PROPOSAL FOR PRELIMINARY EXPLORATION (G-3) FOR POTASH IN LAKHASAR EAST EXTESNTION BLOCK, LAKHASAR SUB BASIN, (9.50 SQ.KM AREA)

DISTRICT- BIKANER, RAJASTHAN

COMMODITY: POTASH

BY

MINERAL EXPLORATION CORPORATION LIMITED

DR. BABASAHAB AMBEDKAR BHAWAN

SEMINARY HILLS

PLACE: NAGPUR

DATE: 15th October, 2024

SUMMARY OF THE BLOCK FOR PRELIMINARY EXPLORATION (G-3)
GENERAL INFORMATION ABOUT THE BLOCK

	Features	Details
	Block ID	Lakhasar East Extension Block, Lakhasar-Sub Basin
	Exploration Agency	Mineral Exploration and Consultancy Limited
	Commodity	Potash
	Mineral Belt	Lakhasar Sub Basin, Nagaur Ganganagar Basin Northwestern Part of Rajasthan
	Completion period with entire Time schedule to complete the project	12 Months
	Objectives	i) To confirm the continuity and potentiality of potash bearing zones in the proposed area. ii) To generate data for assessment of mineralogy of the potash zones and the K contents. iii) To estimate resources of Potash zones as per UNFC system in 333 Category.
	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	Work will be carried out by the proposed agency.
	Name/Number of Geoscientists	Two no Geoscientist (1 Field + 1 HQ)
	Expected Field days (Geology, Geophysics, Surveyor)	Geologist Party days on Field: 240days
		Geologist Party days on HQ: 60 days

<table>
<tr><td>1.</td><td>Location</td><td></td></tr>
<tr><td></td><td>Latitude-Longitude</td><td>The proposed block, i.e., Lakhasar East Block falls in the Survey of India Toposheet No. 44H/16, east of Lakhasar Block near to the Lakhasar Village.
<table>
<tr><td rowspan="2">CARDINAL POINTS</td><td colspan="2">ZONE-43(NORTH)
UTM (m)</td><td colspan="2">WGS-84
DMS</td></tr>
<tr><td>NORTHING</td><td>EASTING</td><td>LONGITUDE</td><td>LATITUDE</td></tr>
<tr><td>A</td><td>3112544.1170</td><td>391485.3980</td><td>73° 53' 42.030" E</td><td>28° 8' 2.539" N</td></tr>
<tr><td>B</td><td>3113939.7219</td><td>393463.6527</td><td>73° 54' 54.082" E</td><td>28° 8' 48.464" N</td></tr>
<tr><td>C</td><td>3110790.3464</td><td>395731.5693</td><td>73° 56' 18.227" E</td><td>28° 7' 6.786" N</td></tr>
<tr><td>D</td><td>3109343.8570</td><td>393757.0370</td><td>73° 55' 6.336" E</td><td>28° 6' 19.221" N</td></tr>
</table></td></tr>
<tr><td></td><td>Villages</td><td>Lakhasar, Benisar</td></tr>
<tr><td></td><td>Tehsil/Taluk</td><td>-</td></tr>
<tr><td></td><td>District</td><td>Bikaner</td></tr>
<tr><td></td><td>State</td><td>Rajasthan</td></tr>
<tr><td>2.</td><td>Area (hectares/ square kilometres)</td><td></td></tr>
<tr><td></td><td>Block Area</td><td>9.50 Sq. Km</td></tr>
<tr><td></td><td>Forest Area</td><td>Data Not Available</td></tr>
<tr><td></td><td>Government Land Area (Bilanam)</td><td>Data Not Available</td></tr>
<tr><td></td><td>Charagaha</td><td>Data Not Available</td></tr>
<tr><td></td><td>Private Land Area</td><td>Data Not Available</td></tr>
<tr><td>3.</td><td>Accessibility</td><td></td></tr>
<tr><td></td><td>Nearest Rail Head</td><td>Shri Dungargarh</td></tr>
<tr><td></td><td>Road</td><td>NH-11</td></tr>
<tr><td></td><td>Airport</td><td>Jodhpur</td></tr>
<tr><td>4.</td><td>Hydrography</td><td></td></tr>
<tr><td></td><td>Local Surface Drainage Pattern (Channels)</td><td>There is not a single perennial stream in the area. The drainage in the area is served by the old course of river Ghaggar forming a narrow alluvial belt in which a network of canals has been developed.</td></tr>
<tr><td></td><td>Rivers/ Streams</td><td></td></tr>
<tr><td>5.</td><td>Climate</td><td></td></tr>
<tr><td></td><td>Mean Annual Rainfall</td><td>Averages 10 cm to 30 cm annually</td></tr>
<tr><td></td><td>Temperatures (December) (Minimum)
Temperatures (June) (Maximum)</td><td>0°C (Minimum)
50°C (Maximum)</td></tr>
<tr><td>6.</td><td>Topography</td><td></td></tr>
<tr><td></td><td>Toposheet Number</td><td>44H/16</td></tr>
</table>

	Morphology of the Area	Covered by aeolian Sand.
7.	**Availability of baseline geoscience data**	
	Geological Map (1:50K/25K)	**1:50,000**
	Geochemical Map	**Sand cover Area**
	Geophysical Map (Aeromagnetic, ground geophysical, Regional as well as local scale GP maps)	**Not Available**
8.	**Justification for taking up Reconnaissance Survey/ Regional Exploration**	On enactment of amended MMDR rule, the critical minerals are being auctioned by Central Government. The previously explored Jaitpur, Lakhasar and Bharusari block for potash are in the auction platform. The exploration in Lakhasar block reveals Potash zones have been classified into 6 major bands, i.e., K1A, K1B, K2A, K2B, K2C and K2D apart from a few Local bands. Each of the bands show merging and spitting nature with rolling dip in the conformity of the respective Halite cycle showing horizontal to sub horizontal with rolling dip of 1° to 5° towards NNW, NW to W. The bands are continuing in the adjacent Lkahasar East blocks. The gross inferred resource of 24.76 m.t and net inferred resource of 19.80 m.t with average grade 6.16%K (7.40% K2O) and gross reconnaissance resource of 3.06 m.t and net reconnaissance resource of 2.45 m.t with average grade of 5.79 % K (6.95% K2O) has been estimated at 5% K cut off in the block. Whereas the gross inferred resource of 93.41 m.t. and net inferred resource of 74.73 m.t. with average grade 4.18%K (5.02% K2O) and gross reconnaissance resource of 10.01 m.t and net reconnaissance resource of 8.01 m.t with average grade of 4.13% K (4.96% K2O) has been estimated at 3% K cut off in the block. In view of the above, it is imperative that the halite cycles and the potash zones established in the Lakhasar East block may show continuity and consistency throughout the Lakhasar sub-basin. Hence the Lakhasar East Extension Block in the eastern side of the Lakhasar East block within Lakhasar sub basin need to be explored on 800m X 800m grid so that potentiality of the block can be established and can be auctioned and developed in to potash mines to meet the rising demand of the fertilizer mineral.

PROPOSAL FOR PRELIMINARY EXPLORATION (G-3) FOR POTASH IN LAKHASAR EAST EXTENSION BLOCK (9.50 Sq Km), LAKHASAR SUB-BASIN, DISTRICT- BIKANER, RAJASTHAN

1.0.0 Preamble

1.1.0 Background

1.1.1 Potassium, Nitrogen and Phosphorous (K, N & P) are the key chemical contents used in the Fertilizer Industry. Major production of potash in the world is obtained from Sylvite (KCl) and Polyhalite [$K_2Ca_2Mg(SO_4)_4{\cdot}2H_2O$] associated with Halite (NaCl) bearing evaporite sequences. India produces only meager quantity of potash as by-products during the manufacture of common salt from seawater and the entire requirement of potash is met through imports. The only known occurrence of potash of some possible economic relevance happens to be the potash bearing evaporite sequence of NW Rajasthan also known as Nagaur-Ganganagar evaporite basin (N-G basin). Discovery of potash deposits in the Nagaur-Ganganagar basin of Rajasthan is looked forward to ease the country's situation. This basin was historically explored by GSI over a long gestation period spanning from 1974 to 1991. The above work of GSI could establish the potash exploration potential of the basin.

1.1.2 In the backdrop of country's continued dependence on import of a very large quantity of potash nutrients with heavy outgo of foreign exchange, the subject was given due consideration at the level of Ministry of Mines, Government of India and the decision was taken to revisit the potash bearing evaporite prospect of Rajasthan and to further work out the exploitation feasibility of the Nagaur-Ganganagar basin so that the prospect can be developed as an auctionable property. In the meeting held on 15th December 2009, under the Chairmanship of Secretary (Fertilizers) possibility of exploration and augmenting indigenous production of rock phosphate and mining for availability of rock phosphate for the indigenous fertilizer industry was discussed. Apart from this the matter related to exploration of Potash and Fertilizer minerals (Phosphorite, Apatite etc) was also discussed in details and decided that exploration of fertilizer mineral deposits in the country should be taken on priority to save a huge foreign exchange for meeting the domestic demand. The matter of Potash exploration of Rajasthan was also discussed in the 1st meeting of National Mineral Exploration Trust (NMET) held on 8th October-2015.

1.1.3 It was suggested that Department of Mining & Geology (DMG), Government of Rajasthan, Mineral Exploration Corporation Ltd. (MECL) and Geological Survey of India (GSI) under Ministry of Mines could take up the exploration work for potash in Nagaur-Ganganagar basin. MECL procured the Geological Report of GSI on Potash Exploration in North-Western part of Rajasthan and formulated the proposal with 4775m of drilling in 7 boreholes and associated sampling and Laboratory Studies. The Committee discussed the proposal in detail in 36th meeting of Technical Sub Committee of SCPP held at 30.10.2017 at MECL, Corporate Office, Nagpur and a few modifications were suggested i.e. committee suggested 800m X 800m grid instead of MECL's 500m X 500m grid. MECL attended the modifications and the proposal with 4775m of drilling in 7 boreholes with associated sampling and Laboratory studies at an estimated cost of Rs 843.84 Lakhs to be completed in a time period of 16 months was recommended by Technical Sub Committee of SCPP for approval of SCPP. The proposal was discussed in 36th meeting of SCPP held on 16th November 2017 at MoM, New Delhi, but due to non availability of budget provision for exploration, SCPP of MECL decided to defer the exploration proposal of Lakhasar sub basin.

1.1.4 In the backdrop of the above development, MECL put up same proposal in the 12th meeting of the Technical cum Cost Committee (TCC) of NMET held on 8th & 9th January 2018 and committee, after detail discussion, recommended the proposal of seven boreholes with associated geological work and laboratory studies worth Rs 843.84 Lakh for approval of Executive committee of NMET with the condition that initially four boreholes are to be drilled and other three boreholes will be released only after the review of the status of exploration. Executive Committee of NMET, in its 6th meeting held on 11.01.2018 at MoM, New Delhi approved the regional exploration for potash mineralization in Lakhasar block, District-Bikaner, Rajasthan for an estimated cost of Rs 843.84 Lakh and the exploration work was sanctioned by NMET, MoM, New Delhi vide sanction Letter No.6/4/2015-NMET/447-451 dated 24.02.2018 at an estimated cost of Rs. 843.84 Lakh. The exploration work was commenced in the block on the 26th January 2018.

1.1.6 During the proceeding of the 20th meeting of the TCC of NMET dated 4th & 5th April 2019, the status of the exploration work being carried out by MECL in Lakhasar block was reviewed. It was informed to the committee that the four boreholes had

been completed and fifth one was in progress. Committee accorded approval for taking up of drilling of remaining two boreholes.

1.1.7 CMD, MECL shared a brief presentation outlining the global scenario of salt deposits during the review of status of exploration in the 20th meeting of Technical cum Cost Committee (TCC) of National Mineral Exploration Trust (NMET) held at GSI, Central Region, Nagpur on 4th & 5th April, 2019. He informed that the salt formation is the source of multiple products namely sodium, potassium, magnesium, lithium, chlorine, bromine, iodine and several other elements in various compositions and percentages. All these elements/ compounds can be used in several sectors across the value chain such as fertilizer, chemical, petrochemical and other allied industries. It was deliberated that the auction of the land containing the bedded salt formations such as potash blocks for composite license may not be an appropriate and feasible option with the present level of exploration results and most importantly when the huge potential of the several products that can be extracted simultaneously from the bedded salt deposit instead of only potash. Further, the geological reports should also identify the other possible resource potential and the same needs to be assessed for techno economic feasibility of extraction/mining.

