PROPOSAL FOR PRELIMINARY EXPLORATION (G-3) FOR GLAUCONITIC SANDSTONE IN JHARI BLOCK DIST.- SATNA, MADHYA PRADESH (AREA 5.1 Sq. Km)

COMMODITY: GLAUCONITIC SANDSTONE

BY

MINERAL EXPLORATION AND CONSULTANCY LIMITED
DR. BABA SAHEB AMBEDKAR BHAWAN
SEMINARY HILLS NAGPUR, MAHARASHTRA

PLACE:
NAGPURDATE:15.
03.2024

SUMMARY OF THE BLOCK FOR PRELIMINARY EXPLORATION (G-3) FOR GLAUCONITIC SANDSTONE IN JHARI BLOCK, DIST- SATNA, MADHYA PRADESH

Features	Details
Block ID	Jhari
ExplorationAgency	MineralExplorationandConsultancyLimited (MECL)
Commodity	Glauconitic Sandstone
Mineral Belt	Jhari block lies in part of Majhgawan-Paharikhera Potash Belt which is situated in the northern part of the Satna Dist, Madhya Pradesh and falls in part of the Survey of India Topo-sheet no63D/09 & 63D/13.
Completion period with entire Time schedule to complete the project	9 Months (2month FC clearance) 13 Months seamlessly if going for G-2 level of exploration
Objectives	i. Geological mapping on 1:5000 scale in the Jhari block. ii. Topographical survey in 2m contour interval on 1:5000 scale iii. To prove the depth continuity of Glauconitic sandstone formation in Jhari block, iv. To estimate the Mineral Resources (333) and grade (K_2O) for glauconite in the block as per UNFC and MEMC-2015 Rules amended up to 2021
Whether the work will be carried out by theproposed agency or through outsourcing and details thereof Components to be outsourced and name of the outsource agency	Work will be carried out by the proposed agency.
Name / Number of Geoscientists	Nos. of Geoscientists:2
Expected Field days (Geology, Geophysics, surveyor)	Geologist Party days: 90 (At field) & 60 at HQ Survey Party days:25

1. Location

Co-Ordinates

Block Corner points	UTMZone-44(m)		GeographicCo-ordinateWGS-84	
	Easting(m)	Northing(m)	LATITUDE	LONGITUDE
A	474362.516	2757674.409	24°56' 2.75"N	80° 44' 45.86"E
B	474372.697	2760101.655	24° 57' 21.665" N	80° 44' 46.061" E
C	475850.745	2760103.970	24° 57' 21.828" N	80° 45' 38.772" E
D	476464.003	2759097.932	24° 56' 49.154" N	80° 46' 0.704"E
E	477254.367	2759097.932	24° 56' 49.198" N	80° 46' 28.888" E
F	476123.430	2757632.480	24°56' 1.49"N	80° 45' 48.65"E

Villages	Ambha, Pindra
Tehsil/Taluk	Majhgawan
District	Satna
State	MadhyaPradesh

2.	**Area (hectares / square Km)**	
	BlockArea	510 ha/5.1 sq.km
	ForestArea	The block co-ordinates were verified in the Decision Support System (DSS) of Forest department, Ministry of Environment, Forest and Climate Change (MOEFCC). **It has been found that the block area is under "not inviolate". (Go) - non-Forest area.** **In Gati Shakti portal, block co-ordinates were verified and found the block falls under Chitrakoot/Majhgawan Protected Forest ranges**
	Government land Area (Bilanam)	Data not available
	Charagaha	Data not available
	Private LandArea	Part of the area is private, cultivated land
3.	**Accessibility**	
	NearestRail Head	Majhgawan located at 10km in South Eastern direction from the block
	Road	NH135BG passes near the block connecting Satna and Chitrakoot
	Airport	Khajuraho situated at 130km in south western from the block.
4.	**Hydrography**	
	LocalSurface Drainage Pattern (Channels)	The dendritic drainage, drained by badha nala.
	Rivers/Streams	
5.	**Climate**	
	Mean Annual Rainfall	Averageannualrainfallis100 mm
	Temperatures (Minimum) Temperatures (Maximum)	Minimum temperatures 5°C (Jan), Maximumtemperaturesupto45°C (May)
6.	**Topography**	
	Toposheet Number	63D/09 & 63D/13
	Morphology oftheArea	The terrain is represented by a number of gently sloping table lands and northfacing escarpments and inter-montane valleys. The table lands are capped by the gently dipping sandstone. The highest elevation of the area is 370m in the norther and lowest elevation of 310m in southern eastern side of the Block.
7.	**Availability of baseline Geoscience data**	
	GeologicalMap (1:50K/25K)	Geological Map of GSI FS 1986-88 is available at1:12500 scale
	Geochemical Map	Available
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	NotAvailable

8	**Justification for taking up Reconnaissance Survey / Regional Exploration**	1. Today most of the potash demand is met through bedded marine evaporite deposits such assylvite, carnalite, kainite, polyhalite, surface and sub-surface potash-rich brines. In absence of mineable evaporite potash deposits in India, it was considered necessary to look for non-traditionalsource of potash such as glauconitic sandstone and potash rich shales. **Hence, potash recovery from low-grade glauconitic sandstone is essential, as its high-grade deposits are limited in our country.** 2. 1984-85, GSI has carried out exploration in area of about 12 sq km in Pindra North Block and estimated 'proved category' reserves of about 266 million tones with 4.90%K_2O, indicated large portion of the horizon carries more than 5% K_2O. TowardsWest of the GSI's Pindra North block, there are two 10a2b cancelled leases for glauconitic sandstone, The twoblocks, namely, **Chitrakoot-2 explored by M/s Nagur Minerals Pvt. Ltd.** and **Chitrakoot-3 explored by M/s Mobile Trading & Investment Pvt. Ltd** which have an estimated proved mineable reserves of 50.46 mT and 85.51 mT respectively. 3. MECL has carried out Reconnaissance survey in Pindra SW Extensionblock (39.23 sq, km), which is south western extension of Pindra North block, where 1918 mT with average 6.96% K_2O (334) resources are estimated. 4. Considering the consistency of glauconitic sandstone in the GSI's PindraNorth& SW extensionblocks and owing to thickness intercepted in boreholes drilled by MECL in Pindra SW Extension block. This block is selected in areas having less over burden with a auctionable size block is demarcated and proposed for G-3 level of exploration.

PROPOSAL FOR PRELIMINARY EXPLORATION (G3) FOR GLAUCONITIC SANDSTONE IN JHARI BLOCK DIST.- SATNA, MADHYAPRADESH (AREA 5.1 Sq. Km)

1. INTRODUCTION

1.1 Along with nitrogen and phosphorus, potassium is one of the most essential macronutrients and is required in agriculture in relatively large amounts for plant's healthy growth. After the growing recognition of potassium as one of the key nutrient in plant growth, potash industry was developed. Reaching an estimated value of one million tonnes in 1921, production of potassium continues to increase consistently and reach to almost 34.6 million tonnes in 2013 (United State Geological Survey, 2013a,2013b) expecting to raise 37.8 million tons in 2022 with the growth rate of about 2.9% annually (Rawashdehet al.,2016).

