Proposal for Mothala Block, Kachchh District, Gujarat State for G3 Stage Mineral Exploration under NMET

Commodity: Bauxite

By

Commissioner of Geology and Mining
Gujarat

Place: Gandhinagar **Date: 22 February 2023**

Summary of the Block for G3 stage exploration

	Features	Details		
	Block ID	CGM/NMET/BP/2024/05		
	Current Exploration Agency	CGM, Gujarat		
	Commodity	Bauxite		
	Mineral Belt	Supra trappean		
	Completion Period with entire Time schedule to complete the project	08 months		
	Objectives	To assess the mineral resource of Bauxite mineral at G3 stage in the proposed study area.		
	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	The work will be carried out through outsourcing.		
	Name/ Number of Geoscientists	Geologist: 1 (Field) + 1(HQ)		
	Expected Field days (Geology, Geophysics, Surveyor)	45 days: Field Geologist 60 days: HQ Geologist 20 days: Surveyor		
1.	**Location**			
	Co-ordinates (Latitude, Longitude) of Block Boundary	**Block corner points**	**Latitude**	**Longitude**
		1	23°13'4.15"N	69° 7'36.59"E
		2	23°14'40.02"N	69° 7'25.25"E
		3	23°14'27.83"N	69° 8'32.91"E
		4	23°13'48.19"N	69° 9'0.43"E
		5	23°13'51.75"N	69° 9'55.72"E
		6	23°13'19.76"N	69° 9'46.67"E
	Villages	Mothala, Balachod moti		
	Tehsil/ Taluk	Abdasa		
	District	Kachchh		
	State	Gujarat		
2.	**Area (hectares/ square kilometres)**			
	Block Area	747 hectares		
	Forest Area	Not Available		
	Government Land Area	Not Available		
	Private Land Area	Not Available		
3.	**Accessibility**			
	Nearest Rail Head	Bhuj railway station – 50.00 km		

	Road	NH 49 – 1.5 km
	Airport	Bhuj airport – 50.50 km
4.	**Hydrography**	
	Local Surface Drainage Pattern (Channels)	Dendritic
	Rivers/ Streams	Small seasonal nalla presents in the area.
5.	**Climate**	
	Mean Annual Rainfall	below 450 mm
	Temperatures (December) (Minimum) Temperatures (June) (Maximum)	Minimum – 7° C Maximum – 47° C
6.	**Topography**	
	Toposheet Number	41E/4
	Morphology of the Area	The proposed area is generally covered by dry barren and agricultural fields. The topography of the proposed region is highly undulating, with rocky, broken ground, wide plains, and is distinguished by hill ranges and isolated peaks. The elevation of the area ranges from 110m to 145m above mean sea level.
7	**Availability of baseline geoscience data**	
	Geological Map	Plate-1
	Geochemical Map	Not available
	Geophysical Map (Aerogeophysical, Ground geophysical, Regional as well as local scale GP maps)	Not available
8.	**Justification for taking up G3 stage mineral exploration**	The region was primarily investigated by CGM by means of pitting, trenching and sample collection of the area. It was found that the Bauxite occurs as pocket deposit in ferruginous Laterite in and around proposed block area. The proposed block is surrounded by the Bauxite leases and exploration blocks of Bauxite, So it can be studied as an extension of the already existing mineable deposits. Thus, the block is suggested for G3 level of exploration.

Detailed description:

1. Block Summary

Physiography

The study area is located in the Abdasa taluka, Kachchh district in the western region of Gujarat. The area under investigation is a western plain, these plains are mainly composed of recent alluvium, wind-blown sands covering the Tertiary strata. These plains gradually merge into mudflats of Rann of Kutch. The topography is mostly undulating, where major portion is gently flat barren fields leaving patches of limestone out crops in form of small low mounds. There is no major river in the area. The area is mostly drained by numerous streams and nallas which are seasonal in nature and mostly remain dry in summer.

Background Geology (Regional Geology & Geology of the Block).

