

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN WEST OF YEPALAMADHAVARAM BLOCK,

**SURYAPET DISTRICT, TELANGANA
(TEXT, ANNEXURES, AND PLATES)**



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

A Government of India Enterprise
CORPORATE OFFICE, NAGPUR

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GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN WEST OF YEPALAMADHAVARAM BLOCK, SURYAPET DISTRICT, TELANGANA

C O N T E N T S

CHAPTER	DESCRIPTION	PAGE
	SALIENT FEATURES	i
	CHAPTER- 1	1 – 3
1.0.0	कार्यकारी सारांश	a – c
1.0.0	EXECUTIVE SUMMARY	1 – 3
	CHAPTER- 2	4
2.0.0	DETAILS OF THE QUALIFIED PERSON(S)/ EXPLORATION AGENCY	4
2.1.0	INVESTIGATING AGENCY	4
2.2.0	PERSONAL INVOLVED WITH PRELIMINARY EXPLORATION (G3) IN WEST OF YEPALAMADHAVARAM BLOCK, DISTRICT-SURYAPET, TELANGANA.	4
	CHAPTER- 3	5 – 6
3.0.0	TITLE OF THE REPORT & OWNERSHIP	5
3.1.0	DETAILS ABOUT PERIOD OF PROSPECTING	5
3.2.0	DETAILS OF EXPLORATION AGENCY, QUALIFICATION, AND EXPERIENCE OF ASSOCIATED TECHNICAL PERSONS ENGAGED IN EXPLORATION	5 – 6
	CHAPTER- 4	7 – 9
4.0.0	DETAILS OF THE AREA	7
4.1.0	LOCATION OF THE BLOCK	7 – 8
4.2.0	DETAILS OF THE AREA WITH LAND USE	8
4.3.0	MINERAL(S) UNDER INVESTIGATION	8
	CHAPTER- 5	10 – 12
5.0.0	PHYSIOGRAPHY AND ENVIRONMENT	10
5.1.0	RELIEF OF THE AREA WITH MINIMUM AND MAXIMUM ELEVATION, DRAINAGE PATTERN, NATURAL WATER COURSES, RESERVOIRS, ETC.	10
5.2.0	ROADS, RAILWAY TRACK, ELECTRIC TRANSMISSION LINE, TELEPHONE LINE, ETC.	10
5.3.0	HOST POPULATION (LOCAL TRIBES), HUMAN SETTLEMENTS WITHIN AND NEARBY THE AREA	10
5.4.0	SOCIO DEMOGRAPHIC PROFILE OF THE AREA AND NEARBY	10 – 11
5.5.0	HISTORICAL SITES AND ARCHAEOLOGICAL MONUMENTS, PLACES OF WORSHIP, PUBLIC UTILITIES ETC.	11
5.6.0	FOREST, SANCTUARIES, NATIONAL PARK AND WILD LIFE SANCTUARIES ETC.	11
5.7.0	FLORA AND FAUNA WITHIN AND NEARBY	11
5.8.0	WATER BODIES SUCH AS RIVER, NALA, STREAM, RESERVOIR, ETC	11
5.9.0	CLIMATIC CONDITIONS	11
5.10.0	OTHER PHYSIOGRAPHIC, SOCIAL AND ENVIRONMENTAL FACTOR	11 – 12

CHAPTER	DESCRIPTION	PAGE
	CHAPTER- 6	13
6.0.0	INFRASTRUCTURE AND ENVIRONMENT	13
6.1.0	LOCAL INFRASTRUCTURE DETAILS	13
6.2.0	HOST POULATION AND HISTORICAL SITES	13
	CHAPTER- 7	14 – 25
7.0.0	GEOLOGY OF THE AREA	14
7.1.0	REGIONAL GEOLOGY	14 – 15
7.2.0	REGIONAL STRUCTURE	15
7.3.0	REGIONAL MINERALIZATION	16 – 17
7.4.0	GEOLOGY OF THE BLOCK	18 – 19
7.5.0	DESCRIPTION OF ROCK TYPES IN THE BLOCK	20 – 22
7.6.0	STRUCTURAL FEATURES OBSERVED IN THE BLOCK	22
7.7.0	PETROGRAPHIC STUDIES	23 – 24
7.8.0	MINERALISATION IN THE BLOCK	25
	CHAPTER- 8	26 – 27
8.0.0	PREVIOUS WORK	26
8.1.0	DETAILS OF PREVIOUS EXPLORATION CARRIED OUT BY OTHER AGENCIES/PARTIES	26 – 27
8.2.0	PREVIOUS WORK DONE BY MECL	27
	CHAPTER- 9	28
9.0.0	GEOPHYSICAL EXPLORATION	28
	CHAPTER- 10	29 – 31
10.0.0	EXPLORATION UNDERTAKEN DURING CURRENT INVESTIGATION	29
10.1.0	OBJECTIVES OF INVESTIGATION	29
10.2.0	EXPLORATION ACTIVITIES TAKEN UP	29 – 31
10.3.0	DETAILS OF SURFACE SAMPLING, DRILLING ETC.	31
	CHAPTER- 11	32 – 33
11.0.0	LOCATION OF DATA POINTS	32
11.1.0	ACCURACY AND QUALITY OF SURVEY USED TO LOCATE BLOCK BOUNDARY AND DRILL HOLES	32 – 33
11.2.0	QUALITY AND ADEQUACY OF TOPOGRAPHIC CONTROL	33
	CHAPTER- 12	34 – 35
12.0.0	SAMPLING TECHNIQUE	34
12.1.0	NATURE AND QUALITY OF SAMPLING AND MEASURES TAKEN TO ENSURE SAMPLE REPRESENTATIVITY	34
12.2.0	NATURE, QUALITY AND APPROPRIATENESS OF THE SAMPLE PREPARATION TECHNIQUE	34
12.3.0	QUALITY CONTROL PROCEDURES ADOPTED	34
12.4.0	MEASURES TAKEN TO ENSURE THE SAMPLING IS REPRESENTATIVE OF THE IN-SITU MATERIAL COLLECTED	35
12.5.0	WHETHER SAMPLE SIZES ARE APPROPRIATE TO THE GRAINSIZE OF THE MATERIAL BEING SAMPLED	35
	CHAPTER- 13	36 – 40
13.0.0	DRILLING TECHNIQUES AND DRILL SAMPLING EMPLOYED	36
13.1.0	DRILLING TYPES AND DETAILS	36
13.2.0	DEVIATION SURVEY IN DRILLING	36

CHAPTER	DESCRIPTION	PAGE
13.3.0	WHETHER CORE AND CHIP SAMPLE RECOVERIES HAVE BEEN PROPERLY RECORDED AND RESULTS ASSAYED	37
13.4.0	MEASURES TAKEN TO MAXIMIZE SAMPLE RECOVERY AND ENSURE REPRESENTATIVE NATURE OF THE SAMPLES	37
13.5.0	CORE LOGGING	38 – 40
	CHAPTER- 14	41 – 42
14.0.0	SUB SAMPLING TECHNIQUES AND SAMPLE PREPARATION	41
14.1.0	WHETHER CUT OR DRAWN AND WHETHER QUARTER, HALF OR ALL CORE TAKEN	41
14.2.0	NATURE, QUALITY AND APPROPRIATENESS OF THE SAMPLE PREPARATION TECHNIQUE	41
14.3.0	QUALITY CONTROL PROCEDURES ADOPTED	41
14.4.0	MEASURES TAKEN TO ENSURE THAT THE SAMPLING IS REPRESENTATIVE OF THE INSITU MATERIAL COLLECTED	42
14.5.0	WHETHER SAMPLE SIZES ARE APPROPRIATE TO THE GRAIN SIZE OF THE MATERIAL BEING SAMPLED	42
	CHAPTER- 15	43 – 51
15.0.0	QUALITY OF ASSAY DATA AND LABORATORY TESTS	43
15.1.0	THE NATURE, QUALITY AND APPROPRIATENESS OF THE ASSAYING AND LABORATORY PROCEDURES	43
15.2.0	STANDARD OPERATING PROCEDURE (SoP) FOR THE ANALYSIS BY JNARDDC, NAGPUR	43 – 44
15.3.0	STANDARD OPERATING PROCEDURE (SoP) FOR THE ANALYSIS BY MECL LAB, NAGPUR	44 – 45
15.4.0	NATURE OF QUALITY CONTROL PROCEDURES ADOPTED	46 – 51
15.5.0	SECURITY AND CHAIN OF CONTROL OF SAMPLES SHOULD BE CLEARLY MENTIONED	51
	CHAPTER- 16	52
16.0.0	MOISTURE	52
	CHAPTER- 17	53
17.0.0	BULK DENSITY	53
17.1.0	BULK DENSITY ANALYSIS DETAILS	53
	CHAPTER- 18	54
18.0.0	BENEFICIATION STUDIES	54
	CHAPTER- 19	55 – 60
19.0.0	RESOURCE ESTIMATION TECHNIQUE	55
19.1.0	GENERAL	55
19.2.0	ASSUMPTIONS FOR RESOURCE ESTIMATION	55 – 56
19.3.0	PARAMETERS FOR RESOURCE ESTIMATION	56 – 57
19.4.0	OVERBURDEN	57
19.5.0	METHODOLOGY	57
19.6.0	METHODOLOGY ADOPTED IN CROSS-SECTION METHOD FOR RESOURCE ESTIMATION (PRINCIPAL METHOD)	57 – 58
19.7.0	METHODOLOGY ADOPTED IN POLYGONAL METHOD FOR RESOURCE ESTIMATION (CHECK METHOD)	58 – 59
19.8.0	COMPUTATION OF AVERAGE GRADE	59 – 60
19.9.0	CATEGORISATION OF RESOURCE	60

CHAPTER	DESCRIPTION	PAGE
	CHAPTER- 20	61 – 66
20.0.0	REPORTING OF RESOURCE	61
20.1.0	RESOURCE ESTIMATION	61
20.2.0	RESOURCE BY POLYGON METHOD	61 – 62
20.3.0	RELIABILITY OF RESOURCE	62 – 66
	CHAPTER- 21	67 – 69
21.0.0	CONCLUSIONS AND RECOMMENDATIONS	67
21.1.0	CONCLUSIONS	67 – 68
21.2.0	RECOMMENDATIONS	68 – 69
	CHAPTER- 22	70
22.0.0	PLATES AND MAPS	70
	CHAPTER- 23	71
23.0.0	ANNEXURE / ENCLOSURES TO THE REPORT	71
	CHAPTER- 24	72 – 74
24.0.0	UTILITY OF INVESTIGATION	72
24.1.0	UTILISATION ASPECTS AND MINEABILITY (AS PER NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS)	72 – 74
	CHAPTER- 25	75
25.0.0	CERTIFICATE FROM THE QUALIFIED PERSON WITH NAME, DATE AND SIGNATURE	75
	REFERENCES	76
	ABBREVIATIONS USED	77

LIST OF ANNEXURES

ANNEXURE No.	TITLE	PAGE No.
I-A	Statement showing Co-ordinates of cardinal points (in WGS-84) of block boundary in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
I-B	Statement showing Co-ordinates (In WGS-84), reduced levels of boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
II-A	Statement Showing run-wise lithologs of boreholes MWYB-01, 02, 03, 04 and 05 drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1-10
II-B	Statement Showing Concise lithologs of boreholes MWYB-01, 02, 03, 04 and 05 drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
III-A	Statement Showing Primary Analysis for borehole core samples generated by MECL, West of Yepalamadhavaram Block, Suryapet district, Telangana.	1-5
III-B	Statement Showing External Check Analysis for borehole core samples done at JNARDDC, Nagpur in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
III-C	Statement showing Primary Vs. Check analysis (External) of core samples of boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
IV-A	Statement showing borehole-wise intersections of Cement Grade limestone in Boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
IV-B	Statement showing borehole-wise intersections of Threshold Grade Limestone in Boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
V	Statement showing Petrography study report of core samples of boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1-2
VI	Statement showing Bulk Density study report of core samples of boreholes drilled in West of Yepalamadhavaram Block.	1
VII-A	Statement showing polygon wise, borehole wise Inferred category of resources (333) of Cement Grade Limestone, Estimated by polygonal method in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
VII-B	Statement showing polygon wise, borehole wise Inferred category of resources (333) of Threshold Grade Limestone, Estimated by polygonal method in West of Yepalamadhavaram Block, Suryapet district, Telangana	1
VII-C	Statement showing section wise, borehole wise Inferred category of resources (333) of Cement Grade Limestone, Estimated by cross sectional method in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
VII-D	Statement showing section wise, borehole wise Inferred category of resources (333) of Threshold Grade Limestone, Estimated by cross sectional method in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1
VIII-A	Recommendation of 80 th TCC-1 for West of Yepalamadhavaram Block, Suryapet district, Telangana.	1-8

ANNEXURE No.	TITLE	PAGE No.
VIII-B	Sanction Order for Exploration Work in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1-9
IX	End Use Grade Classification Limestone as per IBM.	1-2
X	Baseline survey report of West of Yepalamadhavaram Block, Suryapet District, Telangana.	1-106
XI-A	Peer Reviewer Report of West of Yepalamadhavaram Block, Suryapet District, Telangana.	1
XI-B	Peer Reviewer Comments and MECL Response of West of Yepalamadhavaram Block, Suryapet District, Telangana.	1

LIST OF PLATES

PLATE	TITLE	R. F
I	Location Map of West of Yepalamadhavaram Block, Suryapet district, Telangana.	1:50,000
II	Regional Geological Map of West of Yepalamadhavaram Block, Part of Palnad Sub-basin (GSI), Suryapet district, Telangana.	1:30,000
III	Topographical and Geological map of West of Yepalamadhavaram Block, Suryapet district, Telangana.	1:4000
IV	Graphic Lithologs of boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1:1000
V	Polygonal Map of All Grades of Limestone in West of Yepalamadhavaram Block, Suryapet district, Telangana.	1:10,000
VI	Geological Cross Sections of West of Yepalamadhavaram Block (S1-S1', S2-S2', S3-S3' and S4-S4').	1:2000
VII	Fence Diagram of West of Yepalamadhavaram Block.	1:2000

LIST OF TEXT FIGURES

TEXT FIGURE	TITLE	PAGE
01	Location Map of West of Yepalamadhavaram Block, Suryapet district, Telangana.	9
02	Regional Geological Map of West of Yepalamadhavaram Block, Part of Palnad Sub-basin (GSI), Suryapet district, Telangana.	17
03	Topographical and Geological map of West of Yepalamadhavaram Block, Suryapet district, Telangana.	19

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
1	Limestone exposures in Western Part of the block	21
2	Limestone exposure in Western Part of the block	21
3	Limestone exposure in Eastern Part of the block	22
4	Limestone zone of borehole no. MWYB-01 from 30.50m to 36.00m	38
5	Limestone zone of borehole no. MWYB-01 from 36.00m to 41.40m	38
6	Limestone zone of borehole no. MWYB-02 from 26.90m to 31.00m	39
7	Limestone zone of borehole no. MWYB-03 from 35.00m to 39.00m	39
8	Limestone zone of borehole no. MWYB-04 from 19.80m to 24.00m	39
9	Limestone zone of borehole no. MWYB-05 from 11.35m to 16.70m	40
10	Limestone zone of borehole no. MWYB-05 from 16.70m to 21.80m	40
11	Photographs showing WD-XRF instrument (Rigaku, Japan) at Chemical Lab, MECL, Nagpur	45

LIST OF MICROPHOTOGRAPHS

SAMPLE	DESCRIPTION	PAGE
Pmg-1	Pmg - 1: Photomicrograph showing association and parallel alignment of micrite, sparry lenses and quartz and associated opaque specks within foliated impure micritic limestone as seen under crossed nicols. Specimen No. : MWYB-PG-01 Magnification : 100X	23
Pmg-2	Pmg - 2: Photomicrograph showing rotational movement of coarse sparry calcite patches/ sparry lenses and associated clayey fillings within foliated impure micritic limestone as seen under crossed nicols. Specimen No. : MWYB-PG-02 Magnification : 40X	24
Pmg-3	Pmg - 3: Photomicrograph showing association of micro-crystalline to crystalline aggregates of calcite and very fine silt sized quartz clasts and associated sericite fillings within foliated impure micritic limestone as seen under crossed nicols. Specimen No. : MWYB-PG-03 Magnification : 100X	24

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
4.1	Co-ordinates of corner points of explored West of Yepalamadhavaram Block, Suryapet district, Telangana.	7 – 8
7.1	Regional Stratigraphy of the Cuddapah basin.	14 – 15
7.2	Stratigraphic Sequence of Litho-units exposed in and around the block.	18
10.1	Quantum of Work - Proposed Vs Achieved in West of Yepalamadhavaram Block, Suryapet district, Telangana.	29 – 30
11.1	The R.L & Coordinates of the SOI CORS Base Point - SURVEY OF INDIA BASE STATION-NIDA, West of Yepalamadhavaram Block, Suryapet district, Telangana.	32
13.1	Details of Co-ordinates (in WGS-84), Reduced Levels of boreholes drilled in West of Yepalamadhavaram Block.	36
19.1	Borehole zone wise intersection of Cement Grade Limestone Zones in boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	59
19.2	Borehole wise intersection of Threshold Grade Limestone Zones in boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.	59
20.1	Comparison of Gross In-situ Resources estimated by Polygonal Method (Principal Method) with Cross Sectional Method (Check Method) in West of Yepalamadhavaram Block.	62
20.2	Polygon wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Cement Grade Limestone by Polygonal Method for West of Yepalamadhavaram Block, Suryapet district, Telangana.	63
20.3	Polygon wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Threshold Grade Limestone by Polygonal Method for West of Yepalamadhavaram Block, Suryapet district, Telangana.	64

TABLE	DESCRIPTION	PAGE
20.4	Section wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Cement Grade Limestone by Cross Sectional Method for West of Yepalamadhavaram Block, Suryapet district, Telangana.	65
20.5	Section wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Threshold Grade Limestone by Cross Sectional Method for West of Yepalamadhavaram Block, Suryapet district, Telangana.	66
24.1	Cement Industry Specification for Limestone.	72
24.2	B. I. S. (Bureau of Indian Standards) Specification for Limestone.	72
24.3	Iron and Steel Industry Specification for Limestone.	73
24.4	Chemical Industry Specification for Limestone.	73
24.5	Foundry Industry Specification for Limestone.	74
24.6	Cement, Iron and Steel and Chemical Industry Specification for Limestone.	74

GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN WEST OF YEPALAMADHAVARAM BLOCK, SURYAPET DISTRICT, TELANGANA

SALIENT FEATURES

1.	Name of the block	West of Yepalamadhavaram Block, Tahsil - Mellacheruvu, District - Suryapet, State - Telangana.																		
2.	Mineral	Limestone																		
3.	Total Area	4.16 sq.km.																		
4.	Area covered under present scheme	4.16 sq.km.																		
5.	Period of Exploration	January 2026 to March 2026																		
6.	Meterage drilled by Outsourcing Party (M/s Soiltech India Pvt. Ltd.)	Total 250.00 m																		
7.	No. of Boreholes drilled by M/s Soiltech India Pvt. Ltd.	Total 05 Nos																		
8.	Thickness of Different Grades of Limestone	Cement Grade Limestone - Thickness 32m (min), 48.50m (max.). Threshold Grade Limestone - Thickness 1.12m (min), 4m (max.)																		
9.	Cut-off grade	As per end use grade classification recommended by Indian Bureau of Mines (IBM). <table><tr><td rowspan="2">Grade</td><td>CaO (Min.)</td><td>MgO (Max.)</td><td>SiO₂ (Max.)</td></tr><tr><td>%</td><td>%</td><td>%</td></tr><tr><td>Cement Grade Limestone</td><td>≥44</td><td>3.5</td><td>16</td></tr><tr><td>Threshold Grade Limestone</td><td>≥34</td><td>--</td><td>--</td></tr></table>				Grade	CaO (Min.)	MgO (Max.)	SiO ₂ (Max.)	%	%	%	Cement Grade Limestone	≥44	3.5	16	Threshold Grade Limestone	≥34	--	--
Grade	CaO (Min.)	MgO (Max.)	SiO ₂ (Max.)																	
	%	%	%																	
Cement Grade Limestone	≥44	3.5	16																	
Threshold Grade Limestone	≥34	--	--																	
10.	Resources	Cement Grade Limestone: 492 MT* with an average grade 51.30% CaO, 0.71% MgO, 7.87% SiO ₂ . Threshold Grade Limestone: 17.93 MT* with an average grade 41.53% CaO, 0.58% MgO, 20.49% SiO ₂ . * MT - Million Tonnes																		
11.	Grade	Cement Grade Limestone & Threshold Grade Limestone																		
12.	UNFC Category	Inferred Category (333)																		
13.	Report Submission	June 2026																		

चूना पत्थर के लिए प्रारंभिक गवेषण (जी3) कि भूवैज्ञानिक रिपोर्ट पश्चिम येपलमाधवरम ब्लॉक, जिला-सूर्यपेट, तेलंगाना