1.1.8 In view of the above MECL proposed to submit an Interim Geological Report in May 2019 (original time schedule for GR submission) considering the exploration data of four MECL and four GSI boreholes and the final Geological report to be submitted as per new time schedule considering the data of all the 11 boreholes (4 no GSI boreholes and 7 no MECL boreholes) by taking a holistic approach towards potash exploration by identifying the other possible resource potential of the bedded salt deposit of Lakhasar block i.e. sodium, potassium, magnesium, lithium, chlorine, bromine iodine etc. In due course of time, all the seven boreholes MLP-1 to MLP-7 had been completed with the closure of borehole no MLP-7 on 5th October, 2019 and the final geological report was submitted in June' 2020.

1.1.9 On the basis of encouraging result of the boreholes, MECL proposed an exploration proposal for potash with 40 proposed boreholes covering 29.90 sq.km area defined by the area of influence of earlier drilled boreholes by GSI in Lakhasar Sub basin and the proposal was technically evaluated in 23rd meeting of TCC held on 12th and 13th February 2020. Fifteen boreholes covering an area of 18.30 sq km out of total 40 boreholes initially proposed by MECL were selected on plan by the TCC and

recommended for approval to EC, NMET and the proposal with 10,040 m drilling was approved in 16th meeting of EC held on 25th February 2020.

1.1.10 Accordingly after the unprecedented Covid-19 pandemic situation became normalize, MECL commenced the work on 10th December, 2020 with starting of drilling of MLP-8 and completed the drilling work on 28th October 2021 with the closure of borehole no MLP-22. The geological report was submitted in July 2022.

1.1.11 On the basis of encouraging results of boreholes drilled in Lakhasar block, MECL, with the consent of DGM, Govt. of Rajasthan, propose Lakhasar East Block having an area of 16.73 sq km in the eastern side of the existing Lakhasar block within the Lakhasar sub basin and prepared the proposal preliminary exploration (G-3) for potash in Lakhasar East block with 26 Nos of boreholes in 800 m X 800 m grid pattern and put up in the 39th meeting of TCC, NMET for evaluation.

1.1.12 After detail deliberation, committee recommended to explore 7.16 Sq km area in the eastern side of Lakhasar block with 7700 m drilling in 11 Nos of boreholes placed in two consecutive grid line at 800m interval. The rest of the area may be taken up later as a separate block on basis of the outcome of these exploration campaign.

1.1.13 Thus the proposal of Lakhasar East block was recommended by TCC, NMET to EC with cost estimate of Rs. 1550.68 Lakhs including GST with time line of 18 months.

1.1.14 Accordingly, the proposal was put up to EC, NMET in their 24th Meeting held on 18th May, 2022. But EC deferred the project and asked for status of auction of explored blocks from state government.

1.1.15 In the meantime, DMG, Rajasthan, RSMML, Rajasthan and MECL jointly took an initiative (where MECL acted as the Program Manager) to undertake a comprehensive feasibility study through engagement of an international consultant for soulution mining of potash and feasibility of construction of pilot plant in Bikaner district. The main objective of the study was to assess the various requirement of setting up a Pilot Plant for extraction of Potash and to identify the possible methods to de-risk the potential deposits before a sizable investment is made. This study is the pioneering study in the country as mining of potash has not been attempted in any part of the country.

1.1.16 An apex level delegation led by Honorable Minister, Mine and Geology, Govt. of Rajasthan undertook a visit to select solution mining project and potash harvesting facility /manufacturing plant between 12th Sept 2022 and 17th Sept 2022. Several detailed discussions were taken place on the visit made to the solution mining sites

and the findings of the report including the benchmarking of the Rajasthan deposit, resources, selection of block, methodology of solution mining, way forward and action plan etc. The final report had been submitted along with the way forward for Potash mining in the state of Rajasthan in November, 2022.

1.1.17 Moreover Hon'ble Minister, Mine and Geology, Govt. of Rajasthan has also shown his interest to develop potash mining in the state of Rajasthan and also requested to estimate the mineral wise resource in the deposits vide D.O letter No. P.19(12)/Mine/Group-2/2023 dated 13/01/2023. Ministry of Mines, Government of India has also showed further interest to carry out exploration of potash minerals in the state of Rajasthan.

1.1.18 An apex level meeting chaired by Honorable Secretary, Ministry of Mines and Secretary, Ministry of Fertilizer, Govt. of India undertook a visit to possibility solution mining on 24th February 2023. Secretary (Fertilizers) informed that, in Nagaur-Ganganagar Basin, the Polyhalite is associated with NaCl. Secretary (Fertilizers) opined that minerals such as Potash on which we are 100% import-dependent have strategic importance. Secretary, MoM opined that there is a need for further assessment of the deposit through drilling to upgrade the blocks to the G2 stage. This will facilitate a decision on the feasibility of mining.

1.1.19 In this scenario, MECL requested to consider the proposal of Lakhasar East Block again for NMET funding which was recommended by TCC, NMET in their 39th meeting, the same was put up for the approval of EC in their 28th Meeting held on 16th March, 2023. Member Secretary appraised the house about the justification given by State Government. It was informed that the State Government is considering to auction all the Potash blocks explored in the area as one composite block, hence the project proposal may be considered for funding from NMET.

1.1.20 Thus, EC approved the project with an estimated cost of 15.51 Crore and timeline of 18 months and the same was communicated to MECL vide letter F. No 23/331/2023-NMET/04 dated 3rd April, 2023.

1.1.21 Accordingly, the project was commenced on 9th May, 2023 and completed the drilling associated geophysical and geological activity on 29th March, 2023 after drilling 7564 m in 11 Nos of boreholes. A total 2553 Nos of primary samples have been generated from H1 and H2 Halite cycles and observed the continuity of potash zones.

1.1.22 On the basis of above-mentioned outcome, the remaining 9.50 sq km area of initially proposed Lakhasar East Block has been considered for formulation of G-3 level of

exploration proposal. The block, named as Lakhasar East Extension having 9.50 sq km area shall be explored with 10,500 m drilling 15 nos of boreholes placed at 800 m X 800 m grid interval with associated geological activity and thus, put up for evaluation in the 66th meeting of TCC-I, NMET.

1.1.23 The committee recommended to wait for the outcomes of approved items, if the result is encouraging, then this item will likely be approved smoothly.

1.1.24 In the mean time, in September, 2024 the final Geological Report of Lakhasar East block has been prepared and submitted for review in 1st Meeting of TCC-II. The GR was well accepted and the final copy was submitted to NMET, Delhi on 30th September, 2024.

1.1.24 As the final outcome has been furnished as Geological Report of Lakhasar East Block, the proposal of Lakhasar East Extension block is again submitted for evaluation in the 2nd Meeting of TCC-II, NMET for discussion.

1.2.0 Location and Accessibility

1.2.1 The Potash bearing Lakhasar Sub basin in the Nagaur-Ganganagar basin lies in the Survey of India Toposheet No. 44 H/16 & 44 L/4 covered by N Latitude -28°05'00" to 28°20'00" and E Longitude 73°55'00" to 74°10'00". The proposed block, i.e., Lakhasar East Block falls in the Survey of India Toposheet No. 44H/16, east of Lakhasar Block near to the Lakhasar Village.

1.2.2 1.2.2 The block is well connected by rail by Bikaner-Shri Dungargarh-Ratangarh-Sikar-Jaipur rail line of Western Railways and by road from Bikaner-Shri Dungargarh-Ratangarh-Sikar-Jaipur. The Bikaner-Jaipur section of National Highway (NH-11) passes from Shri Dungargarh and also beyond the southern boundary of the block. Shri Dungargarh is the nearest railway station.

Bikaner is around 62 km from the study area (Plate No-I). Lakhasar East Block with 7.16 sq.km area is located in the Northern part of the Lakhasar sub basin and coordinates of the cardinal points of Lakhasar East Extension block boundary are given in Table-1

Table-1
Co-ordinates of the cardinal points of Block Boundary of the Lakhasar East Extension Block, Lakhasar sub basin, Dist: Bikaner, Rajasthan.

CARDINAL POINTS	ZONE-43(NORTH)		WGS-84		AREA
	UTM (m)		DMS		
	NORTHING	EASTING	LONGITUDE	LATITUDE	
A	3112544.1170	391485.3980	73° 53' 42.030" E	28° 8' 2.539" N	9.50 Sq. Km
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1.3.0 Physiography & Climate

1.3.0 The entire area of Nagaur-Ganganagar basin is covered by thick aeolian sand / alluvial sediments except the southern part where scanty outcrops could be seen. The present study area of Lakhasar East Block, Lakhasar Sub-basin is also entirely covered by thick aeolian sand and /or alluvial sediments. The major part of Lakhasar-Sub Basin presents a monotonous topography of NE- SW trending longitudinal dunes.

1.3.1 The topographic relief of 38.00 m approximately has been observed in the block. The elevation of area varies between 250 in the Northern part of the block area to 288m in southern area of the block. The general slope of the area is towards the north.

1.3.2 There is not a single perennial stream in the area. The drainage in the area is served by the old course of river Ghaggar forming a narrow alluvial belt in which a network of canals has been developed.

1.3.3 About 21% of the total area of the Bikaner district is cultivated, net area sown varying from 15 to 23% depending on the rainfall occurrence. The percentage of fallow lands in the district varies from 7 to 15% again depending on the rainfall characteristics. About 64% of the area constitutes the cultivable waste. Forest and permanent pastures accounts for 0.3 % and 1.00 % respectively of the total area and about 4.2% constitute the barren lands.

1.3.4 Agriculture is the dominant occupation in the economy of the district. Average size of land holding is 5.67 ha and average number of fragments per holding is 2.76, the number of fragments increasing with the size of holding.

1.4.0 Climate & Vegetation

1.4.1 The area experiences extreme climate with temperature varying from 0°C during winter to as high as 50°C during summer months. Dust storms are common during summer months. Rainfall is scanty and averages 10 cm to 30 cm annually and mostly received during July-August. However, where irrigation facilities of canal system are developed, there is good vegetation and agricultural crops are gown round the year.

1.5.0 Previous work

1.5.1 The presence of evaporite minerals like gypsum, anhydrite and halite were known from Nagaur and Bikaner areas since 1930's. Halite in Bikaner is reported by P.K. Ghosh 1952, Gypsum in Nagaur by Roy Chowdhury et al 1965 and anhydrite inter section in boreholes drilled by Central Ground Water Board (CGWB) and Oil & Natural Gas Corporation (ONGC). George I. Smith (1968) of the USGS evaluated the data of GSI and identified that Nagaur basin is one of the area geologically most favourable for occurrence of potash bearing marine evaporite deposit.

1.5.2 R.S. Jain and Premchandra (1973), based on the data from ONGC & CGWB, identified several negative Bouguer Gravity anomalies and related these to the presence of a thick evaporite sequence in the Nagaur basin. A total of 12 gravity low sites, mostly in the southern part of the basin were recommended for drilling.

1.5.3 Based on the above studies, GSI has launched exploration programme for potash in 1974. GSI has carried out potash exploration in an area of 28,500 Sq.Km. out of the total area of 50,000 sq.km. of Nagaur-Ganganagar basin. GSI has drilled a total of 58,733.95m of drilling in 68 closed & 2 abandoned boreholes. All the boreholes were drilled vertical, assuming that the host rock (halite) is disposed horizontally to sub horizontally with 3° - 5° rolling dips towards NW.

