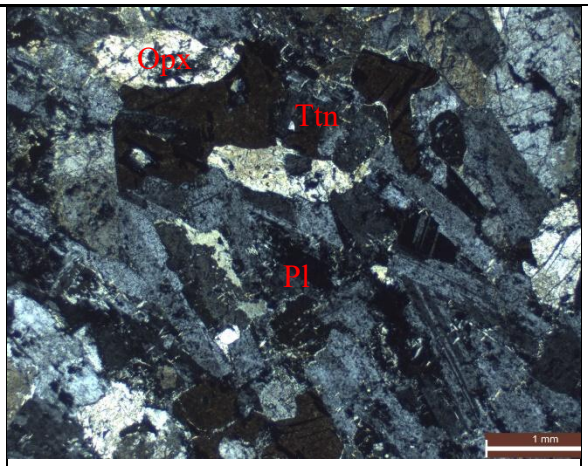


Fig 5b. Photomicrograph of meta-dolerite showing sub-ophitic texture under XPL view (Sample no. UPCKB-05/CH/03).

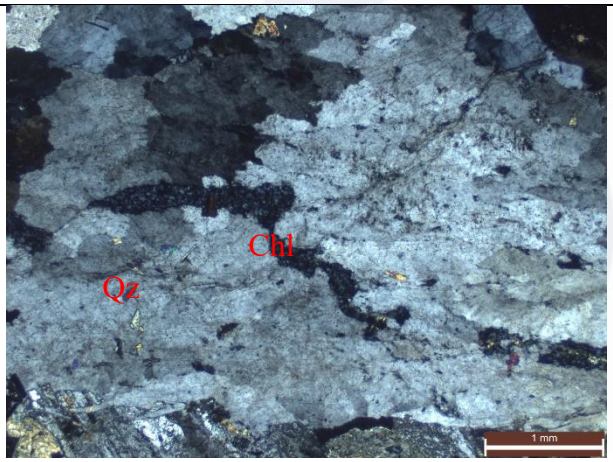


Fig.5c. Photomicrograph of meta-dolerite showing quartz-chlorite (Qtz-Chl) vein under XPL (Sample no. UPCKB-05/CH/03).

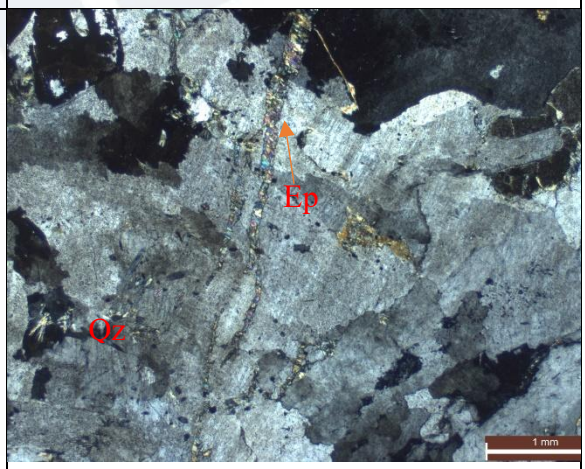


Fig.5d. Photomicrograph of meta-dolerite showing the trails of epidote veins under XPL view (Sample no. UPCKB-05/CH/03).

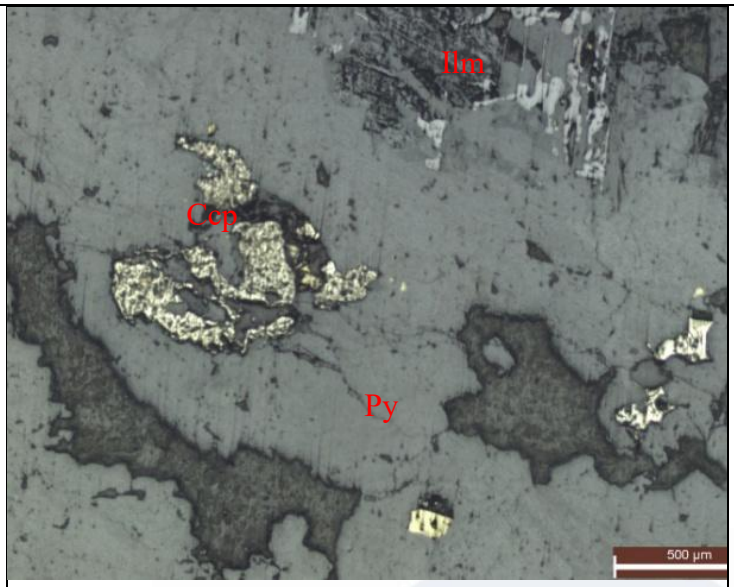


Fig.5e. Photomicrograph of meta-dolerite showing Chalcopyrite (Ccp), pyrite (Py) and ilmenite (Ilm) under reflected light view (Sample no. UPCKB-05/CH/03).

23.13 Annexure XIII: 10% Check sample

SGS Chemical Analysis – Extracted Data																	
Test Method: SGSIN-LAB/BBSR-WI XRF-03, LOI by WI-08 & FeO by ISO 9035																	
Sample Mark	**Sample No**	**Al2O3 (%)**	**Fe2O3 (%)**	**FE (%)**	**SiO2 (%)**	**TiO2 (%)**	**V2O5 (%)**	**CaO (%)**	**Cr2O3 (%)**	**K2O (%)**	**MgO (%)**	**MnO (%)**	**Na2O (%)**	**P2O5 (%)**	**SO3 (%)**	**LOI (%)**	**FEO**
UPCKB-01/01	BM26-001473.001	4.84	42.76	29.90	46.35	0.39	0.01	0.61	0.01	<0.01	0.21	<0.02	0.03	1.06	<0.025	3.61	0.14
UPCKB-01/11	BM26-001473.002	3.17	51.10	35.74	42.07	0.16	<0.01	0.18	<0.01	<0.01	0.13	<0.02	0.02	0.62	<0.025	2.36	0.29
UPCKB-01/12	BM26-001473.003	3.11	57.54	40.24	34.91	0.25	<0.01	0.13	<0.01	0.01	0.23	0.02	0.02	0.61	<0.025	2.98	0.14
UPCKB-01/19	BM26-001473.004	1.20	58.04	40.60	38.99	0.09	<0.01	0.12	0.02	0.01	0.11	<0.02	0.02	0.33	<0.025	0.95	0.14
UPCKB-01/30	BM26-001473.005	6.15	39.78	27.82	44.78	0.66	<0.01	0.12	<0.01	0.02	0.25	0.02	0.02	0.16	<0.025	3.95	0.29
UPCKB-01/52	BM26-001473.006	2.27	44.48	31.11	45.32	0.15	0.01	0.05	<0.01	0.01	0.12	0.13	0.02	1.32	<0.025	5.04	0.14
UPCKB-02/07	BM26-001473.007	4.19	40.38	28.25	43.96	0.31	<0.01	0.91	<0.01	0.11	0.58	2.03	0.01	1.13	0.07	6.05	0.14
UPCKB-02/09	BM26-001473.008	3.14	30.22	21.13	59.98	0.23	<0.01	0.17	0.02	0.05	0.29	0.77	0.01	0.51	<0.025	4.37	0.29
UPCKB-02/13	BM26-001473.009	3.54	47.61	33.30	37.70	0.21	<0.01	1.14	<0.01	0.04	0.29	2.34	0.01	0.98	<0.025	5.55	0.14
UPCKB-02/21	BM26-001473.010	3.90	34.56	24.17	53.03	0.27	0.01	0.60	<0.01	0.08	0.49	0.86	0.02	0.72	<0.025	5.29	0.14
UPCKB-03/03	BM26-001473.011	3.62	46.46	32.50	50.56	0.22	0.01	1.08	0.02	0.07	0.34	1.08	0.02	0.56	<0.025	5.85	0.14