अध्याय -1

- 1.0.0 कार्यकारी सारांश
- 1.1.0 एमएमडीआर संशोधन अधिनियम, 2015 से पहले ग्रांट किए गए प्रॉस्पेक्टिंग लाइसेंस (PLs) में गवेषण स्टेज रिपोर्ट (G4, G3, आदि) शामिल थीं। लेकिन, अधिनियम में 2021 के संशोधनों ने इन PL रिपोर्ट को गैर निष्पादित (इनएलिजिबल) कर दिया, जिससे मिनरल ब्लॉक्स को ऑक्शन से गुजरना पड़ा। इस वजह से, मिनरल्स (एविडेंस ऑफ मिनरल कंटेंट्स) रूल्स, 2015 के तहत ऐसी 19 PL रिपोर्ट्स को पुनर्मूल्यांकन की ज़रूरत है। इनकी स्कूटनी के लिए, राज्य सरकार के द्वारा एक स्कूटनी कमेटी (G.O.Ms..No.8, तारीख 12.03.2025) बनाई गई। 04.06.2025 को GSI, MECL, और IBM के साथ एक मीटिंग हुई और स्कूटनी कमेटी के द्वारा यह परिणाम घोषित किया गया कि आगे के गवेषण के साथ वैलिडेट करने के लिए और फील्ड गवेषण ज़रूरी है।
- 1.2.0 इस क्षेत्र में चूनापत्थर के लिए पहले से माइनिंग लीज़ हैं, प्रॉस्पेक्टिंग लाइसेंस (PL) ब्लॉक के आस-पास, संबंधित एजेंसियों ने G3 लेवल के गवेषण को निष्पादित किया है, जिससे चूनापत्थर होने की पुष्टि हुई है।
- 1.3.0 येपलामाधवरम ब्लॉक के पश्चिम में G3 लेवल के गवेषण का प्रस्ताव तैयार किया है, जो मेसर्स सुवर्णा सीमेंट लिमिटेड के पहले के PL एरिया से सटा हुआ है।
- 1.4.0 एमईसीएल तेलंगाना के सूर्यपेट जिले के मेलचेरुवु तहसील के येपलामाधवरम गाँव में और उसके आसपास के क्षेत्रों में जी3 स्तर के गवेषण पर 5 बोरहोल में 250 मीटर ड्रिलिंग से संबंधित गवेषण प्रस्ताव तैयार किया गया।
- 1.5.0 गवेषण प्रस्ताव (जी3) येपलामाधवरम ब्लॉक के पश्चिम के लिए (4.16 वर्ग किमी) था प्रस्तुत और 28-29 अगस्त, 2025 और 1 सितंबर, 2025 को हुई 80 वीं तकनीकी-सब-लागत समिति (TCC)-1 मीटिंग में इस पर विचार-विमर्श किया गया। कमेटी ने 10A(2)(b) मामलों और तेलंगाना सरकार के MECL के ज़रिए इन PL एरिया में गवेषण करने के अनुरोध पर ध्यान दिया। इसके अनुसार, 80 वीं TCC-1 कमेटी ने अनुशंसित परियोजना "येपलामाधवरम ब्लॉक (4.16 वर्ग किमी.), सूर्यपेट जिला, तेलंगाना के पश्चिम में चूना पत्थर के लिए प्रारंभिक गवेषण (जी3 स्तर)" शीर्षक से प्रस्ताव परियोजना संस्वीकृति समिति (पीएससी), एनएमईडीटी को भेजा गया।
- 1.6.0 80 वीं TCC-1 की सिफारिश पर , NMEDT की पहली परियोजना संस्वीकृति समिति (PSC) की 9 अक्टूबर, 2025 को हुई बैठक में , पत्रांक F.No. 117/1/2025/NMET/491, तारीख 10 नवंबर, 2025 के ज़रिए ₹77.90 लाख की लागत वाले प्रोजेक्ट को मंजूरी दी गई।

- 1.7.0 तेलंगाना के सूर्यपेट जिले में मौजूद येपालमाधवरम ब्लॉक का पश्चिम हिस्सा 4.16 वर्ग.किमी. क्षेत्र में फैला है, जो देशांतर 79°54'57.09" E से 79°56'5.79" E और अक्षांश 16°46'11.00" N से 16°48'2.78" N तक फैला है और इसमें तहसील मेलचेरु के येपालमाधवरम और मेलचेरु गांव शामिल हैं, जो टोपोशीट नंबर 56 P/13 के हिस्से में आते हैं।
- 1.8.0 NMET से मंजूरी मिलने के बाद, MECL ने येपालमाधवरम ब्लॉक के पश्चिम में G3 लेवल के गवेषण निष्पादित की है। MECL ने ड्रिलिंग के साथ 1:4000 स्केल पर जियोलॉजिकल मैपिंग और टोपोग्राफिकल सर्वे किया 5 वर्टिकल बोरहोल, कुल 250 मीटर मीटरेज और 220 कोर नमूने और 22 बाहरी चेक नमूनों का CaO, MgO, SiO₂, Fe₂O₃, Al₂O₃, SO₃, P₂O₅ के लिए विश्लेषण किया गया। K₂O, Na₂O और LOI . कोर ड्रिलिंग, मैपिंग डेटा को सबसरफेस कंटिन्यूटी को दिखाने और मिनरल रिसोर्स का पता लगाने के लिए माना गया।
- 1.9.0 गवेषित क्षेत्र पलनाड उप-घाटी का भाग है तथा यह कडप्पा बेसिन के उत्तर-पूर्वी भाग में स्थित है। बेसिन का ज्यादातर हिस्सा नियोप्रोटोरोज़ोइक युग की चट्टानों के कुरनूल ग्रुप से भरा हुआ है। विलियम किंग (1872) ने पलनाड बेसिन का सबसे पहला जियोलॉजिकल ब्योरा लिखा था। रामलिंगस्वामी, जी. (1976-77) ने टोपोशीट नंबर 56P/10 के कुछ हिस्सों में क्षेत्र की मैपिंग की है। कृपानिधि (1966-67), नागेश्वर राव और वरप्रसाद राव (1967-68), चक्रधर इत्यादि, (1980-83), रवींद्र बाबू इत्यादि, (1989), रामकृष्णैया इत्यादि, (2012-13), जगदीश्वर बाबू के और तिरुमुरुगन. एम. (2013) और सुगाथन और रिम्पल कर (2013) ने पलनाड सब-बेसिन के कुछ हिस्सों में चूना पत्थर की जांच की है।
- 1.10.0 इस इलाके में चूना पत्थर प्रोटोरोज़ोइक पलनाड सब-बेसिन का हिस्सा है, जो कुरनूल ग्रुप के नारजी चूनापत्थर फॉर्मेशन के बराबर है। नारजी चूनापत्थर की ये कार्बोनेट चट्टानें कई अलग-अलग लिथोलॉजिकल ईकाइयों में बंटी हुई हैं। बेड्स का नतिलंब N 28° E – S 28° W है और नति दक्षिण-पूर्व की ओर 5° से 20° तक होता है।
- 1.11.0 ज़ोन IBM ग्रेड कट ऑफ के आधार पर बांटे गए थे, ग्रेड कट ऑफ टेबल इस तरह है:

श्रेणी	CaO (न्यूनतम) %	MgO (अधिकतम) %	SiO ₂ (अधिकतम) %
सीमेंट ग्रेड चूना पत्थर	≥ 44	3.5	16
थ्रेशोल्ड ग्रेड चूना पत्थर	≥ 34	--	--

- 1.12.0 सीमेंट ग्रेड चूनापत्थर को सभी पांच बोरहोल यानी MWYB-01 से MWYB-05 में प्रतिच्छेदित किया गया, जिनकी मोटाई क्रमशः 47m, 32m, 39.50m, 47m और 48.50m है। थ्रेशोल्ड ग्रेड चूनापत्थर को दो बोरहोल यानी MWYB -02 और MWYB-03 में प्रतिच्छेदित किया गया, जिनकी कुल मोटाई क्रमशः 6.62m और 3m है।
- 1.13.0 जियोलॉजिकल ग्रॉस स्व-स्थाने संसाधनों का अनुमान मुख्य तरीके के तौर पर पॉलीगॉन तरीके से और चेक तरीके के तौर पर क्रॉस सेक्शनल तरीके से लगाया गया था। यह MEMC रूल्स 2015 (अमेंडेड

2021) के अनुसार सीमेंट ग्रेड और थ्रेशोल्ड ग्रेड चूनापत्थर के लिए IBM ग्रेड कट-ऑफ के क्लासिफिकेशन पर आधारित था। रिसोर्स के अनुमान के लिए 2.71gm/cc (कैलिपर तरीका) की बल्क डेंसिटी को माना गया था।

चूना पत्थर के अनुमानित जियोलॉजिकल ग्रॉस -स्थाने संसाधन इस तरह हैं:

क्रम संख्या	संसाधनों का प्रकार	भूवैज्ञानिक सकल स्व-स्थाने संसाधन (मिलियन टन)	औसत गुणवत्ता		
			CaO %	MgO %	SiO ₂ %
1	सीमेंट ग्रेड चूना पत्थर	492.00	51.30	0.71	7.87
2	थ्रेशोल्ड ग्रेड चूना पत्थर	17.93	41.53	0.58	20.49

- 1.14.0 सिफारिश: MECL ने नेपालमाधवरम ब्लॉक के पश्चिम में शुरुआती गवेषण (G3) की और सीमेंट ग्रेड और थ्रेशोल्ड ग्रेड चूनापत्थर रिसोर्स पाए, जिन्हें UNFC नाम के अनुसार 333 कैटेगरी में रखा गया है। यह रिपोर्ट तेलंगाना सरकार को ब्लॉक की नीलामी में मदद करेगी।

**GEOLOGICAL REPORT ON PRELIMINARY EXPLORATION (G3) FOR
LIMESTONE IN WEST OF YEPALAMADHAVARAM BLOCK, SURYAPET
DISTRICT, TELANGANA**

CHAPTER - 1

1.0.0 EXECUTIVE SUMMARY

- 1.1.0 Prospecting Licences (PLs) granted before the MMDR Amendment Act, 2015 included exploration stage reports (G4, G3, etc.). However, the 2021 amendments to the Act rendered these PL reports ineligible, requiring mineral blocks to go through auction. As a result, 19 such PL reports need re-evaluation under the Minerals (Evidence of Mineral Contents) Rules, 2015. To scrutinize them, the State Government formed a Scrutiny Committee (G.O.Ms.No.8, dated 12.03.2025). A meeting held with GSI, MECL, and IBM on 04.06.2025 and Scrutiny Committee concluded that further field exploration was necessary to validate with further exploration.
- 1.2.0 The area hosts existing mining leases for limestone, in the vicinity of the Prospecting License (PL) blocks, the respective agencies have undertaken G3 level exploration, confirming the presence of limestone.
- 1.3.0 In view of the above, MECL has prepared the exploration proposal involving G3 level exploration in West of Yepalamadhavaram Block which are adjacent to erstwhile PL areas of M/s Suvarna Cement Limited.
- 1.4.0 MECL formulated exploration proposal involving 250m drilling in 05 boreholes at G3 level of exploration in and around Yepalamadhavaram village of Tehsil Mellacheruvu, Suryapet district, Telangana.
- 1.5.0 Exploration Proposal (G3) for West of Yepalamadhavaram Block (4.16 sq.km.) was submitted and deliberated in 80th TCC-1 meeting held on 28th - 29th August 2025 and 1st September 2025. Committee, noted 10A(2)(b) cases and request of Govt. of Telangana for exploration of these PL areas through MECL. Accordingly, 80th TCC-1 committee recommended the project proposal titled as “Preliminary Exploration (G3 Level) for Limestone in West of Yepalamadhavaram Block (4.16 sq.km.), Suryapet district, Telangana” to Project Sanctioning Committee (PSC), NMEDT.
- 1.6.0 On recommendation of 80th TCC-1, 1st Project Sanctioning Committee (PSC) of NMEDT meeting held on 9th October 2025, vide letter no

F.No. 117/1/2025/NMET/491, Dated 10th November, 2025 approved the project with cost of ₹ 77.90 lakhs.

- 1.7.0 The West of Yepalamadhavaram Block, located in Suryapet district of Telangana, spans 4.16 sq.km area, is bounded by Longitude 79°54'57.09" E to 79°56'5.79" E and Latitude 16°46'11.00" N to 16°48'2.78" N and encompasses the villages of Yepalamadhavaram and Mellacheruvu in Tehsil Mellacheruvu falling within part of Toposheet No. 56 P/13.
- 1.8.0 After receipt of approval from NMET, The MECL has carried out G3 level exploration in West of Yepalamadhavaram Block. MECL carried out geological mapping and topographical survey on 1:4000 scale with drilling 5 nos of vertical boreholes with total meterage of 250m drilling and generated 220 nos of core samples and 22 external check samples, which are analysed for CaO, MgO, SiO₂, Fe₂O₃, Al₂O₃, SO₃, P₂O₅, K₂O, Na₂O & LOI. Geological mapping, core logging and analytical data are considered to delineate subsurface continuity to assess mineral resources.
- 1.9.0 The explored area is a part of Palnad Sub-basin and forms in the northeastern part of the Cudappah Basin. The major portion of the basin is occupied by Kurnool Group of rocks of Neoproterozoic age. William King (1872) documented the earliest geological account of Palnad Sub-basin. Ramalingaswamy, G. (1976-77) has mapped area in parts of Toposheet No.56P/10. Krupanidhi (1966-67), Nagaeswara Rao and Varaprasada Rao (1967-68), Chakradhar et al, (1980-83), Ravindra Babu et al, (1989), Ramakrishnaiah et al, (2012-13), Jagadishwar Babu. K and Tirumurugan. M. (2013) and Sugathan & Rimpal Kar (2013) have carried out investigation for limestone in parts of Palnad Sub-basin.
- 1.10.0 The limestone in the area forms a part of Proterozoic Palnad Sub-basin equivalents to Narji Limestone formation of Kurnool Group. These carbonate rocks of Narji Limestone are sub divided in to several distinct lithological units. The strike of the beds is N28°E - S28°W and dip varies from 5° to 20° towards Southeast.
- 1.11.0 Zones were demarcated based on IBM grade cut off, the grades cut off table as follow:

Grade	CaO (Min.) %	MgO (Max.) %	SiO ₂ (Max.) %
Cement Grade Limestone	≥44	3.5	16
Threshold Grade Limestone	≥34	--	--

1.12.0 Cement Grade Limestone was intersected in all the five drilled boreholes namely MWYB-01, MWYB-02, MWYB-03, MWYB-04 and MWYB-05, where the thickness of limestone bands are 47m, 32m, 39.50m, 47m and 48.50m respectively. Threshold Grade Limestone was intersected in two boreholes i.e. MWYB-02 and MWYB-03, whose cumulative thicknesses are 6.62m and 3m respectively.

1.13.0 Geological Gross In-Situ resources were estimated by polygon method as principal method and cross sectional as check method as per MEMC Rules 2015 (Amended 2021) for Cement Grade and Threshold Grade Limestone based on classification of IBM grade cut-off, bulk density of 2.71gm/cc (Caliper Method) is considered for estimation of resources.

Estimated geological gross in-situ resources of limestone are as follows:

Sl. No.	Type of Resources	Geological Gross In-Situ Resources (Million Tonnes)	Average Quality		
			CaO %	MgO %	SiO ₂ %
1	Cement Grade Limestone	492.00	51.30	0.71	7.87
2	Threshold Grade Limestone	17.93	41.53	0.58	20.49

1.14.0 Recommendation: Preliminary exploration (G3) is carried out by MECL in West of Yepalamadhavaram Block and established Cement Grade and Threshold Grade Limestone resources, which are placed under 333 category as per UNFC nomenclature. This report will facilitate Govt. of Telangana for auction of the block.

CHAPTER - 2

2.0.0 DETAILS OF THE QUALIFIED PERSON(S) / EXPLORATION AGENCY

2.1.0 INVESTIGATING AGENCY

MINERAL EXPLORATION& CONSULTANCY LIMITED

(A Govt. of India Enterprise Miniratna PSE)

Dr. Babasaheb Ambedkar Bhavan, High Land Drive Road,

Seminary Hills, Nagpur-440006

2.2.0 PERSONNEL INVOLVED WITH PRELIMINARY EXPLORATION (G3) FOR LIMESTONE IN WEST OF YEPALAMADHAVARAM BLOCK, SURYAPET DISTRICT, TELANGANA.

1	Overall Guidance	Shri Shrikant Sharma, HOD (Exploration)
2	Overall Planning, Co-ordination & Supervision	Shri Shrikant Sharma, HOD (Exploration) Dr. Kuppusamy E, Dy. G M (Exploration) Rtd. Shri Naveen Kumar Pala, Sr. Manager (Geology)
3	Project Management	Shri M. Rampramod K, Project Manager, Kumaraswamy Project
4	Physical Execution of work	
	a) Geology	Shri M. Rampramod K, Manager (Geology) Shri Sathish Kumar Inaparthi, Sr. Tech. (Sampling)
	b) Survey	Shri Mukesh Vishwakarma, Tech (S. & D.)
	c) Drilling	Shri Deepak Choudary, Sr. Supervisor (Drilling), <i>Drilling is out sourced to M/s Soiltech India Pvt. Ltd.</i>
5	Sample Processing	Shri Ankush Haridas Wagh, Sr. Tech. (Sampling)
		Shri Nagaraju Vaddi, Sr. Tech. (Sampling)
		Shri Pushpraj Tiwari, Tech. (Sampling)
6	Chemical Laboratory	Shri Shrikant Sharma, HOD (Exploration), NEM
		Shri Rohit Sharma, Manager (Chemistry)
		Dr. Deepti Rahangdale, Manager (Chemistry)
7	Petrographic Studies	Shri Sayantan Pal, Manager (Geology)
8	Documentation	Shri Naveen Kumar Pala, Sr. Manager (Geology)
		Shri Lakshmanarao Kaddala, Sr. Manager (Geology)
		Smt. Pooja Singh, Young Professional (Geology)
9	Non-Coal Geological Report Cell	Shri N C S Reddy, Superintendent (IT), Rtd.
		Shri Uday Patil, Sr. Asst. (IT)
		Shri Ashok Kumar, Sr. Asst. (IT)
10	Hindi Translation	Shri Shreekant Rai, Sr. Hindi Translator
11	Reprography and Printing	Shri Pratap Singh Negi, ASMO
		Shri Durgesh Devarshee, ASMO

CHAPTER - 3

3.0.0 TITLE OF THE REPORT AND OWNERSHIP

Title: Geological Report on Preliminary Exploration (G3) for Limestone in West of Yepalamadhavaram Block in Suryapet district, Telangana.

Ownership: Department of Mines and Geology, Government of Telangana.

3.1.0 DETAILS ABOUT PERIOD OF PROSPECTING

The exploratory drilling in the block commenced on 28.01.2026 and completed on 03.03.2026 in West of Yepalamadhavaram Block through outsourcing party i.e. M/s Soiltech India Pvt. Ltd. Total 05 boreholes were drilled with the cumulative meterage of 250m and borehole core sampling etc. were completed simultaneously. The analytical / laboratory studies were also carried out simultaneously in laboratories of MECL, Nagpur and other NABL accredited laboratories (JNARDDC), Nagpur.

3.2.0 DETAILS OF EXPLORATION AGENCY, QUALIFICATION, AND EXPERIENCE OF ASSOCIATED TECHNICAL PERSONS ENGAGED IN EXPLORATION

Exploration Agency	Mineral Exploration and Consultancy Limited (Formerly Mineral Exploration Corporation Limited) A Govt. of India Enterprise - Mini Ratna - 1 CPSE
Qualification	M.Sc. / M. Sc. Tech. (Geology)
Experience	Organisation have more than 50 years of experience with inception of MECL since 1972
Address of the Prospector	Dr. Babasaheb Ambedkar Bhavan, High Land Drive Road, Seminary Hills, Nagpur, Pin- 440006
Email	cmd@gov.in; gm-exploration@mecl.gov.in
Phone No.	0712-2510289; 0712-2511829

Sl. No.	Name of the Person	Designation	Qualification	Experience
1	Shri Shrikant Sharma	HOD (Exploration)	M.Sc., Geology	23 Years
2	Shri Naveen Kumar Pala	Sr. Manager (Geology)	M.Sc. (Tech.), Applied Geology	21 Years
3	Shri M. Rampramod K	Project Manager / Manager (Geology)	M.Sc. (Geology) & M.Tech. (Petroleum Exploration)	12 Years
4	Shri Lakshmanarao Kaddala	Sr. Manager (Geology)	M.Sc. (Tech.), Applied Geology	19 Years
5	Shri Rohit Kumar Sharma	Manager (Chemical Lab)	M.Sc., Chemistry	15 Years

CHAPTER - 4

4.0.0 DETAILS OF THE AREA

4.1.0 LOCATION OF THE BLOCK

4.1.1 The explored West of Yepalamadhavaram Block falls in the jurisdiction of Mellacheruvu Mandal (Taluk), Suryapet district, Telangana. The block can be approached from the nearest Mellacheruvu Mandal (Taluk), Taluk head-quarters towards south-east at a distance of around 4 kms by single lane asphalted village roads.

4.1.2 All the villages in the area are well connected to each other and to the national highway located at a distance of about 40 km away from National Highway No. 9 connecting Vijayawada- Hyderabad. Nearest Railway Station is Miryalaguda about 60 km towards NNW direction. The nearest airport is Vijayawada Airport at 135 km from the block and the location map of the block is shown in **Plate-I**. The Blocks fall in the Survey of India Toposheet No. 56 P/13 and the co-ordinates of the 41 cardinal points of the Yepalamadhavaram are given in the following Table No: 4.1.