1.5.4 Based on the exploration results, eight depo-centres for potash mineralisation containing over 2% K were identified, namely Lakhasar, Bikaner, Gharsisar, Hanseran, Arjunsar, Jaitpur, Bharusari and Satipura. GSI has carried out detailed exploration in three sub basins i.e. Satipura, Bharusari and Lakhasar for computing the resources of Potash minerals and halite

1.5.5 GSI has computed Potash and Halite resources in three sub basins i.e. Satipura (10 boreholes), Bharusari (6 boreholes) and Lakhasar (4 boreholes), based on the intersection of potash mineralization at 3% K cut-off and 1.50 m minimum stoping width by Isochore/Isograde method. GSI estimated a total of 2476.58 mt. (409.19 mt probable and 2072.39 mt possible) potash resources with 4.70 % K and 23.54% Na in Satipura, Bharusari and Lakhasar basins and geological resources of more than 6 trillion tonnes of halite with above 90% NaCl in Nagaur-Ganganagar basin. The resources computed in three basins are given in Table below

Sub-Basin wise Potash Resource with average Grade Estimated by GSI

Sub-Basin	Area (Sq. Kms)	Ore Resource(Million Tonnes)			Grade	
		Probable	Possible	Total	K%	Na %
Satipura	245.61	202.30	1429.95	1632.25	4.80	25.08
Bharusari	71.00	88.16	300.15	388.31	4.68	17.17
Lakhasar	29.50	113.73	342.29	456.02	4.39	23.51
Total	**346.11**	**404.19**	**2072.39**	**2476.58**	**4.70**	**23.54**

1.4.6 MECL started its exploration campaign in the Lakhasar block with commencement of drilling in BH No.MLP-1 (PBH-1) on 26.01.2018 and ended with completion of drilling in BH No MLP-7. MECL carried out a total of 3964.00 m of drilling in seven boreholes against 4775.00 m approved in the Lakhasar block. Besides drilling, topographical surveying and detailed geological mapping of (13.107 Sq.Km.) in the block has been completed on 1:5000 scale with contour intervals of 2m.

1.4.7 It was decided in the 20th meeting of Technical cum Cost Committee (TCC) of NMET that Interim Geological Report of Lakhasar Block considering the data of four boreholes each drilled by GSI and MECL will be submitted in May 2019 and rest of the boreholes/exploration was completed by taking a holistic approach towards potash exploration by identifying the other possible resource potential of the bedded salt deposit of Lakhasar block i.e. sodium, potassium, magnesium, lithium, chlorine, bromine iodine etc. The interim geological report on exploration for potash in Lakhasar block has been submitted on 23rd July, 2019 and final geological report has been submitted in June, 2020. The TCC of NMET in its 22nd meeting held at Bhubaneswar suggested to put up a new proposal for regional (G-3) exploration by

proposing boreholes at 800m X 800m grid in the remaining part of the Lakhasar basin by taking holistic approach.

1.4.8 On the basis of encouraging result of the seven no of boreholes drilled in phase-I, MECL proposed an exploration proposal for potash with 40 proposed boreholes covering 29.90 sq.km area defined by the area of influence of earlier drilled boreholes by GSI in Lakhasar sub basin and the proposal was technically evaluated in 23rd meeting of TCC held on 12th and 13th February 2020. Fifteen boreholes covering an area of 18.30 sq km out of total 40 boreholes initially proposed by MECL were selected on plan by the TCC and recommended for approval to EC, NMET and the proposal with 10,040 m drilling in 15 boreholes was approved in 16th meeting of EC held on 25th February 2020.

1.4.9 Accordingly, after the unprecedented Covid-19 pandemic situation became normalize, MECL commenced the work on 10th December, 2020 with starting of drilling of MLP-8 and completed the drilling work on 28th October 2021 with the closure of borehole no MLP-22. The geological report submitted in July, 2022.

1.4.10 The exploration results reveal the potash minerals i.e. polyhalite & sylvite are associated with the halite horizon/halite cycles. Therefore, the identification of potash minerals based on its color, weight (Sp. Gravity), hardness, feel and luster is extremely difficult. The samples from the suspected potash bearing halite zones have been drawn at 0.50 m interval whereas the rest of the Halite cycle has been sampled by keeping the sample length 1.00 m. The potash zones intersected in the boreholes are identified only on the basis of chemical analysis of the samples and have been delineated at 1%, 2%, 3% and 5% K cut-off after excluding the clots and thin lamellae of the clay minerals. It has been observed that the individual potash zones are very thin. The development of the potash zones is very erratic, discontinuous as well as local.

1.4.11 Potash zones have been classified into 6 major bands, i.e., K1A, K1B, K2A, K2B, K2C and K2D apart from a few Local bands. Each of the bands show merging and spitting nature with rolling dip in the conformity of the respective Halite cycle showing horizontal to sub horizontal with rolling dip of 1° to 5° towards NNW, NW to W.

1.4.12 X-ray diffraction studies of primary and composite samples have revealed the presence of halite, polyhalite, dolomite, anhydrite, magnesite & calcite etc. as major constituents (≥5%), and polyhalite, anhydrite, dolomite, magnesite, calcite & quartz as minor minerals (≤5 to ≥1%). Sylvite, Gypsum, anhydrite, quartz, magnesite, calcite, anorthite, kaolinite, biotite, clinochlore and haematite/ilmenite occur as accessory or trace minerals (≤1 %). The results of above mention study indicates the copresence of less water soluble Polyhalite and water soluble Sylvite in the same samples. As a result with the present study, it can be concluded that the estimated resource of Potash at different cut offs are contributed by intermixing of Polyhalite and Sylvite.

1.4.13 The gross inferred resource of 25.941 m.t. and net inferred resource of 20.752 m.t. with average grade 7.81%K and gross reconnaissance resource of 5.606 m.t. and net reconnaissance resource of 4.485 m.t. with average grade of 7.95 % K has been estimated at 5% K cut off in the block. Whereas the gross inferred resource of 87.587 m.t. and net inferred resource of 70.070 m.t. with average grade 4.74% K and gross reconnaissance resource of 19.193 m.t. and net reconnaissance resource of 15.355 m.t. with average grade of 4.75% K has been estimated at 3% K cut off in the block. Similarly gross inferred resource of 150.093m.t. and net inferred resource of 120.074m.t. with average grade 3.82 %K and gross reconnaissance resource of 32.612 m.t. and net reconnaissance resource as 26.089m.t. with average grade of 3.82% K has been estimated at 2% K cut off. Further the gross inferred resource of 333.300m.t. and net inferred resource of 266.640m.t. with average grade 2.52%K and gross reconnaissance resource of 74.218m.t. and net reconnaissance resource as 59.375m.t. with average grade of 2.54 % K has also been estimated at 1% K cut off.

1.4.14 A total 4504.704 m.t. halite resource with 33.25% Na & 0.63% K has been estimated in **18.30 sq. km.** area of the Lakhasar block and furnished in the Table-1.5.

Table-2
Summary of Halite Resource & Grade of Halite Cycle H1 and H2

Halite Cycle No	Sp. Gravity	Tonnage (Tonnes)	Tonnage (Million Tonnes)	Grade in %		
				Na	K	WI
H2	2.31	**2079294952.00**	**2079.295**	**31.29**	**0.84**	**15.49**
H1	2.31	**2425408688.60**	**2425.409**	**34.09**	**0.44**	**8.08**
Grand Total		**4504703640.60**	**4504.704**	**33.25**	**0.63**	**11.59**

Summary of Potash Resource as per 'Area of Influence Method' at ≥1% K, ≥2% K, ≥3% K and ≥5% K cut-off grade separately.
Lakhasar Block, District- Bikaner, Rajasthan

CUT-OFF CATEGORY	GROSS Inferred Resource of Potash (333) (Million Tonnes)	NET Inferred Resource of Potash (333) (Million Tonnes)	Grade (% K)	GROSS Reconnaissance Resource of Potash (334) (Million Tonnes)	NET Reconnaissance Resource of Potash (334) (Million Tonnes)	Grade (% K)	TOTAL GROSS Inferred + Reconnaissance Resource of Potash (Million Tonnes)	Grade (% K)	TOTAL NET Inferred+ Reconnaissance Resource of Potash (Million Tonnes)	Grade (% K)
At 1% K Cut Off	333.300	266.640	2.52	74.218	59.375	2.54	407.518	2.52	326.015	2.52
At 2% K Cut Off	150.093	120.074	3.82	32.612	26.089	3.82	182.705	3.82	146.163	3.82
At 3% K Cut Off	87.587	70.070	4.74	19.193	15.355	4.75	106.780	4.74	85.425	4.74
At 5% K Cut Off	25.941	20.752	7.81	5.606	4.485	7.95	31.547	7.83	25.237	7.83

1.4.13 On the basis of encouraging results of boreholes drilled in Lakhasar block, MECL, with the consent of DMG, Govt. of Rajasthan, propose Lakhasar East Block having an area of 16.73 sq km in the eastern side of the existing Lakhasar block within the Lakhasar sub basin and prepared the proposal preliminary exploration (G-3) for potash in Lakhasar East block with 26 Nos of boreholes in 800 m X 800 m grid pattern and put up in the 39th meeting of TCC, NMET for evaluation.

1.4.14 After detail deliberation, committee recommended to explore 7.16 Sq km area in the eastern side of Lakhasar block with 7700 m drilling in 11 Nos of boreholes placed in two consecutive grid line at 800m interval. The rest of the area may be taken up later as a separate block on basis of the outcome of these exploration campaign. Thus the proposal of Lakhasar East block was recommended by TCC, NMET to EC with cost estimate of Rs. 1550.68 Lakhs including GST with time line of 18 months.

1.1.15 Accordingly, the proposal was put up to EC, NMET in their 24th Meeting held on 18th May, 2022. But EC deferred the project and asked for status of auction of explored blocks from state government.

1.1.16 In the meantime, DMG, Rajasthan, RSMML, Rajasthan and MECL jointly took an initiative (where MECL acted as the Program Manager) to undertake a comprehensive feasibility study through engagement of an international consultant for solution mining of potash and feasibility of construction of pilot plant in Bikaner district. The main objective of the study was to assess the various requirement of setting up a Pilot Plant for extraction of Potash and to identify the possible methods to de-risk the potential deposits before a sizable investment is made. This study is the pioneering study in the country as mining of potash has not been attempted in any part of the country.

1.1.17 An apex level delegation led by Honourable Minister, Mine and Geology, Govt. of Rajasthan undertook a visit to select solution mining project and potash harvesting facility /manufacturing plant between 12thSept 2022 and 17thSept 2022. Several detailed discussions were taken place on the visit made to the solution mining sites and the findings of the report including the benchmarking of the Rajasthan deposit, resources, selection of block, methodology of solution mining, way forward and action plan etc. The final report had been submitted along with the way forward for Potash mining in the state of Rajasthan in November, 2022.

1.1.18 Moreover Hon'ble Minister, Mine and Geology, Govt. of Rajasthan has also shown his interest to develop potash mining in the state of Rajasthan and also requested to

estimate the mineral wise resource in the deposits vide D.O letter No. P.19(12)/Mine/Group-2/2023 dated 13/01/2023. Ministry of Mines, Government of India has also showed further interest to carry out exploration of potash minerals in the state of Rajasthan.

1.1.19 An apex level meeting chaired by Honorable Secretary, Ministry of Mines and Secretary, Ministry of Fertilizer, Govt. of India undertook a visit to possibility solution mining on 24th February 2023. Secretary (Fertilizers) informed that, in Nagaur-Ganganagar Basin, the Polyhalite is associated with NaCl. Secretary (Fertilizers) opined that minerals such as Potash on which we are 100% import-dependent have strategic importance. Secretary, MoM opined that there is a need for further assessment of the deposit through drilling to upgrade the blocks to the G2 stage. This will facilitate a decision on the feasibility of mining.

1.1.20 In this scenario, MECL requested to consider the proposal of Lakhasar East Block again for NMET funding which was recommended by TCC, NMET in their 39th meeting, the same was put up for the approval of EC in their 28th Meeting held on 16th March, 2023. Member Secretary appraised the house about the justification given by State Government. It was informed that the State Government is considering to auction all the Potash blocks explored in the area as one composite block, hence the project proposal may be considered for funding from NMET.

1.1.21 Thus, EC approved the project with an estimated cost of 15.51 Crore and timeline of 18 months and the same was communicated to MECL vide letter F. No 23/331/2023-NMET/04 dated 3rd April, 2023.

1.1.22 Accordingly, the project was commenced on 9th May, 2023 and concluded the field operation with drilling and associated geophysical and geological activity on 21st March, 2024.