UPCKB-03/10	BM26-001473.012	4.15	54.06	37.81	31.92	0.24	0.01	0.77	<0.01	0.05	0.35	1.14	0.02	0.45	<0.025	6.38	0.14
UPCKB-03/16	BM26-001473.013	1.96	68.73	48.08	21.90	0.11	0.01	0.33	0.01	0.03	0.23	1.11	0.01	0.45	<0.025	8.82	0.29
UPCKB-03/19	BM26-001473.014	2.78	58.39	40.84	30.86	0.20	<0.01	0.88	0.01	0.06	0.35	1.20	0.02	0.38	<0.025	4.65	0.14
UPCKB-03/40	BM26-001473.015	9.56	24.10	16.85	54.64	1.19	0.01	0.84	<0.01	4.74	0.75	0.06	0.03	0.53	<0.025	3.25	0.29
UPCKB-03/45	BM26-001473.016	3.56	36.25	25.36	51.04	0.52	0.01	2.25	0.02	0.45	0.78	0.39	0.02	1.70	<0.025	2.79	0.16
UPCKB-04/06	BM26-001473.017	1.77	32.07	22.43	52.94	0.16	<0.01	4.74	0.02	0.31	1.87	0.13	0.03	0.68	<0.025	5.12	5.32
UPCKB-04/08	BM26-001473.018	0.36	49.10	34.34	36.96	0.07	<0.01	6.60	0.02	0.01	0.44	0.11	0.01	0.73	<0.025	5.12	6.87
UPCKB-04/27	BM26-001473.019	1.87	43.38	30.34	42.84	0.16	0.01	1.58	0.03	0.10	0.45	2.15	0.01	1.29	<0.025	5.36	0.14
UPCKB-04/34	BM26-001473.020	2.23	30.32	21.21	58.78	0.19	<0.01	0.81	0.03	0.09	0.49	1.79	0.02	0.76	<0.025	4.13	0.14
UPCKB-05/04	BM26-001473.021	0.99	3.96	2.77	93.69	0.13	<0.01	0.13	0.02	<0.01	0.11	<0.02	0.07	0.05	<0.025	0.77	0.14
UPCKB-05/14	BM26-001473.022	6.03	76.60	53.57	4.71	0.54	<0.01	0.05	0.01	<0.01	0.12	0.30	<0.01	1.50	<0.025	10.01	0.16
UPCKB-05/31	BM26-001473.023	5.64	44.96	31.45	38.95	0.35	0.01	5.03	<0.01	0.49	2.41	0.32	0.02	1.09	<0.025	0.25	11.75
UPCKB-05/36	BM26-001473.024	1.08	54.13	37.86	36.07	0.09	<0.01	5.17	<0.01	0.19	1.62	0.29	0.10	1.56	<0.025	-0.58	15.92
UPCKB-06/04	BM26-001473.025	0.79	63.67	44.51	26.31	0.08	<0.01	1.66	<0.01	0.01	0.21	0.80	0.02	1.49	<0.025	4.66	1.72
UPCKB-06/09	BM26-001473.026	0.49	17.90	12.52	79.01	0.05	<0.01	0.51	<0.01	0.01	0.18	0.12	0.02	0.46	<0.025	0.99	1.42
UPJTB-01/19	BM26-001473.027	1.53	55.13	38.56	31.75	0.14	0.02	0.15	0.12	0.05	0.13	0.50	0.03	1.60	<0.025	8.62	0.29
UPJTB-01/22	BM26-001473.028	0.99	81.23	56.82	1.99	0.08	0.01	0.17	0.08	0.06	0.14	0.83	0.03	2.46	<0.025	11.68	0.14

UPJTB-01/30	BM26-001473.029	7.26	70.54	49.34	6.68	1.59	<0.01	0.09	0.10	0.04	0.20	0.12	0.02	1.33	<0.025	11.58	0.14
UPJTB-02/08	BM26-001473.030	15.75	23.90	16.72	46.11	5.87	0.08	0.06	0.07	0.04	0.14	0.14	0.02	0.29	<0.025	7.25	0.14
UPJTB-02/12	BM26-001473.031	8.62	45.01	31.48	34.12	5.15	0.08	0.06	0.34	0.11	0.16	0.12	0.07	0.19	<0.025	5.57	0.14
UPJTB-02/18	BM26-001474.002	6.76	31.57	22.08	51.26	5.01	0.09	<0.03	0.48	0.57	0.26	0.19	0.03	0.15	<0.025	3.39	0.14
UPCK/BRS-01	BM26-001474.003	1.68	81.54	57.03	3.29	0.37	0.02	0.04	0.03	<0.01	0.12	0.04	0.03	0.78	<0.025	11.70	0.28
UPCK/BRS-09	BM26-001474.004	0.13	47.69	33.36	50.16	0.03	<0.01	0.13	0.05	<0.01	0.10	<0.02	<0.01	0.32	<0.025	1.03	0.14
UPCK/BRS-14	BM26-001474.005	0.53	93.82	65.62	4.41	0.02	<0.01	0.03	0.01	<0.01	0.10	<0.02	0.01	0.11	<0.025	0.76	0.14
UPCK/BRS-26	BM26-001474.006	0.26	56.56	39.56	41.54	0.04	<0.01	0.05	0.02	<0.01	0.11	<0.02	<0.01	0.26	<0.025	0.90	0.14
UPCK/BRS-33	BM26-001474.007	0.33	43.58	30.48	53.98	0.03	<0.01	0.03	0.06	<0.01	0.10	0.05	0.01	0.32	<0.025	1.40	0.14
UPCK/BRS-54	BM26-001474.008	2.25	59.95	41.93	28.60	0.13	0.01	0.05	0.02	<0.01	0.12	0.05	0.01	0.85	<0.025	7.83	0.29
UPCK/BRS-59	BM26-001474.009	0.18	25.96	18.16	70.32	0.04	<0.01	1.17	0.06	0.02	0.12	0.21	0.02	0.99	0.17	0.62	1.58
UPCK/BRS-71	BM26-001474.010	1.46	60.24	56.12	2.48	0.18	0.01	0.17	0.14	0.04	0.16	0.07	0.02	3.16	<0.025	11.73	0.14
UPJT/BRS-85	BM26-001474.011	6.23	57.84	40.45	22.66	0.47	0.02	0.06	0.03	1.26	0.41	0.05	0.02	1.21	<0.025	8.92	0.14
UPCK/BHC & J-01 / CH-01 / A11	BM26-001474.012	2.11	54.75	38.30	32.03	0.10	0.01	0.17	<0.01	0.06	0.14	1.98	<0.01	1.20	<0.025	6.75	0.14
UPCK/BHC & J-01 / CH-02 / C7	BM26-001474.013	2.45	55.69	38.95	35.59	0.21	<0.01	0.05	<0.01	0.01	0.12	0.05	<0.01	1.04	<0.025	6.64	0.14
UPCK/BHC & J-01 / CH-03 / C6	BM26-001474.014	1.57	75.67	52.93	11.70	0.13	<0.01	0.07	<0.01	<0.01	0.22	0.45	0.01	1.06	<0.025	9.01	0.29
UPCK/BHC & J-01 / CH-04 / D5	BM26-001474.015	1.57	62.59	43.77	27.65	0.16	0.01	0.04	<0.01	0.15	0.12	0.03	<0.01	1.18	<0.025	6.31	0.29

UPCK/BHC & J-01 / CH-05 / E7	BM26-001474.016	0.89	34.07	23.83	58.73	0.08	<0.01	0.05	0.03	0.04	0.13	1.01	0.01	0.59	<0.025	4.07	0.14
UPCK/BHC & J-2 / CH-02 / B10	BM26-001474.017	1.78	44.72	31.28	43.74	0.10	<0.01	0.27	<0.01	0.15	0.34	2.68	0.02	0.42	<0.025	5.16	0.14
UPCK/BHC & J-2 / CH-03 / C11	BM26-001474.018	2.22	73.06	51.10	16.47	0.14	<0.01	0.32	0.01	0.01	0.13	0.65	0.01	1.26	<0.025	5.33	0.29
UPCK/BHC & J-2 / CH-04 / D4	BM26-001474.019	1.39	55.30	38.68	36.36	0.09	0.01	0.06	0.02	0.03	0.12	0.54	<0.01	0.87	<0.025	5.09	0.14
UPCK/BHC & J-2 / CH-05 / E6	BM26-001474.020	0.61	61.06	42.73	35.73	0.07	<0.01	0.04	<0.01	0.01	0.11	0.06	<0.01	0.14	<0.025	1.76	0.14
UPCK/BMC & J-6 / CH-01 / A4	BM26-001474.021	0.65	63.67	44.53	30.08	0.07	<0.01	1.08	<0.01	0.03	0.15	0.32	0.02	1.10	<0.025	2.59	2.44
UPCK/BMC & J-6 / CH-02 / A5	BM26-001474.022	0.17	47.80	33.43	44.89	0.08	<0.01	0.80	<0.01	0.03	0.16	0.13	0.02	0.69	<0.025	0.91	3.31
UPJT/HOB-1 / CH-01 / A6	BM26-001474.023	1.31	66.53	46.54	20.90	0.25	<0.01	0.07	0.06	0.08	0.12	0.08	0.01	1.92	<0.025	8.46	0.29
UPJT/HOB-1 / CH-01 / A14	BM26-001474.024	1.18	74.35	52.03	10.50	0.25	0.03	0.10	0.03	0.05	0.14	0.35	0.01	1.91	<0.025	10.90	0.14
UPJT/HOB-2 / CH-01 / A7	BM26-001474.025	3.26	75.97	53.13	7.32	1.66	0.03	0.07	0.19	0.02	0.13	0.02	0.02	1.43	<0.025	9.67	0.14
UPJT/HOB-2 / CH-01 / A18	BM26-001474.026	6.35	63.86	44.66	15.41	2.81	0.05	0.06	0.13	0.02	0.15	0.02	0.02	1.20	<0.025	9.59	0.14

23.14 Annexure XIII: Details of nature and quantum of work approved vs achievement.

23.14.1 NATURE OF WORK

The nature of the work and its flow pattern are shown in Table-23.1.