Table No: 4.1
Co-ordinates of corner points of explored in West of Yepalamadhavaram Block,
Mellacheruvu Mandal, Suryapet district, Telangana

Boundary Point	Latitude (N)	Longitude (E)	UTM (m)		RL (m)
			Easting	Northing	
1	16° 48' 2.7786"	79°55'30.4788"	385461.848	1857826.203	87.045
2	16° 48' 2.5384"	79°55'31.5487"	385493.481	1857818.648	86.579
3	16° 48' 0.8696"	79°55'31.4208"	385489.415	1857767.383	86.991
4	16° 48' 1.0282"	79°55'33.1093"	385539.428	1857771.984	85.397
5	16° 48' 1.9581"	79°55'33.6183"	385554.651	1857800.481	84.972
6	16° 48' 2.0283"	79°55'34.9890"	385595.239	1857802.419	84.594
7	16° 47' 58.9283"	79°55'34.7385"	385587.308	1857707.187	84.712
8	16° 47' 58.8793"	79°55'36.6938"	385645.183	1857705.367	83.947
9	16° 47' 58.1093"	79°55'37.4148"	385666.397	1857681.589	83.785
10	16° 47' 57.4184"	79°55'38.2596"	385691.291	1857660.219	84.167
11	16° 47' 52.0373"	79°55'37.1175"	385656.585	1857495.023	83.408
12	16° 47' 51.3785"	79°55'40.6073"	385759.788	1857474.217	84.222
13	16° 47' 47.0132"	79°55'41.8166"	385794.862	1857339.865	84.584
14	16° 47' 47.3256"	79°55'43.0265"	385830.731	1857349.273	84.438
15	16° 47' 46.3141"	79°55'43.9289"	385857.278	1857318.043	84.303
16	16° 47' 41.2440"	79°56' 1.54'08"	386377.817	1857159.413	93.307

Boundary Point	Latitude (N)	Longitude (E)	UTM (m)		RL (m)
			Easting	Northing	
17	16° 47' 39.9120"	79° 56' 2.3455"	386401.417	1857118.347	92.514
18	16° 47' 32.7574"	79° 56' 4.5154"	386464.474	1856898.119	91.858
19	16° 47' 20.9601"	79° 56' 3.5384"	386433.603	1856535.708	92.033
20	16° 47' 14.1822"	79° 56' 5.7865"	386499.038	1856327.046	92.079
21	16° 47' 14.3461"	79° 56' 4.1310"	386450.054	1856332.346	91.521
22	16° 47' 12.4499"	79° 56' 4.0060"	386446.040	1856274.092	91.019
23	16° 47' 12.2160"	79° 56' 3.5828"	386433.472	1856266.970	90.321
24	16° 47' 2.6901"	79° 56' 0.7909"	386349.488	1855974.654	85.194
25	16° 46' 19.0558"	79° 55' 13.4171"	384939.421	1854641.223	75.408
26	16° 46' 15.8821"	79° 55' 12.9127"	384923.958	1854543.768	74.943
27	16° 46' 18.3361"	79° 55' 6.4854"	384734.071	1854620.224	73.765
28	16° 46' 14.3600"	79° 55' 4.3000"	384668.700	1854498.378	100
29	16° 46' 13.8007"	79° 55' 5.1006"	384692.311	1854481.058	71.667
30	16° 46' 11.0000"	79° 55' 3.5400"	384645.635	1854395.237	100
31	16° 46' 11.6600"	79° 55' 1.6600"	384590.083	1854415.824	100
32	16° 46' 13.4600"	79° 55' 1.8600"	384596.306	1854471.112	100
33	16° 46' 15.3700"	79° 55' 2.4500"	384614.095	1854529.717	100
34	16° 46' 16°.2955"	79° 54' 58.3090"	384491.645	1854558.829	73.719
35	16° 47' 30.6281"	79° 54' 57.0900"	384468.035	1856843.498	98.903
36	16° 47' 53.3986"	79° 55' 31.1990"	385481.604	1857537.810	84.563
37	16° 47' 54'.6079"	79° 55' 30.9286"	385473.802	1857575.019	84.312
38	16° 47' 54'.9285"	79° 55' 29.1110"	385420.048	1857585.164	85.034
39	16° 47' 55'.3479"	79° 55' 28.5091"	385402.301	1857598.150	84.216
40	16° 47' 58.1984"	79° 55' 28.8992"	385414.324	1857685.692	85.626
41	16° 47' 58.2182"	79° 55' 29.0797"	385419.671	1857686.271	85.691

All the coordinates of corner points West of Yepalamadhavaram Block are given in Annexure-I-A.

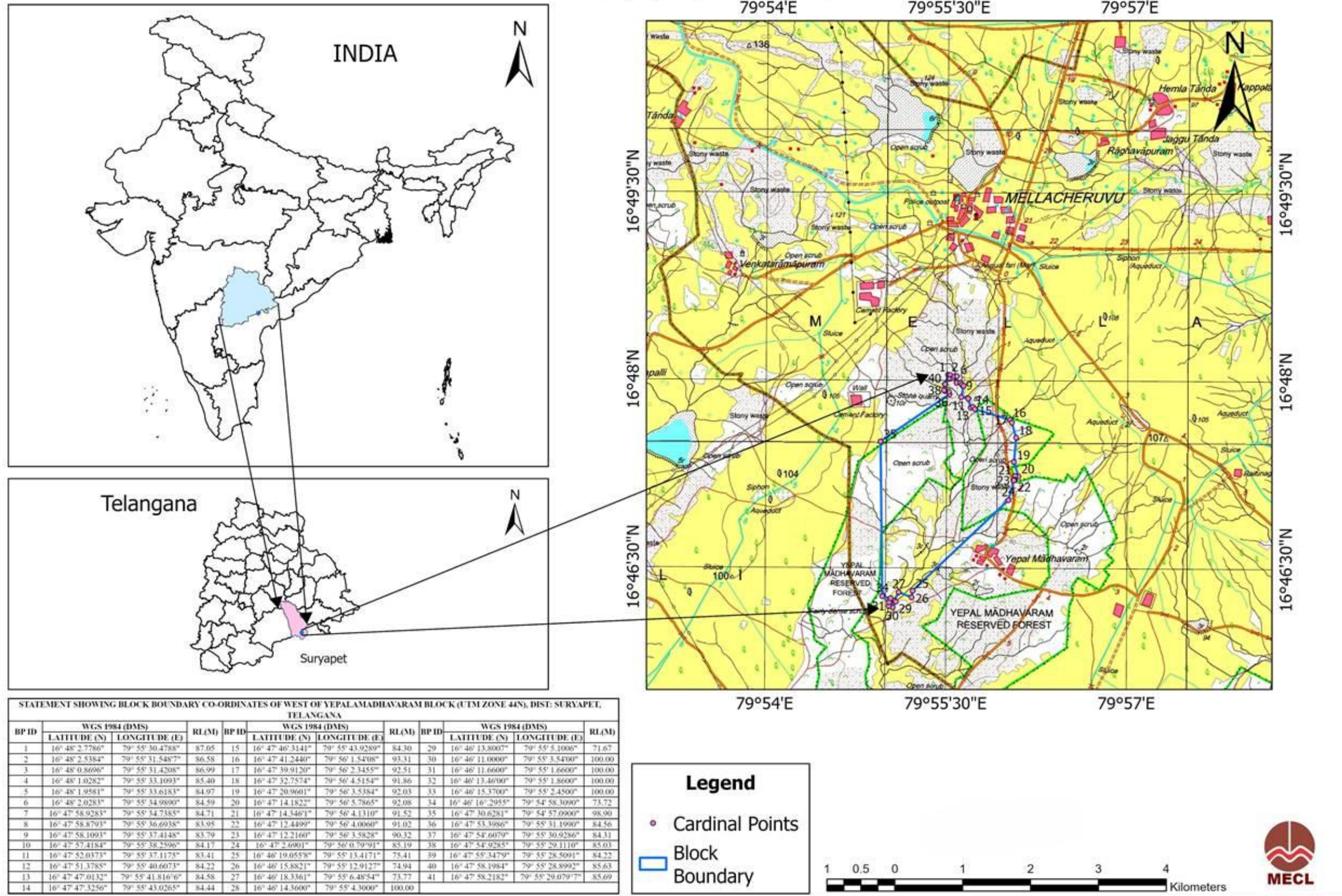
4.2.0 DETAILS OF THE AREA WITH LAND USE

4.2.1 Cadastral details of the area, such as land use, forest cover, and forest type, are not available. Similarly, indicative data on the breakup of Government, private, and forest land could not be furnished due to the absence of relevant information.

4.3.0 MINERAL(S) UNDER INVESTIGATION

4.3.1 Mineral under investigation is Limestone.

Location Map of West of Yepalamadhavaram Block (Extent 4.16 sq.km.), Part of Toposheet No. 56 P/13, Dist: Suryapet, Telangana



Text Figure No. 1: Location Map of West of Yepalamadhavaram Block, Suryapet district, Telangana

CHAPTER - 5

5.0.0 PHYSIOGRAPHY AND ENVIRONMENT

5.1.0 RELIEF OF THE AREA WITH MINIMUM AND MAXIMUM ELEVATION, DRAINAGE PATTERN, NATURAL WATER COURSES, RSERVOIRS ETC.

5.1.1 The area is flat with gentle slope towards ESE or SSE. The entire area is covered by black soil. The elevation of the area ranges from 72m (msl) in the south to 98m above mean sea level (MSL) in the north that is located in West of Yepalamadhavaram Block. The general slope of the topography in the blocks is from NW to SE.

5.2.0 ROADS, RAILWAY TRACK, ELECTRIC TRANSMISSION LINE, TELEPHONE LINE ETC.

5.2.1 The explored West of Yepalamadhavaram block falls in the jurisdiction of Mellacheruvu Mandal (Taluk), Suryapet district. The block can be approached from the nearest town Mellacheruvu Mandal (Taluk), Taluk head-quarters towards south-west a distance of around 4 kms by single lane asphalted village roads.

5.2.2 The block area is well connected to each other and to the highway located at a distance of about 40 km away from National Highway No. 9 connecting Vijayawada-Hyderabad, nearest railway station is Miryalaguda about 60 km NNW. The nearest airport is Vijayawada Airport at 135 km from the block.

5.3.0 HOST POPULATION (LOCAL TRIBES), HUMAN SETTLEMENTS WITHIN AND NEARBY THE AREA

5.3.1 The initial provisional data released by Census India 2011, shows the density of Suryapet district for 2011 had population of 155,422 of which male and female were 77,072 and 75,350 respectively.

5.3.2 West of Yepalamadhavaram Block falls in Mellacheruvu Mandal (Taluka) of Suryapet district of Telangana. Total population of Mellacheruvu Mandal (Taluka) is 74682 out of which Males are 37448 (50.14%) and Females are 37234 (49.86%). The total literacy rate is 59.88% out of this Males are 69.68% and females are 50.10%.

5.4.0 SOCIO DEMOGRAPHIC PROFILE OF THE AREA AND NEARBY

5.4.1 Mellacheruvu Mandal of Suryapet district has a population of 74682 out of which 37448 are male and 37234 females. literacy rate combined is 59.88% (Male 69.68% & Female 50.10%), out of total population 9394 (12.58%) belong to SC community and 12628 (16.91%) belongs to ST community. The sex ratio of Mellacheruvu is 995 females for 1000 men.

5.4.2 In Mellacheruvu Tehsil, there are about 41,579 workers, making up nearly 55.67% of the Mellacheruvu Tehsil total population. Out of these, around 22,369 are male workers, and about 19,210 are female workers.

5.5.0 HISTORICAL SITES AND ARCHAEOLOGICAL MONUMENTS, PLACES OF WORSHIP, PUBLIC UTILITIES ETC. WITHIN OR NEARBY

5.5.1 No historical sites, monuments and archaeological monuments, places of worships within 10 km radius of West of Yepalamadhavaram Block. However, few Hindu temples of Historical importance are there in Pillamarri and Durijpally near Suryapet town.

5.6.0 FOREST, SANCTUARIES, NATIONAL PARK AND WILD LIFE SANCTUARY

5.6.1 50% of the block area is falls in Yepalamadhavaram Reserve Forest. The forest area falls in north-western and eastern parts of the block.

5.6.2 No Sanctuaries, National Park and Wild Life Sanctuaries within the 10 kms from the explored block.

5.7.0 FLORA AND FAUNA

5.7.1 The area is characterised by scanty vegetation and dry crop cultivation. Chilli, maize, groundnut, gingili and pulses are the common dry crops cultivated by rotation. Study area is fertile. Black gram is cultivated in the study area.

5.7.2 The area has no rare endangered species of flora. The species of fauna found in the area are rat, squirrel, lizard and house crow and reptiles.

5.7.3 The block area is partly cultivated by agricultural activities.

5.8.0 WATER BODIES SUCH AS RIVER, NALA, STREAM, RESERVOIR ETC.

5.8.1 There is a river Krishna in the southern part of the block running from west to east and seasonal nalas flowing north to south and joining the river Krishna which is located at about 10 kms to the south.

5.9.0 CLIMATE CONDITIONS

5.9.1 The climate of the area is tropical monsoon type. The temperature during winter month seldom goes to 20° C, while in the peak summer it rises up to 45° C. The average rain fall is around 1000 mm and the relative humidity varies from 70% in summer to 90%.

5.10.0 OTHER PHYSIOGRAPHIC, SOCIAL AND ENVIRONMENT FACTOR

5.10.1 The block area is generally flat with moderately sloping down terrain from west to east. Generally, the area is covered by soil cover, agriculture lands with limestone

exposures along seasonal water way. The main source of the income is agriculture. The block area is surrounded by cement manufacturing industries and some of them are as follows in the Suryapet district:

- * M/s Rain Industries Ltd: Based in Nalgonda, with operations in Suryapet.
M/s Sri Sai Cement Work,
M/s Kodada Cements Pvt. Ltd,
M/s Penna Cement Industries Limited,
M/s NCL Industries Ltd: Headquartered in Hyderabad, with operations in Suryapet,
M/s My Home Cement Industries.
- * M/s Deccan Cements Limited: Located in Bhavanipuram, Janpahad P.O., Suryapet,
M/s NCL Industries Limited: Based in Simhapuri, Mellacheruvu Mandal, Suryapet,
M/s Sagar Cements Ltd: Has a presence in Mellacheruvu, Suryapet,
M/s Parasakti Cement Industries Ltd,
Another cement manufacturing unit in Suryapet, M/s Parasakti Cement Industries Ltd. in Suryapet district.

CHAPTER - 6

6.0.0 INFRASTRUCTURE AND ENVIRONMENT

6.1.0 LOCAL INFRASTRUCTURE DETAILS

- 6.1.1 The West of Yepalamadhavaram Block area is well connected to each other and to the highway located at a distance of about 40km away from National Highway No. 9 connecting Vijayawada- Hyderabad, nearest railway station is Miryalaguda about 60 km towards NNW. The nearest airport is Vijayawada Airport at 135 km from the block.
- 6.1.2 Banking, Government medical facility, Postal, Police facilities are available at Mellacheruvu Mandal (Taluka) which is 4 km from the explored block, educational and other major facilities are available at Sedam Taluk.

6.2.0 HISTORICAL SITES

- 6.2.1 No major historical sites are within the buffer zone of 10 kms.

6.3.0 FORESTS, SANCTUARIES, NATIONAL PARK AND ENVIRONMENT SETTING OF THE AREA

- 6.3.1 50% of the block area falls in Yepalamadhavaram reserve forest.
- 6.3.2 No major environment wild life sanctuaries within the buffer zone of 10 kms.

CHAPTER - 7

7.0.0 GEOLOGY OF THE AREA

7.1.0 REGIONAL GEOLOGY

- 7.1.1 The West of Yepalamadhavaram Block is a part of Palnad Sub-basin and is located in the northeastern part of the Cudappah Basin. The major portion of the basin is occupied by Kurnool Group of rocks of Neoproterozoic age. William King (1872) documented the earliest geological account of Palnad basin. Ramalingaswamy, G. (1976-77) has mapped area in parts of Toposheet No.56P/10. Krupanidhi (1966-67), Nagaeswara Rao and Varaprasada Rao (1967-68), Chakradhar et al, (1980-83), Ravindra Babu et al, (1989), Rama Krishnaiah et al, (2012-13), Jagadishwar Babu. K and Tirumurugan. M. (2013) and Sugathan & RimpalKar (2013) have carried out investigation for limestone in parts of Palnad Sub-basin.
- 7.1.2 The Cuddapah Basin extends from Nagari in the south to Amaravati in the north east over a length of about 440 km. with width ranging from 80 to 145 km. encompassing an area of about 44000 sq. km. Rocks belonging to Kurmool Group are younger than rocks of Cuddapah Group and are well preserved in the Cuddapah Basin. Cuddapahs and associated younger Kurmoos occupy a unique position in Indian Stratigraphy because of economic interest and hence have been the subject of studies for more than seven decades. Kurnool Group of rocks are found confined to two small areas in Cuddapah viz., the area between Cuddapah and Kurmool and the area west of Amaravati. The latter is also referred to as the Palnads.
- 7.1.3 The Detailed Stratigraphy after GSI is as per the table given below:

Table no 7.1: Regional Stratigraphy of the Cuddapah basin

C U D D A P A H S Y S T E M	SERIES	STAGE
	Kurnool Series	Nandyal shale
		Koilkuntla Limestone
		Paniam Quartzite
		Auk Shale
		Narji Limestone
		Banganapalle Quartzite
		Unconformity
	Krishna Series	Srisailam quartzite
		Kolamnala shale
		Irlakonda quartzite
		Unconformity
	Nallamalai Series	Cumbum Formation
		Bairenkonda Quartzite
		Unconformity

	Cheyair Series	Gandikota quartzite Pullampet shales (Tadpatri) Nagri/ Pulivendala quartzite
		Unconformity
	Papaghni Series	Vempalle limestone and shale Gulcheru quartzite
		Unconformity
Archean schist and gneisses		

7.2.0 REGIONAL STRUCTURE

7.2.1 The general strike of the formation is NNE-SSW dipping gently (2° to 4°) towards ESE and the sloping direction is from west to east. The variation in dip direction and amount may be attributed to warps and minor folds. Open asymmetrical synform and antiform folds are preserved in the western part of the study area which are having trend $N70^{\circ}W-S70^{\circ}E$ (axial plane) and plunging towards SE. Minor folds are formed in calcite and quartz vein within the massive grey limestone, the axial plane is trending in E-W direction.

7.2.2 PRIMARY SEDIMENTARY STRUCTURES

The preservation of primary sedimentary structure is relatively poor. In terms of primary sedimentary structure, bedding planes and laminations are common within limestone-shale unit. Bedding planes are usually marked by variation in colour, composition and grain size.

7.2.3 The general strike of the formation is NNE-SSW dipping gently (2° to 4°) towards ESE and dipping from west to east. The variation in dip direction and amount may be attributed to warps and minor folds. Open asymmetrical synform and antiform folds are preserved in the western part of the study area which are having trend $N70^{\circ}W-S70^{\circ}E$ (axial plane) and plunging towards SE. Minor folds are formed in calcite and quartz vein within the massive grey limestone, the axial plane is trending in E-W direction.

7.2.4 SECONDARY/ DIAGENETIC STRUCTURE

Joints: Open, systematic joint sets are common, often with NNE-SSW trend.

Stylolites: Pressure-solution features (stylolite) can form parallel to bedding sometimes creating “pseudo-bedding”. Within the massive limestone, intercalations of thin quartzite veins are seen at place of core. Sedimentary deformation structures are present at places in siliceous limestone.

The general trend of all formations is NNE-SSW, and limestone beds dip 5° to 20° due SE.

7.3.0 REGIONAL MINERALISATION

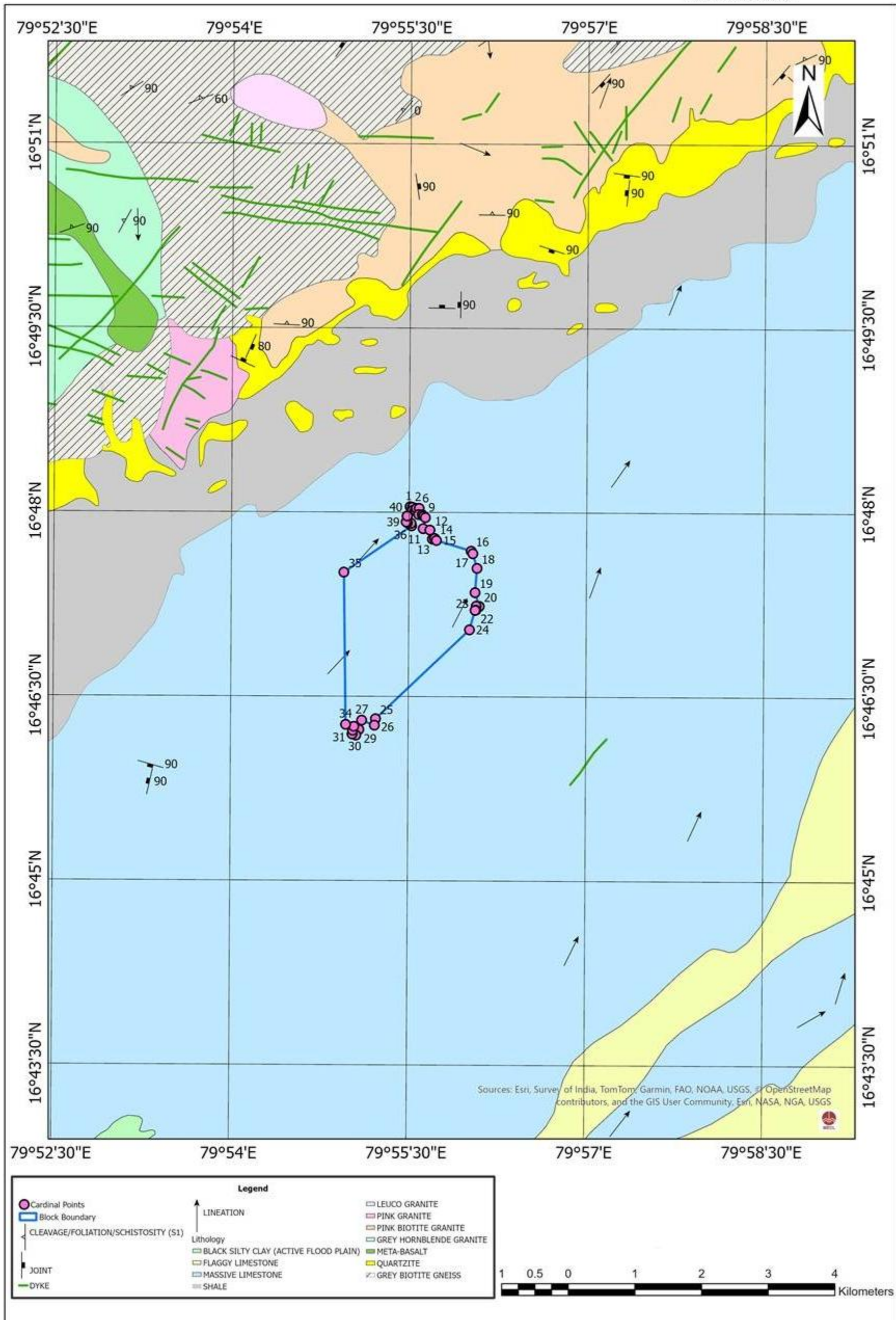
- 7.3.1 The Palnad Sub-basin in Suryapet district, Telangana, is primarily known for its significant limestone resources, with extensive exploration confirming large reserves for cement and other industries. While limestone is the dominant commodity, the basin also shows potential for uranium mineralization, especially unconformity-related, with deposits established in the marginal parts of Srisailem and Palnad Sub-basins, Nalgonda and Guntur districts, Andhra Pradesh.

