PROPOSAL FOR RECONNAISSANCE SURVEY (G4) FOR GLAUCONITIC SANDSTONE IN KISANPUR BLOCK, DIST.- SATNA, MADHYA PRADESH (AREA 52.17 Sq. Km)

COMMODITY: GLAUCONITIC SANDSTONE

BY

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

PLACE: NAGPUR

DATE: 28.08.2024

SUMMARY OF THE BLOCK FOR RECONNAISSANCE SURVEY (G4) FOR GLAUCONITIC SANDSTONE IN KISANPUR BLOCK, DIST.- SATNA, MADHYA PRADESH

<table>
<tr><th>S. No</th><th>Features</th><th>Details</th></tr>
<tr><td></td><td>Block ID</td><td>KISANPUR</td></tr>
<tr><td>1</td><td>Exploration Agency</td><td>Mineral Exploration and Consultancy Limited (MECL)</td></tr>
<tr><td>2</td><td>Commodity</td><td>Glauconitic Sandstone</td></tr>
<tr><td>3</td><td>Mineral Belt</td><td>Proposed block is a part of Majhgawan-Paharikhera Potash Belt which is situated in the northern part of the Satna Dist., Madhya Pradesh and falls in the part of Survey of India toposheet no 63D/09.</td></tr>
<tr><td>4</td><td>Completion period with entire Time schedule to complete the project</td><td>12 months</td></tr>
<tr><td>5</td><td>Objectives</td><td>i. Updating of Geological map on 1:12500 scale in the KIISANPUR area of the GSI's Map which available on 1:12500 scale.
ii. To prove the extension of Glauconitic sandstone in the western area of lapsed leases and Pindra SW extension block explored by MECL.
iii. Drilling of scout boreholes at 1600m grid, from surface till 50m depth / up to the panna shale.
iv. To estimate the Reconnaissance Mineral Resources and grade for glauconite in the block as per UNFC and MEMC-2015</td></tr>
<tr><td>6</td><td>Whether the work will be carried out by the proposed agency or through outsourcing and details thereof.
Components to be outsourced and name of the outsource agency</td><td>Work will be carried out by proposed agency</td></tr>
<tr><td>7</td><td>Name/Number of Geoscientists</td><td>No of Geo Scientists – 02 no</td></tr>
<tr><td>8</td><td>Expected Field days (Geology, Geophysics, surveyor)</td><td>Geological Party days: 100 (At field) & 45 at HQ
Survey Party days: 20 days</td></tr>
<tr><td>9</td><td>Location
With Coordinates in UTM</td><td>
<table>
<tr><th rowspan="2">Corner Points</th><th colspan="2">UTM co-ordinates</th></tr>
<tr><th>Easting (m)</th><th>Northing (m)</th></tr>
<tr><td>A</td><td>460612.000</td><td>2759237.246</td></tr>
<tr><td>B</td><td>461910.352</td><td>2759653.220</td></tr>
<tr><td>C</td><td>462763.500</td><td>2757892.000</td></tr>
<tr><td>D</td><td>465555.723</td><td>2760821.148</td></tr>
<tr><td>E</td><td>468651.164</td><td>2761812.885</td></tr>
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<tr><td>G</td><td>469617.683</td><td>2758073.005</td></tr>
<tr><td>H</td><td>469626.046</td><td>2758516.671</td></tr>
<tr><td>I</td><td>470134.643</td><td>2758506.602</td></tr>
<tr><td>J</td><td>470461.652</td><td>2758072.017</td></tr>
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		K	470465.497	2757004.185
		L	470139.462	2757012.342
		M	470126.788	2756725.405
		N	472041.064	2756723.915
		O	472041.358	2754735.404
		P	460612.000	2754735.404
9.1	Villages	Banhari, Kisanpur, Tikuri, Bathia, Baraha, Putrichuwa, Vadawaha, Telaichuwa, Majhgawan, Rohania, Semaraha, Barigawa		
9.2	Taluka / Tehsil	Majhgawan		
9.3	District	Satna		
9.4	State	Madhya Pradesh		
10	Block area (hectares / Sq.km)	52.17 sq.km		
10.1	Forest area	The block co-ordinates were subjected 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". Implies Go area for exploration.**		
10.2	Government Land (Bilanam), Charagaha,	Data not available		
10.3	Private land	Part of the area is private, cultivated land		
10.4	Accessibility			
10.5	Nearest Rail Head	Majhgawan (15km)		
10.6	Road	NH 11 passes near the block, which connects Satna and Chitrakoot		
10.7	Nearest Airport	Khajuraho (120km)		
11	Hydrography			
	Local Surface drainage pattern (Channels) Rivers and Streams	Dendritic Drainage Palsuni River (also named Badha Nala in toposheet)		
12	Climate			
	Mean Annual Rainfall	Average annual rainfall is 100mm		
	Temperatures	Minimum temp 5°C in January month Maximum temp 45°C in May month		
13	Topography			
	Toposheet No	63 D/09		
	Morphology of the area	The terrain is represented by a number of gently sloping table lands and north facing escarpments and inter-montane valleys. The table lands are capped by the gently dipping sandstone. The highest elevation of the area is 440 m in the eastern and southern western side of the Block		
14	Availability of baseline geo science data			
	Geological Map (1:50k / 25k)	Geological Map of GSI FS 1986-88 is available at 1:12500 scale		
	Geo Chemical Map	Available		
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	Not Available		
15	Justification for taking up Reconnaissance Survey/ Regional Exploration	1. Today most of the potash demand is met through bedded marine evaporite deposits such as sylvite,		