Table 2.1: Nature, quantum, target (NQT) and achievements

DETAILS OF QUANTUM OF WORK																			
Time Schedule (in Months) for Reconnaissance Survey (G4) for Iron ore in Mahakoshal Group around Chakdiya (A1), Jorba (A2) Blocks, Sonbhadra District, Uttar Pradesh																			
Item of Work	2	4	6	8		10	12		14	18	20	22	24		26	28		30
Forest Permission					REVIEW			REVIEW						REVIEW			REVIEW	
Geological Mapping, -(18.56 Sq.Km.) (1:12,500 SCALE)																		
Bed Rock Sampling (BRS), 91 nos.																		
Chemical Analysis of BRS																		
Channel Sampling, 150 Nos. samples																		
Chemical Analysis of Channel samples																		
Drilling of Scout Boreholes 8 Nos.(700meter) & core sampling collection.																		
Chemical Analysis of Core Samples 309 Nos.																		
Geological Report Writing with Peer Review and submission																		

23.14.2 QUANTUM OF WORK APPROVED VS. ACHIEVEMENT

The quantum of approved work and the achievements are shown in Table-23.2.

Table-23.2: Quantum of approved work vs achievements

Sl. No	Nature of Work	Target Assigned	Achievement
1	**GEOLOGICAL EXPLORATION**		
a	Geological Mapping (LSM 1:12,500 Scale)	18.56 (km^2)	Completed
2	**TECHNOLOGICAL**		
a	Surface Exploration- BRS &	91 BRS +	Completed
	Channel Sampling	150 CS	Completed
b	DGPS Survey	9 Nos	Completed
c	Subsurface Exploration -Drilling	700 m	Completed
d	Drill Core Preservation	350m	Completed
3	**GEOCHEMICAL**		
a	Bedrock, Channel & Core Samples (5 Radical Fe, Al2O3, P2O5&SiO2, LOI (XRF Techniques)	91 BRS + 150 CS+309 Core	Completed
			Completed
			Completed
b	i) For Ag, Ni, Co, Cr, Cu, Pb, Zn, V, Ti by AAS Method	10	Completed
	ii) Analysis of Precious Metals by Fire Assay Techniques	10	Completed
4	**PETROGRAPHIC / MINERALOGRAPHIC STUDIES**		
a	i) Petrographic Studies	10	Completed
	ii) Preparation of Thin Sections	10	Completed
	iii) Preparation of Polished Sections	10	Completed
	iv) Complete Ore Microscopy	10	Completed
b	Bulk Density	20	Completed
5	**CHEMICAL ANALYSIS (As per approved NQT)**		
a	Primary Sample (Major oxides 5 radicals) etc.	91+150+309	Completed
b	Check Samples for (5 radicals) (10%)	56	Completed

The approved geological exploration programme was **successfully completed as planned**. Geological mapping was carried out over **18.56 km²** at **1:12,500 scale**. The survey and sampling programme included **9 DGPS observations**, **91 bedrock samples**, **150 channel samples**, and **309 core samples**.

Petrographic and mineralogical investigations were completed on **10 samples each** for **petrographic studies, ore microscopy, polished-section studies, and integrated petrographic/mineralographic studies**. In addition, **20 bulk-density determinations** were carried out.

The chemical analytical programme was also completed in accordance with the approved NQT. A total of **550 primary samples** were analysed for major oxides and specified radicals. **56 check samples (10%)** were analysed for the selected radicals to assess analytical precision and quality control. Further, **10 samples** were analysed for **Au, Ag, Ni, Co, Cr, Cu, Pb, Zn, V and Ti by AAS**, and **10 samples** were subjected to **precious-metal analysis by Fire Assay**.

Overall, 100% of the approved exploration, sampling, petrographic/mineralogical, density and chemical analytical programmes were completed.

23.15 Annexure XVI: Sanction Order

29/02/2024, 15:09 Sanction Details

Public Financial Management System-PFMS
O/o Controller General of Accounts, Ministry of Finance (formerly CPSMS)

Welcome: Vivek Kumar Sharma
User Type: PD
Financial Year: 2023-2024

[nmet] Logout
Change Password
Login History
English
Help

Bill No. 409 OF Expenditure Register on Page No. 179

- AdhocReports
- SchemeWiseContactDetails
- Home
- CAM Reports
- User Manuals
- Masters
- Users
- Agency
- Sanctions
- PreSanction
- DBT File Tracker
- Sanction Custom Fields
- Printing Templates
- Sanction Templates
- Employee Info. System
- Reports
- Masters
- My Schemes
- Agencies
- My Funds
- Scheme Allocation
- Register/ Track Issue
- Utilisation Certificate
- OLD UC

Sanction Details

Controller:	026-MINES	**Sanction Status:**	Approved
Sanction Number:	540	**Sanction Date:**	29/02/2024
Sanction Type:	Transfer (DDO Bill)	**Sanction Amount:**	3816446
IFD Number:	23/433//2023-NMET	**IFD Date:**	28/02/2024
Scheme:	3583-EXPLORATIION ACTIVITIES UNDER NATIONAL MINERAL EXPLORATION TRUST	**PAO:**	036617-PAO(Mines), New Delhi
DDO:	236618-UNDER SECRETARY,DEPTT.OF MINES,ROOM NO.312,SHASTRI BHAVAN,NEW DELHI.TEL.386467.	**Remarks:**	approved

North East Expenditure

Created By:	nmet	**Created On:**	29/02/2024 02:42:25 PM
Modified By:	nmet	**Modified On:**	29/02/2024 03:11:07 PM
File Uploaded:	SO 540.pdf		

Account Details:

Grant	Department (For UT Grants Only)	Function Head	Object Head	Category	Amount	External PAO	Available Budget
069 - Ministry of Mines		2853021020500 - NATIONAL MINERTAL EXPLORATION TRUST FUND ACTIVITIES	31 - GRANTS-IN-AID GENERAL	5 - VOTED	3816446		285078577

Agency Details:

Sr.No	Agency Name	City	District	State	Country	Gross Amount	Deduction Amount	Net Amount	Payee Remarks
1	The Directorate of Geology and Mining Uttar Pradesh	Lucknow	LUCKNOW	UTTAR PRADESH	INDIA	3,816,446	0	3,816,446	Payment of 1st Advance
					Total	3816446	0	3816446	

Sanction Approved Successfully.

Payee Details | Print Sanction Order | Back

6. Sanction is also hereby conveyed for release of the 1st installment of 40% of the estimated project cost i.e. **₹38,16,446/- (₹ Thirty eight lakh sixteen thousand four hundred and forty six only)** as an advance in terms of conditions stipulated in this office letter no. 42/1/2017-NMET/176 dated 16th December 2021 and letter no. 42/1/2017-NMET/217 dated 19th January 2022 regarding "*Release of funds to State Government / NEAs for mineral exploration*".

7. The expenditure will be debited to '2853' Non-Ferrous Mining and Metallurgical Industries (Major Head) 02-Regulation and Development of Mines (Sub-Major head) 102-Mineral Exploration (Minor Head) 05-National Mineral Exploration Trust Fund Activities (Sub-Head) 00- National Mineral Exploration Trust Fund Activities (Detailed-Head) 05.00. 31- Grant-in-aid (General) under Demand No. 69, Ministry of Mines during the financial year 2023-24.

