1/29851/2022

### F. No. 34011/02/2016-CRC-I भारत सरकार/ Government of India कोयला मंत्रालय/ Ministry of Coal (MPS Section)

\*\*\*

Room No. 622A, Shastri Bhawan, New Delhi, dated: 28th June, 2022

### **OFFICE MEMORANDUM**

### Subject: Seeking comments of stakeholders on the final Technical Committee Report on Recommendations on Grading/Categorization of Lignite Resources by the committee constituted by Ministry of Coal.

The undersigned is directed to inform that, a Technical Committee was constituted vide this Ministry's office order of even number dated 1<sup>st</sup> April, 2022 to consider and make suitable recommendations on grading/ categorization of lignite resource. The said committee has submitted its final Technical Committee Report on Recommendations on Grading/Categorization of Lignite Resources. A copy the said draft report is enclosed herewith.

2. In this regard, all stakeholders may provide their comments on the enclosed draft report to this Ministry within 15 days from the date of placing on the website of this Ministry at e-mail id: hitlar.singh85@nic.in. Comments received thereafter shall not be considered.

Encl.: As above.

' (Hitlar Singh) Under Secretary to the Govt. of India e-mail id: hitlar.singh85@nic.in

Τo,

1. NIC – for placing on website of MoC for stakeholder consultation 2. Stakeholders

Technical Committee Report on Recommendations on Grading/Categorization of Lignite Resources

**JUNE 2022** 

**PREPARED BY:** 

COMMITTEE CONSTITUTED BY

**MINISTRY OF COAL** 

Office order dated 01.04. 2022 (OM No. 34011/02/2016-CRC-I [E- 328806])

## Technical Committee Report on Recommendations on Grading/Categorization of Lignite Resources

**JUNE 2022** 

## PREPARED BY: COMMITTEE CONSTITUTED BY MINISTRY OF COAL Office order dated 01.04. 2022 (OM No. 34011/02/2016-CRC-I [E- 328806])

# Report on Recommendations on Grading/Categorization of Lignite Resources

### CONTENTS

Chapter No.	Description	Page No.
Chapter 1	Lignite Scenario in India	1-3
1.1	Introduction	1
1.2	Geological resources of Lignite in India	1
1.3	Occurrence of Lignite Resources in India	1
Chapter 2	Technical Committee and Terms of References	4-4
2.1	Constitution of Technical Committee	4
2.2	Terms of References (ToR)	4
Chapter 3	Proceedings of Technical committee	5-5
3.1	Proceedings of First Technical Committee Meeting	5
3.2	Proceedings of Second Technical Committee Meeting	5
3.3	Acceptance of the Report	5
Chapter 4	Different proposals for grading/categorization of Lignite resources	6-8
4.1	Overview of proposals submitted by NLCIL, CMPDIL and IIT ISM	6
A	Proposal –I NLCIL	6
В	Proposal - II CMPDIL	7
С	Proposal - III IIT (ISM)	8
Chapter 5	Recommendations of the Technical Committee	9-11
5.1	Scope for further work	10
5.2	Confirmation of the committee members	10
5.3	Confirmation from the Chairman of the Committee	11

### LIST OF TABLES

Table No.	Description	Page No.
1.1	Lignite Inventory as on 01.04.2021	3
2.1	List of members of approved Technical Committee	4
3.1	Existing categorization of lignite resources	5
4.1	NLCIL Proposal	6
4.2	CMPDIL Proposal	7
4.3	IIT/ISM Proposal	8
5.1	Proposed Grading System	9
5.2	Comparison of Existing and Proposed Grading Systems	10

### LIST OF ANNEXURES

Annexure No.	Description	Page No.
1.0	Letter From MoC	12
2.0	List of Members of Approved Technical Committee	13
3.0	Proceedings of 1st Technical Committee Meeting	14
3.1	Letter for first meeting of Technical Committee of Lignite on 19.04.2022	14
3.2	Minutes of Meeting (MoM) of the First Technical Committee Meeting	16
3.3	ATR of 1st Minutes of Meeting	21
4.0	Proceedings of 2nd Technical Committee Meeting	28
4.1	Letter for 2nd Technical Committee Meeting on 14.06.2022	28
4.2	Minutes of Meeting of the Second Technical Committee Meeting	30
5.0	E-Mail of acceptance of Committee Members	44
6.0	Confirmation from Chairman of the Committee	58

### **Chapter 1: Lignite Scenario in India**

### 1.1 Introduction

Lignite is geologically the youngest of the coal types. It is intermediate between peat and subbituminous coal. It is soft brown in color. It is composed primarily of compressed, dehydrated woody material. Lignite is also referred as brown coal.