1.2 Today most of the potash demand is met through bedded marine evaporite deposits such as sylvite, carnalite, kainite, polyhalite, surface and sub-surface potash-rich brines. These minerals are mixture of soluble salts, mainly potassium chloride or sulfates. More than 90% of these deposits are mainlyconcentrated in countries like Canada, Russia, Belarus, Brazil, China, Chile,Germany and USA (Anderson, 1985; The New York Times Editorial Board,2013; Rawashdeh and Maxwell, 2014) on which rest of the world is dependentfor supplyof potash fertilizer.

1.3 In order to sustain crop production and to ensure self-sufficiency, exploration and investigation of alternative resource for potassium such as K-bearing silicates could be one of the options to meet the future demand (Manning,2010; Manning,2012; Ciceriet al., 2015).

1.4 In absence of mineable evaporite potash deposit in India, it was considered necessary to look for non-traditional source of potash such as glauconitic sandstone and potash rich shales. In many countries deficient in the conventional evaporite deposits insoluble potash is used to be extracted out of silicate and non-silicate minerals. Thus, alunite in Bulla dealah in New castle, (Australia) containing 5% to 10%. K_2O was commercially exploited. Extraction of potassium from shales has also been discussed by Everest et al. (1964), Similarly glauconite has been used in USSR as a source of potassium fertilizer's (GSI, CGPB report, 1978 p.94).

1.5 Out of different non-conventional sources, glauconitic sandstones deposits are available

in plenty and are considered as one of the indigenous resourcesfor potassium in India. India has vast reserves of more than 3,000 million tonnes of glauconitic sandstone containing 4 to 8% K_2O occurring in States like Madhya Pradesh, Uttar Pradesh, Rajasthan and Gujrat (KumarandBakliwal,2005).

2.0.0 BACKGROUND

2.1.0 MECL has carried out Reconnaissance survey in Pindra SW Extension block (39.23 sq, km), which is south western extension of Pindra North block, MECL has estimated 1918 mT with average 6.96% K_2O (334) resources in this block with average thickness of glauconitic sandstone is 25m.

2.2.0 Considering the consistency of glauconitic sandstone in the GSI's Pindra-North & SW extension blocks and owing to thickness intercepted in boreholes drilled by MECL in Pindra SW Extension block. This block is selected in areas having less over burden and a auctionable size block is demarcated and proposed for G-3 level of exploration.

3.0.0 LOCATIONAND ACCESSABILITY

3.1.0 Jhari block is a part of Majhgawan-Paharikhera Potash Belt is situated in the northern part of the Satna Distt., Madhya Pradesh and falls inthe part of Survey of India toposheet no 63D/09 & 63D/13. Majhgawan railway station is located on Bombay-Jabalpur-Allahabad line and lies between Satna and Manakpur stations. It also falls on State highway no. 11 and is about 44km from Satna on Satna– Chitrakoot road. Khajuraho and Allahabad are nearest airports. Boundary corner points of Jhari block given below

Block Corner points	UTMZone-44(m)		GeographicCo-ordinateWGS-84	
	Easting (m)	Northing (m)	LATITUDE (DMS)	LONGITUDE (DMS)
A	474362.516	2757674.409	24°56' 2.75"N	80° 44' 45.86"E
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3.2.0 PHYSIOGRAPHYANDDRAINAGE

3.3.0 The block lies in the Majhgawan range which is bordering Indo-Gangetic alluvial plains in the north. The terrain is represented by a number of gentlysloping table lands and north facing escarpments and inter-montane valleys. The table lands are capped by the gently dipping sandstone. The Glauconitic Banbiha sandstone forms an erosion surface.

4.0.0 The drainage pattern in the area is of dendritic type. The regional slope of thearea is towards north and northeast and so most of the rivers flows towardsnorth and northeast. Palsuni River (also named Badha Nala in toposheet), the only significant stream in the area forms tributary of river Yamuna. The highest elevation is 376 m in the Northern and western side and lowest elevation is 310 m in the southern side of the Block.

4.1.0 CLIMATE

4.2.0 The climate is tropical monsoon type. The maximum temperature recorded is45°C and in winter temperature drops down to 5°C. Average annual rainfall is100cm with maximum precipitation during July and August.

5.0.0 REGIONALGEOLOGY

5.0.1 The rock types of the region, ranges in age from Archaean to Cainozoic. The Archaean rocks comprise of granites & gneisses and are exposed only in northern part of the Satna district. The rocks of Vindhyan Super group comprised of Semri, Kaimur, Rewa & Bhander groups. TheSemri Group of rocks is represented by an alternating sequence of Sandstoneand shale along with porcellanite and limestone. The Semri Group of rocks mainly exposed in the southern and northern part of the district. The Rohtas Limestone of Semri Group is light to grey in colour, fine grained compact andwell bedded. The Kaimur Group comprising mainly sandstone which is finegrained; massive and thickly bedded is exposed in the northern and southernpart. The Rewa Group of rocks comprises mainly of sandstone, shale and conglomerate.

5.0.2 The Rewa Group has been subdivided in to the Panna Shale, the Itwa Sandstone, the Jhiri Shale and the Gahadra Sandstone. The Panna Shale conformably overlies the Baghain Sandstone. It mainly comprises purple toolive green (khaki), thinly laminated flaggy shale with thin siltstone and fine sandstone. Itwa Sandstone conformably overlies the Panna Shale with a gradational contact. It forms a prominent stratigraphic division between thePanna Shale and the overlying Gahadra Sandstone. The Asan Sandstone comprises dirty green, greenish grey and variously coloured medium to fine grained sandstone with thin shale and siltstone partings. The Jhiri Shale is purple, greenish grey, khaki and chocolate coloured, thinly laminated with wavy to lenticular

bedding. Sedimentary structures such as halite casts, loadcasts, flute casts, bounce marks, small scale cross bedding and ripple marksare commonly exhibited by silty and sandy units. The Gahadra Sandstone comprises a thickly bedded, current bedded and massive sandstone succession. It is compact and pink, light reddish brown and purple coloured, medium to fine grained, rarely gritty. A conglomerate (oligomictic type), comprising pebbles, cobbles and even boulder size fragments of vein quartz and sandstone, has yielded diamonds in the Sakaria area.