The uranium mineralisation is mainly localised along fracture zones proximal to basement-cover sediment unconformity and occur as elongated pods, fine veins and cavity and grain boundary fillings. Mineralised zones are invariably associated with significant alteration features like illitisation, chloritisation and kaolinization. Primary uranium ore minerals viz. pitchblende, uraninite and coffinite are found generally associated with sulphides and organic matter. However, there is marginal difference in mineralisation pattern in these Sub-basins as uranium is mainly hosted by granitoids just below the unconformity in Srisailem Sub-basin while it is dominantly associated with cover sediments in Palnad Sub-basin. Recent integrated surface and sub-surface studies have also indicated uranium potential in deeper parts of these Sub-basins. (Ref: P.V. Ramesh Babu, Rahul Banrrjee and K.K. Achar AMD, Hyderabad).

Other minor minerals occurrences might exist, but limestone and uranium are the key mineral focuses. Regional Geological map of Palnadu Sub-basin is provided as Text Figure No.2 & Plate- II.

Regional Geological Map of West of Yepalamadhavaram (G3) Block, Part of Palnad Sub-Basin (GSI), District: Suryapet, Telangana

Source: NGDR & GSI



Text Figure No. 2: Regional Geological Map of West of Yepalamadhavaram Block, Part of Palnad Sub-basin, Suryapet district, Telangana

7.4.0 GEOLOGY OF THE BLOCK

7.4.1 The rock types exposed in the block belongs to the Narji Formation of Kurnool Group of Palnad Basin. The stratigraphic sequence of the litho units exposed in and around the block based on field observations and available data/literature from nearby mine/areas is given in Table No: 7.2. The Topographical and Geological Map on 1: 4000 scale of the West of Yepalamadhavaram Block is enclosed as Plate-III.

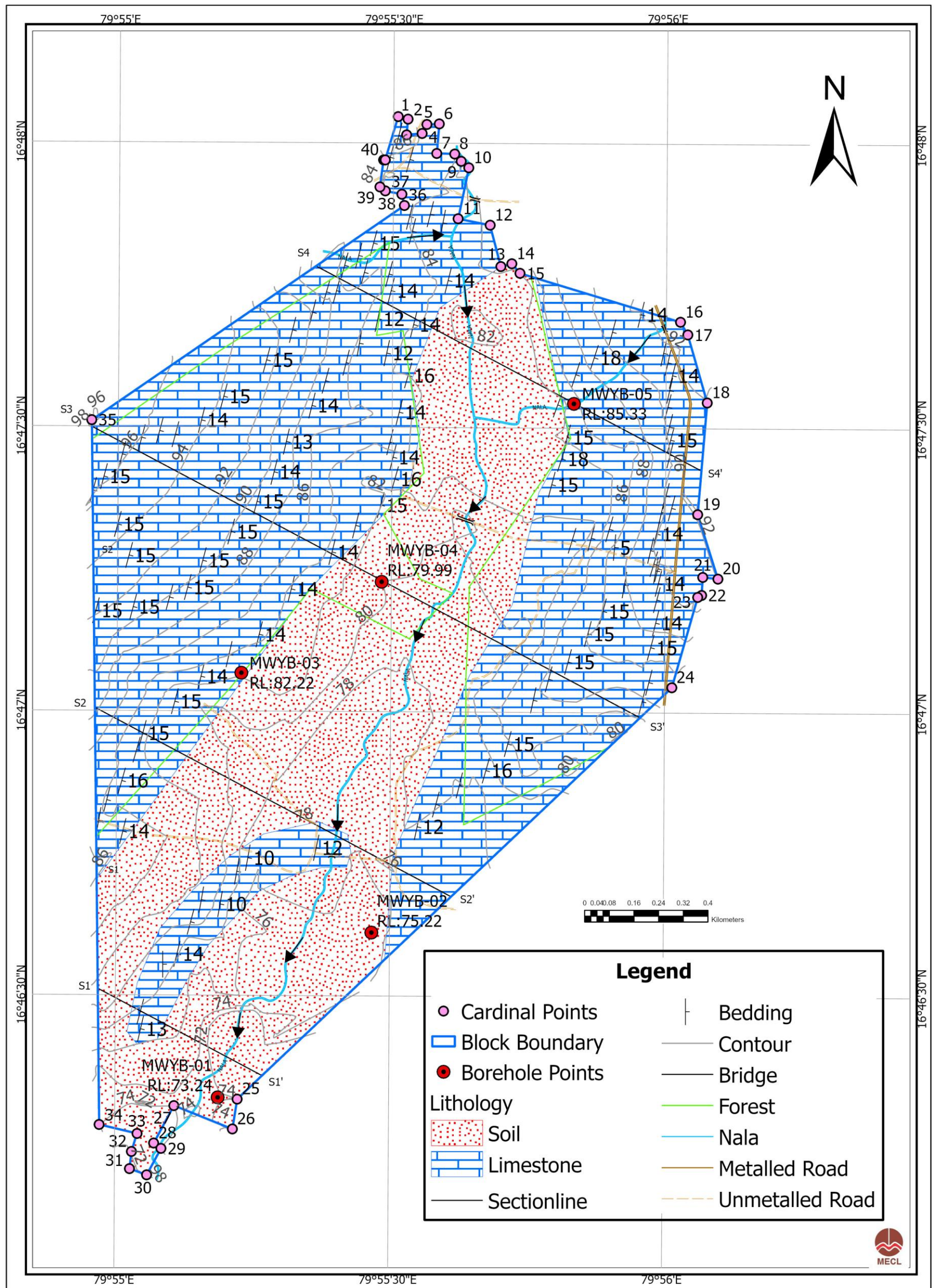
Table No: 7.2

Stratigraphic Sequence of Litho-units exposed in and around the Block

Age	Group	Formation	Litho Units
Quaternary	-	Recent	Top soil (Brown)
Neoproterozoic	Kurnool	Narji Limestone	Upper: Siliceous/flaggy limestone
			Middle: Massive grey limestone
			Lower: Purple shale

Most part of the area has outcrop of mostly massive to flaggy limestone and impure (silicified) limestone of Narji Formation of Kurnool Group. The uniform horizontal to sub horizontal disposition of the sedimentary sequence in the area of investigation indicates that the area has not undergone any major tectonic disturbance. Among the primary sedimentary structures, bedding planes and laminations are common. The secondary structures observed in the area are joints. The generalized strike of the strata is N28°E-S28°W with dips varying 5°-20° towards southeast. Strike & dip recorded on the surface from limestone outcrops are shown on the Topographical and Geological Map (Plate-III).

Topographical & Geological Map of West of Yepalamadhavaram (G3) Block, District: Suryapet, Telangana.



Text Figure No. 3: Topographical and Geological Map of West of Yepalamadhavaram Block, Suryapet district, Telangana

7.5.0 DESCRIPTION OF ROCK TYPES IN THE BLOCK

7.5.1 The recent soil cover about 40% area in central parts of the block. Limestone exposed in almost 60% of the block area in the eastern and western parts of the block. The limestone is greyish white and hard by nature. There is a seasonal stream in the center of the block running north to south and it is tributary to Krishna River. The lithological description of litho-units from top to bottom as obtained from drilled boreholes as well as from nearby mines is given below:

7.5.2 Top Soil

The top soil is brown in colour, fine to silty, friable when dry and sticky when wet. The top soil covers almost entire the block except south east corner of the block. The average soil cover of the block is 2.93m. The thickness of the soil as intersected in boreholes varies from 1.50m (MWYB-03 & MWYB-05) to 6.00m (MWYB-02).

7.5.3 Limestone

Upper Flaggy Limestone: The upper flaggy limestone is thin bedded, light grey to white in colour. The individual thickness of beds varies from few cm to 10cm.

Middle Massive Limestone: Massive limestone is dark grey to light grey in colour, micritic, fine grained and compact. Stylolitic structures are often noticed. All the drilled boreholes intersected massive limestone. The massive grey limestone is Cement Grade to high grade encountered with intermittent parting with Threshold Grade Limestone zone. Over all the cement grade limestone shows +51% CaO, with <8.00% SiO₂ and Threshold Grade Limestone is +41% CaO with <21.00% SiO₂.

7.5.4 Lower Purple Shale

The purple shale constitutes lower most of Narji Formation and it is not exposed in the Block. However, the shale was intersected in Borehole No. MWYB-03 from 44m to 50m., the shale is grey to pinkish grey in colour.



Figure 1: Limestone exposures in Western Part of the Block



Figure 2: Limestone exposures in Western Part of the Block



Figure 3: Limestone exposure in Eastern Part of the Block

7.6.0 STRUCTURAL FEATURES OBSERVED IN THE BLOCK

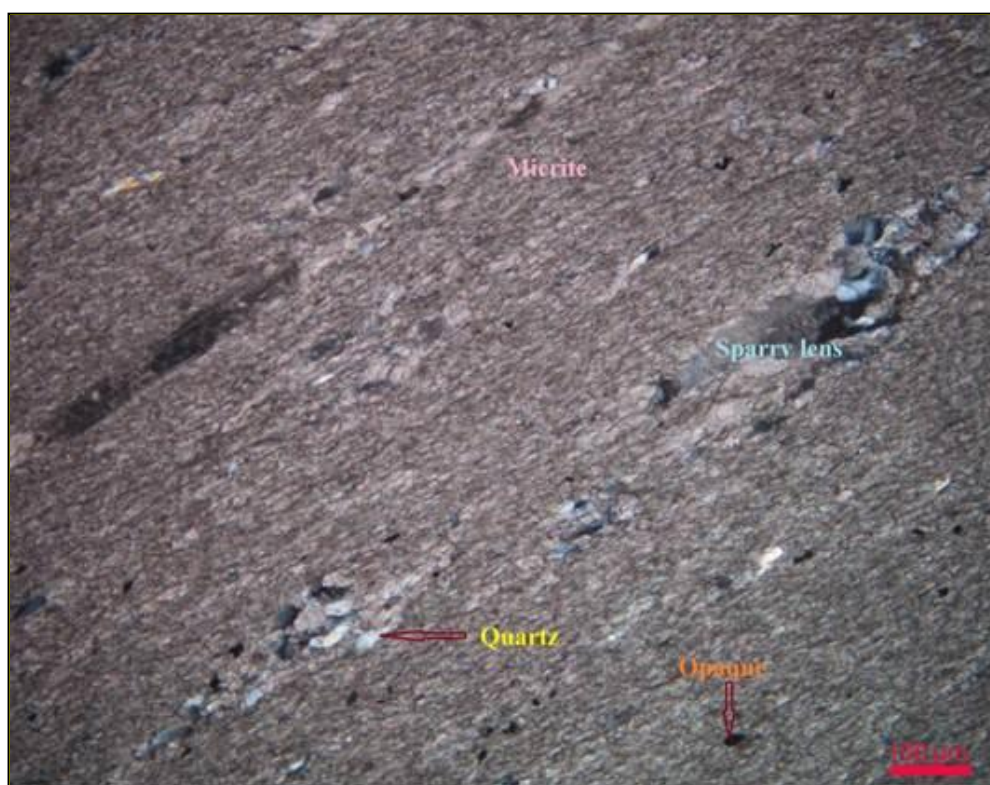
7.6.1 STRUCTURE OF THE BLOCK

The rock formations of the block are horizontally disposed in the south eastern corner and mostly concealed under soil cover in the Block. Generally, limestone beds dip 5° to 20° due SE. Two sets of prominent joints parallel to the bedding and across traverse the rock profusely.

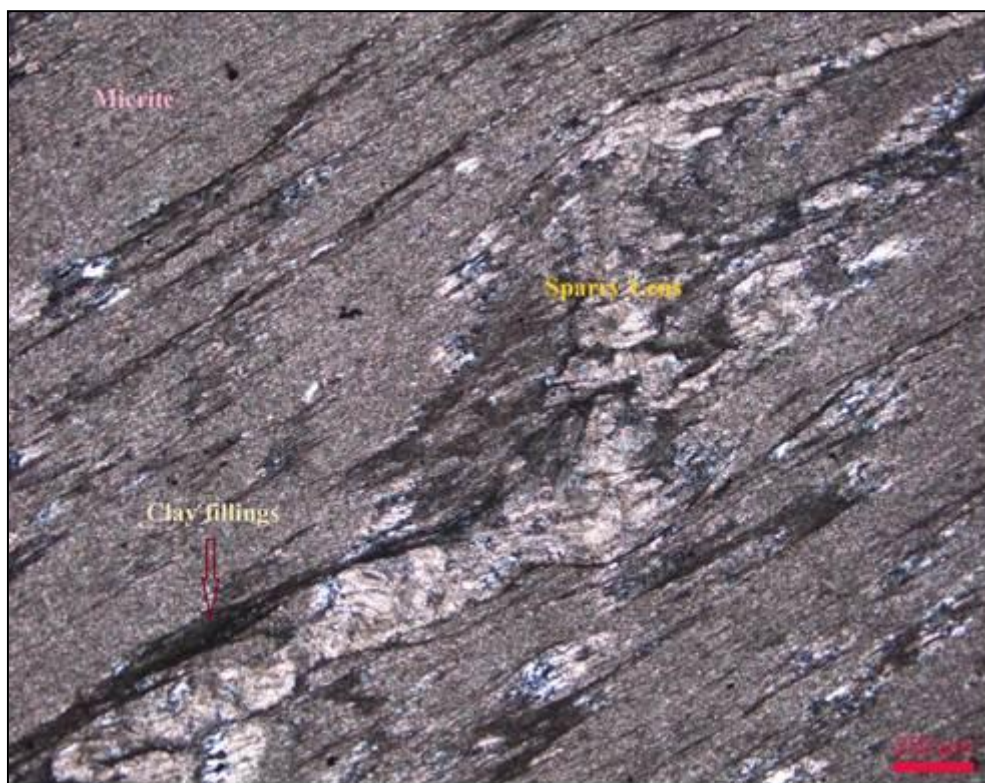
7.7.0 PETROGRAPHIC STUDIES

7.7.1 A total 3 number of core samples, each one from borehole MWYB-02, 04 and 05 are collected and the detailed study report is given in Annexure-V. The summary is tabulated in the following table:

Sl. No.	Sample No.	BH No.	Depth (m)		Thick. (m)	Lithology
			From	To		
1	MWYB-PG-01	MWYB-02	45.00	45.10	0.10	Foliated impure micritic limestone
2	MWYB-PG-02	MWYB-04	20.90	21.10	0.10	Foliated impure micritic limestone
3	MWYB-PG-03	MWYB-05	20.90	21.10	0.10	Foliated impure micritic limestone



Pmg - 1: Photomicrograph showing association and parallel alignment of micrite, sparry lenses and quartz and associated opaque specks within foliated impure micritic limestone are observed under crossed nicols. **Specimen No.:** MWYB-PG-01 **Magnification:** 100X



Pmg - 2: Photomicrograph showing rotational movement of coarse sparry calcite patches/sparry lenses and associated clayey fillings within foliated impure micritic limestone are observed under crossed nicols. **Specimen No.: MWYB-PG-02** **Magnification: 40X**



Pmg - 3: Photomicrograph showing association of micro-crystalline to crystalline aggregates of calcite and very fine silt sized quartz clasts and associated sericite fillings within foliated impure micritic limestone are observed under crossed nicols.

Specimen No.: MWYB-PG-03

Magnification: 100X

7.8.0 MINERALISATION IN THE BLOCK

7.8.1 Massive limestone is dark grey to light grey in colour, micritic, fine grained and compact. Stylolitic structures are often noticed. The intersection of soil cover, Cement Grade Limestone and Threshold Grade Limestone is tabulated below:

Borehole	Soil		Cement Grade Limestone		Threshold Grade Limestone	
	From	To	From	To	From	To
MWYB-01	0.00	3.00	3.00	50.00		
MWYB-02	0.00	5.65	18.00	50.00	5.65	6.77
					9.00	10.50
					14.00	18.00
MWYB-03	0.00	1.50	1.50	41.00	41.00	44.00
MWYB-04	0.00	3.00	3.00	50.00		
MWYB-05	0.00	1.50	1.50	50.00		

The massive grey limestone is Cement Grade to high grade zones with intermittent partitions of Threshold Grade Limestone zones.

CHAPTER - 8

8.0.0 PREVIOUS WORK

8.1.0 DETAILS OF PREVIOUS EXPLORATION CARRIED OUT BY OTHER AGENCIES ARE GIVEN AS BELOW:

- 8.1.1 The block forms part of Palnad Sub-basin and is located in the north-eastern parts of the Cuddappah Basin. The earliest geological account of Palnad Sub-basin was documented by William King (1872).
- 8.1.2 Mukherji and Syed Kazim (1947) of erstwhile Hyderabad Geological Survey carried out geological mapping of Palnad Sub-basin covering parts of Nalgonda district.
- 8.1.3 Systematic geological mapping and mineral investigation in this part of Palnad Sub-basin was carried out by Ziauddin and Sharma (1959-61) Ramalinga swamy, G. (1976-77) has mapped area in parts of Toposheet No. 56P/10. Krupanidhi (1966-67), Nageswara Rao and Varaprasada Rao (1967-68), Chakradhar et. al, (1980-83), Ravindra Babu et. al, (1989), Rama krishnaiah et al, (2012-13), Jagadishwar Babu. K and. Tirumurugan. M. (2013) and Sugathan & Rimpal Kar (2013) have carried out investigation for limestone in parts of Palnad Sub-basin.
- 8.1.4 Mining activities are currently ongoing in surrounding areas and limestone being excavated for manufacturing cement.
- 8.1.5 Two clusters of blocks, namely Mellacheruvu Cluster-2 over an area 14.65 sq.km. were explored by TSMDC with NMET funding. These clusters lie around 2km in southwest direction from the proposed block. Geological Reports (GRs) for both clusters were submitted in January 2020. Exploration drilling comprised four vertical boreholes drilled for 50m depth. The details and results of these boreholes are presented below.

Table 8.1
Details of boreholes drilled in Mellacheruvu Cluster-2, Suryapet dist, Telangana

BH No.	From (m)	To (m)	Thick (m)	SiO₂ (%)	CaO (%)	MgO (%)
MTPCCBH-1	6.00	45.00	39.00	10.21	48.46	0.45
MTPCCBH-2	26.00	50.00	24.00	10.36	47.80	1.26
MTPCCBH-3	7.50	50.00	42.50	9.40	48.28	1.43
MTPCCBH-4	24.75	50.00	25.25	8.89	48.64	1.41

- 8.1.6 Resources of 593 million tonnes with average grade of 46.05% CaO (334) were estimated in Mellacheruvu Cluster-2.

8.1.7 Two cluster of blocks namely Ramapuram Cluster 5 and Dondapadu Cluster 6 were explored by TSMDC through NMET funding and these blocks are located North and South of the proposed block respectively. The GR were submitted in Jan 2020. Two boreholes were drilled in Ramapuram Cluster 5 and four boreholes were drilled in Dondapadu Cluster 6. The details and findings of the boreholes are as follows:

Table 8.2
Details of boreholes drilled in Ramapuram Cluster-5 (RMPCBH) and Dondapadu Cluster-6 (DDPCBH), Suryapet district, Telangana

BH No	RL (m)	Latitude (E)	Longitude (N)	From (m)	To (m)	Thick (m)	SiO ₂ (%)	CaO (%)	MgO (%)
DDPCBH-1	81	80°01'20.19"	16°47'45.90"	16.00	33.00	17.00	18.00	44.06	0.45
				40.00	49.50	9.50	16.19	45.43	0.45
DDPCBH-2	66	80°01'48.37"	16°47'39.50"	29.25	42.75	13.50	16.40	45.35	0.47
				48.00	50.00	2.00	13.36	47.38	0.43
DDPCBH-3	48	80°02'45.19"	16°48'2.73"	34.50	36.00	1.50	16.42	43.93	0.50
DDPCBH-3	49	80°02'46.64"	16°47'37.88"	15.00	29.00	14.00	16.65	44.53	0.62
RMPCBH-1	85	80°01'13.39"	16°50'55.04"	30.75	39.75	9.00	15.96	45.34	0.36
				46.50	50.00	3.50	18.00	44.21	0.38
RMPCBH-1	87	80°01'11.06"	16°50'30.79"	19.00	50.00	31.00	14.39	46.46	0.48

8.1.8 Resources of 675 million tonnes with average grade of 46.05% CaO (334) were estimated in Ramapuram Cluster 5.

8.1.9 Resources of 452 million tonnes with average grade of 44.82% CaO (334) were estimated in Dondapadu Cluster 6

8.1.10 Four limestone blocks i.e. Mukteswarapuram, Pedaveedu East, Pedaveedu West and West of Yepalamadhavaram were approved by NMET in 2025 for G3 level exploration to MECL. These blocks are located in the vicinity of the block area.

8.2.0 PREVIOUS WORK DONE BY MECL

8.1.1 During FS: 2017-2018, MECL carried out G3 level exploration in the adjoining areas covering the Sultanpur, Saidulnama, and Pasupalabodu blocks. The studies established the continuity of limestone formations as well as the resources in these blocks. Among them, the Saidulnama and Sultanpur blocks were subsequently auctioned in 2024. The thickness of limestone intersected in these explorations ranged from 10.5m to 36.0m.

CHAPTER - 9

9.0.0 GEO PHYSICAL EXPLORATION

Geophysical/Geochemical survey was not carried out by MECL and it was also not proposed to the NMET for the approval.