8. Certified that the pattern of assistance, under which the Grants-in-Aid (General) has been sanctioned, has the prior approval of Ministry of Finance.

9 DGM, Uttar Pradesh is a registered agency on EAT module of PFMS. In terms of **Rule 230, 235, 236 and 238 of GFR**, DGM, Uttar Pradesh , should maintain subsidiary accounts of the Government Grants and furnish the same to the Principal Accounts Office of the Ministry. The account shall be open to inspection by the Sanctioning Authority and audit, both by the Comptroller and Auditor General of India and internal audit by the Principal Accounts Office of the Ministry of Mines, whenever the Organization is called upon to do so.

10. The exploration agency has to furnish the utilization certificate in respect of amount disbursed as Grant-in-aid for the project on utilization of disbursed amount or after completion of one year from the date of disbursement of advance, whichever is earlier. The next instalment of advance will be released after submission of utilization certificate and progress report in respect of the 1st installment.

11. Shri Arun Kumar Chail, Section Officer in the Ministry will be the Drawing and Disbursing Officer for this purpose. It is requested that the payment of hereby conveyed for release of the 1st installment of 40% of the estimated project cost i.e **₹38,16,446/- (₹ Thirty eight lakh sixteen thousand four hundred and forty six only)**may kindly be made to the Directorate of Geology and Mining, Uttar Pradesh through RTGS in State Bank of India, Jawahar Bhawan, Lucknow (IFSC Code – SBIN0006144 Account No. 40799552205)

12. This has concurrence of JS &. FA, Mines vide Note# 9 dated 28.02.2024 (E file No. 3074880).

Yours faithfully,

01.03.24

(Vivek Kumar Sharma)
Director &HoD, NMET

Copy for information and further necessary action:

1. The Director, Directorate of Geology and Mining, Uttar Pradesh Khanij Bhawan 27/8 Raja Ram Mohan Rai Marg, Hazratganj, Lucknow Uttar Pradesh-226001.
2. Dr. S Ravi, Dy. Director General and Chairman, TCC-NMET, GSI SU: Karnataka & Goa, Bengaluru-560078.
3. I.F. Division, Ministry of Mines, Shastri Bhawan, New Delhi.
4. Executive Committee (EC) Meeting file (F.No.6/2/2015-NMET)
5. Grant-in aid Sanction order file.

23.16 Annexure XV: Revised Sanction Order

Government of India
Ministry of Mines
National Mineral Exploration Trust

F.No.23/433/2024-NMET/ 234 **New Delhi, 14th July, 2025**

REVISED OFFICE MEMORANDUM

Subject: Additional cost for the project "Reconnaissance Survey (G4) for Iron Ore in Mahakoshal Group around Chakdiya, Kushaniya, Jobra and Tusgaon area, Sonbhadra district, Uttar Pradesh."

Agency: DGM, Uttar Pradesh (NPEA: (M/s GeoExpore Pvt. Ltd.).

On the recommendation of Technical-cum-Cost Committee (TCC) of NMET, the Executive Committee (EC) in its 33rd meeting held on 19th February, 2024 had approved the mineral exploration project **"Reconnaissance Survey (G4) for Iron Ore in Mahakoshal Group around Chakdiya, Kushaniya, Jobra and Tusgaon area, Sonbhadra district, Uttar Pradesh"** with timeline of 09 months at an approved cost (including GST) of **₹ 95,41,116/-** to be executed by DGM, Uttar Pradesh (M/s GeoExpore Pvt. Ltd.).

2. There was revision of cost as approved in 39th EC of NMET. An OM No. 23/433/2024-NMET/69 has also been issued in this regard with revised cost of **₹1,95,44,464/-.**

2. On the request of M/s GeoExpore Pvt. Ltd., the Executive Committee (EC) of NMET in its 42nd meeting held on 02nd June, 2025 accorded approval of additional cost of **₹5,11,005/- (Five lakh eleven thousand and five only).**

3. The total approved cost of the project is revised as under:-

S. No.	Project/Block Name	Commodity	Stage	Duration (Months)	Revised Cost (including GST).
1	Reconnaissance Survey (G4) for Iron Ore in Mahakoshal Group around Chakdiya, Kushaniya, Jobra and Tusgaon area, Sonbhadra district, Uttar Pradesh.	Iron Ore	G4	09 months (& further extension up to 25.11.2025)	₹2,00,55,469/-

(Two crore fifty five thousand four hundred sixty nine only)

4. The uploading of final Geological Report (GR) on NGDR portal is sole responsibility of the exploration agency. The final payment will be made only after receiving the confirmation of the same. The screenshot/acknowledgement of successful uploading of GR is to be submitted to NMET with the final bill.

5. The other conditions of the earlier issued Sanction No. 540 dt. 28.02.2024 remain same.

Yours faithfully,

(Geetika Sharma)
Deputy Secretary & HoD, NMET

Copy for information and further necessary action:

1. The Director, Directorate of Geology and Mining, Uttar Pradesh Khanij Bhawan 27/8 Raja Ram Mohan Rai Marg, Hazratganj, Lucknow Uttar Pradesh-226001.
2. M/s GeoExpore Pvt. Ltd.
3. I.F. Division, Ministry of Mines, Shastri Bhawan, New Delhi.
4. Executive Committee (EC) Meeting file (F.No.6/2/2015-NMET
5. The Chairman, TCC, NMET
6. Grant-in aid Sanction order file.

Annexure 6

Revised Cost for Reconnaissance Survey (G4) for Iron Ore in Mahakoshal Group around Chakdiya, Kushaniya, Jobra and Tusgaon area, Sonbhadra district, Uttar Pradesh.
Area 18.56sq. km, No. of BH: 08, Borehole depth range 700m; Schedule timeline: 15 months (Extension) Review: After 4 Months (done as per timeline)
Agency : GeoExpore Pvt. Ltd.

S. No.	Item of Work *	Unit *	Rates as per NMET SoC 2020-21		Approved Cost of the Proposal		Revised cost			Remarks
			SoC-Item No. *	Rates as per SoC * (a)	Qty (b)	Total Amount (Rs) (a*b)	Rates as per SoC * (a)	Qty. (b)	Total Amount (Rs) (a*b)	
A	**GEOLOGICAL WORK**					-				
i	Geologist party Days H Q	day	1.3	9,000	35	3,15,000	9,000	35	3,15,000	
ii	Geologist Party Days - Field	day	1.3	11,000	120	13,20,000	11,000	120	13,20,000	
iii	Labourers (2 Nos.)	day	5.7	504	240	1,20,960	504	240	1,20,960	
iv	Sampler Party Days (Bed Rock / Soil Stream) and Core Sampling (1 Party)	one sampler per day	1.5.2	5,100	56	2,85,600	5,100	56	2,85,600	
v	Labours for Sampling	day	5.7	504	224	1,12,896	504	224	1,12,896	
	Sub Total of A					**21,54,456**	-		**21,54,456**	
B	**Ground Geophysical Survey**						-			
i	Magnetic Survey (25 30 Line Km) with 200 m spacing	No. of station	3.2 a	1,800	-	-	1,800	-	-	
ii	Expert charges for Geophysicist H Q	Per Day	3.18	9,000	-		9,000	-	-	
iii	Geophysicist - monitoring of Geophysical investigation (Field)	per day	3.19	11,000	-	-	11,000	-	-	
iv	Labourers (Rs.477 / day / labour) Geophysical survey (4 Nos.)	Days	5.7	477	-	-	477	-	-	