5.0.3 Regional Stratigraphy of the area is given in below table

Table:-Regional Stratigraphic Sequence of lithology (After GSI, 1988)

AGE	SUPERGROUP/ GROUP / COMPLEX	FORMATION/ SERIES	LITHOLOGY
Recent to sub-recent			Alluvium
Proterozoic	Vindhyan Super Group	Rewa	Upper Rewa Sandstone Jhiri Shales Itwa Sandstone, Banbiha sandstone (Glauconitic sandstone) Panna Shales Diamondiferous Conglomerate beds
		Kaimur	Baghain Sandstone
	Unconformity		
	Vindhyan Super Group	Semri	Palkwan Shale Dolomitic limestone Pandwafall sandstone
		Semri Pandwa fall Formation	Bansagar sandstone (Upper glauconitic sandstone) Kohari chert (dolomitic limitation chert and chert breccia) Kudwari sandstone (Lower glauconitic sandstone)
Unconformity			
Proterozoic	Bundelkhand Gneissic Complex		Granite gneiss Granite

5.1.0 BLOCK GEOLOGY

5.1.1 Formations in the Jhari block belong to Rewa series of Vindhya Super Group. Litho-units exposed in the block are Rohania Sandstone, Pindra Shale, Bhulwa Limestone, Banbiha glauconitic sandstone and Panna Shale.

5.1.2 Rohania Sandstone is the topmost member of Itwa Sandstone Formation. It is about 4

to 5 meters thick and exhibit uniform thickness throughout the area Diamondiferous Itwa conglomerate of the Panna. Diamond Belt is associated with this sandstone only, however, in this area, the conglomerate is absent the sandstone thickness as intercepted in boreholes varies in thickness from 1.0 to 6.0 metres.

5.1.3 Pindra shale member represents transitional facies from underlying limestone to overlying Rohania sandstone. In the basal part the shale 15 greenish and calcareous with thin interbeds of limestone. In its upper part the shale is noncalcareous, pink and is interbedded with overlying sandstone.

5.1.4 Bhulwa Limestone Member: Bhulwa limestone member consists of a lower chert breccia/brecciated chert horizon and an upper limestone horizon The chert breccia unit overlies Banbiha sandstone and the contact between the two is rather gradational in the sense that, the upper horizons of glauconite. sandstone carries thin bands of chert (bedded) which, in its upper portions, changes into a chert breccias with, fragments of chert and glauconitic sandstone and finally into a thick bed of chert.

5.1.5 Banbiha Sandstone Member (glauconitic sandstone): Being the lowest member of the Itwa Sandstone Formation, this sandstone overlies Panna Shale Formation with a sharp break in grain size and mineral constituents although bands of shale are recorded in the basal part of glauconitic sandstone. The sandstone is exposed in the form of ENE-WSW trending table land on either side of the Badha nala. The length of the sandstone exposures is 20 km and average width is 2 km. The thickness varies from 18.5 to 33.00 meters, however in drill holes its average thickness is about 24.65 meters.

5.1.6 Panna shale formation Panna shale is exposed in the form of a band around table lands formed by overlying Banbiha sandstone.

Stratigraphic Sequence of Pindra south west extension Block, Dist: Satna, Madhya Pradesh

AGE	SUPERGROUP/ GROUP / COMPLEX	SERIES	FORMATION	LITHOLOGY	
Recent to sub-recent			Alluvium/soil/laterite		
	Vindhyan Super Group		Gahadara sandstone	Quartz arenite	
			Jhiri Shale	Upper shale	Green & Red shale
				Upper White sandstone	medium grained quartz arenite
				Middle Glauconitic sandstone	

AGE	SUPERGROUP/ GROUP / COMPLEX	SERIES	FORMATION	LITHOLOGY	
Proterozoic		Rewa			
				Lower White sandstone –	medium grained quartz arenite
				Lower shale	green and red shale with conglomerate
				Rohania sandstone	quartz arenite with granular conglomerate
			Itwa sandstone formation	Pindra Shale	green and red shale with limestone interband
				Bhulwa limestone	cream colour limestone with brown chert
				Banbiha Sandstone	glauconitic limestone
			Panna Shale	Shale with limestone interband	
		Kaimur	Baghain Sandstone	Medium to Coarse Sandstone, fine sandtone with siltstone and shale interbands. Medium to coarse sandstone, angular gravel bearing sandy conglomerate	
		Unconformity			
	Vindhyan Super Group	Semri		Palkwan Shale Dolomitic limestone Pandwafall sandstone	
			Pandwa fall formation	Bansagar sandstone (Upper glauconitic sandstone) Kohari chert (dolomitic limitation chert and chert breccia) Kudwari sandstone (Lower glauconitic sandstone)	
Unconformity					

5.2.0 PREVIOUS WORK:

5.2.1 Regional geological mapping of the area was carried out by Sanyal and Chakraborty (1982). Adjoining parts were mapped by Mehta (1942), Mathur (1954), Rao (1972) and Soni (1981) Rao (1980) and Rao and Soni (1985). Aspects related to stratigraphy of

glauconite bearing horizons and associated rocks were discussed in the report. Adjoining area towards east, falling in thestate of Uttar Pradesh, was studied by Kedar Karayan (1960), Safaya (1963-66), Hukku (1971) and Srivastava et al (1977). Kalsotra and Sheo Prasad (1980), while drilling for testing in ASMARA lineament in the adjoining area of Uttar Pradesh intersected the glauconitic horizon. They analysed samples of glauconitic sandstone. Detailed exploration of glauconitic sandstone in thearea was carried out by Geological Survey of India, Uttar Pradesh Circle in1980-82.

5.2.2 A total of 23 drill holes were drilledin Pindra North Block forthe calculation of reserves of glauconite by GSI in 1987 and also 2 boreholes (GMP-22&GMP-23) were drilled to study the regional distribution of glauconitic sandstone and potash content and the total quantum of drilling in 23 drill holes was 456.90 m. The drilling results show that the glauconitic sandstone varies from 10 m to 19.40 m with an average thickness of 15.89 metres and thickness of 10 to15 m are recorded in holes where the upper part of sandstone is eroded away. The actual thickness varies from 15 to 19.40 meters. The drilling result shows that the upper 5 meters of glauconitic sandstone is ferruginous and brown in colour which confirms the oxidation of iron and the lower portion is bluish-green and non-ferruginous. Also, the sandstone contains thin bands and laminae and fragments of chert in its upper part and thin grey shale bands in its lower part and the thickness of bands varies from 2 mm to 2 cm. Thin bands of quartz rich sandstone (2cm to 14cm) also occur within the sandstone and have diluted K_2Ocontent.

5.2.3 Detailed exploration of about 12 sq km of Pindra North Block indicates 'proved category' reserves of about 266 million tones with 4.90% K_2O with a large portion of the horizon carrying more than 5% K_2O.

5.2.4 M/s Nagur Minerals Pvt. Ltd. had executed exploration work in the Chitrakoot- 2 prospecting lease block, with geological mapping, surface sampling, pitting/trenching and drilling of 16 boreholes to estimate proved mineable resource of 50.46 mT.

5.2.5 MECL has carried out Reconnaissance survey in Pindra South West extension block covering an area of 39.23 sq.km, a total 10 no of exploratory boreholes with total meterage of 472.00 m were drilled on 1600X1600m grid. MECL in the Pindra SW extension block has established a fairly extensive horizon of glauconitic sandstone extending over entire area of 39.23 sq.km with average width of 2.5km, glauconitic sandstone is underlain by younger sediments. Average thickness of the glauconitic band is 24.65m, owing to thickness and extensive horizon area about 1918 million tonnes of

reconnaissance resources with average grade of 6.96% K_2O are estimated.