CHAPTER - 10

10.0.0 EXPLORATION UNDERTAKEN DURING CURRENT INVESTIGATION

10.1.0 OBJECTIVES OF INVESTIGATION

The exploration was proposed with following objectives:

- i) To confirm the continuity of limestone occurrences within the Block area by drilling of 5 boreholes in West of Yepalamadhavaram Block at G3 level of exploration to estimate the grade wise limestone inferred resources in the Block area as per UNFC norms of G3 level of exploration.
- ii) To carry out preliminary exploration (G3) as per the Minerals (Evidence and Mineral Contents) Amendment Rules 2021, Mineral Auction Rule 2015 Amended up to 2021, MMDR Amendment Act 2015 in turn to facilitate the State Government (Telangana) for auctioning of the block.

10.2.0 EXPLORATION ACTIVITIES TAKEN UP

After the receipt of approval vide F. No. 117/1/2025-NMET/491, dated 10.11.2025 with an estimated cost of Rs 77.90 lakhs from the National Mineral Exploration and Development Trust (NMEDT). Mineral Exploration & Consultancy Ltd. (MECL) has undertaken exploration activities in the designated areas. The details regarding the nature, scope, and quantum of works completed are presented in **Table No. 10.1** below for West of Yepalamadhavaram Block.

Table No: 10.1
Quantum of Work - Proposed Vs Achieved in West of Yepalamadhavaram Block
Suryapet district, Telangana

Sl. No.	Item of Work	Unit	Target	Achieved
1	Topographic Survey and Geological Mapping on 1:4000 scale	sq.km	4.15	4.16
2	Boundary and borehole demarcation with DGPS	Nos.	41	36
3	Exploratory Drilling *	m	250.00 05 Bhs	250.00 05 Bhs
4	Laboratory Studies			
	i) Chemical Analysis; Primary samples for 10 radicals, CaO, MgO, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , SO ₃ , P ₂ O ₅ , K ₂ O, Na ₂ O & LOI by XRF. (BRS & Core samples)	Nos.	220	220
	ii) External Check (NABL) samples (10% of Primary samples) for analysis of for 10 radicals,	Nos.	22	22

Sl. No.	Item of Work	Unit	Target	Achieved
	CaO, MgO, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , SO ₃ , P ₂ O ₅ , K ₂ O, Na ₂ O & LOI by XRF			
5	Physical Studies			
	a) Bulk Density Determinations	Nos.	2	2
	b) Petrological Studies	Nos.	3	3
	c) Digital Photomicrograph of thin polished Section	Nos	3	3
6	Report Preparation (5 Hard copies with one soft copy)	Nos.	1	1
7	Preparation of Exploration Proposal (5 Hard copies with a soft copy)	Nos.	1	1

* Core drilling was outsourced to M/s Soiltech India Pvt. Ltd. by MECL as per SoC Item Sl. No. 2.2.1.1b in OM order no. F.No. 117/1/2025-NMET/491, dated 10-11-2025 issued by NMEDT.

Exploratory drilling commenced from borehole no. MWYB-01 on 28.01.2026 in West of Yepalamadhavaram Block and was completed with the closure of borehole no. MWYB-05 on 03.03.2026. The allied field-works including surveying, drilling and borehole core logging and core sampling etc. are completed simultaneously. The analytical / laboratory studies are also carried out simultaneously in laboratories of MECL (Primary) and other NABL accredited laboratories, JNARDDC (External check), Nagpur.

10.2.1 Topographical Survey:

The block boundaries of West of Yepalamadhavaram Block is surveyed with the help of DGPS (TRIMBLE make) and topographical survey by total station in WGS-84 datum. Triangulation network has been laid in the explored area (as per proposed boundary coordinates) of 4.16 sq.km. for West of Yepalamadhavaram Block, however the approved block area is 4.15 sq.km. (as per OM). Surface Contouring done at 2m contour intervals along with survey of surface features for West of Yepalamadhavaram Block on 1:4,000 scale. During current exploration boreholes are fixed on the ground. RL's and co-ordinates of survey and exploration points are determined by DGPS survey. The RL and co-ordinates of corner points and boreholes have been determined and are given in Annexure-I-A and I-B respectively.

10.2.2 Geological Mapping

Geological mapping of the West of Yepalamadhavaram Block was carried out on 1:4,000 scale covering an area of 4.16 sq.km. The block area is covered with limestone exposures and soil/alluvium, and the same is marked in the Topographical and Geological Map enclosed as **Plate-III** on 1:4000 Scale for West of Yepalamadhavaram Block.

10.2.3 Exploratory Drilling

Geological logging of borehole cores was properly done along-with all the structural, lithological and mineralogical observations (Annexure-II-A and II-B) Limestone bands have been encountered in all of the 5 boreholes drilled in West of Yepalamadhavaram Block.

Borehole co-ordinates along with RLs have been determined for all the boreholes with the help of DGPS. The drilling commenced on 28.01.2026 from the borehole MWYB-01 and completed with drilling of borehole MWYB-05 on 03.03.2026.

10.3.0. DETAILS OF SURFACE SAMPLING AND DRILLING

10.3.1 Total 220 numbers of primary core samples are generated from the drilled boreholes, which are analysed at Chemical Lab, MECL, Nagpur for 10 radicals i.e., CaO, MgO, SiO₂, Fe₂O₃, Al₂O₃, SO₃, P₂O₅, K₂O, Na₂O & LOI by XRF method, compiled as Annexure-III-A.

10.3.2 10% samples of primary drill core samples, about 22 nos. samples were analysed at JNARDDC Lab, Nagpur for external check analysis for 10 radicals i.e. CaO, MgO, SiO₂, Fe₂O₃, Al₂O₃, SO₃, P₂O₅, K₂O, Na₂O & LOI by XRF, enclosed as Annexure-III-B.

10.3.3 A total of 3 nos. of samples were studied for petrological study and 2 nos. of samples for bulk density determination their results are enclosed as Annexure-V and VI respectively.

CHAPTER - 11

11.0.0 LOCATION DATA POINTS

11.1.0 ACCURACY AND QUALITY OF SURVEY USED TO LOCATE BLOCK BOUNDARY AND DRILL HOLES

11.1.1 The West of Yepalamadhavaram Block area (4.16 sq.km.) is located north of Krishna River in Suryapet district, Telangana and covered under Survey of India Toposheet No 56P/13. The block area is located less than one km towards western direction from Yepalamadhavaram village. The West of Yepalamadhavaram Block is moderately well connected by road and rail networks to the nearest towns and cities.

11.1.2 The topographical survey, borehole location and block boundary demarcation in this Block has been carried out by the GNSS DA2 Catalyst Instrument.

11.1.3 The Survey of India (SOI) base station was utilized for Topographical survey, Borehole locations and Block Boundary points demarcation. The base stations used from the Survey of India CORS network named '*NIDA*' through online GNSS Post processing method.

The coordinates of the SOI base station are provided in **Table No: 11.1**.

Table-11.1
The R.L & Coordinates of the SOI CORS Base Point

Base Station	Latitude	Longitude	Easting (m)	Northing (m)	RL (m)
SURVEY OF INDIA BASE STATION - <i>NIDA</i>	N16°49'19.50971"	E79°22'04.96052"	1860590.317	326106.609	141.644

11.1.4 TECHNICAL SPECIFICATIONS OF DGPS

- **Make:** Trimble GNSS
- **Model:** DA-2 Catalyst
- **Year:** 2025

Measurement Accuracy:

- Static Mode
 - Horizontal: 10 mm + 0.1 ppm or better
 - Vertical: 20 mm + 0.4 ppm or better

11.1.5 Baseline Processing Results:

36 out of 41 boundary corner points (5 points not fixed because these points are falls in waterbody) and 5 borehole points have been fixed by MECL as part of the present G3 stage exploration. Co-ordinates & Reduced level (RL) of the boreholes are given in **Annexure-I-A & Annexure-I-B** and also shown in **Plate-III**.

11.2.0 QUALITY AND ADEQUACY OF TOPOGRAPHIC CONTROL

11.2.1 The survey work has been carried out with the help of DGPS(GNSS) for higher level measurement accuracy. A point list was then generated as .csv file for topographical points and summary was attached along with report. The baseline processing results are also enclosed with this report. Survey work carried out by the experienced qualified surveyor as per the prevailing standard procedures.

CHAPTER - 12

12.0.0 SAMPLING TECHNIQUES

12.1.0 NATURE AND QUALITY OF SAMPLING AND MEASURES TAKEN TO ENSURE SAMPLE REPRESENTATIVITY

12.1.1 The sampling and analyses have been carried out for the entire mineralized zones/length encountered in bed rocks and boreholes drilled on visual identification basis. The primary samples have been marked in the mineralized zones based on type and concentration of mineralisation/lithology and in general the sample length has been kept as 1.00m to 2.00m which varies in some instances because of variation in lithology and type and concentration of mineralisation. The mineralized core has been split into two equal halves in such a way that the concentrations of ore minerals are uniform in both the equal halves. One half of the core sample has been crushed to (-) 200 mesh size. By progressive coning and quartering and repeatedly mixing the sample has been reduced to 600g. A representative sample of 200g has been collected and analyzed for CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, Na₂O, SO₃, P₂O₅, K₂O and LOI at Chemical Laboratory of MECL, Nagpur.

12.2.0 NATURE, QUALITY AND APPROPRIATENESS OF THE SAMPLE PREPARATION TECHNIQUE

12.2.1 The details of sampling procedure for primary samples are described in Para 12.1.1. Quality of the sample preparation is maintained by proper cleaning, maintenance of the equipment and proper crushing, sieving and coning and quartering of samples. For sample preparation proper technique and expertise has been used.

12.3.0 QUALITY CONTROL PROCEDURES ADOPTED

12.3.1 The primary core samples have been collected from entire mineralized zones/length intersected in the boreholes drilled and the samples have been prepared at centralized mechanized sampling unit. The standard sampling procedure in supervision of qualified sampling technician has been adopted to control the quality of samples. Similarly, internal check and external check samples have also been prepared under the supervision of qualified sampling technician following the standard sampling procedure.

12.4.0 MEASURES TAKEN TO ENSURE THE SAMPLING IS REPRESENTATIVE OF THE IN-SITU MATERIAL COLLECTED

- 12.4.1 All the primary samples have been marked and prepared from limestone cores. During the preparation of primary samples, the mineralised cores have been studied meticulously and samples have been marked properly. These mineralised cores are subjected for preparation of primary samples as per the sampling procedure for primary samples are described in Para 12.1.1. The proper marking of primary samples from drilled cores and following standard procedure for sample preparation shows the representative samples have been collected from the in-situ materials.

12.5.0 WHETHER SAMPLE SIZES ARE APPROPRIATE TO THE GRAIN SIZE OF THE MATERIAL BEING SAMPLED

- 12.5.1 The primary samples have been prepared (-) 200 mesh size and all the other samples have been prepared from primary samples. As per the previous studies in the area, (-) 200 mesh size is appropriate for the analysis of limestone mineralization in the block area.

CHAPTER - 13

13.0.0 DRILLING TECHNIQUES AND DRILL SAMPLING EMPLOYED

13.1.0 DRILLING TYPES AND DETAILS

The core drilling work was out sourced to M/s Soiltech India Pvt. Ltd. A total of 5 nos. of boreholes were drilled with a cumulative meterage of 250 m and other associated geological, analytical works in the West of Yepalamadhavaram Block. The details of boreholes are given in Annexure-I-B and summary of boreholes is given in Table-13.1.

Table No. 13.1

**Details of Co-ordinates (in WGS-84), Reduced Levels of
boreholes drilled in West of Yepalamadhavaram Block**

Sl. No.	Borehole No.	Easting (m)	Northing (m)	RL (m)	Date of Commencement	Date of Closure	Total Depth (m)
1	MWYB-01	384875.972	1854646.695	73.235	28.01.2026	31.01.2026	50.00
2	MWYB-02	385374.649	1855180.923	75.220	20.02.2026	24.02.2026	50.00
3	MWYB-03	384952.934	1856023.439	82.220	25.02.2026	28.02.2026	50.00
4	MWYB-04	385408.193	1856318.086	79.993	25.02.2026	27.02.2026	50.00
5	MWYB-05	386032.014	1856894.929	85.330	01.03.2026	03.03.2026	50.00
Total Drilling Meterage							250.00

13.1.2 The Drilling operation in the block was performed by skid mounted Voltas 90 Drill Rig. All the boreholes in the block are drilled in NQ size with double tube barrel wire line, wet core drilling method. Initially 0.00 m to 6.00m HW casing was set in each borehole by using HW casing short piece. After setting HW casing, drilling advanced in NQ size till to the total depth of each borehole.

Drilling was done by NQ Diamond bit, (Hyden, Sandwik) till closure of the borehole.

13.1.3 The quality of drilling was ensured during the operation. After closure, all the boreholes have been properly plugged and sealed with cement pillars.

13.2.0 DEVIATION SURVEY IN DRILLING

13.2.1 All the exploratory boreholes drilled in the Block are vertical and drilled up to 50m depth in each of boreholes MWYB-01, 02, 03, 04 and 05. Since the boreholes are vertical and depth is shallow, there is least chance of deviation occurred. Hence, deviation survey was not performed for the boreholes.

13.3.0 WHETHER CORE AND CHIP SAMPLE RECOVERIES HAVE BEEN PROPERLY RECORDED AND RESULTS ASSAYED

- 13.3.1 The core samples have been recorded properly and the detailed run wise lithologs and summarized concise lithologs for boreholes are given in Annexure-II-A and Annexure-II-B respectively. The logging of run wise core as well as the cuttings from boreholes has helped in discerning the physical characters like colour, shape, size and nature of the mineralisation as well as texture, structural features and identification of different litho units.
- 13.3.2 Core recovery with reference to the lithologies are properly recorded and presented in Annexure-II-A.
- 13.3.3 The mineralised zones /length recorded during the geological core logging have been sampled for limestone analysis consisting 10 radicals i.e., CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, Na₂O, SO₃, P₂O₅, K₂O and LOI at Chemical Laboratory of MECL, Nagpur. The primary sample had been marked in the mineralized zones intersected in the borehole based on visual inspection/lithology and in general the sample length has been kept as 1m to 2m, which varied in some instances because of variation in lithology and type and concentration of mineralisation. The details of analysis of primary core samples are given in Annexure-III-A.

13.4.0 MEASURES TAKEN TO MAXIMIZE SAMPLE RECOVERY AND ENSURE REPRESENTATIVE NATURE OF THE SAMPLES

- 13.4.1 The drilling has been done by NQ size diamond drill bit with single barrel wire line, wet core drilling method. Initially 0m to 6m HW casing was set in each borehole by using HW casing short piece. After setting HW casing, drilling advanced in NQ size till NW casing was set in the drilled ranging from 10m to 25m depending on the formation of the boreholes. The polymer was used as drilling fluid to flush out the cuttings and stabilize the borehole wall. The drilling fluid also works as a coolant to avoid burning of drill bits. Proper core recovery of more than 90% was maintained in limestone by using double tube core barrel, However in case of weathered, loose and fractured zone and in solution cavities, the core recovery was low. Whenever core recovery is less, the grade of the recovered portion has been extrapolated over the non-recovered section. However, all the precautions like modulated water pressure, proper liner, optimum head pressure and the hands of an expert drilling technician had been taken to maintain the quality of drilling.

13.5.0 CORE LOGGING

13.5.1 The core recovered by drilling was logged systematically in detail describing lithological units with mineralisation details that can be observed by visual inspection. The details of lithology, grain size, colour, texture, structural features, presence of intercalations and cavities have been recorded. Wherever the recovery is less than 100%, extrapolations of drilled depth were done on proportionate basis considering the physical characteristics of individual units recovered. All the cores were kept and preserved properly in the GI core boxes of specifications given by NMEDT following “Book pattern”. The detailed run wise lithologs and summarized lithologs for boreholes are given in Annexure- II-A and Annexure-II-B respectively.

Core Photographs:

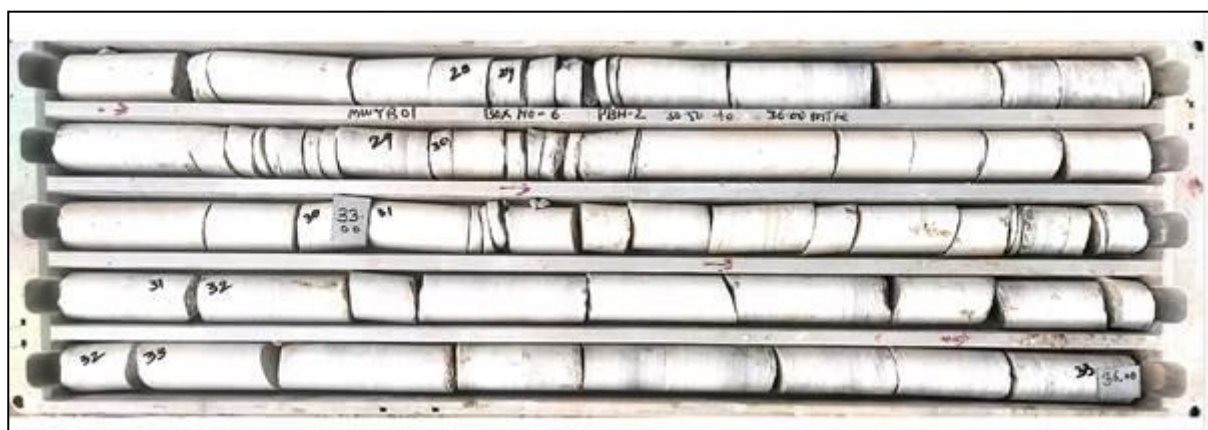


Figure 4: Limestone zone of borehole no. MWYB-01 from 30.50m to 36.00m



Figure 5: Limestone zone of borehole no. MWYB-01 from 36.00m to 41.40m



Figure 6: Limestone zone of borehole no. MWYB-02 from 26.90m to 31.00m

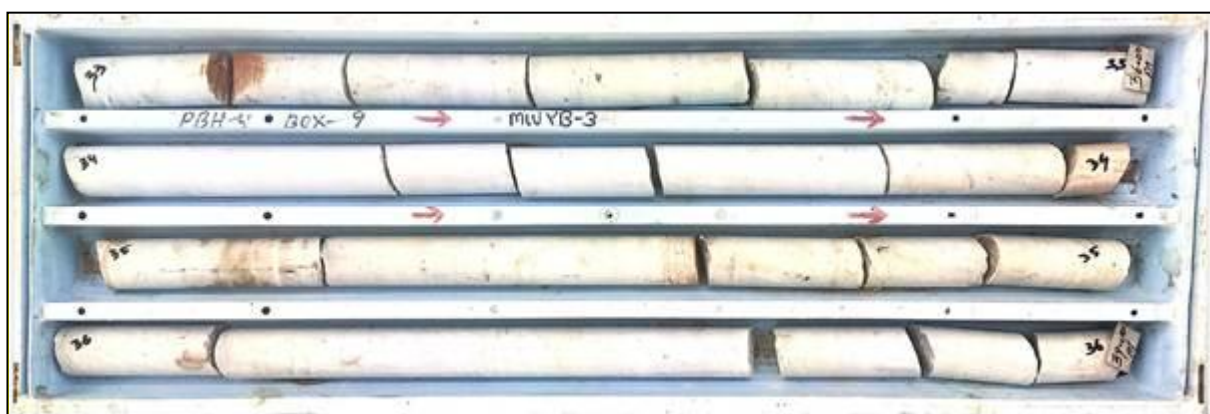


Figure 7: Limestone zone of borehole no. MWYB-03 from 35.00m to 39.00m

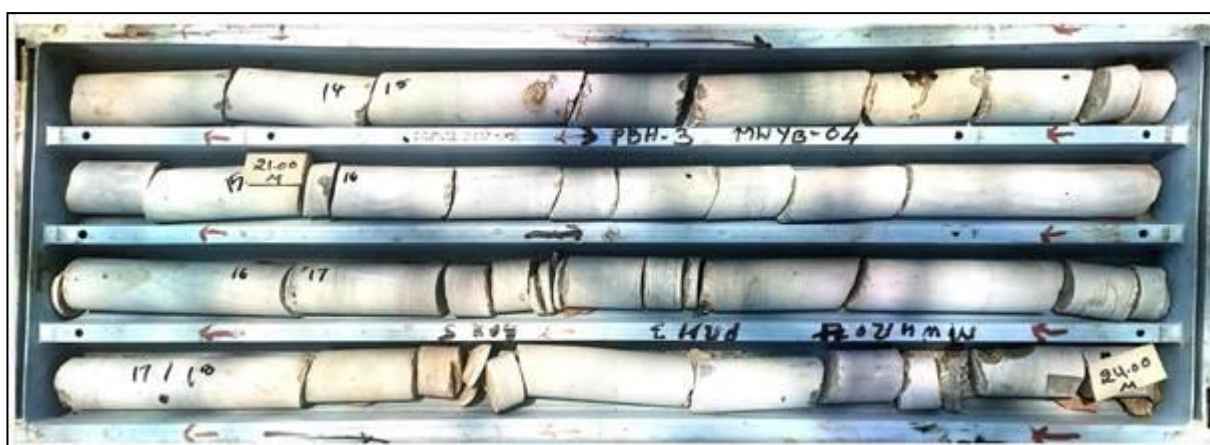


Figure 8: Limestone zone of borehole no. MWYB-04 from 19.80m to 24.00m

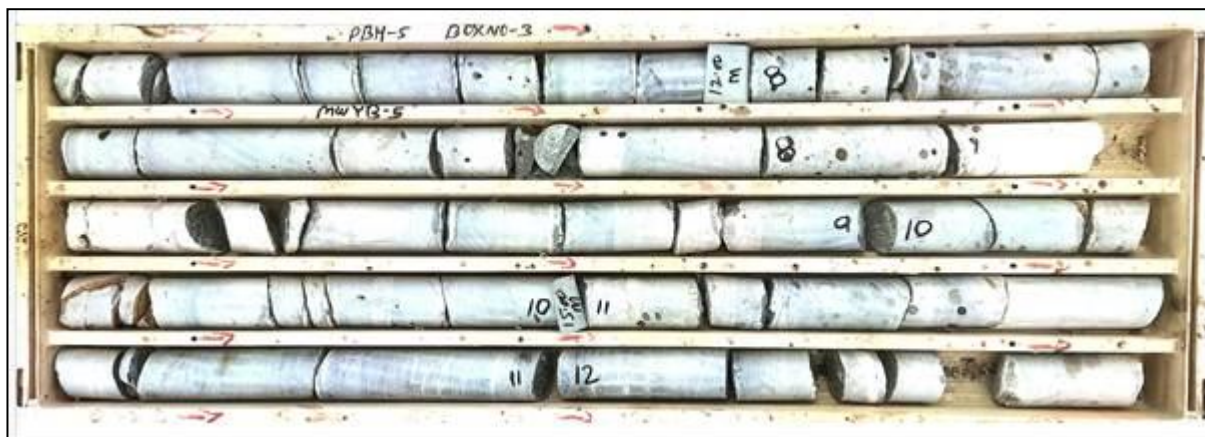


Figure 9: Limestone zone of borehole no. MWYB-05 from 11.35m to 16.70m



Figure 10: Limestone zone of borehole no. MWYB-05 from 16.70m to 21.80m

CHAPTER - 14

14.0.0 SUB SAMPLING TECHNIQUES AND SAMPLE PREPARATION

14.1.0 WHETHER CUT OR DRAWN AND WHETHER QUARTER, HALF OR ALL CORE TAKEN

- 14.1.1 The core sampling and chemical analysis of core samples have been carried out for entire mineralized zones/length intersected in the boreholes drilled. Samples are marked in limestone zones on the basis of visual inspection. The mineralized core has been split into two equal halves by core splitter in such a way that the concentrations of ore minerals are uniform in both the equal halves. The whole quantity of half portion of the sample was crushed to (-) 200 mesh and about 600g representative sample of was drawn by coning and quartering method of gradual size reduction with the help of crusher and pulveriser. Two sample pouches weighing samples 200g each were drawn, one of which was analysed for limestone analysis of 10 radicals CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, Na₂O, SO₃, P₂O₅, K₂O and LOI were analysed in at Chemical Laboratory of MECL, Nagpur and external check samples were analysed in Jawaharlal Nehru Aluminium Research Development and Design Centre (JNARDDC), Nagpur (NABL accredited Laboratory). The remaining 200g fraction was kept for future purpose including composite sample analysis etc.