Lignite is characterized by high moisture, high volatile matter (VM) and low ash content. The moisture content may vary from 30% to as high as 55%. On dry basis, the lignite is found to contain 45-60% VM and 10-25% ash against coals which have low VM (24-32%) and high ash content (30-35%). The fixed carbon content ranges from about 20-35% by mass. Lignite, particularly from deposits in Gujarat and Rajasthan, contains up to 9% Sulphur (on dry basis). Sulphur content in lignite from Neyveli, Tamil Nadu varies from 0.5 to 1.5% (on dry basis).

Lignite is inferior to higher-rank coal in terms of heating value, storage stability and other properties. It is light, porous and friable in nature and cannot be transported to far distance as it readily absorbs oxygen from the atmosphere which leads to spontaneous combustion.

Composition of lignite varies widely from one deposit to another in India. Quality of the Indian lignite deposits are not uniform and it varies from block to block in the lignite fields.

### 1.2 Geological resources of Lignite in India

The total geological resource of lignite of the country as per Geological Survey of India (GSI) stands at 46,018.47 million tonnes as on 01.04.2021.

7374.10 million tonne belongs to 'Measured (331)', 25650.53 million tonnes 'Indicated (332)' and 12993.84 million tonne belongs to 'Inferred (333)' categories.

### 1.3 Occurrence of Lignite Resources in India

In India, major occurrences of lignite are well established in Tamil Nadu, Puducherry, Gujarat and Rajasthan states. The nature has made lignite available in these areas where hard coal is absent. Small occurrences are also reported in parts of Kerala, Jammu & Kashmir and West Bengal. The state wise occurrence of lignite resources found in India is given in Fig1.

Lignite inventory, state-wise, depth –wise and category –wise (as on 01.04.2021) is given in the Table-1.1.



Fig1. State wise occurrence of lignite resources in India

LIGNITE INVENTORY AS ON 01.04.2021						
(STATE WISE, DEPTH WISE, CATEGORY WISE LIGNITE RESOURCES in MT)						
SI.no	State	Depth (M)	Measured	Indicated	Inferred	Grand Total
1	Pondicherry	0-150	0.00	405.61	11.00	416.61
I	Total		0.00	405.61	11.00	416.61
		0-150	4319.74	639.36	934.62	5893.72
2	Tamil Nadu	150-300	607.18	6978.27	1351.84	8937.29
2		>300	0.00	14292.43	7366.16	21658.59
	Total		4926.92	21910.06	9652.62	36489.60
		0-150	984.03	430.74	551.78	1966.55
3	Rajasthan	150-300	184.50	2089.84	1180.70	3455.04
5		>300	0.00	509.20	418.29	927.49
	Total		1168.53	3029.78	2150.77	6349.08
	Gujrat	0-150	575.68	86.68	45.36	707.72
1		150-300	702.97	197.02	1114.34	2014.33
4		>300	0.00	0.00	0.00	0.00
	Total		1278.65	283.70	1159.70	2722.05
						0.00
		0-150	0.00	20.25	7.30	27.55
5	Jammu & Kashmir	150-300	0.00	0.00	0.00	0.00
0		>300	0.00	0.00	0.00	0.00
	Total		0.00	20.25	7.30	27.55
		0-150	0.00	0.00	9.65	9.65
6	Kerala	150-300	0.00	0.00	0.00	0.00
U		>300	0.00	0.00	0.00	0.00
	Total		0.00	0.00	9.65	9.65
		0-150	0.00	0.29	1.82	2.11
7	West Bengal	150-300	0.00	0.84	0.98	1.82
		>300	0.00	0.00	0.00	0.00
	Total		0.00	1.13	2.80	3.93
	Grand Total		7374.10	25650.53	12993.84	46018.47

### Table 1.1: Lignite Inventory as on 01.04.2021

### **Chapter 2: Technical Committee and Terms of References**

### 2.1 Constitution of Technical Committee

Ministry of Coal (MoC) has constituted a "**Technical Committee**" under chairmanship of CMD, CMPDIL to make suitable recommendations on grading/ categorization of lignite resource through office order dated 01.04. 2022 (OM No. 34011/02/2016-CRC-I [E- 328806]) received on 08.4.2022 given in Annexure-1.0 The members of the approved committee are given in Table 2.1 (copy at Annexure-2.0.)