6.0.0 OBJECTIVES OF THE EXPLPORATION

The exploration is proposed with the following objectives

i. Geological mapping on 1:5000 scale in the Jhari block.

ii. Topographical survey in 2mt interval in 1:5000 scale

iii. To prove the depth continuity of Glauconitic sandstone formation in Jhari block,

iv. To estimate the Mineral Resources (333) and grade (K_2O) for glauconite in the block as per UNFC and MEMC-2015 Rules amended up to 2021.

6.1.0 PROPOSEDSCHEMEOFEXPLORATION

6.1.1 **Geological mapping:** The available geologicalmap of GSI (1984-88) in1:12,500scalewhich will beused as base map and geological mapping will be carried out in 5.1 sq.km block, on 1:5000 scale.

6.1.2 **Topographical Survey:** DGPS survey will be carried-out for determining co-ordinate and reduced level (RL) of 05 no the bore hole locations and block boundary. Area is surveyed for topographical features at 2m contour interval in 1:5000 scale.

6.1.3 **Exploratory Drilling:** The present exploration scheme is prepared by proposing 05 nos of boreholes on 800X800m grid with proposed closed borehole depth of 50m. All the boreholes are planned vertical to establish the depth continuity of glauconite zones as intercepted in the MECL borehole MPSW-09.

BH No.	Section Line	From (m)	To (m)	Glauconitic sandstone Thickness (m)
MPSW-09	S3-S3'	8.00	26.00	18.00

6.1.4 The boreholes will be closed judicially by the field geologist, after encountering the panna shale formation, so that entire glauconitic sandstoneis drilled. The proposed location & depth of the borehole is tentative and thefinal decision regarding taking up borehole, borehole location and closing of borehole will be ascertained by field geologist. Tentative location and depth of borehole have been provided for each block Proposed Borehole parameters are tentative and may vary subject to the geological and drillingconditionsin the studyarea.

6.1.5 **Drill core logging:** Geological core logging will be carried out systematicallyby recording carefully the minute details and physical / lithological characters of the rock formations including colour, core recovery, grain size, weathered zone, texture, banding, mineralogical composition, micro-structural/structural details, lithological

variations. As per the requirement the Rock qualitydesignation (RQD) shall also be carried out, while logging drill cores. On thebasis of these parameters, grade of glauconite can be broadly assessed and it will also be helpful in sampling/demarcating the Phosphorite zones.

6.1.6 **SAMPLING:**

6.1.6.1 Drill core sampling:For preparation of samples, the borehole core will be splitted into two equal halves by using core splitter one half will be powdered to 100 mesh size and the other half will be kept for future studies.The powdered material will be mixed thoroughly and about 100 gram of samples will be taken for chemical analysis by successive coning and quartering as primary samples and rest of the material (-100 mesh size) willbe kept as duplicate half for future reference. It will generate about 125 Nos **primary samples** and 6 Nos **Internal Check samples** (5% of Primarysamples). In addition to this, 10% of primary samples i.e. 12 nos **External Check samples** will be prepared as External Check samples that will be sent to NABL Lab for analysis. **Composite samples** will be prepared boreholewise based on the analytical results of primary sample at every 8m interval (8m bench height). Composite samples shall be prepared from the entire borehole in which glauconitic sandstone bands will be intersected. This will generate about 20 nos. of composite samples. Each sample should bemarked at every 1m length in case of continuance of similar mineralogical composition down the borehole. The sample length towards the floor markedby non-ore zone needs also to be adjusted as per variations of the litho-units.Even if the floor is distinctly differentiated by the presence of non-mineralized zone, at least two nos of samples after the Glauconite zone need to be drawn to mark the floor of the Glauconite zone decisively.

6.1.7 **Chemical Analysis:** All the 125 no of primary core samples and 18 no of check samples (10 Internal & 20 External) will be analyzed for 4 radicals (K_2O, SiO_2, Al_2O_3 & Fe_2O_3). Around 20composite samples will be analyzed for 12 radicals i.e. K_2O, Na_2O, CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, Mn_2O_3, TiO_2, and LOI.

6.1.8 **XRD Study:** To know the different mineral phases, for recovery of potash, XRD study will be performed in 5samples of glauconitic sandstone.

6.1.9 **Determination of specific gravity:** To calculate the resource, volume of the ore body need to be multiplied with a density factor. Hence, 5nos.of samples will be drawn from the glauconitic sandstone for determination ofspecificgravity.

6.1.10 **Beneficiation Studies.**

Entire half core glauconitic sandstone (after primary sampling) of about 200kg samples will be studied under beneficiation at IBM Nagpur.

7.0.0 PHASE II exploration

7.1.0 MECL intends to carry out G-2 level of exploration seamlessly in this block, i.e., exploratory boreholes will be drilled on 400X400m grid, a total 22no of boreholes of 1100m drilling and 550 primary and 83 check samples will be generated during this exploration. Phase II exploration will be carried upon the recommendation of TCC committee.

7.2.0 QUANTUMOFWORK

The following quantum of work have been proposed for preliminary exploration (G-3) for glauconitic sandstone in Jhari block:

Sl.No.	Item of Work	Unit	Phase – I Target	Phase II Target
1	Geological Mapping on 1:5000scale	Sq.Km	5.1	
2	Topographical Survey (1:5000scale)	Sq.Km	5.1	
3	DGPS Survey for Borehole fixation	Nos.	6	22
4	Drilling (Core)	m.	250	1100
5	Drill core sample (Primary)	Nos.	125	550
6	Drill core sample (Check)	Nos.	18	83
7	Chemical Analysis (Primary + Check) for 4 radicals viz. K_2O,SiO_2,Al_2O_3&Fe_2O_3	Nos.	143	633
8	Chemical Analysis (Composite) for 12 radicals viz. K_2O, Na_2O, Cao, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, Mn_2O_3, TiO_2, and LOI.	Nos.	20	69
9	XRD Study	Nos.	5	-
10	Determination of Specific Gravity	Nos.	5	-
12	Beneficiation Study	Nos.	1	1
12	Geological Report preparation	Nos.	1	

7.3.0 TIME SCHEDULE AND ESTIMATED COST

The proposed exploration program envisages geological mapping, core drilling, sample preparation and laboratory studies, which will be completed within 4 months, geological report preparation and peer review will take 3 months with two months overlapping with lab works. As the block is coming under forest 2months time is taken for forest clearances before starting of drilling. Therefore, a total of 9 months is planned for completion of the entire proposed program

Cost has been estimated based on actualschedule of rates mandatedin the circular OM

No. 61/1/2018/NMET dated 31st March 2020 for NMETfunded Projects. The total estimated cost is Rs. 109.78 Lakhs. The summary of cost estimates for this preliminary exploration (G-3) is given below:

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Mapping, Other Geological Work	1,615,720
2	Drilling	3,579,160
3	Labrotary studies	818,436
4	Geologist at HQ	540,000
	Sub Total (1 to 7)	6,553,316
5	Exploration Report Preparation	327,666
6	Proposal Preparation	137,620
7	Peer review charges	10,000
8	Sub Total (1 to 9)	7,028,601
9	GST 18%	1,265,148
	Total:	**8,293,750**
	Say Rs. In Lakh	**82.94**

Scheduled time for Preliminary Exploration (G3) for glauconitic sandstone in Jhari block (5.1 Sq. Km), District- Satna, Madhya Pradesh

S.No.	Activities	MONTHS									
		1	2	3	4	5	6	Review	7	8	9
1	Forest Clearance										
2	Camp setting										
3	Geological mapping										
4	Core drilling (1 rig)										
5	Geologist days (Field)										
6	Sampling days, core sampling										
7	Camp winding										
8	Laboratory studies										
9	Geologist days (HQ)										
10	Report writing/ Peer review										

*** Commencement of project will be reckoned from the day the exploration acreage is available along with all statutory clearances**

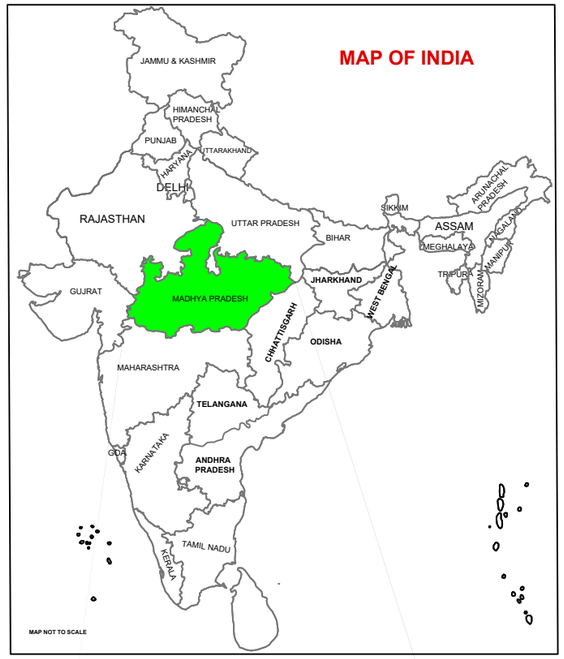
***Time loss on account of monsoon/agricultural activity/forest clearance/ local law & order problems will be addition to above time line.**

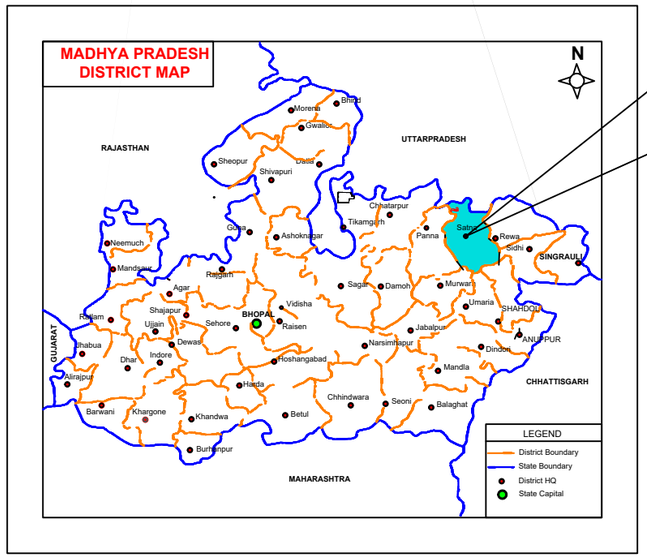
Estimated cost for Preliminary Exploration (G3) for Glauconitic Sandstone in Jhari Block, Satna District, Madhya Pradesh
Total Area - 5.1Sq. Km; Completion Time - 9 Months