14.2.0 NATURE, QUALITY AND APPROPRIATENESS OF THE SAMPLE PREPARATION TECHNIQUE

- 14.2.1 Quality of the sample preparation is maintained by proper cleaning, maintenance of the equipment and proper crushing, sieving and coning and quartering of samples. For sample preparation, proper technique and expertise has been used.

14.3.0 QUALITY CONTROL PROCEDURES ADOPTED

- 14.3.1 The primary core samples have been collected from entire mineralized zones/length intersected in the boreholes drilled and the samples have been prepared at centralized mechanized sampling unit, MECL, Nagpur. The standard sampling procedure in supervision of qualified sampling technician has been adopted to control the quality of samples. Similarly external check samples have also been prepared under the supervision of qualified sampling technician following the standard sampling procedure and analysed at NABL accredited external lab.

14.4.0 MEASURES TAKEN TO ENSURE THE SAMPLING IS REPRESENTATIVE OF THE INSITU MATERIAL COLLECTED

- 14.4.1 All the primary samples have been marked and prepared from mineralised cores. During the preparation of primary samples, the mineralised cores have been studied meticulously and samples have been marked properly. These mineralised cores are subjected for preparation of primary samples as per the sampling procedure for primary samples are described in Para 14.1.0. The proper marking of primary samples from drilled cores and following standard procedure for sample preparation shows the representative samples have been collected from the in-situ materials.

14.5.0 WHETHER SAMPLE SIZES ARE APPROPRIATE TO THE GRAIN SIZE OF THE MATERIAL BEING SAMPLED

- 14.5.1 The primary samples have been prepared (-) 200 mesh size and all the other samples have been prepared from primary samples. As per the previous studies in the area (-) 200 mesh size is appropriate for the analysis of limestone etc. mineralization in the block area.

CHAPTER - 15

15.0.0 QUALITY OF ASSAY DATA AND LABORATORY TESTS

15.1.0 THE NATURE, QUALITY AND APPROPRIATENESS OF THE ASSAYING AND LABORATORY PROCEDURES

15.1.1 The primary samples from limestone mineralization have been analyzed for 10 radicals i.e., CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, Na₂O, SO₃, P₂O₅, K₂O and LOI in Chemical Laboratory of MECL, Nagpur and external check samples for same 10 radicals analysed at Jawaharlal Nehru Aluminium Research Development and Design Centre, (JNARDDC), Nagpur a NABL accredited Laboratory.

15.2.0 STANDARD OPERATING PROCEDURE (SoP) FOR THE ANALYSIS BY JNARDDC, NAGPUR

CHEMICAL ANALYSIS

- 1. Pellet Method (using XRF)**
- 2. XRF (model Axiosm Ax, (Analytical make)**
- 3. CRM used- NCSDC-16006**

Procedure for Preparation of Pellets by Hydraulic Press:

For XRF measurement a sample must be homogenized, pulverized to -100 mesh and pressed into pellet.

- (i) Weigh accurately 5 gms of sample and used 10 gms of boric acid as a binder
- (ii) Press the sample at a pressure of around 20-22 tons on a hydraulic press (Pellet Making Machine) with a diameter of 40 mm
- (iii) Calibrate the XRF equipment using known standards for elements present in limestone (Calcium, Magnesium etc)
- (iv) Ensure the instrument is set up correctly according to standard guidelines
- (v) Place the prepared pellet into the sample holder
- (vi) Ensure the sample cup is positioned correctly in the instrument for carrying out analysis
- (vii) Start the XRF analysis using software and initiate the analysis process automatically
- (viii) Allow the XRF instrument to scan the sample. It will emit X-rays onto the sample, causing the atoms to emit fluorescence

- (ix) Record the results in a report, including elemental concentrations and any relevant information about the analysis conditions
- (x) Intermediate check also performed using bead with inbuilt software

LOSS ON IGNITION

WCL procedure for determination of LOI:

Weighed quantity of sample (duly dried at 110°C) is placed in platinum crucible and heated to 1000°C for about an hour. Sample is again weighed after it is cooled. Difference in weight expressed in percentage as LOI.

15.3.0 STANDARD OPERATING PROCEDURE (SoP) FOR THE ANALYSIS BY MECL LAB, NAGPUR.

15.3.1 SOP OF ANALYSIS BY XRF

Sample Particle Size:

The Sample is ground to a particle size <75µm, but <50µm is ideal.

Sample preparation: Pellets preparation

The process of making pressed pellets for XRF analysis includes grinding the sample to fine particle size and pressing the sample at pressure of between 15 to 35 tons.

Instrumentation:

1. X-ray irradiates the sample.
2. Sample emits secondary X-ray characteristic of a particular element.
3. Analyzing sample rotates to accurately diffract each wavelength and satisfy Bragg's Law.
4. Detector measures position and intensity of XRF peaks

Photograph of WD-XRF instrument (Rigaku, Japan) at Chemical Lab, MECL, Nagpur have been represented in photo 15.



Figure 11: Photographs showing WD-XRF instrument (Rigaku, Japan) at Chemical Lab, MECL, Nagpur

Photo - 12: Photographs showing WD-XRF instrument (Rigaku, Japan) at Chemical Lab, MECL, Nagpur

15.3.2 STANDARD OPERATING PROCEDURE (SoP) FOR THE DETERMINATION OF LOSS ON IGNITION (L.O.I.) AT MECL LAB

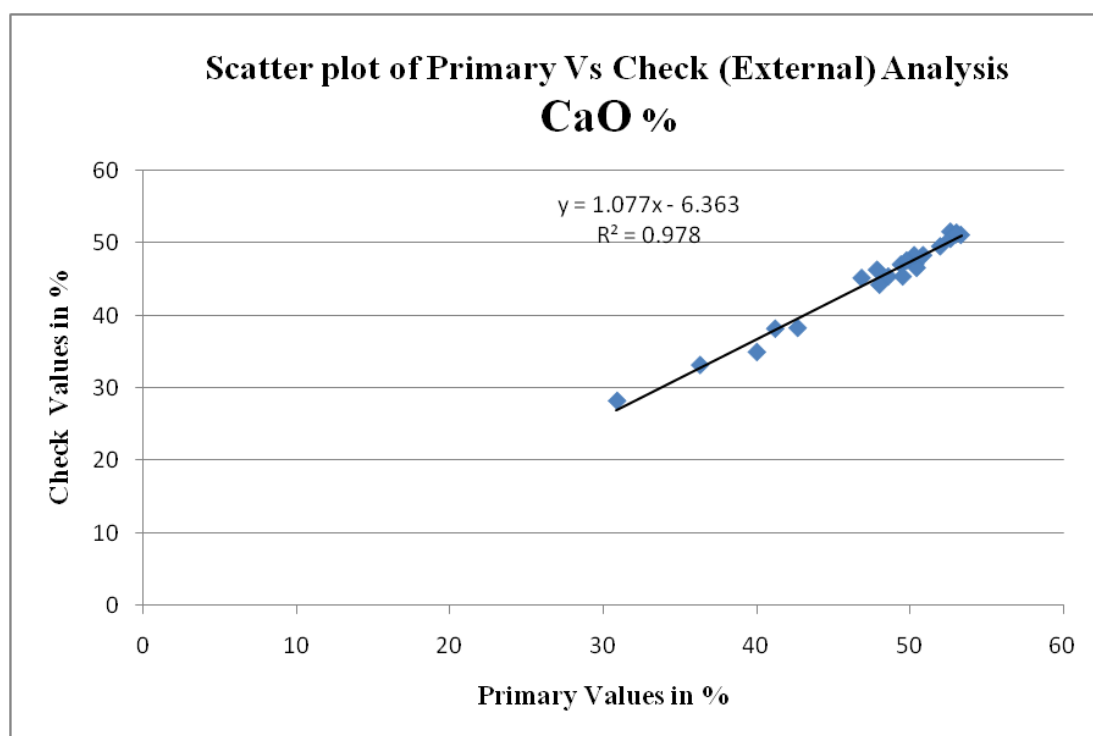
Procedure

1. Weigh 1 g of dry sample in silica or platinum crucible.
2. Place this crucible in muffle furnace at a temperature below 300°C. Raise the temperature of the furnace to 1000°C. Keep this at this temperature for about 30 minutes.
3. Cool the crucible in desiccators and weigh the crucible.
4. Find the loss in weight.
5. % Loss on Ignition (LOI) = $\left(\frac{\text{Loss in weight}}{\text{Sample Weight}} \right) \times 100$

15.4.0 NATURE OF QUALITY CONTROL PROCEDURES ADOPTED

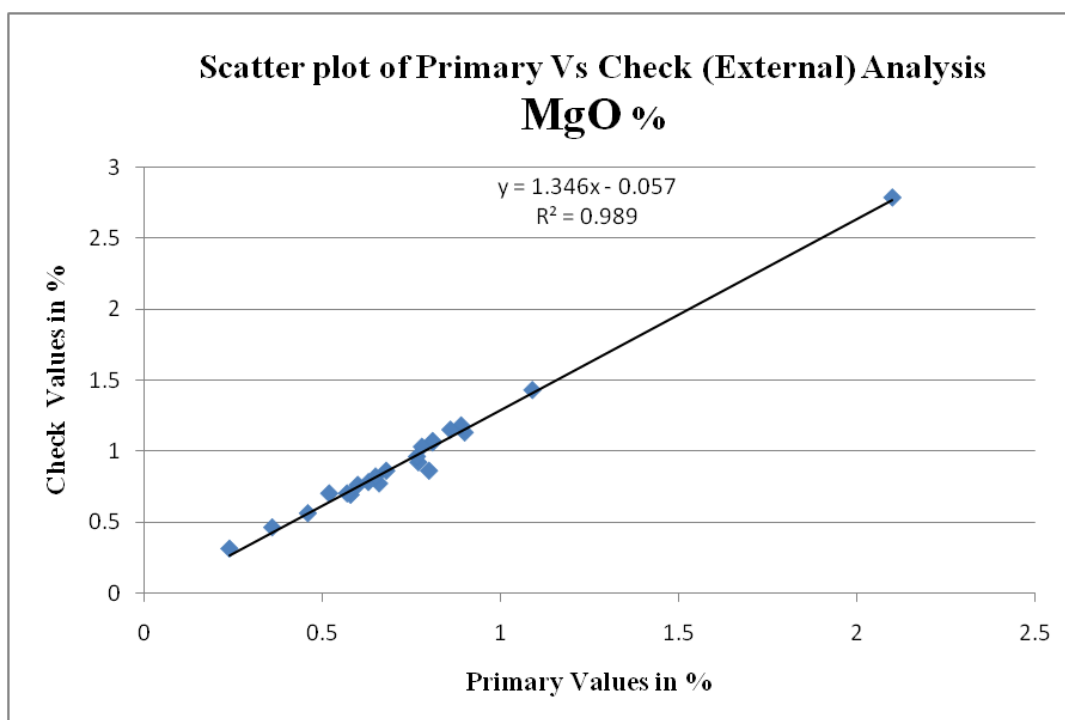
15.4.1 In order to ensure the accuracy of the analyzed samples, **NCSDC-16006** has been used as certified reference material. The Certified Reference Material (CRM) was processed under similar conditions as samples and run after every 20 samples.

15.4.2 A total 22 nos. of external check samples analysed at JNARDDC, Nagpur for 10 radicals i.e. CaO, MgO, SiO₂, Fe₂O₃ and Al₂O₃. The analytical results of external check samples are provided in Annexure-III-B and comparison of primary vs external check sample analysis attached as Annexure-III-C. Statistical comparison has been furnished in the following figures and corresponding tables:



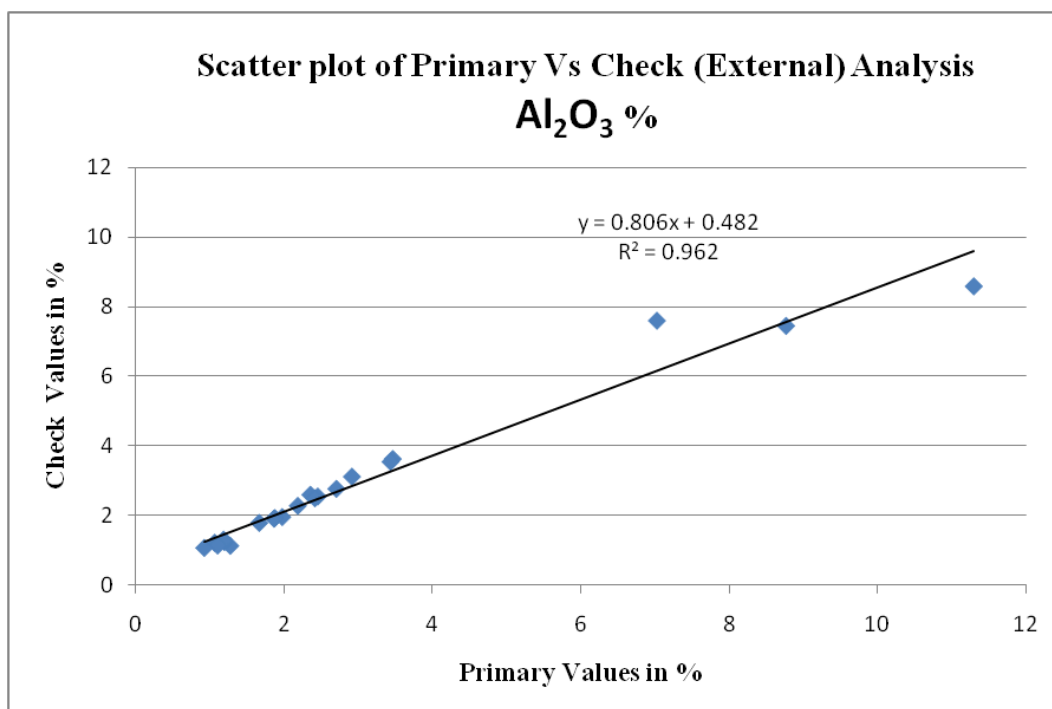
COMPARISON OF PRIMARY Vs. EXTERNAL CHECK ANALYSIS

COMPARISON INDEX	CaO %	
	Primary	Check
No. of Sample Pairs	22	
Arithmetic Mean	47.727	45.049
Standard Deviation	5.802	6.318
Std. Error of Mean	1.237	1.347
Variance	33.668	39.923
Mean of Deviation	2.678	
Standard Deviation (Error)	1.027	
Correlation Coefficient	0.989	
Mean Absolute Error	2.678	
Mean Relative Random Error	5.611%	
Paired T value	12.232	
F - test value	0.843	



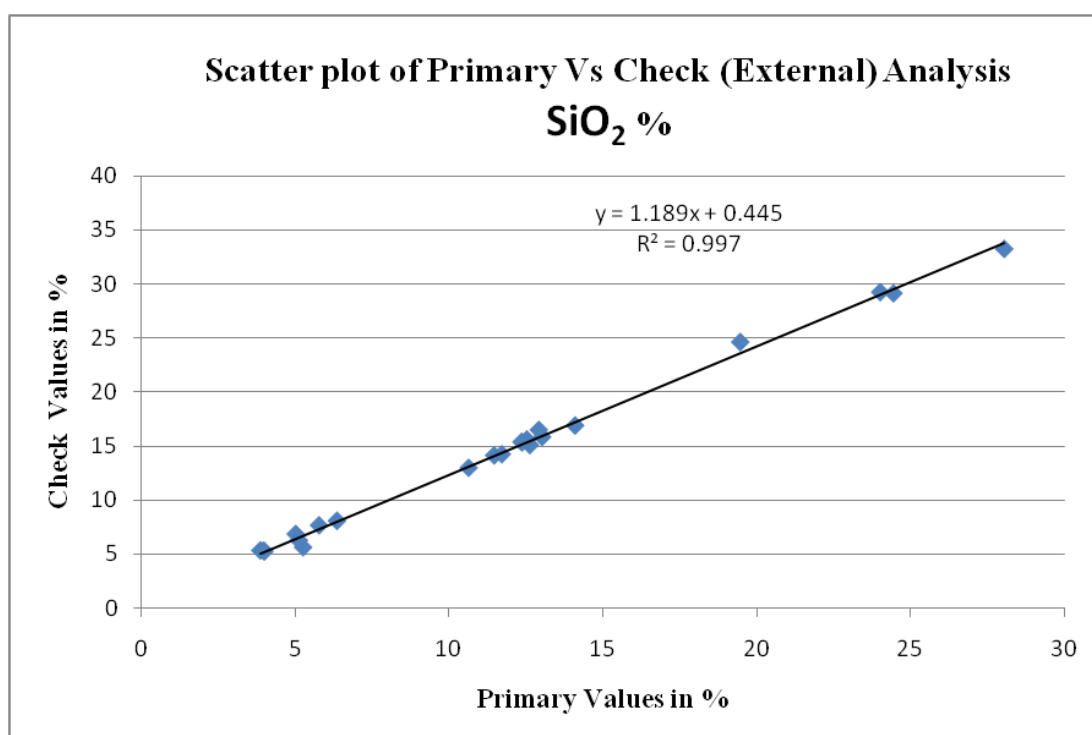
COMPARISON OF PRIMARY Vs. EXTERNAL CHECK ANALYSIS

COMPARISON INDEX	MgO %	
	Primary	Check
No. of Sample Pairs	22	
Arithmetic Mean	0.751	0.954
Standard Deviation	0.349	0.472
Std. Error of Mean	0.074	0.101
Variance	0.122	0.223
Mean of Deviation	-0.203	
Standard Deviation (Error)	0.13	
Correlation Coefficient	0.995	
Mean Absolute Error	0.203	
Mean Relative Random Error	27.012%	
Paired T value	-7.327	
F - test value	0.546	



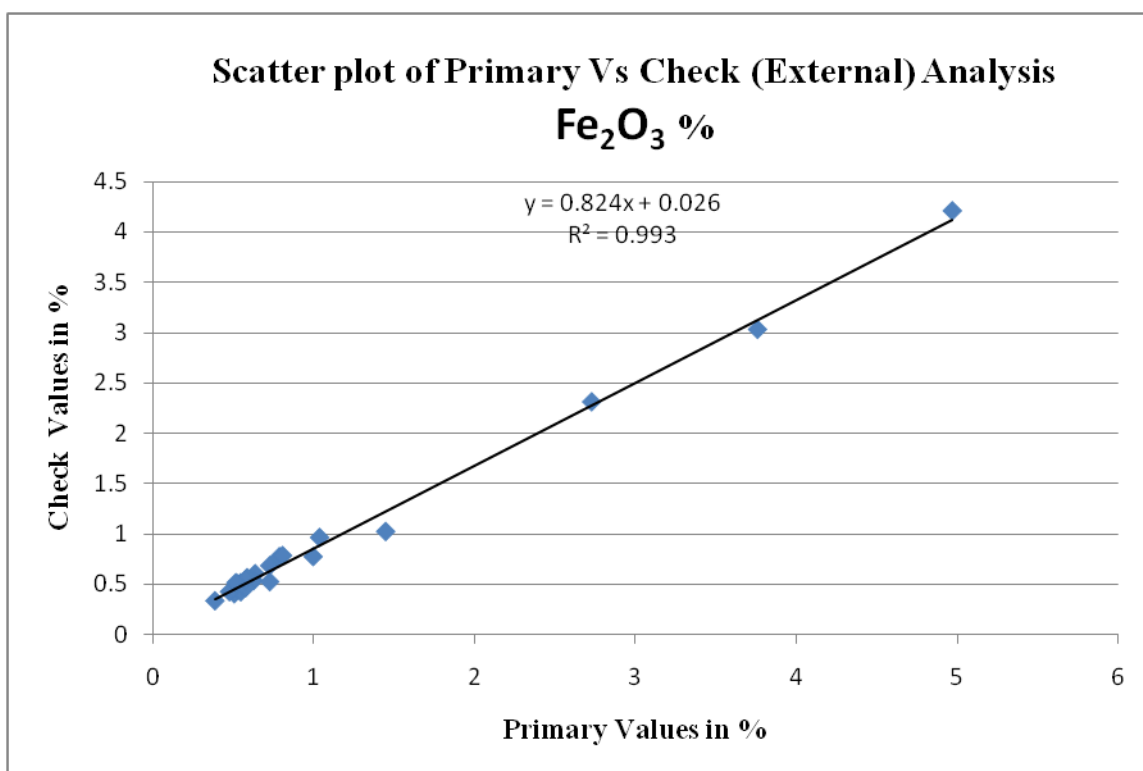
COMPARISON OF PRIMARY Vs. EXTERNAL CHECK ANALYSIS

COMPARISON INDEX	Al ₂ O ₃ %	
	Primary	Check
No. of Sample Pairs	22	
Arithmetic Mean	2.919	2.837
Standard Deviation	2.613	2.149
Std. Error of Mean	0.557	0.458
Variance	6.827	4.617
Mean of Deviation	0.082	
Standard Deviation (Error)	0.656	
Correlation Coefficient	0.981	
Mean Absolute Error	0.298	
Mean Relative Random Error	10.215%	
Paired T value	0.585	
F - test value	1.479	



COMPARISON OF PRIMARY Vs. EXTERNAL CHECK ANALYSIS

COMPARISON INDEX	SiO ₂ %	
	Primary	Check
No. of Sample Pairs	22	
Arithmetic Mean	11.78	14.456
Standard Deviation	6.835	8.14
Std. Error of Mean	1.457	1.736
Variance	46.714	66.265
Mean of Deviation	-2.676	
Standard Deviation (Error)	1.365	
Correlation Coefficient	0.999	
Mean Absolute Error	2.676	
Mean Relative Random Error	22.72%	
Paired T value	-9.199	
F - test value	0.705	



COMPARISON OF PRIMARY Vs. EXTERNAL CHECK ANALYSIS

COMPARISON INDEX	Fe ₂ O ₃ %	
	Primary	Check
No. of Sample Pairs	22	
Arithmetic Mean	1.116	0.947
Standard Deviation	1.149	0.95
Std. Error of Mean	0.245	0.203
Variance	1.32	0.903
Mean of Deviation	0.17	
Standard Deviation (Error)	0.215	
Correlation Coefficient	0.997	
Mean Absolute Error	0.17	
Mean Relative Random Error	15.187%	
Paired T value	3.704	
F - test value	1.462	

15.4.3 It has been observed that:

- i) The scatter plots clearly show scatter of values along a band closely following the bisector.
- ii) The arithmetic means of principal and check assays show an excellent agreement for all the radicals.
- iii) The correlation coefficient, which is an index assays showing value for CaO% 0.989, MgO% 0.995, Al₂O₃% 0.981, SiO₂% 0.999 and Fe₂O₃% 0.997, which

implies excellent/agreement for the dataset of primary and check analysis of radicals.