	Sub Total- B					**-**	-		**-**	
C	**Survey work**						-			
i	Survey party Days (1 Party)	Days	1.6.1a	8,300	5	41,500	8,300	5	41,500	
ii	DGPS Survey - Demarcation of Boundary, fixation of Boreholes, determination of coordinates are reduced level (including) labourer		1.6.2	19,200	9	1,72,800	19,200	9	1,72,800	
iii	Labourer (Rs.477 / days / labour) for Survey party (4 Nos.)	Days	5.7	477	10	4,770	477	10	4,770	
	Sub-Total C				**24**	**2,19,070**	**-**		**2,19,070**	
	Sub-Total A + B + C					**23,73,526**	-	**-**	**23,73,526**	
D	**Trenching/Pitting**						-			
	Trenching (1 m x 2 m x 10 m) (5 Nos.)	Per Cu.m	2.1.1	3,330	-	**0**	3,330	**0**	**0**	
	Sub-Total D									
E	**DRILLING (out sourced)**						**DRILLING (In house)**			
i	Surface Drilling (2 Rigs) (30 m Vertical Depth) 8 Exploratory BHs	mts	2.2.1.5 a	12,650	**700**	**8855000**	12,650	**700**	**8855000**	
ii	Drill core preservation charges - "one complete borehole plus mineralised cores of all the BHs of the block, all cost included	Per mts.	5.3	1,590	**350**	**556500**	1,590	**350**	**556500**	
iii	Approach road making for Rugged / Hilly terrain	Per Km.	2.2.10b	32,200	-	**0**	32,200	**12**	**386400**	
iv	Land compensation	Per Borehole	5.6	20,000	-	**0**	20,000	**2**	**40000**	2 Boreholes falling in the village within the forest area
v	construction of concrete pillar (12" X 12" X 30")	Per Borehole	2.2.7a	2,000	-	**0**	2,000	**8**	**16000**	
vi	Accommodation	Per Month	2.2.9	50,000			50,000	**3**	**150000**	
vii	Drilling camp setting cost	Per Project	2.2.9 b	2,50,000			2,50,000	**1**	**250000**	

viii	Drilling camp winding cost	Per Project	2.2.9 a	2,50,000			2,50,000	1	250000	
ix	Transportation of drill rigs and truck associated with it (To and Pro)	Km	2.2.8	36			36	5,000	180000	
	Sub-Total E					9411500	-		10683900	
F	ABORATORY STUDIES						-			
	a) Chemical Analysis						-			
i	Primary samples (Bed rock / Soil / Stream / Core) for 5 Radical Fe, Al2O3, P2O5&SiO2,LOI (XRF Techniques)	Per Sample	4.1.15a	4,200	550	23,10,000	4,200	550	23,10,000	
ii	Check sample ((Bed rock / Soil / Stream) (10 %)	Per Sample	4.1.15a	4,200	56	2,35,200	4,200	56	2,35,200	
iii	For Ag, Au Ni, Co, Cr, Cu, Pb, Zn, V, Ti by AAS Method	Per Sample	4.1.14	7,731		-	7,731	10	77,310	
iv	Analysis of Precious metals by fire assay techniques	Per Sample	4.1.5 a	2,380	10	23,800	2,380	10	23,800	
	Primary + Check samples									
	a) Primary Samples (Drill core) for 5 Radical Fe, Al2O3, P2O5 & SiO2,LOI	Per Sample	4.1.15a	4,200	-	-	4,200	-	-	
	b) Check Samples for 5 Radical Fe, Al2O3, P2O5 & SiO2, LOI (20 %)	Per Sample	4.1.15a	4,200	-	-	4,200	-	-	
	c) Composite Samples for 5 Radical Fe, Al2O3, P2O5 & SiO2, LOI	Per Sample	4.1.15a	4,200	-	-	4,200	-	-	
	d) Whole Rock Analysis	Per Sample	4.1.15a	4,200	-	-	4,200	-	-	
	b) Petrography Studies						-			
	a) XRD studies	Per Sample	4.5.1	4,000	-	-	4,000	-	-	
	b) ICP-MS Studies (34 Trace elements)	Per Sample	4.1.14	7,731	-	-	7,731	-	-	

	c) Preparation of Thin Sections	Per Sample	4.3.1	2,353	10	23,530	2,353	10	23,530	
	d) Complete Petrographic / Ore microscopic study / Mineralgraphic studies	Per Sample	4.3.4	4,232	10	42,320	4,232	10	42,320	
	e) Preparation of Polished Sections	Per Sample	4.3.2	1,549	10	15,490	1,549	10	15,490	
	f) Complete Ore microscopic study / Mineralgraphic studies	Per Sample	4.3.4	4,232	10	42,320	4,232	10	42,320	
	Sub-Total F					**26,92,660**	-		**27,69,970**	
G	**Geotechnical Studies**						-			
	Sp. Gravity Determination	per sample	4.8.1	1,605	-	-	1,605	-	-	
	Bulk density	per sample	4.10	3,540	20	70,800	3,540	20	70,800	
	Sub-Total G					**70,800**	-		**70,800**	
	Total A + B + C + D + E + F + G					**1,45,48,486**	-	-	**1,58,98,196**	
H	**Preparation of Exploration Proposal (5 +1 soft copy)**	**Per Project**	**5.1**		1	**2,90,970**	-		**3,17,964**	
I	**Peer review Charges**	**As per EC Committee**				**30,000**	-		**30,000**	
J	**Geological Report Preparation 5 + 5 Hard Copies + 2 Soft Copies (@ 5%)**	**Per Project**	**5.2**		1	**7,27,424**	-		**7,50,000**	
L	**Tender Processing Cost**					**1,77,100**	-	-		
M	**Operational Charge**					**7,89,125**	-			
	Total A to M					**1,65,63,105**	-		**1,69,96,160**	
L	**Total Estimated Cost without GST**					**1,65,63,105**	-		**1,69,96,160**	
M	**Provision for GST (18% of J)**					**29,81,359**	-		**30,59,309**	
N	**Total Estimated Cost with GST**					**1,95,44,464**	-		**2,00,55,469**	
				or Say Rs. In Lakhs		**195.44**	or Say Rs. In Lakhs		**200.55**	
Note:										
1	**Strict adherence to the Ministry of Finance's and GFR guidelines is mandatory. Every transaction must adhere to GFR rule 21.**									

55

23.17 Annexure XVI: Letter of intent from DGM, Lucknow

प्रेषक

संयुक्त निदेशक,
भूतत्व एवं खनिकर्म निदेशालय, उ0प्र0,
"खनिज भवन", लखनऊ।

सेवा में

जिलाधिकारी
सोनभद्र

संख्याः /खo3ो(136)/NPEA/2022 दिनांकः 01/05/2024

विषयः– खान मंत्रालय, भारत सरकार द्वारा नामित Notified Private Exploration Agencies, M/s Geoexpore को अनुमोदित लौह अयस्क की परियोजना में अपेक्षित सहयोग प्रदान किये जाने के सम्बन्ध में।

महोदय,

कृपया उपर्युक्त विषयक अवगत कराना है कि खान मंत्रालय, भारत सरकार द्वारा Notified Private Exploration Agencies M/s Geoexpore को जनपद सोनभद्र के महाकौशल ग्रुप के चकदिया, कुशनिया, जोबरा एवं तुषगांव क्षेत्रों में लौह अयस्क के प्रारम्भिक खोज हेतु 18.56 वर्ग कि0मी0 में कार्य किये जाने हेतु भारत सरकार द्वारा NMET Fund के तहत अनुमोदन प्रदान किया गया है। **Geoexpore** फर्म के निदेशक श्री वाई0 पाटील द्वारा अन्वेषण कार्य के दौरान क्षेत्रीय सहयोग प्रदान किये जाने का अनुरोध किया गया है।

अतः आपसे अनुरोध है कि उक्त फर्म को यथावश्यक सहयोग प्रदान किये जाने हेतु सम्बन्धित को निर्देशित करने का कष्ट करें।

भवदीय,

(नवीन कुमार दास)
संयुक्त निदेशक

संख्याः 255 /खo3ो(136)/NPEA/2022 तद्दिनांक।

प्रतिलिपिः निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

1. पुलिस अधीक्षक, जनपद सोनभद्र।
2. प्रभारी अधिकारी क्षेत्रीय कार्यालय, सोनभद्र ।
3. Director, M/s Geoexpore pvt. Ltd

(नवीन कुमार दास)
संयुक्त निदेशक

23.18 Annexure XVIII: Forest Permission for 5 Boreholes

कार्यालय मुख्य वन संरक्षक/नोडल अधिकारी, पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, उ0प्र0, लखनऊ।

पत्रांक:- 3100/11-सी, लखनऊ, दिनांक: मई 20 ,2025

सेवा में,

प्रभागीय वनाधिकारी,
ओबरा वन प्रभाग,
ओबरा।

विषय:- Request for Forest Permission for carrying out pitting/trenching and drilling work in forest cover areas around Chakdiya, Kushniaya, Jobra and Tusgaon village areas for fulfilling of exploration project work sponsored by National Exploration Trust (NMET), Ministry of Mines, Govt. of India Reg.