Kachchh, located in western Gujarat, is renowned for its intricate geological history. The stratigraphy of Kutch mainly comprises rocks ranging in age from middle Jurassics to Recent. Major part of the Kutch mainland is occupied by the Mesozoic sediments and Deccan Trap rocks. Tertiary sediments occupy the coastal strips of the mainland bordering Mesozoic sediments and Deccan traps. The study area falls in the western part of Kutch mainland where Tertiary sequence is developed and Tertiary rocks overlie unconformably the basaltic rocks belonging to Deccan traps. Lithologically, the proposed area comprises of Matano Madh Formation including Bauxite, laerite, Sandstone and different clays.

The general stratigraphic succession of the region is as follows:

Age	Formation	Lithology
Holocene	Rann Formation	Rann clay and deposits
	Jantral Formation	Unstabilized sand sheet and sand dune deposit
Lower Pleistocene	Kothara Formation	Pebbly sandstone, conglomerate gravel and sand
Pliocene	Sandhan Formation	Micaceous sandstone, siltstone, conglomerate and calcareous clay with marl
Lower to Middle Miocene	Gaj Formation	Shale interbedded with fossiliferous limestone and marl
Upper Oligocene to Lower Miocene	Khari Nadi Formation	Variegated siltstone and gypseous claystone
Middle to Upper Oligocene	Maniyara Fort Formation	Calcareous and gypseous claystone/siltstone, clay, coral limestone and sandstone

Middle Eocene	Fulra Formation		Foraminiferal limestone, glauconitic shale and clay
Lower Eocene	Kakdi Nadi Formation		Gypseous, lignite- bearing shale, fossiliferous nodular limestone and clay, ferruginous shale and clay with intercalated marl
Palaeocene	Matanomadh Formation		Laterite, sandstone, conglomerate and bentonitic and kaolinitic clay
Upper Paleocene	Supra trappean		Bauxite and laterite
Upper Cretaceous to Eocene	Deccan Volcanics	Extrusive	Andesitic trachyte
		Intrusive	Olivine gabbro, basalt and dolerite dyke
		Extrusive	Basalt flows with intertrappean sediments
Cretaceous	Bhuj Formation		Glauconitic and burrowed sandstone, siltstone, shale, limestone, marl, conglomerate, ironstone and clay with marine and plant fossil
Upper Jurassic to Lower Cretaceous	Katrol Formation		Shale, fossiliferous sandstone, marl and conglomerate
Middle to Upper Jurassic	Chari Formation		Gypseous shale, siltstone and conglomerate with phosphatic nodule, oolitic limestone
Middle Jurassic	Pachchham Formation		Gypseous shale, siltstone, limestone, sandstone and conglomerate

The stratigraphic sequence of the proposed block area is

Bauxite and Laterite (Supra trappean)

The Bauxite and Laterite is forms almost a continuous zone between the Gaj beds and the underlying traps. They have been subjected to a considerable amount of denudation prior to deposition of Gaj beds. There are scattered pockets of bauxite in the ferruginous laterite belt. Two varieties of bauxite can be made out in the areas. One the bouldary, nodular and the other earthy massive bauxite. The bouldary bauxite is hard and compact with shades of red and brown colour. The earthy bauxite is soft and friable in nature. Generally, it is pinkish to whitish in colour these earthy clays bauxite rests directly on the clay below. Clays are of different shade and colour. These

are succeeded by the trap below there for these deposits are inferred to be insitu in nature.

Deccan Trap (Upper cretaceous to Lower Eocene)

The trap is the dominant country rock covering the major portion of the area. Traps (basalts) are medium to fine grained with voids filled with quartz, chalcedony and calcite. The bauxite deposits are invariably found associated with ferruginous laterite. It was observed that the bauxite horizon rest directly on the Deccan Trap and at place is found covered by the Gaj beds.

Mineral potentiality based on geology, geophysics, ground geochemistry etc.

The bauxite deposits in all the places found associated with ferruginous laterite and Aluminious laterite. It is noticed that bauxite horizons rest directly on the Deccan Traps and are found covered by the Tertiary group of rocks.