1.1.23 In the ongoing exploration campaign, MECL drilled 7564 m in 11 nos of boreholes at 800 m X 800 m spacing and generated 2553 nos of primary samples from H1 and H2 halite cycles at 0.50 m to 1.00 m interval. The analytical result of 1821 nos of samples from 8 nos of boreholes, i.e., BH No MLEP-01, MLEP-02, MLEP-03, MLEP-04, MLEP-05, MLEP-06, MLEP-07 and MLEP-08 have been received. The borehole data shows consistent halite thickness in both the halite cycles and the floor of the cycle trending NE-SW and dipping in NW direction. Potash zone is also continuing as present in the Lakhasar Block. The details of the potash bearing zones have been furnished below. The Graphic correlation has been furnished in **Plate No III.**

Table No : 3

Details of Potash Zones intersected in the boreholes at 2 % Cut Off

Sr. No	BH No	From (m)	To (m)	Thickness (m)	K%	Zone Name
1	MLEP-01	549.40	550.70	1.30	3.79	K2D2/2
2	MLEP-01	562.00	563.00	1.00	5.09	K2C
3	MLEP-01	572.94	576.17	3.23	2.26	K2B1
4	MLEP-01	592.70	593.70	1.00	2.28	K2A1
5	MLEP-01	610.52	611.52	1.00	2.08	K1B4
6	MLEP-01	660.50	661.64	1.14	3.63	K1A2
7	MLEP-01	668.12	669.35	1.23	3.85	K1A1
8	MLEP-02	532.00	537.52	5.52	2.83	K2D2/2
9	MLEP-02	563.93	566.25	2.32	4.41	K2B2
10	MLEP-02	570.57	573.67	3.10	2.59	K2B1
11	MLEP-02	592.40	593.40	1.00	3.53	K2A1
12	MLEP-02	638.10	639.10	1.00	2.01	K1B1
13	MLEP-03	532.00	537.44	5.44	3.36	K2D2/2
14	MLEP-03	561.50	564.58	3.08	3.73	K2B2
15	MLEP-03	568.00	571.60	3.60	2.82	K2B1
16	MLEP-03	606.15	607.15	1.00	2.40	K1B4
17	MLEP-04	546.95	549.00	2.05	4.28	K2D2/2
18	MLEP-04	562.00	563.00	1.00	5.30	K2C
19	MLEP-04	575.50	578.50	3.00	3.47	K2B2/2
20	MLEP-04	603.00	604.00	1.00	2.48	K2A1
21	MLEP-04	619.70	620.70	1.00	2.70	K1B4
22	MLEP-05	548.00	551.50	3.50	3.23	K2D2/2
23	MLEP-05	562.00	563.29	1.29	2.51	K2C
24	MLEP-05	575.00	577.50	2.50	3.21	K2B2/2
25	MLEP-05	580.03	581.03	1.00	3.46	K2B2/1
26	MLEP-05	644.24	645.26	1.02	2.70	K1B1
27	MLEP-07	548.32	550.50	2.18	2.67	K2D2/2
28	MLEP-07	563.20	565.00	1.80	3.96	K2C
29	MLEP-07	574.50	579.00	4.50	4.35	K2B2/2
30	MLEP-07	598.50	600.50	2.00	2.15	K2A1
31	MLEP-07	614.60	615.60	1.00	3.27	K1B4
32	MLEP-06	532.42	535.54	3.12	2.66	K2D2/2
33	MLEP-06	537.68	539.90	2.22	2.81	K2D2/1
34	MLEP-06	541.58	543.20	1.62	2.74	K2D1
35	MLEP-06	590.00	591.00	1.00	2.05	K2A1
36	MLEP-08	546.87	551.50	4.63	2.67	K2D2/2
37	MLEP-08	577.17	578.87	1.70	5.36	K2B2/2
38	MLEP-08	582.30	584.16	1.86	1.98	K2B2/1

39	MLEP-08	598.62	600.62	2.00	2.14	K2A1
40	MLEP-08	659.38	662.14	2.76	3.29	K1A1
41	MLEP-09	553.50	555.00	1.50	2.41	K2C
42	MLEP-09	577.70	582.38	4.68	5.21	K2B2
43	MLEP-09	587.00	590.24	3.24	3.30	K2B1
44	MLEP-09	591.50	592.50	1.00	2.79	L
45	MLEP-09	597.46	600.71	3.25	3.79	K2A1
46	MLEP-09	616.95	617.95	1.00	3.59	K1B4
47	MLEP-10	553.52	556.15	2.63	5.28	K2D2/2
48	MLEP-10	590.83	594.18	3.35	5.14	K2B2
49	MLEP-10	600.74	604.00	3.26	2.37	K2B1
50	MLEP-10	609.00	610.90	1.90	4.63	K2A1
51	MLEP-10	627.47	628.47	1.00	6.06	K1B4
52	MLEP-10	644.00	646.00	2.00	3.84	K1B3
53	MLEP-11	532.46	534.50	2.04	3.29	K2D2/2
54	MLEP-11	563.17	564.42	1.25	4.06	K2B3
55	MLEP-11	568.23	572.03	3.80	4.85	K2B2

Table No: 4

Details of Potash Zones intersected in the boreholes at 3 % Cut Off

S.No	BH No	From (m)	To (m)	Thickness (m)	K%	Zone data
1	MLEP-01	562.00	563.00	1.00	5.08	K2C
2	MLEP-01	572.94	574.00	1.06	3.33	K2B1
3	MLEP-01	668.12	669.35	1.23	3.84	K1A1
4	MLEP-02	533.22	537.52	4.30	3.10	K2D2/2
5	MLEP-02	563.93	566.25	2.32	4.41	K2B2
6	MLEP-02	592.40	593.40	1.00	3.53	K2A1
7	MLEP-03	532.00	535.75	3.75	4.22	K2D2/2
8	MLEP-03	561.50	564.58	3.08	3.72	K2B2
9	MLEP-03	569.00	570.00	1.00	3.74	K2B1/1
10	MLEP-04	546.95	549.00	2.05	4.28	K2D2/2
11	MLEP-04	562.00	563.00	1.00	5.29	K2C
12	MLEP-04	575.50	578.50	3.00	3.47	K2B2/2
13	MLEP-05	548.00	551.50	3.50	3.23	K2D2/2
14	MLEP-05	575.00	577.50	2.50	3.21	K2B2/2
15	MLEP-05	580.03	581.03	1.00	3.46	K2B2/1
16	MLEP-06	532.42	533.42	1.00	3.39	K2D2/2
17	MLEP-06	537.68	538.79	1.11	4.36	K2D2/1
18	MLEP-07	563.20	565.00	1.80	3.95	K2C
19	MLEP-07	574.50	578.48	3.98	4.53	K2B2/2
20	MLEP-07	614.60	615.60	1.00	3.27	K1B4
21	MLEP-08	548.18	551.50	3.32	3.24	K2D2/2
22	MLEP-08	577.84	578.87	1.03	7.89	K2B2/2
23	MLEP-08	661.00	662.14	1.14	4.06	K1A1/1

24	MLEP-09	577.70	582.38	4.68	5.22	K2B2
25	MLEP-09	587.50	590.24	2.74	3.35	K2B1
26	MLEP-09	599.71	600.71	1.00	6.68	K2A1/1
27	MLEP-09	616.95	617.95	1.00	3.59	K1B4
28	MLEP-10	553.32	556.15	2.83	5.28	K2D2/2
29	MLEP-10	590.83	593.78	2.95	5.53	K2B2
30	MLEP-10	602.50	603.50	1.00	3.25	K2B1/1
31	MLEP-10	609.45	610.90	1.45	5.20	K2A1
32	MLEP-10	627.47	628.47	1.00	6.06	K1B4
33	MLEP-10	644.00	646.00	2.00	3.84	K1B3
34	MLEP-11	532.46	534.50	2.04	3.29	K2D2/2
35	MLEP-11	568.23	572.03	3.80	4.85	K2B2

Table No: 5

Details of Potash Zones intersected in the boreholes at 3 % Cut Off

S.No	BH No	From (m)	To (m)	Thickness (m)	K%	Zone Name
1	MLEP-02	564.78	566.25	1.47	5.88	K2B2
2	MLEP-04	562.00	563.00	1.00	5.29	K2C
3	MLEP-04	576.90	578.50	1.60	5.34	K2B2/2
4	MLEP-07	577.28	578.48	1.2	10.84	K2B2/2
5	MLEP-08	577.84	578.87	1.03	7.89	K2B2/2
6	MLEP-09	577.7	579.27	1.57	5.97	K2B2/2
7	MLEP-09	599.71	600.71	1.00	6.69	K2A1/1
8	MLEP-10	553.52	556.15	2.63	5.28	K2D2/2
9	MLEP-10	590.83	593.78	2.95	5.53	K2B2
10	MLEP-10	609.90	610.90	1.00	6.13	K2A1
11	MLEP-10	627.47	628.47	1.00	6.06	K1B4
12	MLEP-10	645.00	646.00	1.00	5.73	K1B3
13	MLEP-11	568.23	569.86	1.63	6.40	K2B2

1.4.24 The present exploration in Lakhasar East block has confirmed the presence and persistence of two halite cycles (H1, H2) out of seven halite cycles identified by GSI in Hanseran Evaporite Group (HEG) in Nagaur Ganganagar basin. These halite cycles are separated from one another by clays and/or anhydrite or dolomite. The first halite cycle (H1) has the thickness ranges from 60.20 m (MLEP-3) to 67.66 m (MLEP-4) whereas the thickness of H2 cycle ranges from 47.46 m (MLEP-01) to 64.11m (MLEP-09).

1.4.25 The potash mineralization in the Lakhasar East Block is restricted to the two different halite cycles i.e. H1,H2 in the Hanseran Evaporite Group (HEG). In accordance to the XRD study carried out on the primary samples, it has been

observed that the Major potash bearing mineral is Polyhalite along with Sylvite as traces in few samples.

1.4.26 The gross inferred resource of 24.76 m.t and net inferred resource of 19.80 m.t with average grade 6.16%K (7.40% K2O) and gross reconnaissance resource of 3.06 m.t and net reconnaissance resource of 2.45 m.t with average grade of 5.79 % K (6.95% K2O) has been estimated at 5% K cut off in the block. Whereas the gross inferred resource of 93.41 m.t. and net inferred resource of 74.73 m.t. with average grade 4.18%K (5.02% K2O) and gross reconnaissance resource of 10.01 m.t and net reconnaissance resource of 8.01 m.t with average grade of 4.13% K (4.96% K2O) has been estimated at 3% K cut off in the block. Similarly gross inferred resource of 156.14 m.t. and net inferred resource of 124.92 m.t with average grade 3.45 %K (4.14% K2O) and gross reconnaissance resource of 14.96 m.t. and net reconnaissance resource as 11.97 m.t with average grade of 3.58% K (4.30% K2O) has been estimated at 2% K cut off.

1.4.27 In accordance to the XRD study carried out on the primary samples, it has been observed that the Major potash contributing mineral is Polyhalite along with Sylvite as traces in few samples. Hence the estimated resource in Lakhasar East Block may be considered as resource of Polyhalite mineral.

1.4.28 Summary of category wise resource as per 'Area of Influence Method' at ≥2% K and ≥3% K cut-off grade separately is given in Table 6 below:

Table No 6
Summary of Potash Resource as per 'Area of Influence Method' at ≥2% K, ≥3%Kand ≥5% K cut-off grade separately.
Lakhasar East Block, District- Bikaner, Rajasthan

CUT-OFF CATEGORY	GROSS Inferred Resource of Potash (333) (Million Tonnes)	NET Inferred Resource of Potash (333) (Million Tonnes)	Grade % K (%K2O)	GROSS Reconnaissance Resource of Potash (334) (Million Tonnes)	NET Reconnaissance Resource of Potash (334) (Million Tonnes)	Grade (% K) (%K2O)	TOTAL GROSS Inferred + Reconnaissance Resource of Potash (Million Tonnes)	TOTAL NET Inferred+ Reconnaissance Resource of Potash (Million Tonnes)	Grade (% K) (%K2O)
At 2% K Cut Off	156.14	124.92	3.45% (4.14%)	14.96	11.97	3.58% (4.30%)	171.1	136.89	3.46% (4.16%)
At 3% K Cut Off	93.41	74.73	4.18% (5.02%)	10.01	8.01	4.13% (4.96%)	103.42	82.74	4.18% (5.02%)
At 5% K Cut Off	24.76	19.80	6.16% (7.40%)	3.06	2.45	5.79% (6.95%)	27.82	22.25	6.12% (7.35%)

Note: 20% Deduction was considered due to unknown geological reasons from gross resources to arrive at net resource.