संदर्भ:- प्रभागीय वनाधिकारी, ओबरा का पत्रांक-1525/ओबरा/15, दिनांक 16.01.2025 एवं पत्रांक-2458/ओबरा/15, दिनांक 13.05.2025

महोदय,

उपरोक्त विषयक संदर्भित पत्रों का अवलोकन करने का कष्ट करें। आपके उपरोक्त संदर्भित पत्र द्वारा GeoExpOre Pvt. Ltd द्वारा चकडिया, कुशनैया, जोबरा और तुसगांव गांव के क्षेत्रों के आसपास के वन क्षेत्रों में Pitting/Trenching and Drilling कार्य हेतु बिना वृक्ष पातन के 1.87 इंच आकलीटर के 18.56 वर्गकिमी0 में कुल 05 बोरहोल की अनुमति मांगी गयी है।

उक्त के क्रम में अवगत कराना है कि विषयगत प्रकरण में वन (संरक्षण एवं संवर्धन) अधिनियम 1980 एवं वन (संरक्षण एवं संवर्धन) नियम 2023 के अंतर्गत निर्गत समेकित गाइडलाइन में दिये गये प्राविधानों के अंतर्गत निम्न शर्तों एवं प्रतिबन्धों के अधीन Pitting/Trenching and Drilling हेतु अनुमति प्रदान की जाती है:-

1. उपरोक्त अन्वेषण में किसी प्रकार के वृक्षों का कटान नहीं किया जायेगा। क्षेत्रों को चिन्हित करने हेतु केवल झाड़ियों की सफाई एवं साइटिंग हेतु पेड़ों की शाखाओं की मात्र शाखा तराशी ही की जायेगी। इसके लिए सम्बन्धित प्रभागीय वनाधिकारी से पूर्वानुमति लेना आवश्यक होगा।
2. यदि परीक्षण एवं अन्वेषण कार्य हेतु वृक्षों का पातन आवश्यक है तो ऐसी दशा में भारत सरकार की पूर्वानुमति आवश्यक होगी।
3. वन्य जीव विहार तथा राष्ट्रीय उद्यान में कोई भी परीक्षण एवं अन्वेषण कार्य प्रधान मुख्य वन संरक्षक, वन्य जीव, उ0प्र0 लखनऊ की पूर्वानुमति के बिना नहीं किया जायेगा।
4. किसी स्थल विशेष के परीक्षण एवं अन्वेषण से पर्याप्त समय पूर्व स्थल के जी0पी0एस0 को-ऑर्डिनेटस व स्थल का मानचित्र सम्बन्धित प्रभागीय वनाधिकारी को उपलब्ध कराना होगा तथा परीक्षण एवं अन्वेषण की निश्चित तिथि सम्बन्धित प्रभागीय वनाधिकारी को सूचित करनी होगी।
5. प्रस्तावित स्थल व आस-पास के क्षेत्र की वनस्पति एवं जीव-जन्तु को किसी प्रकार की क्षति नहीं पहुँचाई जायेगी।
6. परीक्षण एवं अन्वेषण हेतु प्रस्तावित क्षेत्र में किसी भी प्रकार का निर्माण कार्य अनुमन्य नहीं होगा।
7. वन क्षेत्र में परीक्षण एवं अन्वेषण किये जाने हेतु मजदूरों का कोई कैम्प कार्य क्षेत्र में स्थापित नहीं किया जायेगा।
8. वन क्षेत्र में परीक्षण एवं अन्वेषण कार्य केवल दिन में ही अनुमन्य होगा।
9. उक्त अनुमति आदेश जारी होने की तिथि से छः माह तक प्रभावी होगी। आवश्यकता पड़ने पर भविष्य में इसका अवधि विस्तार किया जा सकता है।

भारत सरकार/उ0प्र0 शासन द्वारा इस संबंध में समय-समय पर निर्गत दिशा-निर्देश/आदेश/गाइडलाइन का अनुपालन करना होगा।

भवदीय,

(ललित कुमार वर्मा)
अपर प्रधान मुख्य वन संरक्षक/नोडल अधिकारी,
उ0प्र0, लखनऊ।

पत्रांक:- 3100/11-सी, दिनांकित।

प्रतिलिपि:- निम्नलिखित अधिकारियों को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित:-

1. मुख्य वन संरक्षक, मीरजापुर क्षेत्र, मीरजापुर।
2. GeoExpOre Pvt. Ltd बैंगलूरू।

(ललित कुमार वर्मा)
अपर प्रधान मुख्य वन संरक्षक/नोडल अधिकारी,
उ0प्र0, लखनऊ।

P-666

23.19 Annexure XVII: Forest Permission for Additional 3 Boreholes

कार्यालय प्रभागीय वनाधिकारी, ओबरा वन प्रभाग, ओबरा सोनभद्र।
पत्रांक–1859 /ओबरा/15भू0ह0. दिनांक–19-3- 2026

सेवा में,

GeoExpore Pvt. Ltd
Bangaluru.

विषय– Request for Permission to Drill 3 Additional Boreholes for completing within 6 months in forest coverd areas around Chakdiya, Kushniya, Jobra and Tungaon villages area for fulfilling of exploration project work sponsored by National Mineral Exploration Trust (NMET), Ministry of Mines, Govt. of India, Reg.

सन्दर्भ– आनलाईन प्रस्ताव सं0– FP/UP/SRY/565299/2026 एवं आवश्यक दिनांक रहित पत्र, इस कार्यालय का पत्रांक–1606/ओबरा/15भू0ह0, दिनांक–13.02.2026 तथा उप प्रभागीय वनाधिकारी, ओबरा के कार्यालय पत्रांक–98/ओबरा/15, दिनांक–13.03.2026

महोदय,

विषयगत प्रकरण में ओबरा वन प्रभाग के जुरैल रेंज अन्तर्गत चकदिया, कुशनिया, जोबरा एवं तुंगांव क्षेत्रों में 3 additional Boreholes कार्य की अनुमति के सम्बन्ध में आपके द्वारा परिवेश पोर्टल 2.0 पर आनलाईन प्रस्ताव सं0– FP/UP/SRY/565299/2026 आवेदन किया गया। जिसके सम्बन्ध में अनुमति प्रदान किये जाने के सन्दर्भ में प्रस्ताव से सम्बन्धित समस्त अभिलेखों का परीक्षण कर संयुक्ति सहित रिपोर्ट/आख्या प्रेषित किये जाने हेतु उप प्रभागीय वनाधिकारी, ओबरा की अध्यक्षता में समिति का गठन किया गया। जिसके क्रम में उप प्रभागीय वनाधिकारी ओबरा के कार्यालय पत्रांक–98/ओबरा/15, दिनांक–13.03.2026 द्वारा संयुक्त आख्या/संयुक्ति इस कार्यालय में उपलब्ध कराया गया।

उक्त के क्रम में विषयगत प्रकरण में वन (संरक्षण एवं संवर्धन) अधिनियम 1980 एवं वन (संरक्षण एवं संवर्धन) नियम 2023 के अन्तर्गत समेकित गाइडलाइन एवं भारत सरकार, पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, नई दिल्ली के फाईल सं0–FC-11/79/2023-FC दि0 12.09.2025 में दिये गये प्रावधानों के अनुसार विशेष सचिव, पर्यावरण वन एवं जलवायु परिवर्तन अनुभाग-2 के पत्र संख्या–1606/81-2-2025, दिनांक–23.09.2025 द्वारा दिये गये निर्देश के क्रम में निम्नलिखित शर्तों एवं प्रतिबन्धों के अधीन 7.21 वर्ग किमी0 में 1.87 इंच डायमीटर के 03 additional Boreholes कार्य हेतु अनुमति प्रदान किया जाता है–

1. बोरहोल कार्य में किसी प्रकार के पेड़ों का कटान नहीं किया जायेगा। क्षेत्रों को चिन्हित करने हेतु केवल झाड़ियों की सफाई एवं साइटिंग हेतु पेड़ों की शाखाओं की मात्र शाखा तराशी ही की जायेगी। इसके लिए प्रभागीय वनाधिकारी से पूर्वानुमति लेना आवश्यक होगा।
2. बोरहोल कार्य हेतु पेड़ों का पातन आवश्यक है तो ऐसी दशा में भारत सरकार की पूर्वानुमति आवश्यक होगी।
3. वन्यजीव विहार तथा राष्ट्रीय उद्यान में कोई भी बोरहोल कार्य प्रबल मुख्य वन संरक्षक, वन्यजीव, उ0प्र0 लखनऊ के पूर्वानुमति के बिना नहीं किया जायेगा।
4. प्रस्तावित स्थान व आस-पास के क्षेत्र की वनस्पति एवं जीव जन्तु को किसी प्रकार की क्षति नहीं पहुचायी जायेगी।
5. बोरहोल हेतु प्रस्तावित क्षेत्र में किसी प्रकार का निर्माण कार्य अनुमन्य नहीं होगा।
6. वन क्षेत्र में बोरहोल किये जाने हेतु मजदूरों का कोई कैम्प कार्य क्षेत्र में स्थापित नहीं किया जायेगा।