The laterites of the area show varied colours like brown, dark brown and red. They are highly ferruginous in composition. They are three to four meters in thickness, and gradually pass into clayey zones. They also contain pieces of agates, chalcedony and quartz. Some laterites are soft, earthy and clayey in nature, while the others are hard, compact and brecciated.

Two verities of bauxites are seen, one the bouldery and nodular bauxite and the other earthy bauxite. The bouldery bauxite is hard, compact and massive with shades of red and brown colours. The earthy bauxite is soft, friable and pale pink in colour.

The bauxite deposits of the area are hard, compact, massive abundance ferruginous in nature. They are bouldery and nodular having shades of pink and brown colours with glossy sheen. This bouldery zone overlies the earthy clayey bauxite. As the bauxite boulders are embedded in a clayey matrix, it is necessary to estimate the percentage recovery of the bauxite.

Several lease areas for Bauxite are situated adjacent to this block which adds up to the mineral potentiality.

Scope for proposed exploration

1. Location: - Village: Mothala, Malachod Moti Tehsil: Abdasa, District: Kachchh, State: Gujarat.
2. Quantum of work: The approximate core drilling work is 1075 meters.
3. Rock formations to be drilled: Various types of soil, sub-soil, Bauxite, Laterite, clay, etc.
4. The boreholes shall be in depth range of approximately 25 m. However, this is indicative only and may vary as per actual geological conditions.
5. Type of Drilling: Core drilling by Hydraulic Drilling Rigs.
6. Borehole size: The holes shall be derived in NQ sizes.
7. The core recovery in all the formation should be at least 90% except in fault zone, weathered zone, soil, sand and structurally disturbed area
8. CGM will provide proposed borehole location plan of all the areas to be covered under exploration.
9. Sampling: There will be one mineral/rock sample for every 1-meter run. Each sample should be cut by core splitter. Each run shall be marked properly by plastic cards and the core boxes shall be numbered properly. Each sample shall be

reduced to an approximate quantity by following the standard sampling procedures such as homogenizing, coning, quartering and pulverizing into 100/200 mesh and be prepared into two packets of 100-200 gm each. The final sample pockets shall be properly labelled with BH number, sample run.

Recommendations of G4 Stage Mineral Exploration Report.

Report on the Bauxite Deposits in Kukma, Lakhond, Satapar, Ratnal, Mamuara, Wamoti (M), Wamoti (N), Khanpar, Deban, Rasaliya, Netra and Bhunjai villages, Kutch district, Gujarat State by H.R. Vyas, Directorate of Geology and Mining, Government of Gujarat, Ahmedabad, Field season-1964-65.

The Report on the Assessment of Bauxite deposits in Kutch District, Gujarat State, CGM, Field Season-1963-70.

The proposed block is surrounded by the Bauxite leases of Gujarat Mineral Development Limited and exploration blocks of Bauxite, So it can be studied as an extension of the already existing mineable deposits.

Objectives of Exploration

- To know the continuity of the mineral body both along the strike and dip.
- To map the extent of the ore body.
- To ascertain the grade of Bauxite deposit.
- Ore resource/reserve estimation in accordance with MEMC Rule-2015

2. Previous Work

Previous Exploration in proposed block area as well as adjoining area: All the sample (bed rock/trench/ groove/soil), borehole location should be plotted on the geological map and analytical data should be discussed briefly

H.R. Vyas (Field Season-1964-65) has done the work on Kukma, Lakhond, Satapar, Ratnal, Mamuara, Wamoti (M), Wamoti (N), Khanpar, Deban, Rasaliya, Netra and Bhunjai of the Kutch District, Gujarat State during the year 1964-65, was part of a project to assess the quality and quantity of Bauxite for its economical utilization. During the period under report total number of 262 pits was opened up and total number of 245 samples was collected and have been sent for laboratory analysis. An area of 4,60,000 square meters was found to be under bauxite and the reserves have been estimated to be about 1,270,000 tonnes.

B.A. Amin (Field Season 1963-70) has done the Bauxite Deposits in Kutch District, Gujarat State. During the field work, general reconnaissance survey on the scale 1:63, 360, was done covering an area of about 20sq. kilometres and detail mapping of the bauxite bearing area was also done on the scale 1:2000, covering an area of 8.60 sq. kilometres. The area mapped is depicted on survey of India top sheet No.41 E/4.