		carnalite, kainite, polyhalite, surface and subsurface potash-rich brines. 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. 2. Hence, potash recovery from low grade glauconitic sandstone is essential, as its high-grade deposits are limited in our country. 3. Previous exploration work by GSI in about 12 sq km of Pindra North Block indicates 'proved category' reserves of about 266 million tones with 4.90% K_2O a large portion of the horizon carrying more than 5% K_2O. 3.1 Towards West of the GSI's Pindra North block, there are two 10a2b cancelled lease block, having exploration work done for glauconitic sandstone. The two blocks, namely, Chitrakoot-2 explored by M/s Nagur Minerals Pvt. Ltd. and Chitrakoot-3 explored by M/s Mobile Trading & Investment Pvt. Ltd having proved mineable reserve estimated viz. 50.46 mT and 85.51 mT respectively. 4. MECL has carried out Reconnaissance survey (G-4) in Pindra SW Extension block (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. 5. Considering the consistency of glauconitic sandstone, present proposed Kisanpur block is located west of 10A2(b) cases and Pindra SW extension block explored by MECL. The present exploration programme is planned to prove the continuity of the glauconitic sandstone in the west extension part.

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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 nutrients in plant growth, subsequent development of potash industry was resulted. 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 (Rawashdeh et al., 2016).

1.2. Today most of the potash demand is met through bedded marine evaporite deposits such as sylvite, carnalite, kainite, poly halite, 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 mainly concentrated 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 dependent for supply of 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; Ciceri et 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 used 'to be extracted out of silicate and non-silicate minerals. Thus, alunite in Bulla dealah in New castle, (Australia) containing 5% to 10%. K2O 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 resources for 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 (Kumar and Bakliwal, 2005).

2. BACKGROUND

2.1. Exploration for strategic, critical, precious, rare earths and PGE are given top priority by Govt. of India, after amendment of MMDR act 2015. Keeping in view, the present proposal has been prepared and being put up for Reconnaissance Survey for NMET funding and execution.

3. LOCATION AND ACCESSABILITY

3.1. Kisanpur block is a part of Majhgawan-Paharikhera Potash Belt is situated in the northern part of the Satna Distt., Madhya Pradesh and falls in part of the Survey of India toposheet no. 63D/09. 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 55 km from Satna on Satna -Chitrakoot road. Khajuraho and Allahabad are nearest airports.

3.2. Villages falling under the block are Banhari, Kisanpur, Tikuri, Bathia, Baraha, Putrichuwa, Vadawaha, Telaichuwa, Majhgawan, Rohania, Semaraha, Barigawa of Tehsil Majhgawan, Satna Distict. boundary corner points of Kisanpur block are given below:

Corner Points	UTM co-ordinates	
	Easting (m)	Northing (m)
A	460612.000	2759237.246
B	461910.352	2759653.220
C	462763.500	2757892.000
D	465555.723	2760821.148
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4. PHYSIOGRAPHY AND DRAINAGE

4.1. 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 gently sloping 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 erosional surface.