1.4.29 A total 1760.84 m.t. halite resource with 30.31% Na & 0.75% Khas been estimated in **7.16 sq. km.** area of the Lakhasar East block.

Table-7
Summary of Halite Resource & Grade of Halite Cycle H1 and H2

Halite Cycle	Specific Gravity	Tonnage (In Metric Tonnes)	Tonnage (In Million Tonnes)	Na %	K %
H2	2.18	836330644	836.33	28.6	1.18
H1	2.18	924511868.4	924.51	31.86	0.38
Grand Total		1760842512	1760.84	30.31	0.75

2.0.0 Regional Geology

2.1.0 The Nagaur-Ganganagar Evaporite Basin is an intracratonic basin in which marine sediments of Marwar Supergroup were deposited on the basement rocks of the Malani Igneous Suite and/or Delhi metamorphites. This basin is considered the southernmost continuation of this large Eocambrian basin of which Salt Range of Pakistan forms the northern part (Jones, 1970). The Halogenic deposits in Iran, Oman and Pakistan are considered to form a single basin (Zharkov, 1984) situated on the south-western Asiatic continent at the time of its formation, but moved to its present geographic location due to plate tectonic movements. This large evaporate basin extends approximately 700 km from north to south and 350 km from east to west, notwithstanding a void area corresponding with the Delhi-Lahore uplift. The northern part of this evaporite basin, close to the northern edge of the Indian plate, has been thrusted southwards (Salt Range and Potwar Plateau). The thrust is still active (Baker, 1987; Jaillard 1992), and has brought the Eocambrian salt to surface (Jaillard, op. cit.). Several salt mines, including those of Khewra and Warcha, are located in the Salt Range of Pakistan. Nagaur Ganganagar basin, covering over 1,00,000 sq km and in parts of Ganganagar, Hanumangarh, Churu, Bikaner, Nagaur, Jodhpur, Jaisalmer and Pali districts of Rajasthan, Sirsa district of Haryana and Faridkot and Bhatinda districts of Punjab. It is bounded by Delhi-Lahore subsurface ridge to the north and northeast, Aravalli range in the east, Jodhpur-Pokaran-Chhotan (Malani) ridge in the south and Devikot- Nachana (subsurface) high in the southwest, Birmania basin about 120 km to the southwest, probably forms the extension of the main evaporate basin in the southwest. The halite-bearing evaporate sequence within the basin appears to extend up to Sardarshahr- Bidasar Fault in the east, up to Balesar in the south and up to Devikot- Nachana subsurface high in the southwest, inferred from Oil

India boreholes located at Baghewala and Tabriwala. The salt deposits in the south and southeast in Nagaur area show gradual litho-facies variation to a thick sulphate predominating facies where thick gypsum/anhydrite beds are developed within the sequence. The absence of un-metamorphosed sediments older than those of the Marwar Supergroup in its contact with Precambrian rocks suggests that the basin floor comprises metamorphites belonging to the Delhi Supergroup and gneisses, granites and rhyolites of the Malani Igneous Suite (Dasgupta et at, 1988). In the southern part of the basin, rocks of the Marwar Supergroup and their time equivalents, the Randha and the Birmartia Formations, overlie the Malani Igneous Suite (at Jodhpur, Balesar, Kul and Pokaran) and the Delhi Supergroup of rock (at Khatu, Bidasar, Ratangarh, etc.). The above conclusion is also supported by the strong and steep deepening of the Precambrian basement along the Pakistan border (Tectonic Map of India; Ray, 1977). This is believed to be the western edge of the Indian plate, the north-western movement of which induces the Quetta festoon. The eastern margin of the basin (in Indian part) is tectonically disturbed in most of the places. The Sardarshahr-Bidasar Fault located on the eastern margin is a well-marked dividing plane between the Marwar Supergroup and the Delhi Supergroup. This fault strikes almost NNE-SSW with steep westerly dip and an estimated down-throw of over 740 m for the western block. The fault passes through Khatu, Ladnun, Rajaldesar and Sardarshahar. This fault was either contemporaneous to the deposition of sediments of the Marwar Supergroup or pre-dated it. The fault became intermittently active and is envisaged to have been active till recent time (Ahmad and Ahmad, 1980). Geophysical data suggest that the fault extends towards north through Haryana into Punjab (Babu Lal, et al., 1984) and further north-westwards into Pakistan.

2.1.1 Regional Straticgraphic Setup: The entire area of the Nagaur-Ganganagar basin is covered by thick aeolian sand or alluvium sediments except in the southern part where scanty out crops are observed. The Nagaur-Ganganagar basin is an intra-cratonic basin in which marine sediments of the Marwar Supergroup were deposited on the basement rocks of the Malani Igneous suite and/or Delhi metamorphites. A generalized stratigraphic sequence built up is as follows:

Table No-8

Litho-Stratigraphic Succession of Nagaur-Ganganagar Basin
(After Kumar et. al, 1993 GSI)

Age	Supergroup	Group	Thickness (m)
Recent to Sub recent (Quaternary)	-----	-----	0 – 373
---------- Unconformity ----------			
Lower Eocene (Tertiary)	-----		38 – 120
---------- Unconformity ----------			
Upper Proterozoic to Lower Cambrian	Marwar	Nagaur, Bilara/HEG, Jodhpur	50 - 290 100 - 300 240 - 423
---------- Unconformity ----------			
Precambrian	MalaniIgneous Suite/ Delhi Supergroup	----- Ajabgarh	Basement rocks

2.1.2 The Hanseran Evaporite Group (HEG) appears to be homotaxially time equivalent and Facies Variant of the Bilara Group and comprises cyclic deposits of halite (most dominant constituents) alternating with anhydrite, clay, dolomite & magnesite.

2.2.0 Description of Lithounits

2.2.1 Basement Rocks (Malani Igneous suite rocks/Delhi Metamorphites)

The basement rocks of Delhi Supergroup (Ajabgarh Group) are exposed towards East, North and North-Eastern margin and the rocks of Malani Igneous Suites are exposed towards south & south-west margin of Nagaur-Ganganagar basin. Metasediments of the Delhi Supergroup are represented by massive quartzite, quartz-sericite schist, phyllite, slate and amphibolite intruded by post-Delhi quartz veins. Rocks of the Malani Igneous Suite represented by rhyolite, tuffs and rhyolite porphyry intruded by Jalore and Siwana granites.

2.2.2 Marwar Super Group

The Marwar Supergroup is best developed in the Nagaur- Ganganagar basin which extends from near Jodhpur in the south to Pokaran in the southwest while in the northeast it follows the Aravlli trend in to Haryana and Punjab. In the north it extends up to salt range in Pakistan. It comprises essentially an unfossiliferous marine sedimentary sequence that has been divided into following three groups.

(i) Nagaur Group.

(ii) The Bilara Group and the Hanseran Evaporite Group (HEG) which are homotaxially time equivalent and facies variant.

(iii) Jodhpur Group.

I) **Jodhpur Group:** The rocks of Jodhpur Group unconformably overlie the basement rocks (Malani Igneous Suite and Delhi Metamorphites) and have gradational contact with the overlying Bilara Group or Hanseran Evaporite Group. The Jodhpur Group mainly comprises reddish to buff and grey coloured, medium to coarse grained, often calcareous, glauconitic & micaceous sandstone, with occasional interbands of shale & siltstones.

II) **Bilara Group:** The Jodhpur Group of rocks is unconformably overlain by Bilara Group, which comprises three calcareous dominant rock formations i) Pondlo Dolomite, ii) Gotan Limestone and iii) Dhanapa Dolomite. Outcrops of the Bilara Group are scanty. The Bilara limestone emits fetid odour when freshly chipped. It also yields small quantity of oil and inflammable gas on distillation (Heron, 1932).

III) **Hanseran Evaporite Group (HEG):** The Hanseran Evaporite Group (HEG) is sandwiched between the underlying Jodhpur Group and the overlying Nagaur Group of rocks. HEG comprises cyclic deposits of halite (NaCl) with anhydrite, clay, dolomite and magnesite. Halite is the most dominant constituent of the Group with minor polyhalite ($[K_2MgCa_2(SO_4)4.2H_2O]$, occasional sylvite (KCl), rare langbeinite $[K_2\ SO_4,\ 2MgSO_4]$ and traces of carnallite (KCI, $MgCl_2.2H_2O$). Thickness of HEG ranges from 103.20m to 652.15m. So far seven halite cycles; numbered as H1, H2-to- H7 from bottom to top, have been identified. These halite cycles are separated from one another by clays and/or anhydrite and/or dolomite. It has been divided into eight formations and 17 units on the basis of lithological characters and order of superposition as shown in Table below.

STRATIGRAPHIC SEQUENCE OF THE HANSERAN EVAPORITE GROUP (H.E.G)
(After GSI)

Age	Super Group	Group	Formation	Unit	Rock Types
	----------Unconformity----------				
		Nagaur	-	-	-
		----------Gradational Contact----------			
Upper Proterozoic to Lower Cambrian	Marwar Super Group	HANSERAN	Lakhusar	E 16	Clay, Claystone, Anhydrite.
			Sataiyan	E 15	Halite (H_7) ± Polyhalite
				E 14	Clay, anhydrite, dolomite
			Harsinghpura	E 13	Halite (H_6) ± Polyhalite
				E 12	Clay, anhydrite, dolomite
			Kupli	E 11	Halite (H_5) ± Polyhalite
				E 10	Dolomite, Dolomitic Anhydrite + clay
			Malkisar	E 9	Halite (H_4) ± Polyhalite
				E 8	Dolomite + Anhydrite + clay
			Chattargarh	E 7	Halite (H_3) + Polyhalite
				E 6	Dolomite + Anhydrite + clay
			Kalu	E 5	Halite+Polyhalite(H_2)±sylvite+ Langbeinite
				E 4	Anhydrite + Dolomite+ clay
			Lakhasar	E 3	Halite (H1) + Polyhalite+ sylvite
				E 2	Anhydrite + dolomite

				E 1	Clay with Anhydrite
				E 0	Clay+marl+calcilutite gyp+LS
		----------Gradational Contact----------			
		Jodhpur	-	-	-

IV) **Nagaur Group**: The Nagaur Group is the youngest member of the Marwar Supergroup and has a gradational contact with the underlying HEG. in the northern parts of the basin. In the southern part of the basin the Group overlies the Bilara Group with gradational contact at most of the places. The Nagaur sandstone, comprising a sequence of brick red to red claystone, siltstone and sandstone often with blotches and bands of green clay varies in thickness from 50m to 290m.

Tertiary Sediments

The Nagaur Group rocks are overlain by the Tertiary sediments in parts of Southern & Western sector of Nagaur-Ganganagar basin. The contact is unconformable with the Nagaur Group of rocks. Tertiary sedimentation appears to have taken place along the sea arms extending from SW (Jaisalmer basin) through Pokaran to north of Ganganagar and limiting its eastern extent by the subsurface Dulmera High passing through Kanchian-Suratgarh-Harsinghpura-Lunkaransar-Dulmera and Lakhusar. The Sub surface stratigraphy inferred by Ghosh and Srivastava (1971) is given below:

Stratigraphic sequence of Tertiary in Nagaur-Ganganagar basin

Recent & Sub recent			**Thickness (m)**
---------- Unconformity ----------			
Teriatry	Jogira Fullers Earth (Eocene)	Shale, marl, fuller's earth, limestone, Forminiferal limestone & siltstones.	116-121m
	Marl Sandstone (Paleocene)	Ferruginous sandstone and glass sand with clay and siltstone; lignite with alternating sandstone and claystone beds.	200-210m
	Palana Shales (Palaeocene)	Variegated shales and clays, associated with carbonaceous c base-not shale; shaly lignite, silt & sandstone.	157m
---------- Unconformity ----------			
Nagaur Group			

Quaternary Sediments

Quaternary Sediments comprising aeolian sand (forming dunes) alluvial sand, clay, kankar, grit, gravel, calcareous sandstone, caliche, gypsite and reworked limestone fragments lie unconformably either over the Nagaur Group of rocks or over the Tertiary sediments varying in thickness from 0.00 to 373.00m in Nagaur-Ganganagar basin.