3. Block description

Block corner points	Latitude	Longitude
1	23°13'4.15"N	69° 7'36.59"E
2	23°14'40.02"N	69° 7'25.25"E
3	23°14'27.83"N	69° 8'32.91"E
4	23°13'48.19"N	69° 9'0.43"E
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4. Planned Methodology

- The drilling for Bauxite is to be carried out on the grid pattern of 400 x 400 meters as the deposit is of irregular habit, for G3 stage as per MEMC, 2015.
- The drilling will be carried out with the help of hydraulic drilling rigs.
- The depth for each borehole is set to be 25 meters or depending on the encountered mineralized zone.
- As it is bedded deposit so the drilling will be vertical.
- The Blocks boundary shall be surveyed by DGPS in WGS-84 datum for demarcation of block boundary/corner points.
- Boreholes will be fixed on the ground whose RL's and co-ordinates of survey and exploration points will be determined.

5. Nature Quantum and Target

Components	G3
Aerial reconnaissance	NA
Geological Survey	NA
Scout drilling / Systematic drilling Only Systematic drilling	Refer below
Petrographic and mineragraphic studies	Bulk density/Specific Gravity studies
Synthesis of all available data	i) Integration of regional/ detailed geophysical, geological and geochemical data, if not done earlier. ii) Synthesis of all available data and Report writing

Borehole spacing (As per MEMC, 2015)

Type of deposit	Bedded Stratiform and Tabular deposit of regular habit (Minerals to be identified)	Bedded stratiform and tabular deposits of irregular habit (Minerals to be identified)	Lenticular bodies occurring en echelon Lenses, pockets. (Different minerals)
G3 Stage	Not Applicable	400 m	Not applicable
	(Vertical depth of intersection of mineralised zone for different level boreholes should be specified, number of boreholes (first, second, third), borehole spacing, approximate length of different level of boreholes may also be specified)		

6. Exploratory Drilling

- The boreholes shall be in depth range of approximately 25 m. However, this is indicative only and may vary as per actual geological conditions.
- Type of Drilling: Core drilling by Hydraulic Drilling Rigs.
- Borehole size: The holes shall be derived in in NQ sizes.
- While drilling, wherever water table is encountered, depth of the water table should be recorded and to be mentioned in the driller logs.
- The core recovery in all the formation should be at least 90% except in fault zone, weathered zone, soil, sand and structurally disturbed area.

7. Manpower deployment

Sl. No.	Activities	Unit	MONTHS							
			1	2	3	4	5	6	7	8
1	Camp Setting	Month								
2	Surface Drilling (3 rigs)	m.								
3	Survey Party days (1 Party)	day								
4	Geologist Party days in field (1 Party)	day								
5	Sampling Party days, Core Sampling (1 party)	day								
6	Laboratory Studies	Nos.								
7	Camp Winding	Month								
8	Geologist Party days in HQ (1 Party)	day								
9	Geological Report Writing with Peer Review	Month								

Note: 1. Commencement of project may be reckoned from the day the exploration acreage is available along with all statutory clearances.

2. Time loss on account of monsoon/agricultural activity/forest clearance/local law & order problem may be additional to above time line.

8. Break-up of expenditure

The cost has been estimated based on actual schedule of rates mandated in the circularOM No. 61/1/2018/NMET dated 31st March 2020 for NMET funded projects which is **Rs. 209.33 Lakhs.** The detailed cost sheet for G-3 exploration for Bauxite in proposed Mothala Block is given below:

SL. NO.	Item	Estimated Cost (Rs.)
1	Drilling	7283125
2	Geology and Survey	1736572
3	Laboratory	5016425
	Sub Total (1 to 3)	**14036122**
4	Miscellaneous	3704307
	Total	**17740428**
	GST 18%	3193277
	Grand Total (including GST)	**20933705**
	Say Rs. In Lakhs	**209.33**

9. References

- "Report on the Bauxite Deposits in Kukma, Lakhond, Satapar, Ratnal, Mamuara, Wamoti (M), Wamoti (N), Khanpar, Deban, Rasaliya, Netra and Bhunjai villages, Kutch district, Gujarat State" by H.R. Vyas, Directorate of Geology and Mining, Government of Gujarat, Ahmedabad, Field season-1964-65.
- "The Report on the Assessment of Bauxite deposits in Kutch District, Gujarat State" by B.A. Amin, Directorate of Geology and Mining, 1974.
- Bhukosh (www.gsi.gov.in)

List of Plates

Plate 1: Proposed block boundary over existing Geological map.