4.2. The drainage pattern in the area is of dendritic type. The regional slope of the area is towards north and northeast and so most of the rivers flows towards north 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 of the area is 448 m in the southern eastern side of the Block.

5. CLIMATE

5.1. The climate is tropical monsoon type. The maximum temperature recorded is 45°C and in winter temperature drops down to 5°C. Average annual rainfall is 100 cm with maximum precipitation during July and August.

6. REGIONAL GEOLOGY

6.1. 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 Sandstone and 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 and well bedded. The Kaimur Group comprising mainly sandstone which is fine grained; massive and thickly bedded is exposed in the northern and southern part. The Rewa Group of rocks comprises mainly of sandstone, shale and conglomerate.

6.2. 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 the Panna 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, load casts, flute casts, bounce marks, small scale cross bedding and ripple marks are 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.

6.3. 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

7. BLOCK GEOLOGY

7.1. Formations in the Kisanpur 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.

7.2. 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.

7.3. 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.

7.4. 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.

7.5. 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.

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

Stratigraphic Sequence of Kisanpur Block, Dist: Satna, Madhya Pradesh

AGE	SUPERGROUP/ GROUP / COMPLEX	SERIES	FORMATION	LITHOLOGY
Recent to sub-recent			Alluvium/soil/laterite	

AGE	SUPERGROUP/ GROUP / COMPLEX	SERIES	FORMATION	LITHOLOGY	
Proterozoic	Vindhyan Super Group	Rewa	Gahadara sandstone	Quartz arenite	
			Jhiri Shale	Upper shale	Green & Red shale
				Upper White sandstone	medium grained quartz arenite
				Middle Glauconitic sandstone	
				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	

AGE	SUPERGROUP/ GROUP / COMPLEX	SERIES	FORMATION	LITHOLOGY
				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		

8. PREVIOUS WORK:

8.1. 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.

8.2. A total of 23 drill holes were drilled in Pindra North Block for the 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.

8.3. 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.

8.4. 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.

8.5. 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.

9. OBJECTIVE

9.1. The exploration is proposed with the following objectives

9.2. Updating of Geological map on 1:12500 scale in the Kisanpur area of the GSI's Map which available on 1:12500 scale.

9.3. To prove the extension of Glauconitic sandstone in the western area of lapsed leases and Pindra SW extension block explored by MECL.

9.4. Drilling of scout boreholes at 1600m grid, from surface till 50m depth / up to the panna shale.

9.5. To estimate the Reconnaissance Mineral Resources and grade for glauconite in the block as per UNFC and MEMC-2015

10. PROPOSED SCHEME OF EXPLORATION

10.1. Geological mapping: The available geological map of GSI (1984-88) in 1:12,500 scale will be updated on same scale.

10.2. Survey: DGPS survey will be done for determining co-ordinate and reduced level (RL) of all the borehole locations.

10.3. Drilling : The present exploration scheme is prepared by proposing 15 nos. of scout boreholes on 1600m grid spacing with a total meterage of 750m. Scout boreholes are planned in the western area of Chitrakoot-2 10a2b cancelled lease block, as well as pindra SW extension block of MECL, proposed borehole closing depth is 50m /till panna shale whichever is earlier. All the boreholes are planned vertical to establish the continuity of glauconite zones. The boreholes will be closed judicially by the field geologist, after encountering the panna shale formation, so that entire glauconitic sandstone is drilled. The proposed location & depth of the borehole is tentative and the final 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 as plate IV. Proposed Borehole parameters are tentative and may vary subject to the geological and drilling conditions in the study area.

10.4. **Drill core logging:** Geological core logging will be carried out systematically by 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 along with visual estimate in respect of Potash content encountered in boreholes. As per the requirement the Rock quality designation (RQD) shall also be carried out, while logging drill cores. On the basis of these parameters, grade of glauconite can be broadly assessed and it will also be helpful in sampling/demarcating the Phosphorite zones.

10.5. **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) will be kept as duplicate half for future reference. It will generate about 450 Nos **primary samples** and 10% of primary samples i.e. 45 nos **External Check samples** will be prepared and sent to NABL Lab for analysis. Each sample should be marked at every 1m length in case of continuance of similar mineralogical composition down the borehole. The sample length towards the floor marked by 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. samples after the Glauconite zone need to be drawn to mark the floor of the Glauconite zone decisively. **Composite samples** will be prepared borehole wise 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 60 nos. of composite samples.