SI No	Name & Designation	Designation in the Committee
1	CMD, CMPDI	Chairman
2	CMD, MECL	Member
3	Director (Mining), NLCIL	Member
4	Representative of IIT-ISM, Dhanbad	Member
5	Representative of CIMFR, Dhanbad	Member
6	Coal Controller CCO or his representative	Member
7	General Manager (Exploration), CMPDI	Member
8	DDG, MII B NeNR, GSI	Co-opted Member
9	Dy GM, Lab, CMPDI	Co-opted member &
		Member Secretary

### Table 2.1: List of Members of Approved Technical Committee

### 2.2 Terms of References (ToR)

In order to promote allocation of lignite blocks, lignite resources are required to be appropriately categorized based on energy efficiency parameters or any other characteristic parameter of lignite as may be deemed necessary.

The ToR of the Committee is as follows:

"Analyze and recommend different grades of lignite based on appropriate energy efficiency parameter, like Gross Calorific Value (GCV) or any other characteristic parameter of lignite as may be deemed necessary".

### **Chapter 3: Proceedings of Technical committee:**

### 3.1 **Proceedings of First Technical Committee Meeting**

The 1<sup>st</sup> Technical Committee meeting was held on 19<sup>th</sup> April 2022 under the chairmanship of CMD CMPDIL, wherein a brief presentation was made by CMPDIL referring the ToR of the committee. The deliberation was made referring to the available geological state-wise occurrences of lignite resources. The exploration of Lignite and resource estimation carried out as per the guidelines mentioned in SYSTEM OF LIGNITE RESOURCE ESTIMATION AND CLASSIFICATION (SLREC) 2008, was explained. The previous grading system based on "Ash content" on as received basis and existing system of grading of lignite based on Gross Calorific Value (GCV) on in situ Moisture basis was explained. It was also mentioned that almost 70% of lignite resources are found in Grade B GCV range of 2001-3000Kcal/kg.

The existing categorization of lignite resources is as per SLREC is given in Table-3.1

Grade	Gross calorific value (KCal. /Kg.) On in-situ Moisture basis
Lignite A	More than 3000
Lignite B	2001 to 3000
Lignite C	1000 to 2000

### Table-3.1: Existing categorization of lignite resources

Deliberations were made to explore whether any other parameters apart from GCV can be found suitable for grading of lignite. The further scope of sub grouping of existing grades was also discussed. The minutes of meeting(MoM) and its ATR is placed at Annexure-3.0

### 3.2 **Proceedings of Second Technical Committee Meeting**

The 2nd Technical Committee meeting was held on 14th June 2022 under the Chairmanship of CMD CMPDIL Ranchi to decide the parameters to be adopted for grading of Lignite with respect to energy efficiency and to recommend different grades of lignite resources of India based on appropriate energy efficiency parameter according to the proposals submitted by committee members.

NLCIL had submitted the data on band/band, proximate analysis and GCV for 94 blocks as per SLREC classification. An elaborate presentation was made by CMPDIL. The different proposals for appropriate energy efficiency parameter for grading of lignite resources and sub grouping of existing grades were discussed. The minutes of meeting(MoM) is placed at Annexure-4.0.

**3.3 Acceptance** of the committee members is given at Annexure 5.0 and confirmation of Chairman of Technical Committee is given at Annexure 6.0

# Chapter 4: Different proposals for grading/categorization of Lignite resources

### 4.1 Overview of proposals submitted by NLCIL, CMPDIL and IIT-ISM.

The proposals submitted by NLCIL, CMPDIL and ISM have taken into consideration. The subdivision of existing SLREC grading system of lignite of all the three grades i.e., A, B and C in GCV interval of 1000 Kcal/kg has been taken into consideration. As per the available quality data of 94 blocks, the frequency of available blocks as per each proposed grading system is given below.