Plate 2: Proposed Borehole Location Map.

Plate 3: Proposed block boundary over topographic map.

Proposal for Mothala Block, Kachchh District, Gujarat

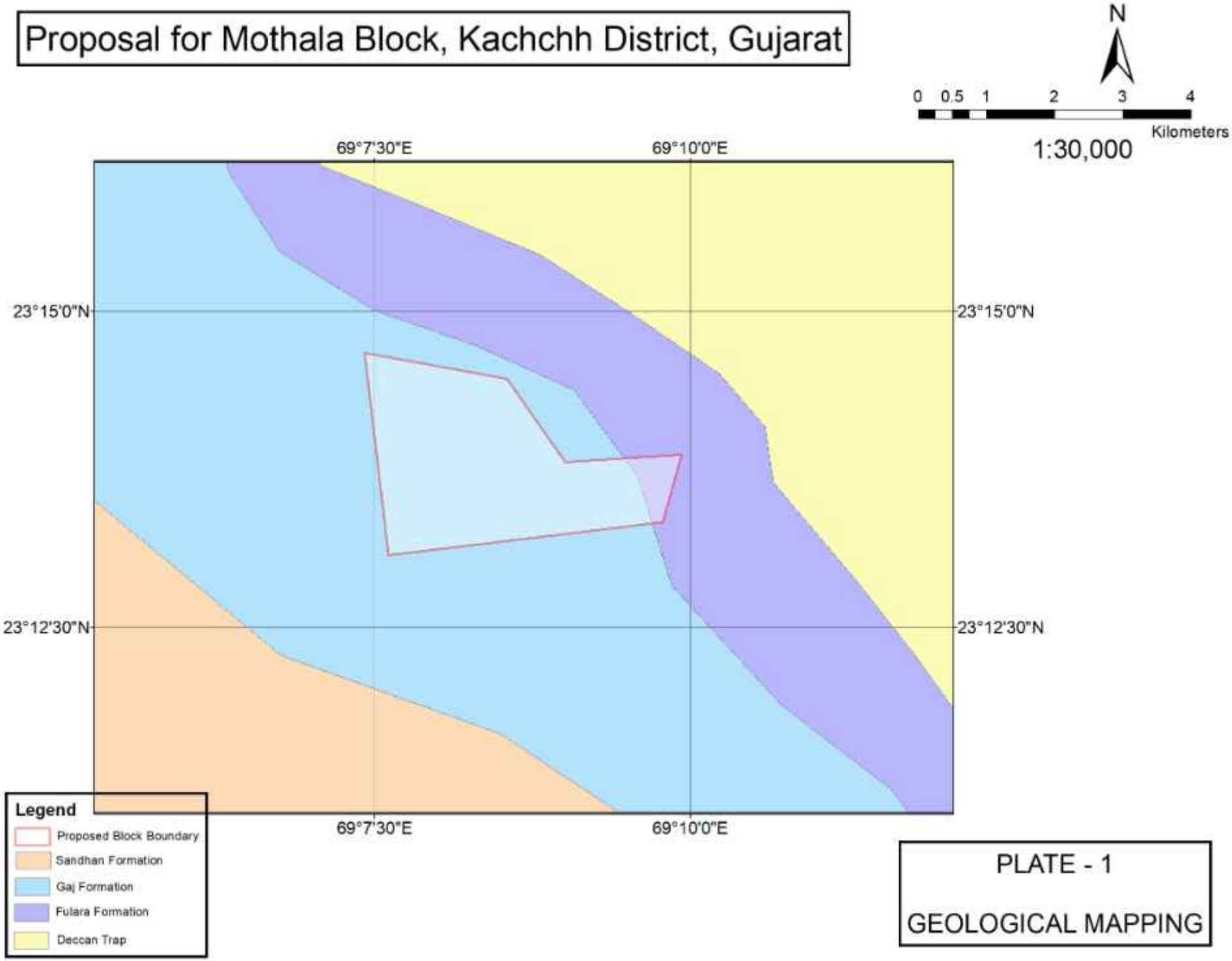
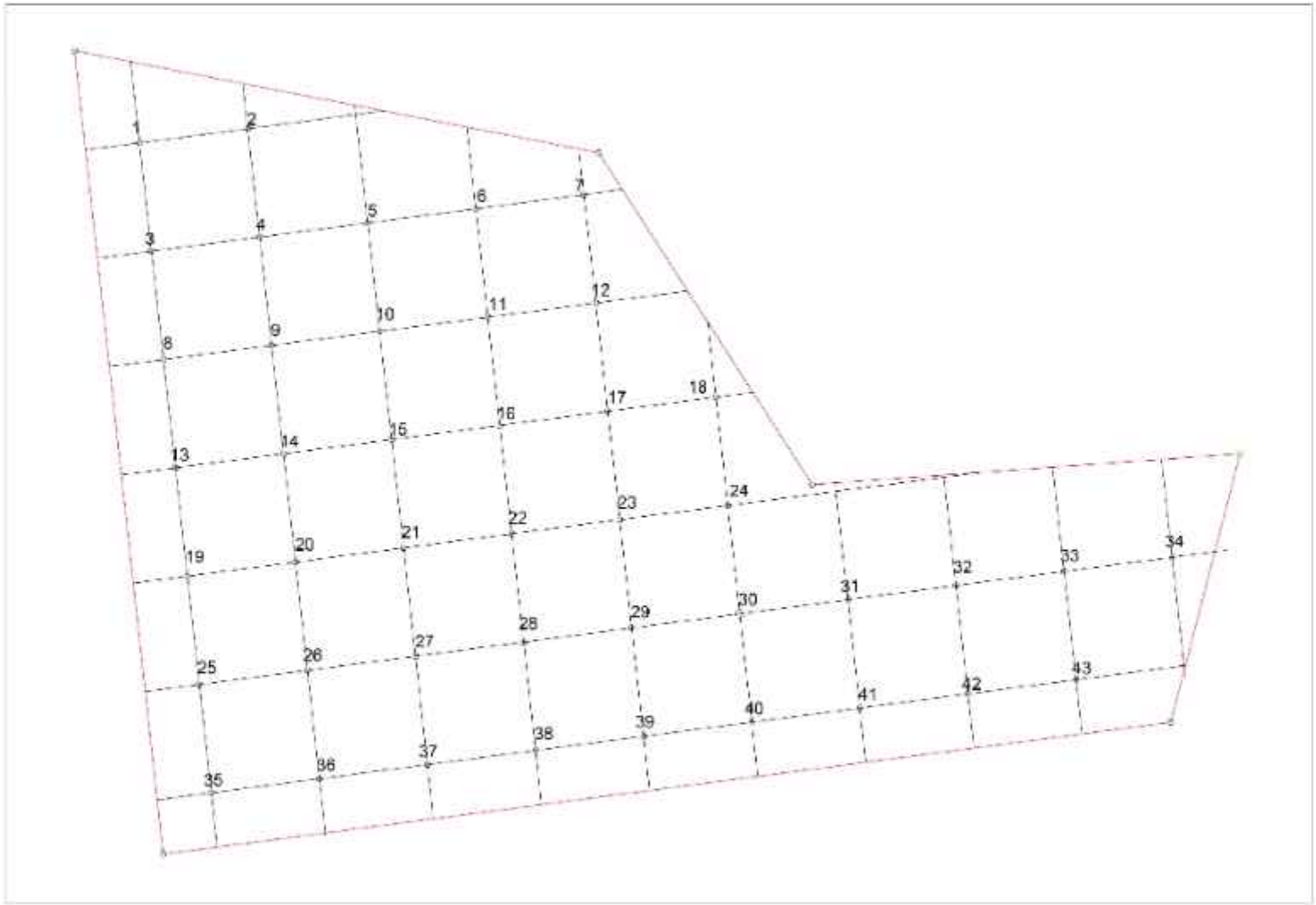