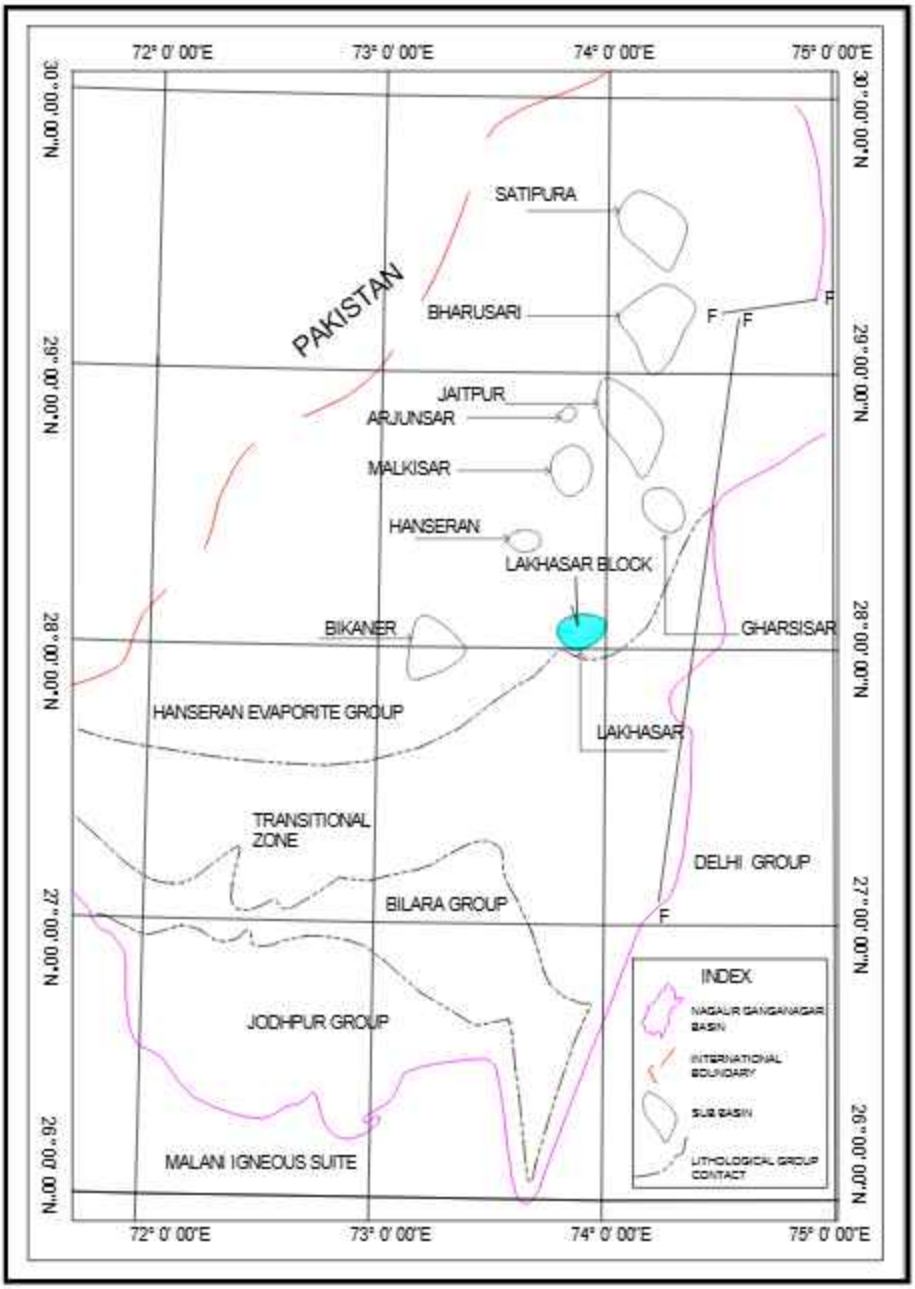
3.0.0 Structure

3.1.1 The Nagaur-Ganganagar basin, covering an area of 50,000 sq km is bounded by the Aravalli Range in the east, Lahore-Delhi sub-surface ridge in the north and north-east, Devikot-Nachana sub-surface high in the west and Jodhpur-Pokharan-Chotan-Malani ridge in the south. The basin appears to extend up to Sardarsahar- Bidasar fault in the east; The Sardarsahar fault trend N-S with steep dip towards west and downthrown also towards West and marks the Eastern limit of HEG. The basin appears to merge with the Indus basin in the Northwest. Jones (1970) considers the Nagaur-Ganganagar basin as south-eastern extension of the saline series of salt range of Pakistan (the exposed portion of Nagaur-Ganganagar basin in Pakistan constitutes the Salt Range.)

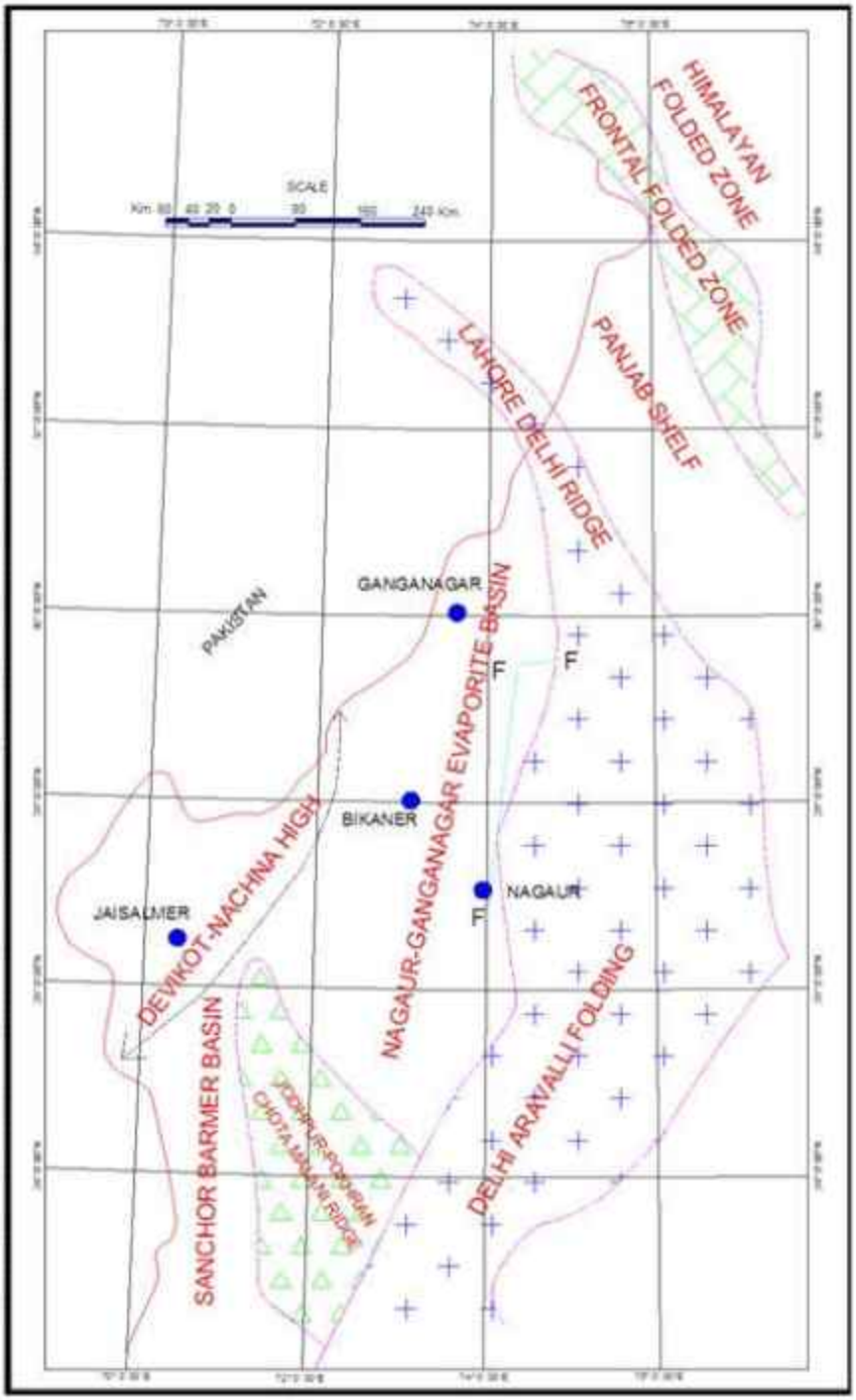
3.1.2 A number of vertical to sub-vertical faults (FIII to FVII) trending N-S, NE-SW and E-W with downthrow towards W, NW and S respectively has been inferred on the basis of drill data. Evaporite horizons in western part occur at relatively greater depths than in the east as a result of these step faults providing favourable condition for evaporite deposition resulting in increase in thickness of H.E.G. as well as halite together with number of halite cycles in the western and north-western parts of the basin. One E-W trending transverse faults (FVIII) between Lakhasar and Kalu with a down throw of 217m towards south has been inferred.

3.1.3 Structures observed in drill cores include bedding, lamination, flow structures, nodular anhydrite, stylolite sutures, breccia and algal structures. Bedding is horizontal to sub horizontal with 3° to 5° rolling dips towards NW. Flow structures have an oblique relationship with the bedding/lamination due to salt flowage. Locally the halite beds show steep dip due to salt flowage. Presence of nodular anhydrite could indicate their formation in marginal sea environment under arid climate. Stylolite sutures are observed in anhydrite cores indicating solution activity under high pressure. Algal structures in the form of non-phosphatic stromatolites of Collonella Group have been recorded in the cores of dolomite and dolomitic anhydrite in various boreholes.

ISOGRADE MAP SHOWING VARIOUS SUB BASINS WITHIN NAGAUR-GANGANAGAR BASIN (AFTER GSI) DISTRICT – CHURU, BIKANER & SHRI GANGANAGAR, RAJASTHAN



TECTONIC SETUP & GEOLOGICAL MAP OF NAGAUR-GANGANAGAR EVAPORATE BASIN (After GSI)



4.0.0 Mineralisation

4.1.0 The Hanseran Evaporite Group (HEG) comprises cyclic deposits of halite (most dominant constituent) alternating with anhydrite, clay-dolomite and magnesite. The most dominant constituent of Group is halite (NaCl) with minor polyhalite [K_2 Mg Ca_2 $(SO_4)_4$ $2H_2O$], sylvinite (KCl, NaCl), sylvite (KCl), langbeinite (K_2 SO_4 2 Mg SO_4) and carnallite (KCl, Mg Cl_2 $6H_2O$), in order of their abundance. A maximum of seven halite cycles, numbered as H1, H2-- H7 from bottom to top have been identified. The halite cycles are separated from one another by intervening zones comprising anhydrite, clay, dolomite and occasionally glauconite.

5.0.0 Proposed Exploration by MECL

5.1.0 Strategy

5.1.1 An unexplored area of 9.50 sq.km on the eastern part of Lakhasar East block within the 229.733 sq. km area of Lakhasar sub-basin have been proposed as Lakhasar East Extension block for Preliminary Exploration (G-3) and the proposal has been prepared on the basis of the exploration work completed so far in the adjacent Lakhasar Block by MECL in the same sub basin. The basic idea behind it is to establish the continuity of Potash bands occurring in the adjacent Lakhasar and Lakhasar East block and its potentiality so that a new block for Potash can be established for auctioned and developed in to a working mine.
A total of 15 no. of boreholes with a total of 10500 m of drilling at 800m X 800m grid in the area i.e.9.50 sq. km has been proposed.

5.2.0 Objectives

The Preliminary Exploration (G-3) is proposed with the following Objectives:

iv) To confirm the continuity and potentiality of potash bearing zones in the proposed area.

v) To generate data for assessment of mineralogy of the potash zones and the K contents.

vi) To estimate resources of Potash zones as per UNFC system in 333 Category.

5.3.0 Methodology of Exploration

5.3.1 Survey: Co-ordinates of the cardinal points and all the boreholes will only be determined by DGPS survey. Hence a total of 15 nos of boreholes and 4 Boundary points to be surveyed by DGPS.

5.3.2 Geological Mapping: Geological mapping on 1: 5,000 scale will be carried out in the entire block by taking geological traverses and all the geological/structural features will be recorded if any. This map will be the Base map for future work.