D:\VANOO.DOCX 81

23.20 Annexure XIX: Core Submission Certificate



भारत सरकार / GEOVERNMENT OF INDIA
भारतीय भूवैज्ञानिक सर्वेक्षण / GEOLOGICAL SURVEY OF INDIA
उत्तरी क्षेत्र / NORTHERN REGION
लखनऊ / LUCKNOW

पत्र सं. 176/ क्षे. नि. प्र.-II/मु.स./उ.क्षे./2026 दिनांक: 03.08.2026

प्रेषक:
उपमहानिदेशक एवं
क्षेत्रीय निदेशक प्रमुख - II,
भारतीय भूवैज्ञानिक सर्वेक्षण
उत्तरी क्षेत्र, लखनऊ

सेवा में,
अपर-महानिदेशक एवं निदेशालयाध्यक्ष
भारतीय भूवैज्ञानिक सर्वेक्षण
उत्तरी क्षेत्र, लखनऊ

विषय : M/s GeoExpOre Pvt. Ltd., Bengaluru, Karnatak द्वारा जमा कराए गए ड्रिल कोर के संबंध में सिनॉप्स Core Submission Certificate के अग्रेषण के संबंध में आदेश।

महोदय,

उपरोक्त विषयक अधिसूचित है कि M/s GeoExplore Pvt. Ltd., Bengaluru, Karnatak, जो कि Notified Private Exploration Agency-NPEA है, द्वारा वित्तीय वर्ष 2024-25 के दौरान "Reconnaissance Survey (G4) for Iron Ore Block A1 & A2 in Mahakoshal Group around Chakdiya, Kushniaya, Jorba and Tusgaon Area, Sonbhadra District, Uttar Pradesh" शीर्षक वाली अन्वेषण परियोजना के अंतर्गत क्षेत्र का कार्य संपादित किया गया था।

NPEAs की SOP के अनुसरण कुल 351 मीटर ड्रिल कोर (कुल 08 बोरहोल, UPCKB-01 to 6 और UPJTB-01 to 2) 76 Core Boxes में कोर लाइब्रेरी, भारतीय भूवैज्ञानिक सर्वेक्षण, उत्तरी क्षेत्र, लखनऊ में दिनांक 11.05.2026 को जमा कराए गए हैं। कोर के जमा होने के उपरांत दिनांक 24.07.2026 को Core Submission Certificate निर्गत किया जा चुका है।

अतः अधिसूचित है कि उक्त Core Submission Certificate की मूल प्रति M/s GeoExplore Private Limited, Bengaluru, Karnataka को प्रेषित किए जाने हेतु इस पत्र के साथ संलग्न कर आपके माहर अग्रेषित एवं आवश्यक आदेशार्थ विनम्रतापूर्वक प्रस्तुत की जा रही है।

संलग्नक:
Core Submission Certificate

भवदीय

(डॉ. पी. एस. सिंघा)
उपमहानिदेशक एवं क्षेत्रीय निदेशक प्रमुख - II
भा.भू.स., उत्तरी क्षेत्र, लखनऊ

पत्र सं. क्षे. नि. प्र.-II/मु.स./उ.क्षे. /2026

प्रतिलिपि सूचनार्थ प्रेषित:
1. उपमहानिदेशक, राज्य इकाई-U.P., भारतीय भू-वैज्ञानिक सर्वेक्षण, उत्तरी क्षेत्र, लखनऊ
2. निदेशक, कोर लाइब्रेरी, भारतीय भू-वैज्ञानिक सर्वेक्षण, उत्तरी क्षेत्र, लखनऊ

निदेशक M/s. GeoExplore Pvt. Ltd. NPEA वारि हेतु

(डॉ. पी. एस. सिंघा)
उपमहानिदेशक एवं क्षेत्रीय निदेशक प्रमुख - II
भा.भू.स., उत्तरी क्षेत्र, लखनऊ

भारत सरकार / GEOVERNMENT OF INDIA
भारतीय भूवैज्ञानिक सर्वेक्षण / GEOLOGICAL SURVEY OF INDIA
उत्तरी क्षेत्र / NORTHERN REGION
लखनऊ / LUCKNOW

पत्र सं/164 /क्षे. मि. प्र.-II/भा.भू.स./उ.क्षे. /2026 दिनांक: 24.07.2026

CERTIFICATE

This is to certify that M/s GeoExpOre Pvt. Ltd., Bengaluru, Karnatak is a Notified Private Exploration Agency (NPEA), has submitted drill core of boreholes under the exploration project titled: " "Reconnaissance Survey (G4) for Iron Ore block A1& A2 in Mahakoshal Group around Chakdiya, Kushniaya, Jorba and Tusgaon Area, Sonbhadra District, Uttar Pradesh." During 2024-25.

As per the SOP for NPEAs, M/s GeoExpOre Pvt. Ltd. submitted a total of 351.00 metres of drill core of 8 nos. of boreholes (UPCKB-01 to 6 and UPJTB-01 to 2) comprising 76 core boxes generated from the above-mentioned project to the Core Library, Geological Survey of India (GSI), Northern Region, Lucknow, on 11.05.2026, in accordance with the SOP of the Core Library.

This certificate is issued as required under the SOP for NPEAs for official purposes.

उपमहानिदेशक एवं क्षेत्रीय मिशन प्रमुख - II
भा.भू.स., उत्तरी क्षेत्र, लखनऊ

पत्रांक क्षे. मि. प्र.-II/भा.भू.स./उ.क्षे. /2026 दिनांक: 24.07.2026

प्रतिलिपी सूचनार्थ प्रेषित:
1. अपर-महानिदेशक एवं विभागाध्यक्ष, भारतीय भू-वैज्ञानिक सर्वेक्षण, उत्तरी क्षेत्र, लखनऊ
2. उपमहानिदेशक, राज्य इकाई-उ.प्र., भारतीय भू-वैज्ञानिक सर्वेक्षण, उत्तरी क्षेत्र, लखनऊ
3. निदेशक, कोर लाइब्रेरी, भारतीय भू-वैज्ञानिक सर्वेक्षण, उत्तरी क्षेत्र, लखनऊ

DDG SU: UP
27/7/26

उपमहानिदेशक एवं क्षेत्रीय मिशन प्रमुख - II
भा.भू.स., उत्तरी क्षेत्र, लखनऊ

A-762/HSB/NR
27/07/26

CHAPTER 24: ANY OTHER INFORMATION

"RECONNAISSANCE SURVEY (G4) FOR IRON ORE IN MAHAKOSHAL GROUP AROUND CHAKDIYA (A1) AND JORBA (A2) BLOCKS, SONBHADRA DISTRICT, UTTAR PRADESH."