PLATE - 1

GEOLOGICAL MAPPING

Proposal for Mothala Block, Kachchh District, Gujarat

N

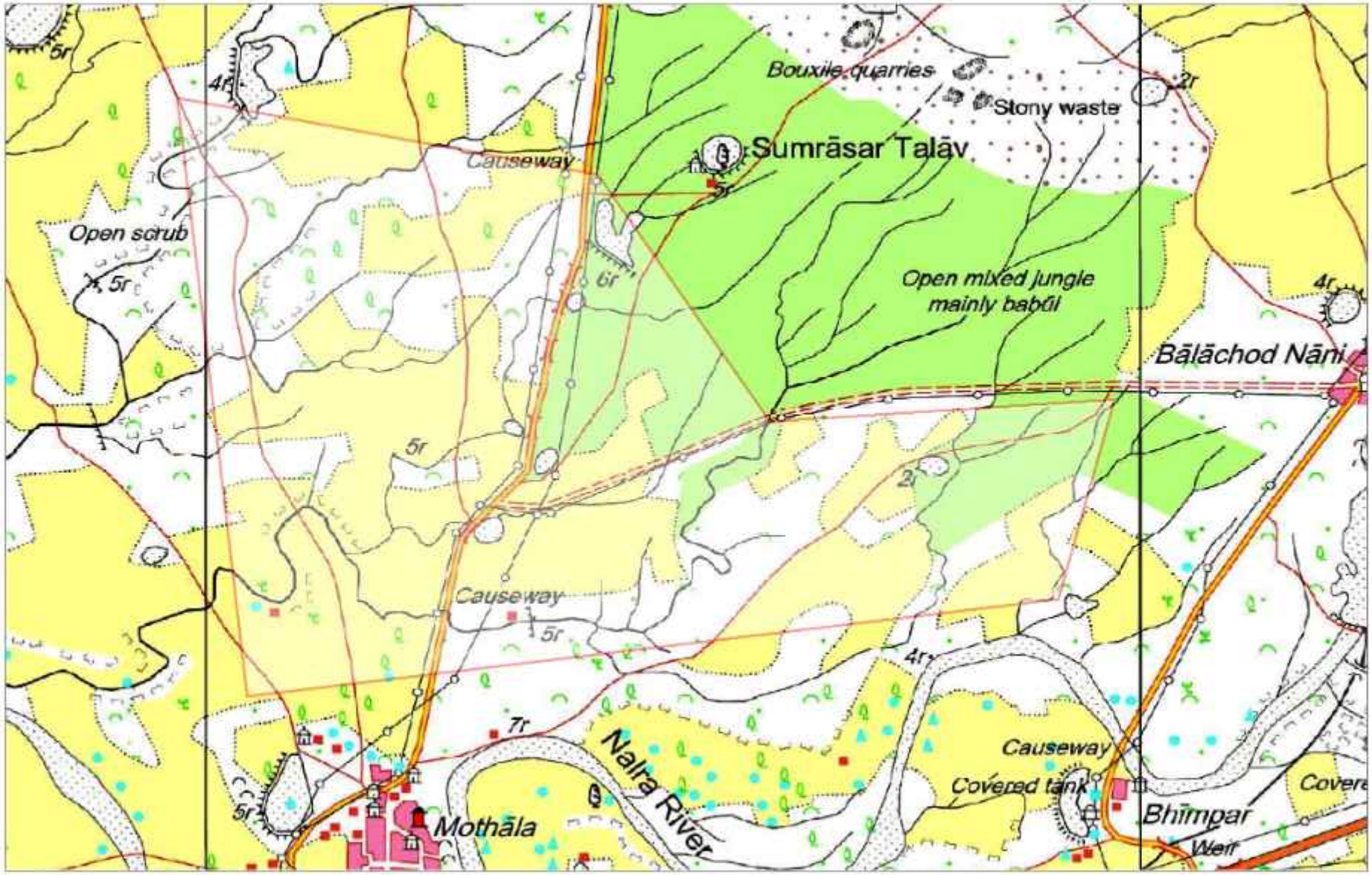


Proposed Area :- 747 Ha.
Proposed Borehole :- 43
Proposed Meterage :- 1075 mts.