5.3.3 Drilling: A total of 15 no. of boreholes are proposed in the unexplored area of the Lakhasar sub basin in 800m X 800m grid which is suggested exploration scheme as per the MEMC 2015 (Amended upto 2021). A total of 10500 m of drilling in 15 Nos of vertical boreholes have been proposed in the block. The location of proposed boreholes is given as Plate No- II with proposed depth.

The location of these boreholes may change slightly subject to approachability owing to terrain conditions. All the formations i.e. Quaternary / Tertiary sediments, Nagaur Group, Hanseran Evaporite Group and Jodhpur Group will be drilled by coring.

5.3.4 Geophysical Studies.

As per the existing exploration practice Dual Density, Neutron, Resistivity, Spectral Gamma and Caliper logging to be carried out in all the boreholes. Based on the geophysical interpretation, sampling of potash bearing zones shall be taken up.

5.3.5 Drill core Logging and Sampling

Detailed core logging will be carried out for all the boreholes and various details i.e., litho units/formations, intercalations and parting, core recovery, colour; structures and textures etc will be recorded. In the Hanseran Evaporite Group, special attention is required to identify Polyhalite and other Potash bearing minerals.

5.3.6 Sampling:

The primary samples will be drawn at the length of 0.50 m in the potash bearing zones depending upon the variation in the potash characteristics as well as 1.00m length interval in the non potash bearing Halite zones for both the Halite Cycles.

This will generate about 3000 no of Primary samples for 11 radicals, K, Na, Water insolubles, Mg, Cl, Br, I, Li & CaSO4, F & B. Thus 300 no (10% of primary samples) external check samples will also be generated.

5.3.7 Laboratory Studies

Chemical Analysis:

a) All the Primary, External Check samples [3300 no; = 3000 Primary & 300 External Check (10%) of Primary samples will be analyzed for 11 radicals i.e. K, Na, Mg, Cl, Br, I, Li, F, B, $CaSO_4$ & Water insolubles.

X.R.D. Studies: X-ray Diffraction studies will be carried out on the primary samples of potash zones which will be about 300 nos to identify the different mineral phases occurring in the mineralized zones.

Specific gravity determination: Specific Gravity will be determined on 15 nos. drill core specimen of halite.

5.3.8 Exploration Report: Data generated from proposed exploration along with integration of earlier data of GSI & MECL will be utilized in Report preparation.

5.3.9 Quantum of work:

The quantum of work proposed in the present exploration scheme is given in Table below:

Quantum of work proposed for Potash Exploration in Lakhasar East Extension Block, Lakhasar Sub Basin, District- Bikaner, Rajasthan.

Sl. No.	Item of work	Unit	Quantum
1.	Geological Mapping on 1:5,000 scale	Sq. Km.	9.50
2	DGPS survey of 15 Nos of BHs, 4 boundary points	Nos	19
3.	Drilling: i) 15 boreholes	m.	10500 m (15 BHs)
4.	Geophysical Studies		
	i) Borehole Geophysical Logging Dual Density, Resistivity, Spectral Gamma, Neutron & Caliper	m.	10500 m (15BHs)
5.	**Laboratory Studies**		
	A. Primary + Check Samples		
	i. **Primary samples** for 11 radicals i.e. K, Na, Mg, Cl, Br, I, Li, F, B, $CaSO_4$ & Water insolubles	Nos.	3000
	ii. **External check samples** (10% of Primary samples) for 11 radicals i.e. K, Na, Mg, Cl, Br, I, Li, F, B, $CaSO_4$ & Water insolubles from External NABL Lab.	Nos.	300
	iii. X-Ray Diffraction Studies	Nos.	300
6.	Specific Gravity Determination	Nos.	15
7.	Report Preparation (Digital Format)	Nos.	1

6.0.0 Manpower Deployment

6.0.1 Manpower deployment List may be provided later.

7.0.0 Time Schedule and Cost Estimates:

7.1.0 Time Schedule: The proposed exploration programme like drilling, Geology, Laboratory work including Camp setting & winding and Laboratory studies will be completed in 10 months time. Report writing will take additional 3 months including

1 months overlap with laboratory studies. Thus, the total time proposed for completion of work is **12 months**. The bar chart showing Action Plan/time schedule is given in Annexure-I.

7.2.0 **Cost Estimate**: Cost has been estimated based on rates of SOC of NMET dated 01.04.2020. The total estimated cost is **Rs 1809.08 Lakhs**. The details of cost estimates are given in Annexure-II and summary is given below.

Summary of Cost Estimates

Sl. No.	Item	Estimated Cost INR ( )
1	Exploratory Drilling	111,451,600
2	Geology & Survey	6,498,780
3	Geophysical Logging	4,689,000
4	Laboratory Studies	28,142,175
	Sub total	**150,781,555**
6	Report	2,000,000
7	Peer Review	30,000
8	Proposal Prepration	500,000
	Total	**153,311,555**
9	GST (18%)	27,596,080
Total cost including 18% GST		**180,907,635**
SAY, in Lakhs		**1,809.08**

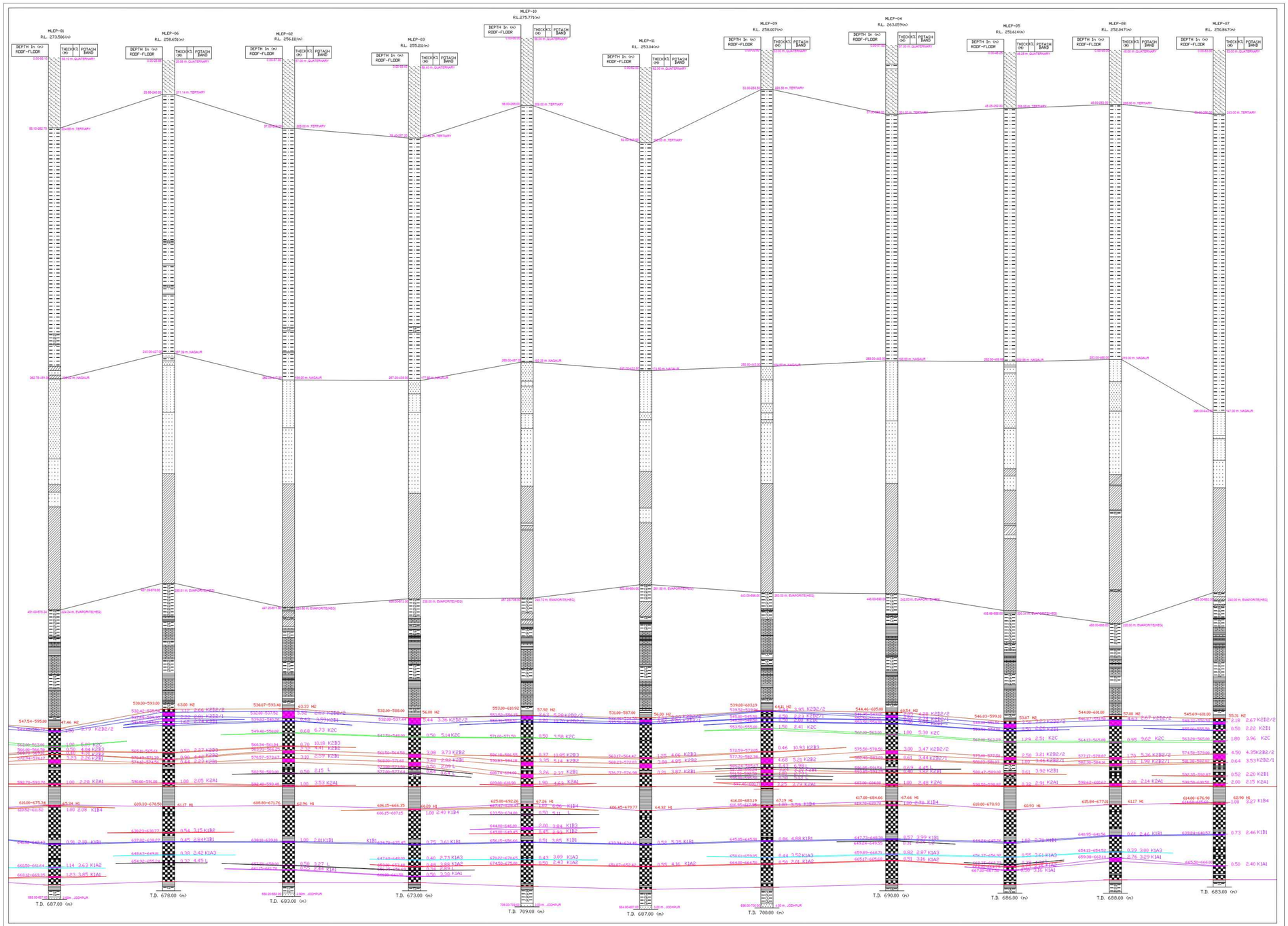
8.0.0 **Justification**:

8.1.1 On enactment of amended MMDR rule, the critical minerals are being auctioned by Central Government. The previously explored Jaitpur, Lakhasar and Bharusari block for potash are in the auction platform.

8.1.2 The exploration in Lakhasar block reveals Potash zones have been classified into 6 major bands, i.e., K1A, K1B, K2A, K2B, K2C and K2D apart from a few Local bands. Each of the bands show merging and spitting nature with rolling dip in the conformity of the respective Halite cycle showing horizontal to sub horizontal with rolling dip of 1° to 5° towards NNW, NW to W. The bands are continuing in the adjacent Lakahasar East blocks.

8.1.3 The gross inferred resource of 24.76 m.t and net inferred resource of 19.80 m.t with average grade 6.16%K (7.40% K2O) and gross reconnaissance resource of 3.06 m.t and net reconnaissance resource of 2.45 m.t with average grade of 5.79 % K (6.95% K2O) has been estimated at 5% K cut off in the block. Whereas the gross inferred resource of 93.41 m.t. and net inferred resource of 74.73 m.t. with average grade 4.18%K (5.02% K2O) and gross reconnaissance resource of 10.01 m.t and net reconnaissance resource of 8.01 m.t with average grade of 4.13% K (4.96% K2O) has been estimated at 3% K cut off in the block.

8.1.3 In view of the above, it is imperative that the halite cycles and the potash zones established in the Lakhasar East block may show continuity and consistency throughout the Lakhasar sub-basin. Hence the Lakhasar East Extension Block in the eastern side of the Lakhasar East block within Lakhasar sub basin need to be explored on 800m X 800m grid so that potentiality of the block can be established and can be auctioned and developed in to potash mines to meet the rising demand of the fertilizer mineral.