24.1 Locality Index

LOCALITY INDEX CHAKDIYA (A1) BLOCK					
S.N.	**Name of Locality**	**Latitude**	**Longitude**	**Elevation**	**Toposheet no.**
1	BHADAHI	24.53606	82.86347	243 M	63L/14
2	GOUR GHATTI	24.53861	82.91011	249 M	
3	PRISAR MUNDHA	24.52750	82.86978	246 M	
4	CHHALEHWA TAULA	24.55750	82.88683	332 M	
5	MURGIDAND	24.53883	82.87708	263 M	
6	KERJI	24.54969	82.91328	230 M	
7	KERJI AGORI KHAS	24.54897	82.91800	223 M	
8	BIJORA	24.57197	82.94819	187 M	
9	CHAURA	24.55806	82.95139	184 M	

LOCALITY INDEX JORBA (A2) BLOCK					
S.N.	**Name of Locality**	**Latitude**	**Longitude**	**Elevation**	**Toposheet no.**
1	KHOKHDI DAND	24.51953	82.85403	237 m	63L/14
2	ANGANWADI KHOKHDI DAND	24.52067	82.85622	240 m	
3	BHAINSORA TOLA	24.51139	82.86308	234 m	
4	BHAINSORA PRIMARY SCHOOL	24.51178	82.86786	224 m	
5	JORBA VILLAGE	24.52025	82.86897	235 m	
6	BHAINSORA NEW PRIMARY SCHOOL	24.51164	82.86903	238 m	
7	AVHAL DAND	24.51708	82.87097	237 m	
8	JORBA VILLAGE	24.52203	82.87442	225 m	
9	BADKA DAND	24.50250	82.87622	216 m	
10	KOHILI DAND	24.50850	82.87683	220 m	
11	JHARPIYA VILLAGE	24.52106	82.88156	212 m	
12	KOHILI DAND	24.50703	82.87853	214 m	
13	JHARPIYA VILLAGE	24.51869	82.88383	219 m	
14	NAUDWA PRIMARY SCHOOL	24.51356	82.88497	218 m	
15	NAUDWA VILLAGE	24.51036	82.88500	214 m	
16	KARWANIYA VILLAGE	24.50558	82.88522	207 m	
17	KARWANIYA PRIMARY SCHOOL	24.50300	82.88661	217 m	
18	KHARHARA VILLAGE	24.51294	82.89356	212 m	
19	SOLEHAWA TOLA	24.51333	82.92244	205 m	
20	TUSGAON	24.50875	82.92369	208 m	
21	BIJUL RIVER	24.52433	82.95694	171 m	
22	GAYE GHAT	24.52572	82.95214	174 m	
23	BHATWA TOLA	24.51931	82.93783	197 m	
24	PATAIYA TOLA	24.51439	82.93597	188 m	
25	GOURA TOLA	24.51692	82.94536	178 m	
26	GOUTHANI PROTECTED FOREST	24.51956	82.94686	189 m	

24.2 Officials involved in the exploration project

Sr. No.	Name	Designation	Signature
1	Mr. Ritesh Singh	Junior Geologist	
2	Ms. Mansi Kesarwani	Assistant Manager- Geoscience Strategy	
3	Mr. Mohammad Muslemeen	Senior Geologist	
4	Mr. Sandeep Hamilton	Project Coordinator	
5	Mr. Channamalikarjun B. Patil	Project Director	
6	Dr. Yerriswamy Pateel	Project Director	

24.3 Project reviewed at various stages

1. Reconnaissance Survey (G-4) for Iron ore in Mahakoshal Group around Chakdiya, Kushniaya, Jorba and Tusgaon Area, Sonbhadra District, Uttar Pradesh project got approved with SO F.No.23/433/2023-NMET/540 dated 29th Feb 2024

2. There was revision of cost as approved in 39th EC of NMET An OM No. 23/433/2024-NMET/69 has also been issued in this regard with revised cost of 19544464/-.

3. At the request of M/S GeoExpOre Pvt Ltd the 42nd Executive Committee (EC) of NMET held on 2nd June 2025 accorded approval of additional cost of 511005/- (Five Lakh eleven thousand and five only.) with revised cost of 20055469/-.

4. The 67th TCC-Meeting held on 25th July 2024 has been reviewed.

5. The 2nd TCC-II Meeting held on 22nd Oct 2024 project has been reviewed.

6. The 4th TCC-II Meeting held on 26th Dec 2024 project has been reviewed and the committee advised that out of present BHQ bands, band with highest value should be targeted through drilling. Committee suggested 8 nos. of Boreholes (6 boreholes in A1 block and 2 boreholes in A2 block).
7. The 6th TCC-II Meeting held on 27th Feb 2025 project has been reviewed.

8. The 7th TCC-II Meeting held on 24th March 2025 project has been reviewed and revised project cost of revised cost of ₹ 211.96/- lakhs (including GST).

9. The 8th TCC-II Meeting held on 28th April 2025 project has been reviewed The committee recommends the proposal for approval of EC for timeline extension of 6 months up to 25th Nov 2025 for GR submission.

10. The 11th TCC-II Meeting held on 25th July 2025 Project has been reviewed.

11. The 16th TCC-II Meeting held on 3rd Nov 2025 Project has been reviewed & the committee recommended the proposal for approval of PSC for “Timeline extension of 3 months up to 24th Feb 2026.

12. The 16th TCC-II Meeting held on 3rd Nov 2025 Project delayed due to drilling activities was under progress subsequently, Timeline extension was approved up to 31st May 2026, in 3rd PSC meeting held on 15th Dec 2025.

13. The 28th TCC-II Meeting held on 7th May 2026 Project has been reviewed & the Committee recommended the proposal for approval of PSC for “timeline extension of 4 months up to 30th Sep 2026 for completion of the project work and submission of final GR.

14. The 34th TCC-II Meeting held on 6th Aug 2026 project has been reviewed & The Committee recommended "The committee agreed for peer review of the final geological report".

24.4 Field inspection with GSI Lucknow & DGM Lucknow photographs

1. GSI Visit on 22nd May 2026: Mr. Mohammad Asif, Senior Geologist and Mr. Shamiuddin Ahmad, Geologist GSI Lucknow visited the Sonbhdra project.

2. GSI Inspection during core submission at Core Library Lucknow on 11th May 2026: Mr. Pushpesh Narayan, Director & Chairman along with Mr. Mohammad Asif, Senior Geologist and Mr. Shamiuddin Ahmad, Geologist GSI Lucknow visited the Sonbhdra project.

3. GSI Visit on 22nd & 24th April 2026: Mr. Pushpesh Narayan, Director & Chairman along with Mr. Mohammad Asif, Senior Geologist and Mr. Shamiuddin Ahmad, Geologist GSI Lucknow visited the Sonbhdra project.

4. GSI Visit on 13th & 14th Feb 2026: Mr. Pushpesh Narayan, Director & Chairman along with Mr. Mohammad Asif, Senior Geologist and Mr. Shamiuddin Ahmad, Geologist GSI Lucknow visited the Sonbhdra project.

5. GSI Visit on 23rd Jan 2026: Mr. Mohammad Asif, Senior Geologist GSI Lucknow visited the Sonbhdra project.

6. GSI Visit on 20th Dec 2025: Mr. Mohammad Asif, Senior Geologist and Mr. Shamiuddin Ahmad, Geologist GSI Lucknow visited the Sonbhdra project.

7. GSI Visit on 12th & 14th Nov 2025: Mr. Pushpesh Narayan, Director & Chairman along with Mr. Mohammad Asif, Senior Geologist GSI Lucknow visited the Sonbhdra project.

8. DGM Lucknow Visit on 4th Jan 2026: Dr. Rajesh Singh Joint director DGM Lucknow along with Mr. Atul Singh Mining Sub inspector Sonbhadra visited the Sonbhdra project.

9. DGM Sonbhadra Visit on 4th June 2024: Mr. Anuj Kumar (RO) DGM Sonbhadra, Uttar Pradesh inspected Geological Mapping and BRS sampling locations.

10. DGM Lucknow Visit on 11th & 12th July 2025: Dr. Naveen Das, Additional Director, along with Mr. S.N. Patel, Regional Officer (Lucknow), Mr. Doud Ansari, Senior Geologist, Mr. Asad, Geologist, Mr. Anuj Kumar, Regional Officer (Sonbhadra), and Mining Inspector, Sonbhadra, DGM Lucknow and Sonbhadra teams visited our project site and formally inaugurated our drilling operations.



Figure-24.1: Field Photographs During Core Drilling and GSI Lucknow Team Inspections



Figure-24.2: Field Photographs During Core Drilling and DGM Lucknow Team Inspections



Figure-24.3: Field Photographs Showing Cement Sealing and Plugging of Eight Boreholes After Completion of Core Drilling Operations

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CHAPTER 25: CERTIFICATE FROM THE QUALIFIED PERSON WITH NAME, DATE AND SIGNATURE.

This is to certify that geological report has been prepared in respect of Reconnaissance Survey (G-4) for Iron Ore Minerals in A1 Chakdiya & A2 Jorba Block, Sonbhadra District, Uttar Pradesh. The report was prepared by GeoExpOre Private Limited on behalf of the National Mineral Exploration and Development Trust (NMEDT). The report adheres to the Minerals (Evidence of Mineral Contents) Rules, 2015, as specified under the Mineral Auction Rules, 2015 and amended up to 2021.

NAME: Mr. Sandeep Hamilton

DATE: 26-08-2026

SIGNATURE: 

DESIGNATION: Project Coordinator