PLATE-2

BOREHOLE PLAN

Proposal for Mothala Block, Kachchh District, Gujarat



PLAN - 3
TOPOSHEET PLAN

Annexure-I

Sr. No.	Item of Work	Unit	Rates as per NMET SoC 2020-21		Estimated Cost of the Proposal	
			SoC- Item S.No.	Rates as per SoC	Qty.	Total Amount (Rs.)
A	DRILLING (Outsourced)					
1	Surface Drilling	m.	2.2.1.1b	6775	1075	7283125
	Sub Total A					7283125
B	Geological Work					
1	Survey Days	day	1.6.1a	8300	30	249000
	Labour	day	5.7	504	60	30240
2	Geologist (Field)	day	1.3b	11000	60	660000
3	Geologist (HQ)	day		9000	60	540000
4	Core Sampling Days	day	1.5.2	5100	90	459000
	Labour	day	5.7	504	120	60480
	Sub-Total B					1736572
C	LABORATORY STUDIES					
a	Chemical Analysis					
1	Primary Analysis	Nos.	4.1.15a	4200	1075	4515000
2	External Check Samples	Nos.	4.1.15a	4200	107	449400
b	Physical Analysis					
1	Preparation of Thin Section	Nos.	4.3.1	2353	5	11765
2	Petrographic Studies	Nos.	4.3.4	4232	5	21160
3	Digital Micro Photographs	Nos.	4.3.7	280	5	1400
4	Bulk Density	Nos.	4.1	3540	5	17700
	Sub-Total C					5016425
	Total A+B+C					14036122
D	Miscellaneous Charges					
1	Geological Report - 5% of (A+B+C)		5.2			701806
2	Proposal Preparation- 2% of approved project cost or 3.8 lakh (whichever is lower)		5.1			280722
3	Drill Core Preservation	m.	5.3	1590	1075	1709250
4	Peer Review Charges			30000		30000
5	Tender Process					280722
6	Operational Charges					701806
	Total					17740428
	GST 18%					3193277
	GRAND TOTAL					20933705
	Rs. In Lakhs					209.33 lakhs

Dr. Dhaval Patel, IAS
Commissioner of Geology & Mining
Industries & Mines Department
Government of Gujarat

No: CGM/Expl/NMET-Mothala/964/2023-24/149 to 150 Date- 23 FEB 2024

To,
Director,
National Mineral Exploration Trust
Ministry of Mines, Government of India,
New Delhi, Delhi-110001.

Sub: Allocation of funds [₹2,09,33,705 (Rupees Two Crore Nine Lakhs Thirty-Three Thousand Seven Hundred Five Only)] for Mothala Block, Kachchh District, Gujarat State for G3 Stage Mineral Exploration under NMET.

Respected Sir,

With respect to above mentioned subject, we are submitting proposal for Mothala Block, Kachchh District, Gujarat State for G3 Stage Mineral Exploration.

It is requested to NMET to allot the fund of Rs. 2,09,33,705 (Rupees Two Crore Nine Lakhs Thirty-Three Thousand Seven Hundred Five Only) for Mothala Block, Kachchh District, Gujarat State for G3 Stage Mineral Exploration.

We would like to submit the same under sub-section 5 of section-9C of the MMDR Act-2021 for NMET funding.

Thank you.

Your Faithfully,
Dhaval
23/2/24
(Dr. Dhaval Patel, IAS)
Commissioner
Geology and mining,
Gujarat State, Gandhinagar

Enclosed: As above

Copy to: Joint secretory, Industry and Mines Department, New Sachivalay, Gandhinagar