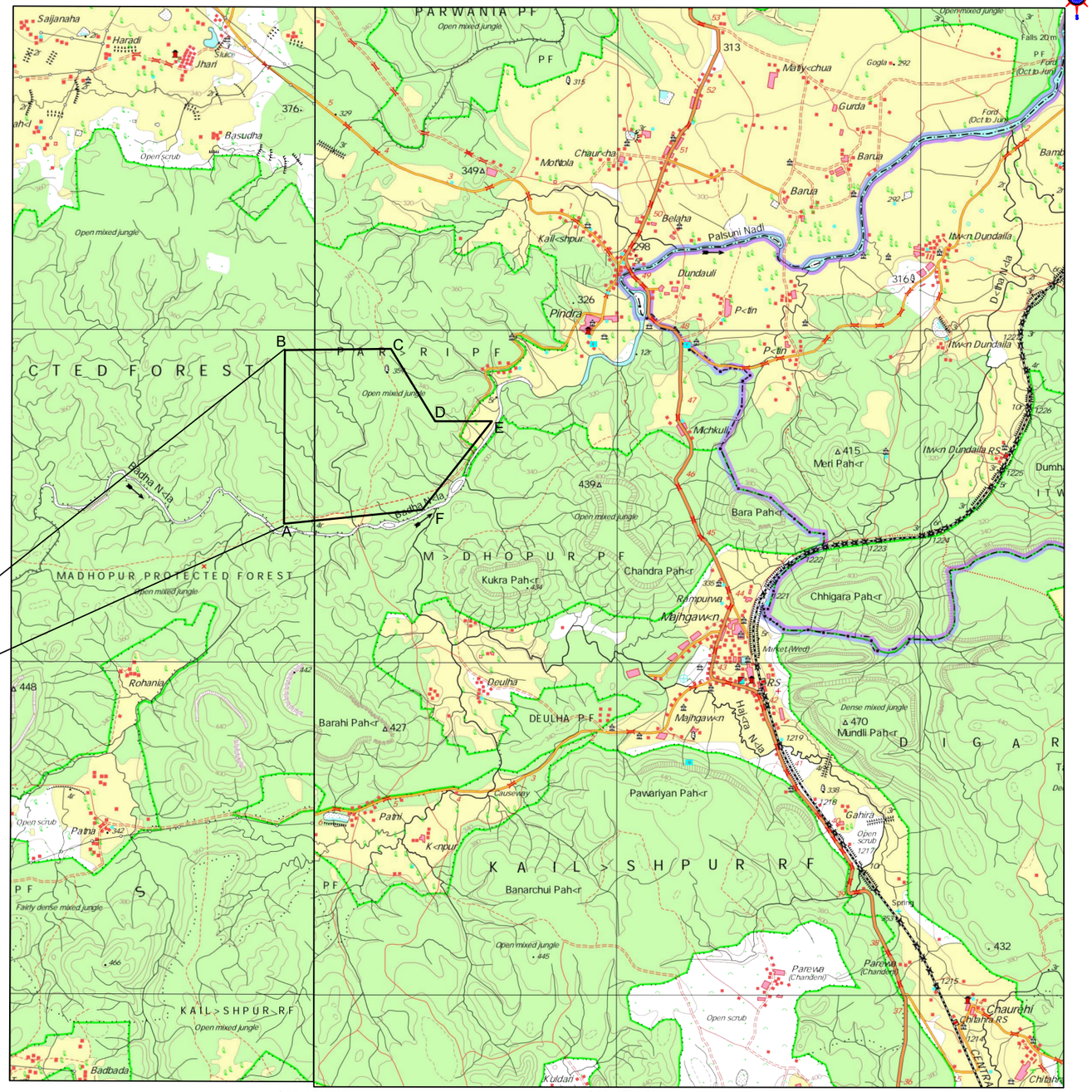
Sl. No.	Item of Work	Unit	Rates as per NMET SoC 2020-21		Total Cost of the Project		Remarks
			SoC- Item- S. No.	Rates as per SoC	Qty.	Total Amount (Rs)	
1.0	**Geology & Survey**						
1.1	Geologist man days for Geological Mapping in 1:5000 scale (Field)/Sampling	days	1.3	11,000	90	9,90,000	
1.2	Labour Mapping (Field) (2 workers per geologist)	per worker	5.7	504	180	90,720	Amount will be reimburse as per the notified rates by the Central Labour Commissioner (Rs. 431/- per day) or respective State Govt. whichever is higher
1.3	Sampling man days - Sampler (Geochemical/Trenching/Pitting) Labour charge not included	day	1.5.2	5,100	30	1,53,000	
1.4	4 labours/ party (Rs 431/day/labour) (As per rates of Central Labour Commissioner) for sampling work	day	5.7	504	120	60,480	Amount will be reimburse as per the notified rates by the Central Labour Commissioner (Rs. 431/- per day) or respective State Govt. whichever is higher
1.5	Determination of co-ordinates and Reduced Level (RL) of boreholes by DGPS	Nos.	1.6.2	19200	6	1,15,200	5 BH Points+1 Base Station
1.6	Charges for one surveyor(1 Party)	day	1.6.1a	8300	20	1,66,000	
1.7	4 labours/ party (Rs 431/day/labour) (As per rates of Central Labour Commissioner) for sampling work	Nos.	5.7	504	80	40,320	Amount will be reimburse as per the notified rates by the Central Labour Commissioner (Rs. 431/- per day) or respective State Govt. whichever is higher
Sub-Total 1						**16,15,720**	
2.0	**Drilling**						
2.1	Drilling -Medium hard rock (100m to 300m)	m	2.2.1.3a	10,100	250	25,25,000	
2.2	Land / Crop Compansation (in case the BH falls in agreecultural Land)	per BH	5.6	20,000	5	1,00,000	
2.3	Construction of concrete Pillar (12"x12"x30")	per borehole	2.2.7a	2,000	5	10,000	
2.4	Transportation of Drill Rig & Truck associated per drill (for 1 rig)	Km	2.2.8	36	1100	39,600	
2.5	Monthly Accomodation Charges for drilling Camp (up to 1 Rigs)	month	2.2.9	50,000	2	1,00,000	
2.6	Drilling Camp Setting Cost	Nos	2.2.9a	2,50,000	1	2,50,000	
2.7	Drilling Camp Winding up Cost	Nos	2.2.9b	2,50,000	1	2,50,000	
2.8	Road Making (Flat Terrain)	Km	2.2.10a	22,020	3	66,060	
2.9	Drill Core Preservation	per m	5.3	1,590	150	2,38,500	
Sub-Total 2						**35,79,160**	
3.0	**Laboratory Studies**						
3.1	Primary + Check Sample - 4 radicals viz. K_2O, SiO_2, Al_2O_3 & Fe_2O_3	per sample	4.1.7a	2,506	143	3,58,358	
3.2	Chemical Analysis (Composite) for 12 radicals viz. K_2O, Na_2O, CaO, MgO, Al_2O_3, SiO_2, Fe_2O_3, SO_3, P_2O_5, Mn_2O_3, TiO_2, and LOI.	per sample	4.1.7a	4,851	20	97,020	
3.3	Sp. Gravity determination	per sample	4.8.1	1,605	5	8,025	
3.4	XRD Study	per sample	4.5.1	4,000	5	20,000	
3.5	Beneficiation Study	Nos	N.A	3,35,033	1	3,35,033	
Sub-Total 3						**8,18,436**	
4.0	**Geologist man days (1 No.) for geological map & Report (HQ)**	days	1.2	9,000	60	**5,40,000**	
Total (1.0 to 4.0)						**65,53,316**	
5.0	**Preparation of Exploration Proposal**	Nos	5.1	2% of the cost or Rs. 3.80 lakh - whichever is lower	1	**1,37,620**	EA has to submit the Hard Copies and the soft copy of the final proposal along with Maps and Plan as suggested by the TCC- NMET in its meeting while clearing the proposal.

6.0	**Geological Report Preparation**	Nos	5.2	For the projects having cost exceeding Rs. 50 Lakhs but less than Rs. 150 Lakhs: A Minimum of Rs.2.5 lakhs or 5% of the value of work whichever is more and Rs. 3000/- per each additional copy.	1	**3,27,665.80**	EA has to submit the final Geological Report in Hard Copies (5 Nos) and the soft copy to NMET.
7.0	**Report Peer Review Charges**	**lumpsum**	**As per EC decision**		**1**	**10,000**	
Total Estimated Cost without GST						**70,28,601**	
Provision for GST (18%)						**12,65,148**	GST will be reimburse as per actual and as per notified prescribed rate
Total Estimated Cost with GST						**82,93,750**	
					Say Rs. in Lakhs	**82.94**	

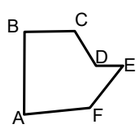
Note -
1. If any part of the project is outsourced, the amount will be reimbursed as per the Paragraph 3 of NMET SoC and Item no. 6 of NMET SoC. In case of execution of the project by EA on its own, a Certificate regarding non outsourcing of any component/project is required.