15.5.0 SECURITY AND CHAIN OF CONTROL OF SAMPLES SHOULD BE CLEARLY MENTIONED

15.5.1 The samples have been prepared at centralized mechanized sampling unit with proper labelling and tag and sent to chemical laboratory in supervision of qualified sampling technician. At the sampling unit, standard procedure has been followed and all the precautionary measures have been taken to avoid the contamination. The sampling unit is separate from the chemical laboratory, so there is no chance of contamination.

CHAPTER - 16

16.0.0 MOISTURE

16.1.0 All the analysis of borehole core samples has been carried out with natural moisture.

CHAPTER - 17

17.0.0 BULK DENSITY

17.1.0 BULK DENSITY ANALYSIS DETAILS

17.1.1 A total 2 nos. of core samples are collected for the determination of bulk density studies and detailed procedure is given below:

Applicability: This method shall be applicable in hard litho units, where regular solid cylindrical drill cores are obtained during the course of drilling. The drill core samples to be used for the study should be of NQ or larger diameter.

Sample Preparation: Take a full cylindrical drill core sample of minimum fifteen (15) centimeters - length with both ends trimmed smoothly at right angle to the core axis using a mechanical core cutter to form a regular cylinder.

Procedure: Measure the length of the sample, at-least at four locations along its axis by suitably rotating the sample. Measure the diameter of the sample using a Caliper scale, at least at four locations, preferably at regular interval. Weigh the air-dried sample in a platform balance.

Calculation: Take mean average of all the readings for length and diameter. Divide the average mean value of diameter by two to arrive at the radius of the sample. The volume of a core sample is obtained by using formulae: $V = \pi r^2 h$ (where V = volume, r = radius and h = height or length of the cylindrical core). The bulk density of the sample is determined by using the formula: $B.D = M/V$ where $B.D$ = bulk density, M = mass (weight) of the sample and V = volume of the sample.

17.1.2 **Number of Samples studied:** Total 2 no. of core samples are studied, where a total of five observations are carried out for each sample. The average of these observations results for each sample may be taken as the final bulk density for the purpose of estimation of resources. Bulk density determination results are mentioned below:

Sl. No.	Sample No.	BH. No.	From (m)	To (m)	Bulk Density (gm/cc)
1	MWYB-BD-01	MWYB-01	44.00	44.20	2.71
2	MWYB-BD-02	MWYB-05	44.10	44.30	2.71
Average Bulk Density					2.71

The average bulk density of the limestone zones in the block is determined as 2.71 gm/cc, which has been utilised for the resources estimation. Bulk density study report is analysed as Annexure-VI.

CHAPTER - 18

18.0.0 BENEFICIATION STUDIES

18.1.0 The present exploration has no provision for beneficiation studies.

CHAPTER - 19

19.0.0 RESOURCE ESTIMATION TECHNIQUE

19.1.0 GENERAL

19.1.1 The limestone resources of the block has been estimated by “**Polygon**” and “**Geological cross-section**” methods. Certain axiomatic assumptions are inherently involved in estimation of overall grade and resources of the deposit, which are given below:

1. The rule of gradual change or law of linear function has been applied (Constantine C. Popoff, 1966) along with the rule of nearest points for application of influence of half way between successive boreholes.
2. The boreholes which did not intersect any mineralisation have been considered as negative boreholes and completely eliminated from resources estimation.
3. The thickness and grade of each mineralized zone intersected in the borehole have been considered as it is for the entire influence area of the borehole.

19.1.2 Grades and Resources have been assessed on the basis of end-use grade classification given by IBM’s National Mineral Inventory (NMI) in following two categories

- i) Cement grade ($\geq 44\%$ CaO, $< 3.5\%$ MgO and $< 16\%$ SiO₂).
- ii) Threshold grade (≥ 34 to $< 44\%$ CaO).

19.1.3 Further Resources have been estimated and categorized as per UNFC and placed as Inferred Resources (333) category by polygonal method (Principal Method) and calculated by cross sectional method also for check method.

19.2.0 ASSUMPTIONS FOR RESOURCE ESTIMATION

19.2.1 Resources was computed by “Polygonal method” as well as “Cross-sectional method”. Certain axiomatic assumptions are inherently involved in estimating overall grade and resource of a deposit, are given below.

19.2.2 Grades and resources were categorized based on end-use grade classification given by IBM threshold in following categories for Cement Grade Limestone and Threshold Grade Limestone are presented in Annexure-IX.

19.2.3 For limestone grade categorization into Cement and Blendable grades are considered.

19.2.4 Resources estimated for Cement grade limestone $\text{CaO} \geq 44\%$, 3.5% MgO (Max) and 16% SiO₂ (Max), Threshold Grade $\text{CaO} \geq 34\%$ to $< 44\%$ are considered for the assessment of limestone resources.

- 19.2.5 The zones of different grades have been demarcated from the values of primary sample analysis as per cut-off limits by End Use Grade specifications by IBM for CaO, MgO and SiO₂. The minimum cumulative thickness of 1.00m of all grades has been considered for resources calculation in both methods.
- 19.2.6 The exploration scheme was formulated for G3 level exploration. The exploration program, which involved drilling 5 boreholes (MWYB-01, 02, 03, 04 and 05) fall along four parallel cross-section lines (S1-S1', S2-S2', S3-S3' & S4-S4') oriented in the N62°W / S62°E direction within the West of Yepalamadhavaram Block.
- 19.2.7 The Limestone body is bedded and continuous within the block. For resources estimation by cross-sectional method, resources are categorized under Inferred Resources (333) of UNFC (as per MEMC 2015 and 2021) Rules.
- 19.2.8 The grade classification and categorisation marked in the cross sections are suitable indexed and enclosed as Plate-VI for West of Yepalamadhavaram Block. Along strike and dip the influence of maximum 400 m from control point towards the block boundary has been categorized in Inferred Category (333).
- 19.2.9 The average bulk density of limestone has been taken as 2.71gm/cc as determined by Calliper's method from 2 limestone core samples in MECL Laboratory, Nagpur. This value is taken for computation of resources for Cement and Threshold grade of limestone.
- 19.2.10 Polygonal resources have been calculated for Cement Grade and Threshold Grade based on the thickness of limestone zones of respective grades encountered in each borehole. The details are enclosed as Annexure-VII-A and VII-B for Polygonal Resources.
- 19.2.11 Cross sectional resources of inferred category estimated for Cement grade and Threshold grade for thickness of limestone zone of respective grades encountered in boreholes is enclosed as Annexure-VII-C and VII-D.

19.3.0 PARAMETERS FOR RESOURCE ESTIMATION

19.3.1 SAMPLING PROCEDURE

The primary samples have been collected as per the litho-contact and sample length of one meter has been taken, however due to lithological variations in very few places the sample length was also taken less than 1.00m, but resources has not been calculated for the zones which are less than 1.00m. Samples from bore hole cores were crushed to (-) 200 mesh size, cone and quartered, thoroughly mixed and representative samples of

200g were prepared and sent to laboratory for analysis of 10 radicals i.e. CaO, MgO, Al₂O₃, SiO₂, Fe₂O₃, Na₂O, SO₃, P₂O₅, K₂O and LOI at Chemical Laboratory of MECL, Nagpur and results were obtained to delineate the ore zones.

19.3.2 CHEMICAL ANALYSIS

A total of 220 nos. of samples generated from the 5 boreholes drilled (MWYB-01, 02, 03, 04, 05) in West of Yepalamadhavaram Block were analyzed by MECL, Chemical lab, Nagpur and the results are enclosed as Annexure-III-A. And 22 nos. of external check samples analysed at JNARDDC Laboratory, Nagpur, the analytical results are enclosed as Annexure-III-B.

Considering the open cast potentiality of the block, the minimum workable thickness / minimum stopping width of 1.00m and minimum non ore parting of 1.00m is considered for resources estimation.

19.4.0 OVERBURDEN

Overburden of limestone includes top layer of soil and subsequent sticky clay which lies immediately above Limestone in West of Yepalamadhavaram Block. The minimum overburden of soil cover is 1.50m in MWYB-03 & MWYB-05 and maximum is 6m in MWYB-02. The average thickness of the overburden in the block is around 3m.

19.5.0 METHODOLOGY

The resources have been estimated by polygonal method as per MEMC rules, 2015 (Amended 2021). The methodology adopted, keeping the above assumptions in view, for resources estimation are described further.

19.6.0 METHODOLOGY ADOPTED IN POLYGONAL METHOD FOR RESOURCE ESTIMATION (PRINCIPAL METHOD)

19.6.1 The main objective of this method is to demarcate the area of influence of the limestone intersected by a particular borehole. The influence area has been obtained by constructing polygons by drawing perpendicular bisector of triangles, rectangles that connect the adjoining boreholes. The area of the influence of zones has been ascertained by Auto-Cad software. The area of non-development of respective zones is shown on the resources plan. The height of polygons is the cumulative thickness of limestone horizon/bands encountered by the corresponding borehole. The entire limestone body in block is divided into number of polygons.

The zone wise borehole wise resources estimation by Polygonal method for Cement Grade and Threshold Grade Limestone of this block are calculated.

19.6.2 The grade assigned to each polygon block is the same as the weighted average grade of the corresponding borehole. Areas classified as non-development for a particular grade within a borehole have been excluded from the calculation. The formula of resources estimation is as follows:

$$R = P_A \times Th \times \text{Bulk Density}$$

Where, P_A = Area of Polygon

R= Resources/ Tonnage

Th= Thickness of Limestone

19.6.3 The resources are estimated polygon wise, borehole wise presented as **Annexure-VII-A and VII-B** for Cement Grade and Threshold Grade Limestones respectively. Polygonal map for Cement grade and Threshold Grade Limestones provided as Plate-V for West of Yepalamadhavaram Block.

19.7.0 METHODOLOGY ADOPTED IN CROSS-SECTIONAL METHOD FOR RESOURCES ESTIMATION (CHECK METHOD)

19.7.1 A total of 5 boreholes are located along four parallel cross-section lines, S1-S1', S2-S2', S3-S3' and S4-S4', drawn in the N62°W / S62°E direction from west to east throughout the West of Yepalamadhavaram Block which is marked on Plate-III.

19.7.2 The limestone intersected in all the drilled boreholes and continuous within the block. Efforts were made to pass these sections through drilled borehole locations wherever possible. The boreholes which have not fallen on section lines are projected on to the nearest section line. Since the beds are generally sub-horizontal with very low dip of 10° to 20° due SE direction and boreholes drilled are all vertical, hence true thickness will be the same as thickness intersected in the exploratory boreholes. Geological cross sections are generated by GDM software. Cross sectional area on each section has been measured with the help of Auto CAD map 2018 software and recorded systematically. Strike influence between two section lines and boreholes has been taken up-to half way distance. However, the influence is up to block boundary has been taken in section S1-S1' and S4-S4' up to 400m in inferred (333) category. Each of these areas has been multiplied with sectional influence / strike influence of the section lines to give volume. The volume is then multiplied with average specific gravity, to estimate geological in-situ gross resources.

$$R = Sv (X) T (X) \text{ Avg Specific Gravity}$$

Where in,

$$R = \text{Resources / Tonnage}$$

Sv = Sectional area of limestone
T = Influence between successive section lines
Sp. Gr. = Specific Gravity of limestone

19.8.0 COMPUTATION OF AVERAGE GRADE

19.8.1 All calculations for grade estimation are made by weighted average method. The sample interval was uniformly maintained at 1m interval with the exception of minor variations or structural implications and the weighted average method of calculation is made by the following formula:

$$\text{Weighted average grade} = \frac{V_1XG_1 + V_2XG_2 + V_3XG_3 + \dots + V_nXG_n}{V_1 + V_2 + V_3 + \dots + V_n}$$

Where 'V' = Volume of Limestone in individual borehole

'G' = Grade of the respective Limestone in the corresponding borehole

Table No. 19.1

Borehole wise intersection of Cement Grade Limestone Zones in boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.

BH. No.	From (m)	To (m)	Thickness (m)	CaO %	MgO %	Al ₂ O ₃ %	SiO ₂ %	GRADE
MWYB-01	3.00	50.00	47.00	49.79	0.64	1.84	10.51	CEMENT GRADE LIMESTONE
MWYB-02	18.00	50.00	32.00	50.78	0.35	1.64	10.87	
MWYB-03	1.50	41.00	39.50	52.02	0.64	1.47	6.80	
MWYB-04	3.00	50.00	47.00	51.76	0.70	1.50	7.93	
MWYB-05	1.50	50.00	48.50	51.01	0.92	1.78	6.65	

19.8.2 As mentioned earlier, Limestone is classified into different grades on the basis of three major constituents viz. CaO, MgO and SiO₂. The Other major chemical constituents of limestone are Al₂O₃, Fe₂O₃ and LOI. The Cement grade limestone intersected in borehole no. MWYB-01 to MWYB-05 and Threshold Grade Limestone intersected in borehole no. MWYB-02 and MWYB-03 in West of Yepalamadhavaram Block.

Table No. 19.2

Borehole wise intersection of Threshold Grade Limestone Zones in boreholes drilled in West of Yepalamadhavaram Block, Suryapet district, Telangana.

BH. No.	From (m)	To (m)	Thickness (m)	CaO %	MgO %	Al ₂ O ₃ %	SiO ₂ %	GRADE
MWYB-02	5.65	6.77	1.12	45.94	0.24	2.29	21.51	THRESHOLD GRADE LIMESTONE
MWYB-02	9.00	10.50	1.50	42.68	0.58	2.70	24.45	
MWYB-02	14.00	18.00	4.00	42.67	0.36	3.00	23.58	
MWYB-03	41.00	44.00	3.00	39.22	0.85	7.78	16.47	

19.8.2.1 Deleterious Constituents

19.8.2.1.1 The most deleterious constituent of cement is MgO. It affects the soundness of setting time of cement. It mostly adds through limestone. The Indian cement manufacturers considered 4% as the safe limit. The average MgO % estimated for Cement grade zone is 0.65. which is within the limit.

19.8.2.1.2 Another harmful impurity in limestone for cement making is sulphur. The SO₃% content in limestone should not exceed 1.7%, because it forms sulpho-aluminate which has marked swelling property. The average SO₃ content in Primary samples analyzed is 0.03% which is well-within the limit.

Minor Constituents

19.8.2.1.3 Besides above broad chemical specifications, Cement grade limestone bound to have some limitations in the content of minor elements and constituents. Although these minor constituents do not have direct significance in assessing the suitability of a limestone, however, their presence beyond certain limits is undesirable as these may affect the manufacturing process or the quality of cement adversely.

19.8.2.1.4 Phosphorus: Content of P₂O₅ should not exceed 1% as excess phosphorus which inhibits clinker minerals formation and reduces the strength of cement appreciably. Average P₂O₅ content is 0.12% which is within the permissible limit.

19.9.0 CATEGORISATION OF RESOURCE

19.9.1 Resources have been categorised under Inferred (333) category of resources as per UNFC classification. The assumptions and parameters are already discussed earlier in this chapter under 19.2.0 and 19.6.0.

19.9.2 Limestone zones are computed and categorised based on end use grade specifications prescribed by Indian Bureau of Mines.

19.9.3 The average grades for 3 radicals CaO, MgO and SiO₂ have been calculated. Thus, average grade of the block is calculated for all grades of limestone.

CHAPTER - 20

20.0.0 REPORTING OF RESOURCE

20.1.0 RESOURCE ESTIMATION

20.1.1 Resources are estimated by polygonal method. The main objective of this method is to demarcate the area of influence of the limestone intersected by a particular borehole and the same is discussed earlier under chapter 19.6.0 of this report.

20.1.2 The grade assigned to the polygon blocks is same as the weighted average grade of the corresponding boreholes. The area of non-development of particular grade in borehole has been deducted. Polygon-wise, borehole-wise polygonal area is tabulated hereunder.

Block	Borehole No.	Polygon No.	Polygonal Area (m²)
West of Yepalamadhavaram	MWYB-01	P1	381790.00
	MWYB-02	P2	578293.34
	MWYB-03	P3	932483.04
	MWYB-04	P4	1165149.40
	MWYB-05	P5	1105837.49

20.1.3 A total 492.00 MT of Cement Grade Limestone resources estimated by polygonal method with an average grade of 51.30% CaO, 0.71% MgO and 7.88% SiO₂. The Polygon-wise, grade wise, borehole-wise resources estimated by Polygonal method for Cement Grade Limestone are given in Table number 20.2. (Annexure-VII-A).

20.1.4 A total 17.93 MT of Threshold Grade Limestone resources estimated by polygonal method with an average grade of 41.53% CaO, 0.58% MgO and 20.49% SiO₂. The Polygon-wise, grade wise, borehole-wise resources estimated by Polygonal method for Threshold Grade Limestone are given in Table number 20.3. (Annexure-VII-B).

20.2.0 RESOURCE BY POLYGONAL METHOD

The Resources of limestone have been estimated borehole wise, polygon wise in polygonal method for different intersected zones/grade wise as per specifications and basic assumptions enumerated earlier. The resources of limestone have been estimated with borehole wise for limestone intersected in the boreholes as per specifications by polygonal method.

The resources are also estimated by cross sectional method (check method) for validation of resources. The category wise and grade wise estimated resources are given

in Table No. 20.4 (Annexure-VII-C) for Cement Grade Limestone and Threshold Grade Limestone are given in Table No. 20.5 (Annexure-VII-D).

20.3.0 RELIABILITY OF RESOURCE

20.3.1 The Limestone resources estimated at different end use cut-off grade by the polygonal method and cross-sectional method were compared to ascertain the confidence level of estimation. The resources are estimated grade wise, borehole wise by both polygonal and cross-sectional methods, and presented as Annexure-VII-A, VII-B, VII-C & VII-D respectively.

20.3.2 In West of Yepalamadhavaram Block, the relative difference in resources by two methods comes to 0.12%. The resources calculated by polygonal method are bit higher side due to irregular shape of the block. Hence, the polygonal method resources are considered for reporting. The comparison of resources is given in the Table 20.1.