10.6. **Chemical Analysis:** All the 450 no of primary samples will be analyzed for 4 radicals (K_2O, SiO_2, Al_2O_3 and Fe_2O_3), About 10% of primary samples i.e 45 no of samples will be sent to NABL external laboratory as check samples for analysis of 4 radicals i.e. K_2O, SiO_2, Al_2O_3 & Fe_2O_3. Around 60 composite 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.

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

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

11. QUANTUM OF WORK

11.1. The following quantum of work have been proposed for preliminary level exploration for glauconitic sandstone in Kisanpur block:

Sl. No.	Item of Work	Unit	Target
1	Updation of Geological Map (1:12500 scale)	Sq. Km	52.17
2	DGPS Survey for Borehole fixation	Nos.	15
3	Drilling (Core)	m.	750
4	Drill core sample (Primary)	Nos.	450
5	Drill core sample (Check)	Nos.	45
6	Chemical Analysis (Primary + Check) for 4 radicals viz. K2O, SiO2, Al_2O3 & Fe2O3	Nos.	495
7	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.	60
8	XRD Study	Nos.	5
9	Determination of Specific Gravity	Nos.	5
10	Geological Report preparation	Nos.	1

12. TIME SCHEDULE AND ESTIMATED COST

12.1. The proposed exploration program envisages geological mapping, core drilling, sample preparation and laboratory studies. The above said activities will be completed within 10 months, geological report preparation and peer review will take another 4months with two months overlapping with the laboratory works. Therefore, a total 12 months are planned for completion of the entire exploration program.

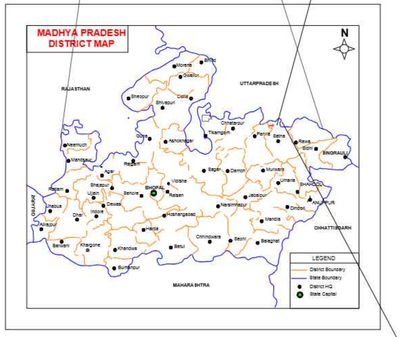
Scheduled time for Reconnaissance Survey (G4) for glauconitic sandstone in Kisanpur block (52.17 Sq. Km), District- Satna, Madhya Pradesh

S. No.	Activities	MONTHS											
		1	2	3	4	5	6		7	8	9	10	11	12
1	Camp setting							R						
2	Geological mapping							e						
3	Core drilling (1 rig)							v						
4	Geologist days (Field)							i						
5	Sampling days, core sampling							e						
6	Camp winding							w						
7	Laboratory studies													
8	Geologist days (HQ)													
9	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.**														