Block Corner points	UTM Zone-44 (m)		Geographic Co-ordinate WGS-84	
	Easting (m)	Northing (m)	LATITUDE	LONGITUDE
A	474362.516	2757674.409	24° 56' 2.75" N	80° 44' 45.86" E
B	474372.697	2760101.655	24° 57' 21.665" N	80° 44' 46.061" E
C	475850.745	2760103.97	24° 57' 21.828" N	80° 45' 38.772" E
D	476464.003	2759097.932	24° 56' 49.154" N	80° 46' 0.704" E
E	477254.367	2759097.932	24° 56' 49.198" N	80° 46' 28.888" E
F	476123.43	2757632.48	24° 56' 1.49" N	80° 45' 48.65" E



BLOCK BOUNDARY FOR JHARI BLOCK (5.1 Sq.km)

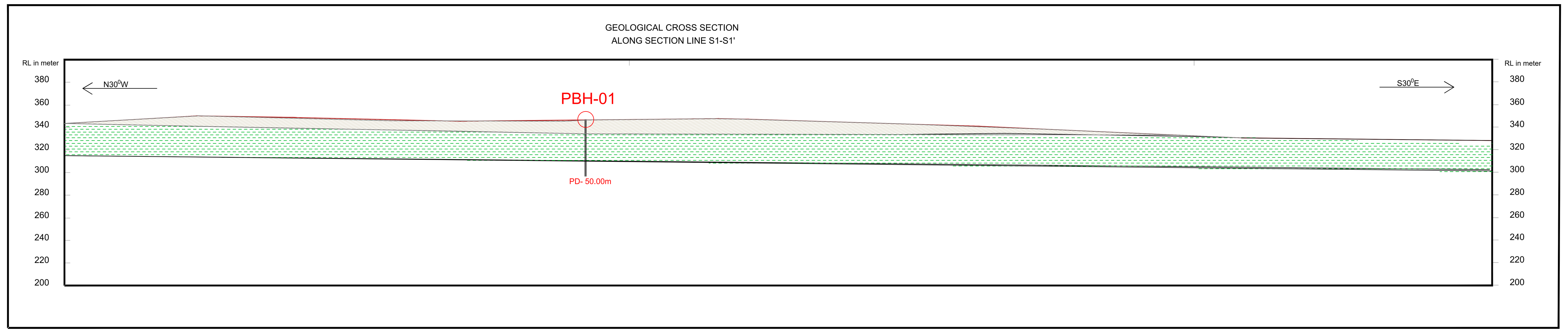
MINERAL EXPLORATION & CONSULTANCY LIMITED

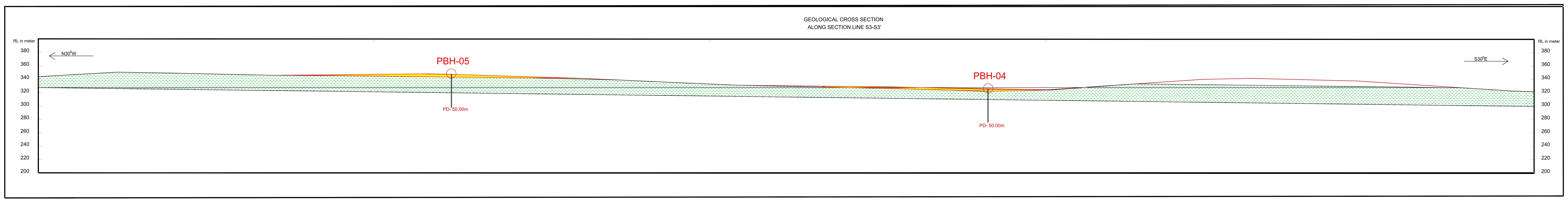
LOCATION MAP

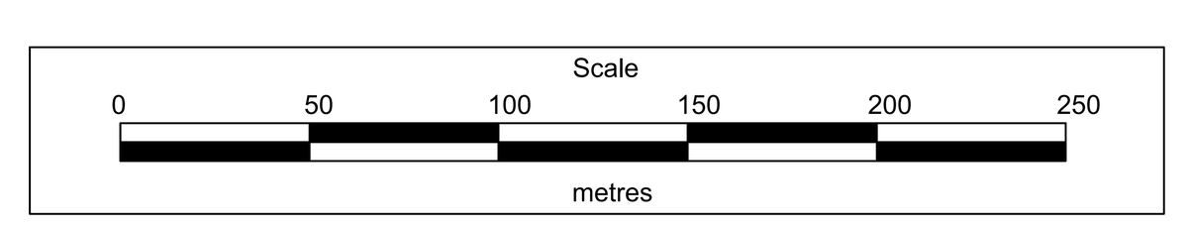
G3 EXPLORATION FOR JHARI BLOCK

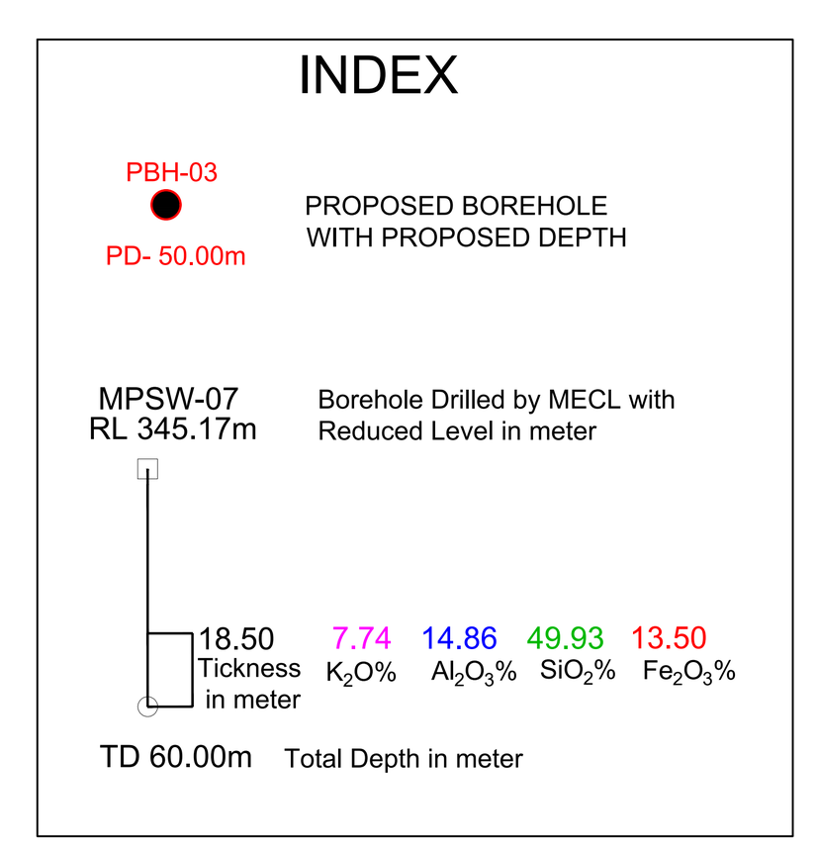
(PART OF TOPOSHEET NO. 63D/09 and 63D/13)