Table No: 20.1

Comparison of Gross In-situ Resources estimated by Polygonal Method (Principal Method) with Cross Sectional Method (Check Method) in West of Yepalamadhavaram Block

Sl.No.	Category of Resources	Polygonal Method (MT)	Cross Sectional Method (MT)	Relative Difference %
1	Cement Grade Limestone	492	491.84	0.104
2	Threshold Grade Limestone	17.93	17.84	0.502

Table 20.2

Polygon wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Cement Grade Limestone by Polygonal Method for West of Yepalamadhavaram Block, Suryapet district, Telangana

Bulk Density: 2.71 gm/cc

Polygon No.	BH No.	Polygonal Area (m ²)	From (m)	To (m)	Thick. (m)	Volume (m ³)	Geological Gross in-situ Resources (tonnes)	Average Quality		
								CaO %	MgO%	SiO ₂ %
P1	MWYB-01	379464.76	3.00	50.00	47.00	17834843.72	48332426.48	49.79	0.64	10.51
P2	MWYB-02	577029.35	18.00	50.00	32.00	18464939.20	50039985.23	50.78	0.35	10.87
P3	MWYB-03	932485.64	1.50	41.00	39.50	36833182.78	99817925.33	52.02	0.64	6.80
P4	MWYB-04	1165152.00	3.00	50.00	47.00	54762144.00	148405410.24	51.76	0.70	7.93
P5	MWYB-05	1106173.94	1.50	50.00	48.50	53649436.09	145389971.80	51.01	0.92	6.65
Total Geological Gross in-situ Resources of Cement Grade Limestone in Tonnes							491985719.09	51.30	0.71	7.87
Total Geological Gross in-situ Resources of Cement Grade Limestone in Million Tonnes							492.00			

Table 20.3

Polygon wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Threshold Grade Limestone by Polygonal Method for West of Yepalamadhavaram Block, Suryapet district, Telangana

Bulk Density: 2.71gm/cc

Polygon No.	BH No.	Polygonal Area (m ²)	From (m)	To (m)	Thick. (m)	Volume (m ³)	Geological Gross in-situ Resources (Tonnes)	Average Quality			
								CaO %	MgO%	Al ₂ O ₃ %	SiO ₂ %
P2	MWYB-02	577029.35	5.65	6.77	1.12	646272.87	1751399.483	45.94	0.24	2.29	21.51
P2	MWYB-02	577029.35	9.00	10.50	1.50	865544.03	2345624.308	42.68	0.58	2.70	24.45
P2	MWYB-02	577029.35	14.00	18.00	4.00	2308117.40	6254998.154	42.67	0.36	3.00	23.58
P3	MWYB-03	932485.64	41.00	44.00	3.00	2797456.92	7581108.253	39.22	0.85	7.78	16.47
Total Geological Gross in-situ Resources of Threshold Grade Limestone in Tonnes							17933130.20	41.53	0.58	4.91	20.49
Total Geological Gross in-situ Resources of Threshold Grade Limestone in Million Tonnes							17.93				

Table 20.4

Section wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Cement Grade Limestone by Cross Sectional Method for West of Yepalamadhavaram Block, Suryapet district, Telangana

Bulk Density: 2.71 gm/cc

BH.No.	Section Line	Sectional Area (m ²)	Strike Influence (m)	Volume (m ³)	Geological Gross In-situ Resources (Tonnes)	Average Quality			
						CaO%	MgO %	Al ₂ O ₃ %	SiO ₂ %
MWYB-01	S1-S1'	26866.90	522.56	14039585.45	38047276.57	52.54	0.61	0.84	6.68
MWYB-02	S2-S2'	20942.91	969.58	20305824.64	55028784.78	52.52	0.55	1.38	4.69
MWYB-03	S2-S2'	32301.00	1278.13	41284838.53	111881912.42	49.37	0.51	1.85	7.78
MWYB-04	S3-S3'	90150.80	618.56	55763686.52	151119590.46	51.42	0.61	1.05	7.32
MWYB-05	S4-S4'	62622.20	800.00	50097782.08	135764989.44	51.98	0.66	0.92	6.74
Total Geological Gross In-situ Resources of Cement Grade Limestone in Tonnes					491842553.66	51.32	0.59	1.21	6.92
Total Geological Gross In-situ Resources of Cement Grade Limestone in Million Tonnes (MT)					491.84				

Table 20.5

Section wise, Borehole wise Geological Gross In-Situ Resources (333) estimated for Threshold Grade Limestone by Cross Sectional Method for West of Yepalamadhavaram Block, Suryapet district, Telangana

Bulk Density: 2.71 gm/cc

BH.No.	Section Line	Sectional Area (m ²)	Strike Influence (m)	Volume (m ³)	Geological Gross In-situ Resources (tonnes)	Average Quality									
						CaO %	MgO %	Al ₂ O ₃ %	SiO ₂ %	Fe ₂ O ₃ %	Na ₂ O %	SO ₃ %	P ₂ O ₅ %	K ₂ O %	LOI %
MWYB-02	S2-S2'	719.0898	969.58	697215.09	1889452.89	45.94	0.24	2.29	21.51	0.77	0.02	0.01	0.15	0.43	28.37
MWYB-02	S2-S2'	822.46	969.58	797438.63	2161058.70	42.68	0.58	2.70	24.45	1.00	0.02	0.01	0.16	0.47	27.68
MWYB-02	S2-S2'	2265.648	969.58	2196726.50	5953128.82	42.67	0.36	3.00	23.58	1.02	0.01	0.01	0.24	0.51	28.32
MWYB-03	S2-S2'	2262.513	1278.13	2891786.25	7836740.74	39.22	0.85	7.78	16.47	3.29	0.16	0.03	0.10	1.55	29.90
Total Geological Gross In-situ Resources of Threshold Grade Limestone in Tonnes					17840381.15	41.50	0.59	4.99	20.35	1.99	0.08	0.02	0.16	0.95	28.94
Total Geological Gross In-situ Resources of Threshold Grade Limestone in Million Tonnes (MT)					17.84										

CHAPTER - 21

21.0.0 CONCLUSIONS AND RECOMMENDATIONS

21.1.0 CONCLUSIONS

21.1.1 The West of Yepalamadhavaram Block undertaken for Preliminary Exploration (G3 stage) for limestone lies in the Palnad Sub-basin of Suryapet district, Telangana. It falls in part of the Survey of India Toposheet No. 56P/13 in Mellacheruvu Mandal (Taluka) of Suryapet district, Telangana.

21.1.2 The major portion of the explored block is covered by limestone. Geological mapping of the West of Yepalamadhavaram Block was carried out by MECL on a 1:4,000 scale, incorporating data generated during the current exploration programme along with available data and relevant literature.

21.1.3 The total absence of fossils rules out the sediments of Bhima Group transgresses into the Cambrian. Thus envisaged the upper age limit is not less than 600 million years.

21.1.4 The rock types exposed in the block belongs to the Narji Limestone Formation of Kurnool Group of Palnad Sub-basin. The limestone is exposed in 75% of the block area and forms the major portion of the block. The limestone area extends across almost the entire block from the south-western end near S1 to the north-eastern end near S4, occurring on both sides of the central soil-covered zone within the block boundary. i.e. soil cover extends continuously from the south-western boundary near S1 to the north-eastern boundary near S4, forming a central elongated overburden zone across the exploration block.

21.1.5 The limestone formation of the block is horizontally disposed with strike of N 28° E to S 28° W dips 5° to 20° due SE. A total of 5 boreholes drilled. They are located along four parallel cross-section lines, S1-S1', S2-S2', S3-S3' & S4-S4' are drawn in the N62°W /S62°E direction from south to north throughout the West of Yepalamadhavaram Block, which are marked on Plate- III. All the 5 boreholes intersected limestone zones.

The intersected limestone is of Cement Grade to high grade encountered with intermittent partitions of Threshold Grade Limestone zone. A total of 2 grades of limestones are intersected in West of Yepalamadhavaram Block i.e. Cement Grade Limestone and Threshold Grade Limestone. Borehole wise intersection of various grades limestone zones, are discussed under the Chapter 10.

21.1.6 A total of 220 nos. of borehole primary samples and 22 nos. of external check samples were generated in West of Yepalamadhavaram Block. All the primary samples are analysed in Chemical Lab, MECL, Nagpur and external check samples are analysed from JNARDDC Lab, Nagpur and the results of primary samples are enclosed as Annexure-III-A (Primary) and external check samples analysis are enclosed as Annexure-III-B (External Check). Comparison of primary sample and external sample analysis results enclosed as Annexure-III-C. Considering the open cast potentiality of the block, the minimum workable thickness / minimum stopping width of 1.00m and minimum non ore parting of 1.00m is considered for resources estimation.

21.1.7 Limestone zones are demarcated based on End use classification of IBM.

21.1.8 A total of 2 nos. of limestone core samples from drilled boreholes were selected for the determination of bulk density by Caliper Method. The average bulk density of these 2 samples has been determined as 2.71gm/cc and the same have been considered for estimation of resources.

21.1.9 Geological Gross In-situ resources were estimated by polygonal method.

21.1.10 A total of **492.00 Million Tonnes (MT)** of Cement Grade Limestone has been estimated as gross in-situ resources, with an average grade of 51.30% CaO, 0.71% MgO, 7.87% SiO₂. In addition, **17.93 MT** of Threshold Grade Limestone has been estimated with average grade 41.53% CaO, 0.58% MgO, 20.49% SiO₂.

21.2.0 RECOMMENDATIONS

21.2.1 MECL has undertaken Preliminary Exploration (G3 level) over an area of 4.16 sq.km. in the West of Yepalamadhavaram Block. The exploration programme is established the occurrence of Cement Grade Limestone and Threshold Grade Limestone, based on lithological characteristics, borehole logging and analytical results.

Limestone in the block is suitable for potential utilization in the cement industry. The exploration is carried out as per Mineral (Evidence of Mineral Contents) Rule-2015, Mineral Auction Rule-2015, MMDR Amendment Act - 2015 and in accordance with the Minerals (Evidence of Mineral Contents) Amendments Rules 2021.

21.2.2 The study area suggests that any future mining project may generate employment for the local people and will enhance socio-economic status of the people residing there and in nearby areas.

21.2.3 The estimated mineral resources have been classified under the 333 category of the United Nations Framework Classification (UNFC) system. The findings of this

geological report provide a sound technical basis for the Government of Telangana to proceed with auctioning of the block for grant of a Mining Lease.

CHAPTER - 22

22.0.0 PLATES AND MAPS

- 22.1.0 Location Map of West of Yepalamadhavaram Block, Suryapet district, Telangana on 1: 50,000 Scale is given as Plate-I.
- 22.2.0 Regional Geological Map of West of Yepalamadhavaram Block, Part of Palnad Sub-basin (GSI), Suryapet district, Telangana on 1:30,000 scale is given as Plate-II.
- 22.3.0 Topographical and Geological Map of West of Yepalamadhavaram Block, Suryapet district, Telangana on 1:4,000 scale is given as Plate-III.
- 22.4.0 Graphic Lithologs of boreholes drilled in West of Yepalamadhavaram Block on 1:1000 scale is given as Plate-IV.
- 22.5.0 Polygonal Map of Cement Grade and Threshold Grade Limestone in West of Yepalamadhavaram Block on 1: 10,000 scale is given as Plate-V.
- 22.6.0 Geological Cross Sections of West of Yepalamadhavaram Block (S1-S1', S2-S2', S3-S3' and S4-S4') on 1:2000 scale is given as Plate-VI.
- 22.7.0 Fence Diagram of West of Yepalamadhavaram Block, on 1:2000 scale is given as Plate-VII.

CHAPTER - 23

23.0.0 ANNEXURE / ENCLOSURES TO THE REPORT

23.1.0 The report includes all the relevant annexure and maps/ plans, sections and photographs etc. List of annexures, tables, maps/plans/sections, photographs, text figures etc. are provided before the start of the text and part of the Geological Report.

CHAPTER - 24

24.0.0 UTILITY OF INVESTIGATION

24.1.0 UTILISATION ASPECTS AND MINEABILITY (AS PER NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS)

24.1.1 The specifications of limestone for various industrial used are as follows

1. CEMENT INDUSTRY SPECIFICATION

Table 24.1

Cement Industry Specification for Limestone

CaO	:	44% (min.) to 46%
MgO	:	3.50% (max.)
SiO ₂	:	16% (max.)
Al ₂ O ₃	:	2 (max.)
Fe ₂ O ₃	:	2% (max.)
SO ₃	:	1.75% (max.)

$$\text{Lime Saturation Factor (LSF)} = \frac{\text{CaO}}{2.8 (\text{SiO}_2) + 1.2 (\text{Al}_2\text{O}_3) + 0.65 (\text{Fe}_2\text{O}_3)}$$

(ideal to be at 0.66 to 1.02)

$$\text{Silica Modules} = \frac{\text{SiO}_2}{\text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3} = \text{ideal at (1.2 to 4.0)}$$

$$\text{Iron Modules} = \frac{\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Fe}_2\text{O}_3}{\text{Fe}_2\text{O}_3} = \text{ideal at (1.7 to 2.4)}$$

$$\text{Hydraulic Modules} = \frac{\text{Al}_2\text{O}_3}{\text{Fe}_2\text{O}_3} = \text{ideal at (0.65 (min.))}$$

2. B. I. S. (BUREAU OF INDIAN STANDARDS) SPECIFICATION

Table 24.2

B. I. S. (Bureau of Indian Standards) Specification for Limestone

CaO (Min)	42%
MgO (Max.)	2.5%
SiO ₂ (Max.)	15%
P ₂ O ₅ (Max.)	1.5 %
FeS ₂ (Max.)	2%

3. IRON AND STEEL INDUSTRY:

Table 24.3

Iron and Steel Industry for Specification for Limestone

Elements	BF Grade	SMS Grade	LD Grade
CaO	42% (Min.)	48% (Min.)	52% (Min.)
MgO	4% (Max.)	3% (Max.)	2% (Max.)
SiO ₂	9% (Max.)	4% (Max.)	1% (Max.)
SiO ₂ + Al ₂ O ₃	11.5% (Max.)	-	-
Total Insoluble	12%	-	-
Acid Insoluble	-	6.5% (Max.)	-

4. CHEMICAL INDUSTRY SPECIFICATION

BIS Specifications (1S:3204-1978, Reaffirmed-2003)

Table 24.4

Chemical Industry Specification for Limestone

Characteristics	Requirement in percent by mass for			
	Calcium carbide	Bleaching Powder	Caustic soda	Sugar
CaO (Min.)	54.0	54.0	53.0	50.0
MgO (Max.)	0.8	2.0	1.0	1.0
SiO ₂ (Max.)	1.0	0.75	-	2.0
Fe ₂ O ₃ (Max.)	0.25	0.15	-	-
Mn ₂ O ₃ (Min.)	-	0.06	-	-
CO ₂ (Min.)	42.00	42.00	42.00	41.00
Loss on Ignition (LOI)	46.00	46.00	46.00	44.00
S (Max.)	0.10	-	-	-
P (Max.)	0.01	-	-	-
Al ₂ O ₃ + Fe ₂ O ₃ (Max.)	0.50	-	-	1.5
SiO ₂ + Al ₂ O ₃ + Fe ₂ O ₃ (Max.)	-	-	3.0	-

5. FERTILIZER INDUSTRY SPECIFICATION

CaCO₃+ MgCO₃: 85 % (Min)

SiO₂ : 5% (Max.)

6. GLASS INDUSTRY SPECIFICATION

CaCO₃ : 94.5%

CaCO₃ +MgCO₃ : 97.5%

Fe₂O₃ : 0.20% (Max)

BIS Specifications (1S:997-1973, Reaffirmed-1998)

CaO : 53.0 %

SiO₂ : 2.5 %

Fe₂O₃ : 0.10 %

CaO + MgO : 54.50 %

7. FOUNDRY INDUSTRY SPECIFICATION

BIS Specifications (1S:4149-1978, Re-affirmed-2008)

Table No: 24.5
Foundry Industry Specification for Limestone

Characteristics	Grade-1	Grade-2	Grade-3
CaO (Min.)	52 %	50 %	45 %
SiO ₂ (Max)	1.5 %	3 %	5 %
R ₂ O ₃ (Al ₂ O ₃ + Fe ₂ O ₃) Max.	1 %	1 %	2 %
MgO	2 %	3 %	5 %
Insoluble matter	0.5	1	2
Sulphur and Phosphorus	Traces	Traces	Traces

8. CEMENT, IRON AND STEEL AND CHEMICAL INDUSTRY SPECIFICATION

Table No: 24.6
Cement, Iron and Steel and Chemical Industry Specification for Limestone

Constituents	Cement Industry (Specification)	Iron and Steel Industry (Specification)			Chemical Industry BIS Specifications (1S:3204-1978, Reaffirmed-2003)			
					Requirement in percent by mass for			
		BF Grade	SMS- OH Grade	SMS- LD	Calcium carbide	Bleaching Powder	Caustic soda	Sugar
CaO (Min.)	44% (Min.) to 48% (Max)	42% (Min.)	48% (Min.)	52% (Min.)	54.0	54.0	53.0	50.0
MgO	3.50% (Max.)	4%	3%	2%	0.8	2.0	1.0	1.0
SiO ₂ (Max.)	16 % (Max.)	9%	4%	1%	1.0	0.75	-	2.0
Fe ₂ O ₃	2% (Max.)				0.25	0.15	-	-
Mn ₂ O ₃	--	--	--	--	-	0.06	-	-
CO ₂ (Min.)	--	--	--	--	42.00	42.00	42.00	41.00
Loss on Ignition	--	--	--	--	46.00	46.00	46.00	44.00
S (Max.)	--	--	--	--	0.10	-	-	-
P (Max.)	--				0.01	-	-	-
Al ₂ O ₃ + Fe ₂ O ₃	2%				0.50	-	-	1.5
SiO ₂ + Al ₂ O ₃ + Fe ₂ O ₃	--	11.5% (Max.)			-	-	3.0	-
Acid Insoluble			6.5% (Max.)					

CHAPTER - 25

25.0.0 CERTIFICATE FROM THE QUALIFIED PERSON WITH NAME, DATE AND SIGNATURE

This is to certify that geological report has been prepared in respect of Preliminary Exploration Report (G3 stage) for Limestone in West of Yepalamadhavaram Block, Suryapet district, Telangana. The report was prepared by Mineral Exploration and Consultancy Limited (MECL) on behalf of the National Mineral Exploration and Development Trust (NMEDT). The report adheres to the Minerals (Evidence of Mineral Contents) Rules, 2015, as specified under the Mineral Auction Rules, 2015 and amended up to 2021.

NAME: SHRIKANT SHARMA

DESIGNATION: HoD (EXPLORATION)

DATE: 30-06-2026

REFERENCES

1. The earliest geological account of Palnad Sub-basin was documented by William King (1872).
2. Geological Report on Preliminary Exploration (G3) for Limestone in Sulthanpur Block, Saiddulnama and Pasupalabodo blocks in Suryapet district of Telangana.
3. Geological report by TSMDC for limestone blocks in Telangana with special reference to the Ramapuram Cluster 5 and Dondapadu Cluster 6 explored by TSMDC through NMET funding and these blocks are located North and South of the proposed block respectively. The GR were submitted in Jan 2020.
4. William King (1872) documented the earliest geological account of Palnad basin.
5. Ramalingaswamy, G. (1976-77) has mapped area in parts of Toposheet No.56P/10.
6. Krupanidhi (1966-67), Nageswara Rao and Varaprasada Rao (1967-68), Chakradhar et al, (1980-83), Ravindra Babu et al, (1989), Rama Krishnaiah et al, (2012-13), Jagadishwar Babu.
7. K and Tirumurugan. M. (2013) and Sugathan & RimpalKar (2013) have carried out investigation for limestone in parts of Palnad Sub-basin.
8. Mukherji and Syed Kazim (1947) of erstwhile Hyderabad Geological Survey carried out geological mapping of Palnad Sub-basin covering parts of Nalgonda district.
9. Systematic geological mapping and mineral investigation in this part of Palnad Sub-basin was carried out by Ziauddin and Sharma (1959-61) Ramalinga swamy, G. (1976-77) has mapped area in parts of Toposheet No. 56P/10. Krupanidhi (1966-67), Nageswara Rao and Varaprasada Rao (1967-68), Chakradhar et. al, (1980-83), Ravindra Babu et. al, (1989), Rama krishnaiah et al, (2012-13), Jagadishwar Babu. K and. Tirumurugan. M. (2013) and Sugathan & Rimpal Kar (2013) have carried out investigation for limestone in parts of Palnad Sub-basin.
10. The rule of gradual change or law of linear function has been applied (Constantine C. Popoff, 1966) along with the rule of nearest points for application of influence of half way between successive boreholes.
11. MSTC E commerce Website.
12. Demographic and population data from Census India (<https://censusofindia.net>).

ABBREVIATIONS USED

SL. No.	Abbreviation	Full form
1	MECL	Mineral Exploration and Consultancy Limited
2	GSI	Geological Survey of India
3	CGWB	Central Ground Water Board
4	CPSE	Central Public Sector Enterprises
5	NMEDT	National Mineral Exploration and Development Trust
6	TCC	Technical cum Cost Committee
7	EC	Executive Committee
8	DMG, TS	Directorate of Mines and Geology, Telangana
9	UNFC	United Nation Framework Classification
10	NMI	National Mineral Inventory
11	DGCO	Directorate General Camp Office
12	NABL	National Accreditation Board for Testing and Calibration Laboratories
13	JNARDDC	Jawaharlal Nehru Aluminium Research Development and Design Centre
14	F.S.P.	Field Season Programme
15	MEMC	Minerals (Evidence of Mineral Contents)
16	MMDR	Mines & Minerals (Development and Regulation)
17	NH	National Highway
18	WGS-84	World Geodetic System-84
19	UTM	Universal Transverse Mercator
20	RL	Reduced Level
21	Cu.m	Cubic Meter
22	DGPS	Differential Global Positioning System
23	DMS	Degree Minute Second
24	M / m	Meter
25	mt	Million Tonne
26	Sq. km/sq.km	Square Kilometer
27	M. Sc.	Master of Science
28	M. Sc. (Tech.)	Master of Science in Technology
29	NDDP	Net District Domestic Product
30	mRL	Reduced Level in metre
31	R.F.	Reserve Forest
32	XRF	X-ray Fluorescence
33	ML	Mining Lease
34	CRM	Certified Reference Material
35	MMT	Million Metric Tonnes
36	GGR	Gross Geological Resources
37	NGR	Net Geological Resources
38	Geol. Res. (Mil. tons)	Geological Resources (Million tons)
39	MT	Million Tonnes
40	RQD	Rock Quality Determination
41	PSC	Project Sanctioning Committee