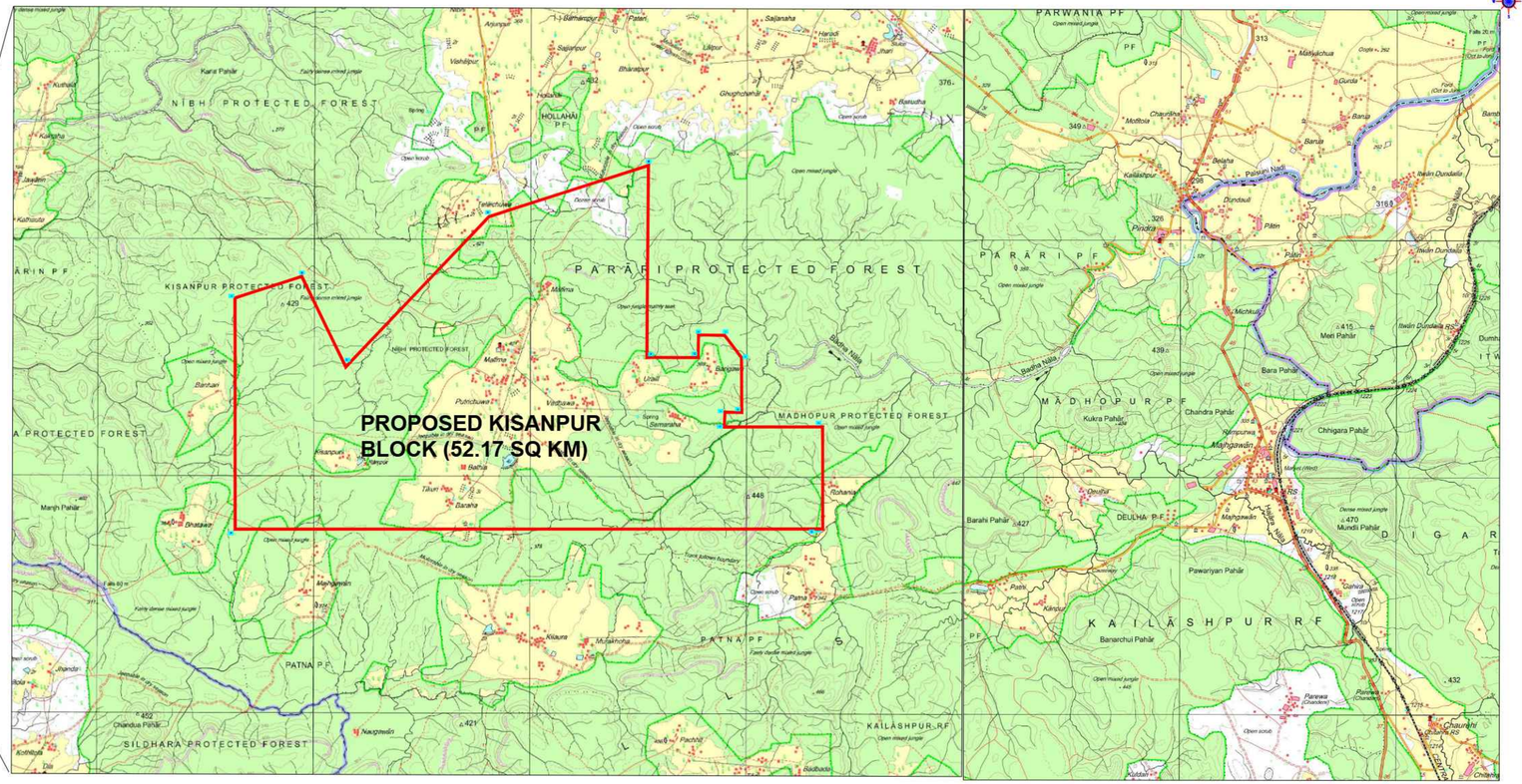
13. Cost has been estimated based on actual schedule of rates mandated in the circular OM No. 61/1/2018/NMET dated 31st March 2020 for NMET funded Projects. The total estimated cost is Rs. 170.44 Lakhs.

+

Sl. No.	Item	Total Estimated Cost (Rs.)
1	Geological Mapping, Other Geological Work	21,00,408
2	Drilling	93,93,300
3	Labrotary studies	15,59,555
4	Geologist at HQ	4,05,000
	Sub Total (1 to 7)	1,34,58,263
5	Exploration Report Preparation	6,72,913
6	Proposal Preparation	2,82,624
7	Peer review charges	30,000
8	Sub Total (1 to 9)	1,44,43,800
9	GST 18%	25,99,884
	Total:	**1,70,43,684**
	Say Rs. In Lakh	**170.44**



POINTS	EASTING (m)	NORTHING (m)
A	460612.000	2759237.246
B	461910.352	2759653.220
C	462763.500	2757892.000
D	465555.723	2760821.148
E	468651.164	2761812.885
F	468619.767	2758078.313
G	469617.683	2758073.005
H	469626.046	2758516.671
I	470134.643	2758506.602
J	470461.652	2758072.017
K	470465.497	2757004.185
L	470139.462	2757012.342
M	470126.788	2756725.405
N	472041.064	2756723.915
O	472041.358	2754735.404
P	460612.000	2754735.404



PROPOSED KISANPUR BLOCK (52.17 SQ KM)

MINERAL EXPLORATION & CONSULTANCY LIMITED

LOCATION MAP

G4 EXPLORATION FOR GLAUCONITIC SANDSTONE IN KISANPUR BLOCK (52.17 SQ KM)

(PART OF TOPOSHEET NO. 63D/09)

DISTRICT : SATNA STATE : MADHYA PRADESH

RF: 1:50000

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