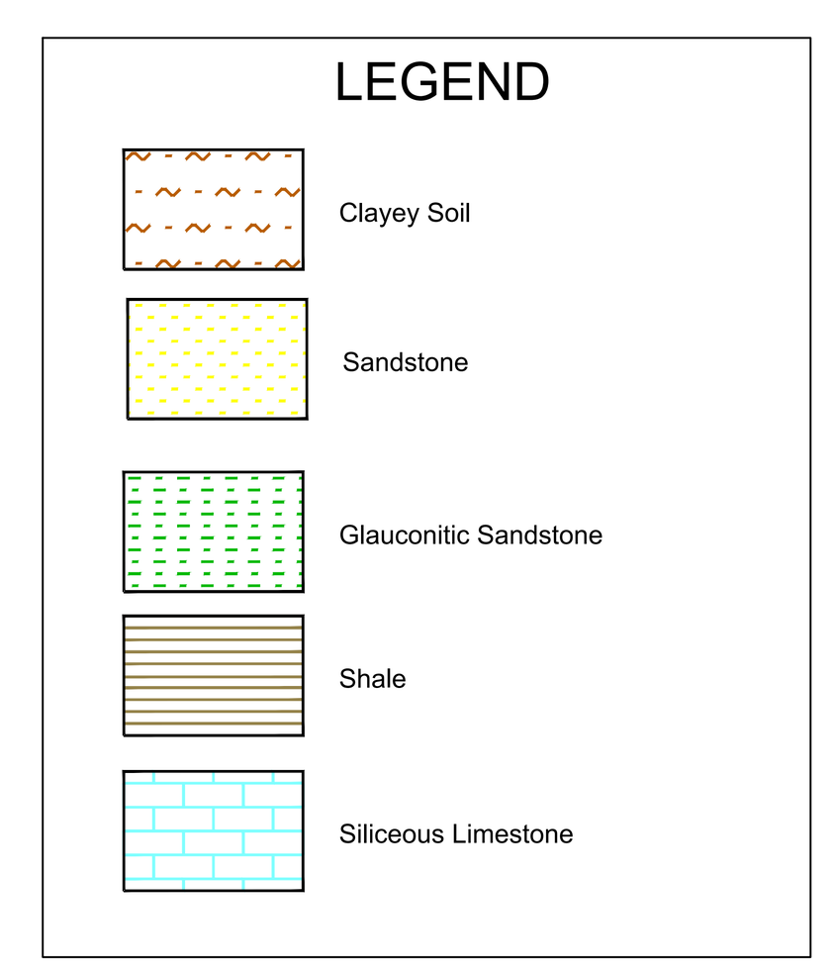
DISTRICT : SATNA	STATE : MADHYA PRADESH
Prepared by : Exploration Division, MECL, Nagpur.	Processed at : Survey & Map section,MECL, Nagpur.
MECL / EXPLORATION / MAR-2024	PLATE NO - I | 1











MINERAL EXPLORATION AND CONSULTANCY LIMITED

(Formerly Mineral Exploration Corporation Limited)

GEOLOGICAL CROSS SECTION

PROPOSED JHARI BLOCK, (EXTENT 5.1 sq km)

SATNA-DISTRICT, MADHYA PRADESH.

RF. 1:2,000

PROCESSED AT :

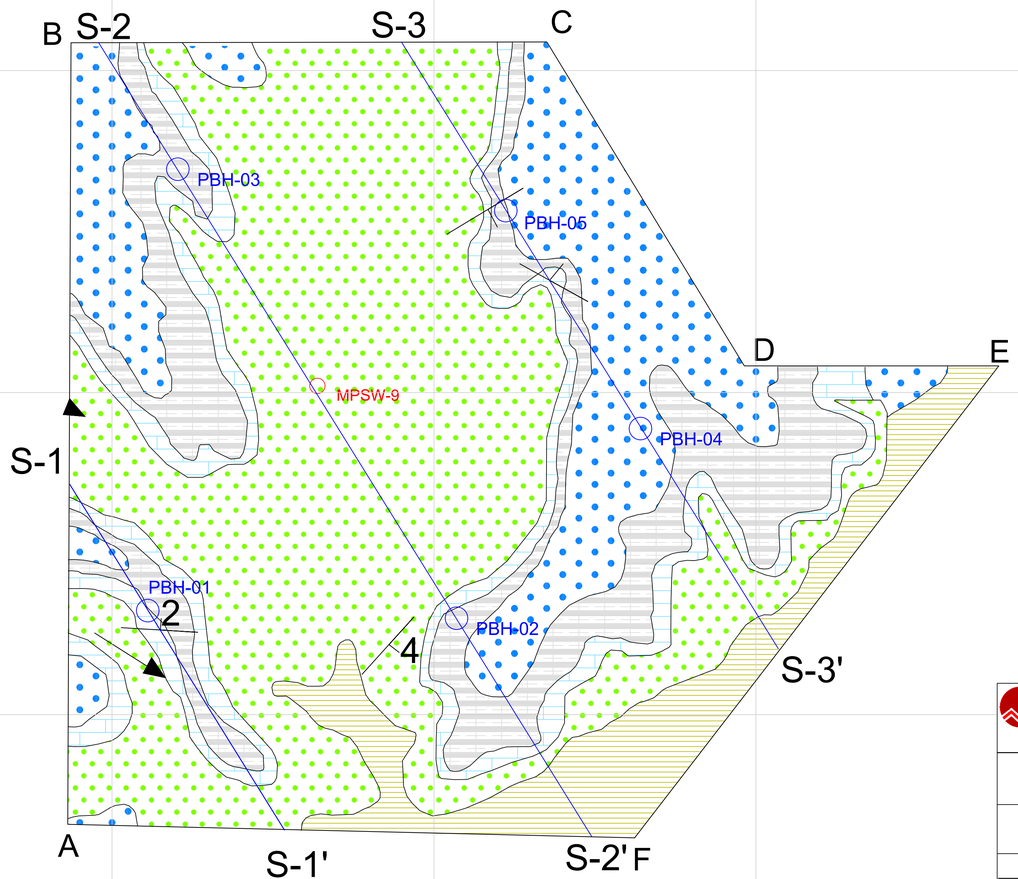
GR CELL
(NON-ENERGY MINERALS),
MECL, NAGPUR.

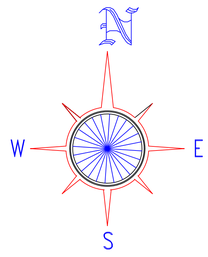
MECL/EXPL./MARCH-2024

GEOLOGICAL MAP OF JHARI BLOCK, DISTRICT- SATNA, MADHYA PRADESH

473500 474500 475500 476500 477500 478500 479500

2760000 2759000 2758000 2757000





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- MPSW-9 — Drilled Borehole Locations by MECL
- PBH-01 — Proposed Borehole Locations
- S1 —— S1' Section Line
- Rohania Sandstone
- Pindra Shale
- Bhulwa Limestone
- Banbiha Glauconitic Sandstone
- Panna Shale
- DIP OF THE BEDDING PLANE (4)
- ANTIFORMS, SYNFORMS
- PALEOCURRENT DIRECTION (on the basis of cross beds)
- Block Boundary with points (A, B, C, D, E, F)

SCALE
250 500 750 1000
Meters

MINERAL EXPLORATION AND CONSULTANCY LIMITED
(Formerly Mineral Exploration Corporation Limited)

GEOLOGICAL MAP

PROPOSED JHARI BLOCK, (EXTENT 5.1 sq km)
SATNA-DISTRICT, MADHYA PRADESH.
RF. 1:8,000

PROCESSED AT :

GR CELL
(NON-ENERGY MINERALS),
MECL, NAGPUR.

MECL/EXPL./MARCH-2024