INDEX

- AEOLIAN SAND
- SANDY CLAY
- SAND/SANDSTONE,MGD-CGD
- SAND/SANDSTONE,MGD
- CLAY
- SAND/SANDSTONE,FGD
- SILT
- SAND/SANDSTONE,FGD-MGD
- SAND/SANDSTONE,CGD
- DOLOMITE
- ANHYDRITE/GYPSUM
- HALITE

Depth,Thickness of Halite cycle and name of Halite cycle

Depth/Thickness/KC (82% cut off),Zone name

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

GRAPHIC LITHOLOGS FOR BH NO (MLEP-01 TO MLEP-11)
WITH POTASH ZONES AT 2% K CUT-OFF

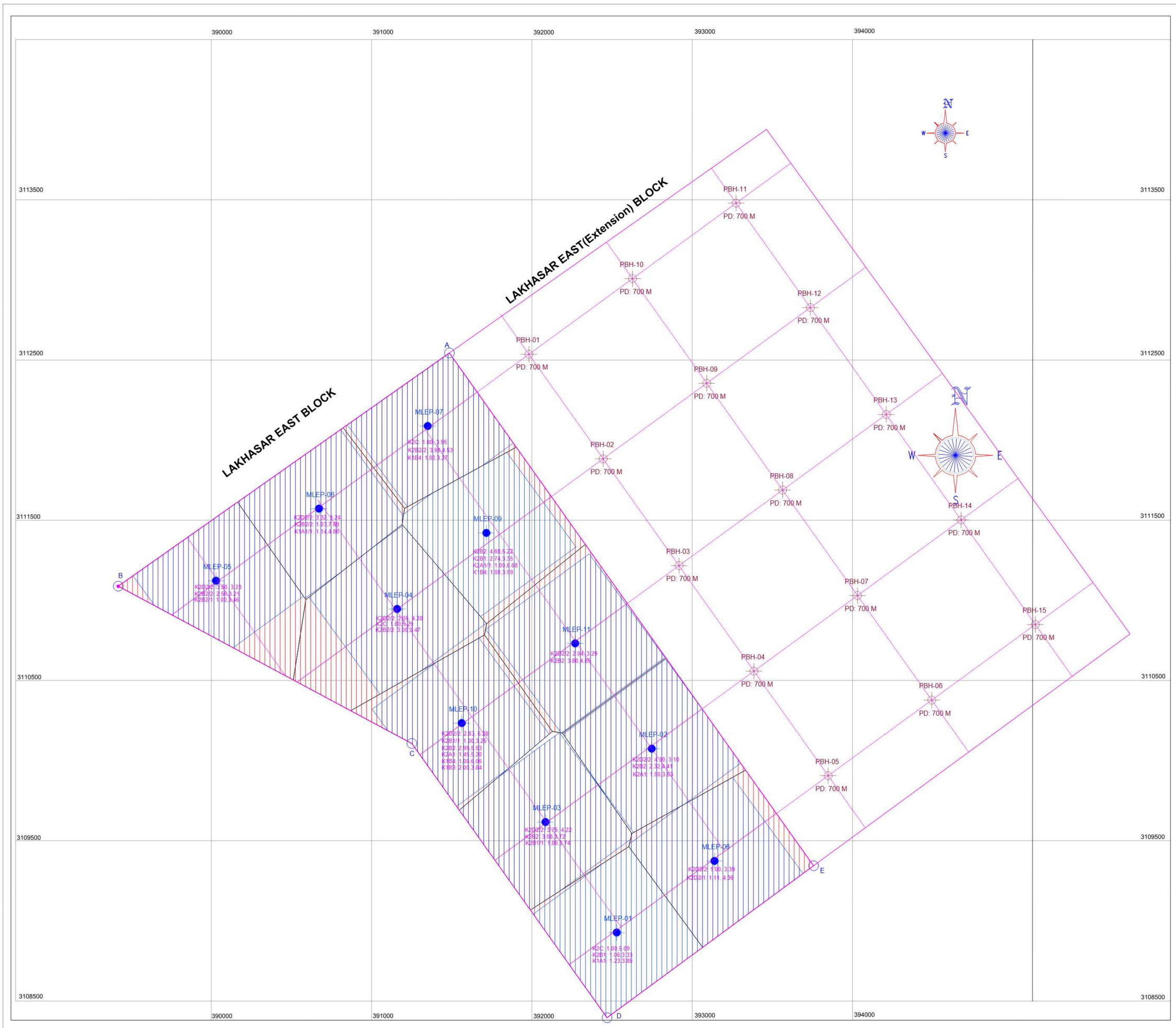
LAKHASAR EAST BLOCK

DIST.: BIKANER STATE:RAJASTHAN

R.F. 1:1000

PROCESSED BY:
INFORMATION TECHNOLOGY CENTRE,
CORPORATE OFFICE,MECL,NAGPUR.

MECL/EXPLORATION/OCT-2024 PLATE NO. III 3



0m 500 1000

SCALE 1:10000

INDEX

MLEP-01 K2A1: 1.00,2.25 — BOREHOLES DRILLED BY MECL ALONG WITH POTASH ZONE NAME IN m AND K%

BLOCK BOUNDAY WITH CARDINAL POINTS

INDEX

RESOURCE AREA OF 333 CATEGORY

RESOURCE AREA OF 334 CATEGORY

PBH-05 PD: 700 M — PROPOSED BOREHOLE WITH PROPOSED DEPTH IN METER

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

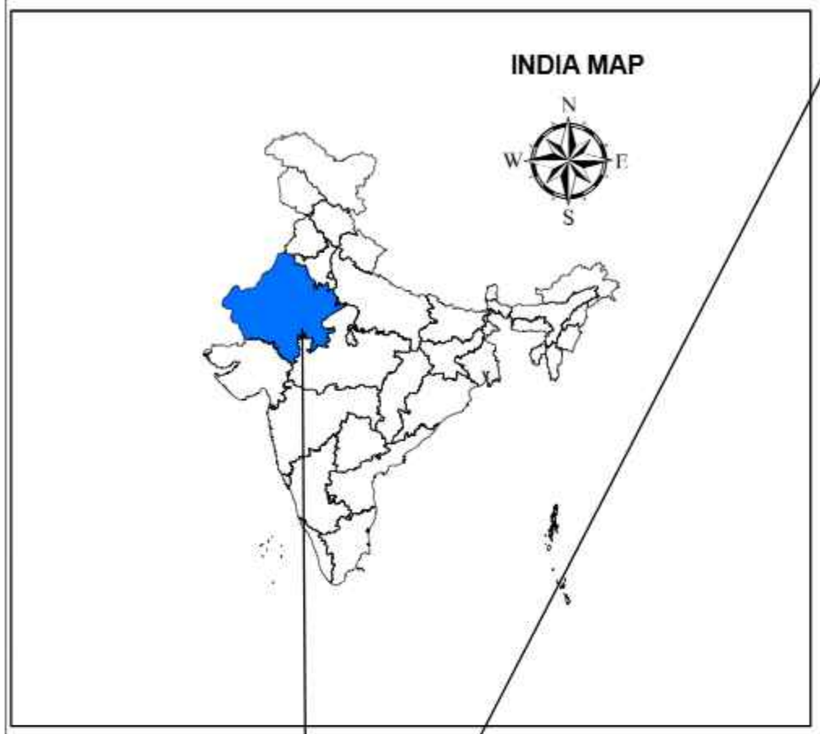
PROPOSED BOREHOLE PLAN FOR LAKHASAR EAST EXTENSION BLOCK

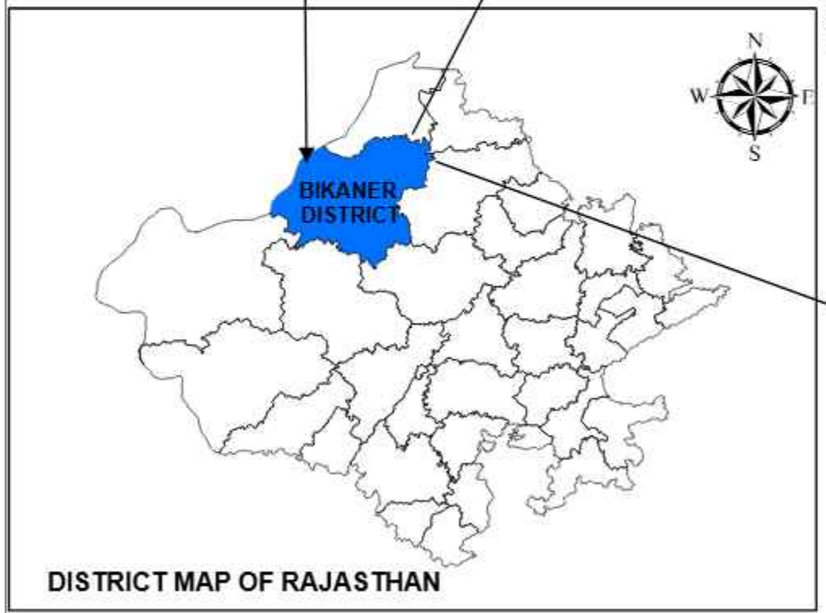
DISTRICT:BIKANER | SCALE 1:10,000 | STATE : RAJASTHAN

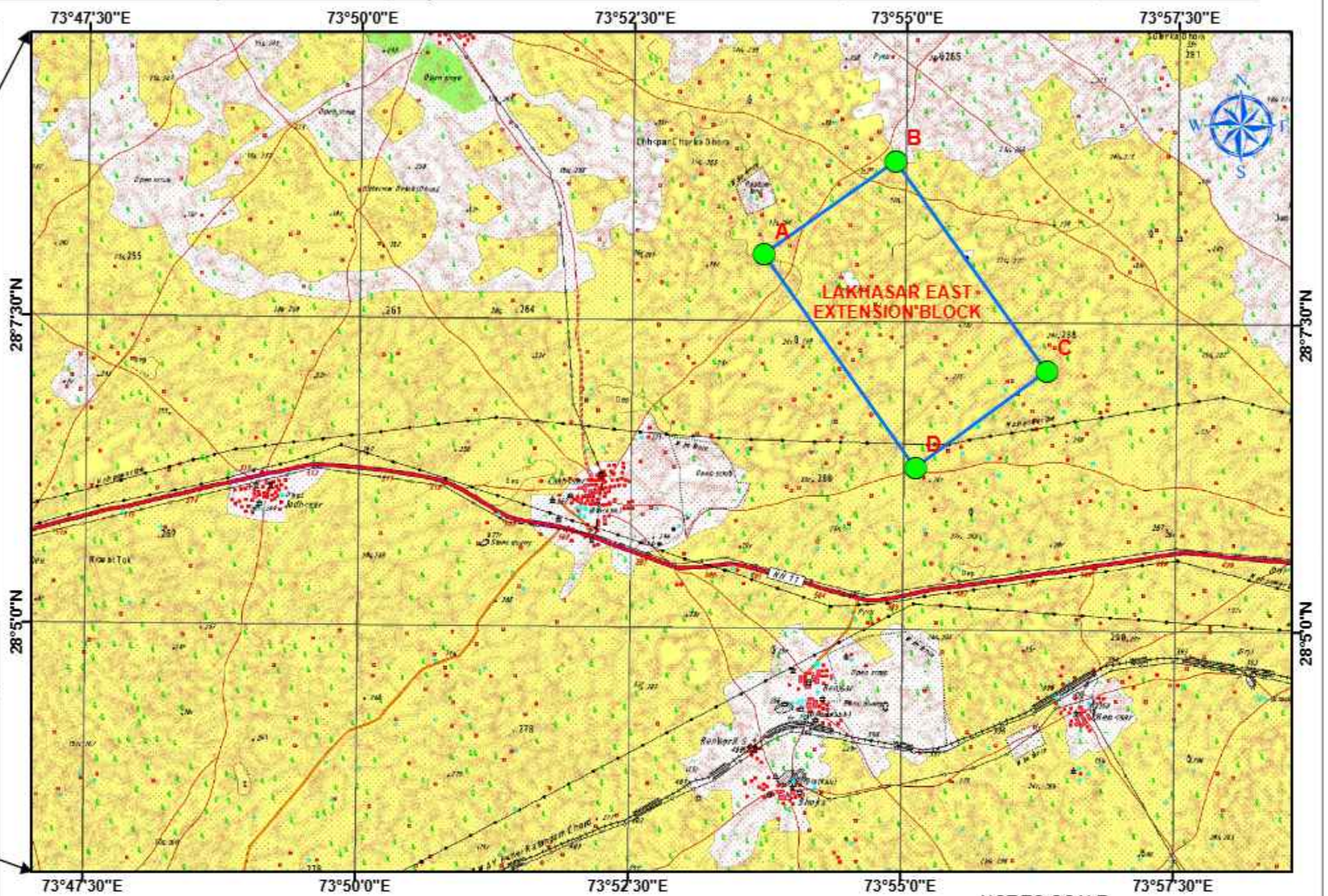
PROCESSED BY :
INFORMATION TECHNOLOGY CENTRE,
CORPORATE OFFICE, MECL, NAGPUR

MECL/CHQ/EXPLORATION /AUGUST-2024 | PLATE NO: II | 2

LOCATION MAP OF PROPOSED LAKHASAR EAST EXTENSION BLOCK (AREA: 9.50 Sqkm) PART OF TOPOSHEET NO 44H/16, DISTRICT : BIKANER, RAJASTHAN







COORDINATE OF LAKHASAR EAST EXTENSION BLOCK				
CARDINAL POINTS	ZONE-43(NORTH) UTM (m)		WGS-84 DMS	
	NORTHING	EASTING	LONGITUDE	LATITUDE
A	3112544.117	391485.398	73° 53' 42.030" E	28° 8' 2.539" N
B	3113939.722	393463.6527	73° 54' 54.082" E	28° 8' 48.464" N
C	3110790.346	395731.5693	73° 56' 18.227" E	28° 7' 6.786" N
D	3109343.857	393757.037	73° 55' 6.336" E	28° 6' 19.221" N

MECL