### A. Proposal – I NLCIL

The basis of grading will be GCV on in-situ moisture basis. The existing Grades of SLREC classification A, B are divided equally in bandwidth of 300 KCal/Kg starting from A1 having GCV >3900K.Cal/Kg till Grade C having GCV <1800 KCal/Kg as given in Table-4.1

NLCIL'S PROPOSED GRADING/ CATEGORIZATION					
GRADE	RANGE	BLOCKS- FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIGNITE BLOCKS
A1	>3900	0	0.00		
A2	3601-3900	4	4.26		
A3	3301-3600	4	4.26		
A4	3001-3300	6	6.38		
B1	2701-3000	25	26.60	81 91	77
B2	2401-2700	26	27.66	01.01	
B3	2101-2400	17	18.09		
B4	1801-2100	9	9.57		
С	<1800	3	3.19		
		94	100.00		

### Table-4.1 NLCIL Proposal

As no lignite blocks having GCV greater than 3900 K.Cal/Kg were reported, the upper limit of GCV in this proposal has been kept as >3900 Kcal/kg to accommodate any new blocks which may have GCV >3900 Kcalkg.

Lignite-A grade of the SLREC classification divided into A1, A2, A3 and A4 with same bandwidth of 300 K.Cal/Kg. Most of the lignite blocks falls in Lignite - B grade of the SLREC classification, Lignite-B grade is divided into Grade B1, B2, B3 and B4 with a bandwidth 300 K.Cal/Kg. The GCV of Grade C of SLREC (GCV 1000-2000 Kcal/kg) will now have GCV <1800 Kcal/kg and will be categorized as Grade C. The frequency of the available blocks as per the proposed grades has been elaborated in Table 4.1. The most frequent GCV range of the lignite blocks i.e B1 to B4 with frequency percentage of 81.91 and 14 blocks falls in GCV range of 3001 to 3900 K.Cal/Kg i.e A1 to A4 Only 3 blocks fall in GCV range less than 1800 K.Cal/Kg.

### B. Proposal - II CMPDIL:

The basis of grading will be GCV on in-situ moisture basis. The existing Grades of SLREC classification A, B are divided equally in bandwidth of 500 KCal/Kg starting from A1 having GCV >3500K.Cal/Kg till Grade C2 having GCV range 1000-1500 KCal/Kg as given in Table-4.2

CMPDIL'S PROPOSED GRADING/ CATEGORIZATION							
GRADE	RANGE	BLOCKS- FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIGNITE BLOCKS		
A1	>3500	5	5.32				
A2	3001-3500	9	9.57	85.10	80		
B1	2501-3000	48	51.06				
B2	2001-2500	23	24.47				
C1	1501-2000	7	7.45				
C2	1000-1500	0					
	<1000	2	2.13				
		94	100.00				

### Table-4.2 CMPDIL Proposal

From the available data it was observed that no blocks were having GCV >4000 Kcal/kg hence the upper limit of GCV in this proposal has been kept as >3500 Kcal/kg to accommodate any new blocks which may have GCV >3500 Kcalkg.

All the grades of SLREC classification i.e., A, B and C have been equally divided into two subgroups each. A1, A2, B1, B2, C1, C2, as given in Table 4.2 having GCV interval of 500 Kcal/kg. The frequency of the available blocks as per the proposed grades has been elaborated in Table 4.2.

It was observed that the most frequent GCV range was 2001 to 3500 Kcal/kg whereby 85.10% of blocks were identified. However, proposed grade B1 and B2 has the maximum number of blocks (71 blocks out of 94 available blocks).

It was also observed that the GCV wise lignite resources in the recent GR have band width of GCV in 500 Kcal/kg.

2 nos. of blocks were also reported having GCV <1000 Kcal/kg which have been excluded from the proposed grading system.

### C. Proposal - III IIT (ISM):

The proposal follows the Non-Coking coal grading system, adopting band width of 300KCal/kg for all proposed Grades. The upper limit has been considered as >6000Kcal/kg. This grading system adopts the nomenclature of L1, L2, L3 .... (L for lignite) L1 corresponding to L1 as GCV >6000KCal/kg, and at interval of 300Kcal/kg all the remaining grades till 900 Kcal/kg as given in table 4.3.

FREQUENCY DISTRIBUTION OF GCV OF 94 LIGNITE BLOCKS- IIT (ISM) PROPOSAL						
GRADE	RANGE	BLOCKS- FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIFNITE BLOCKS	
L1	>6000	-				
L2	5701-6000		•	]		
L3	5401-5700			]		
L4	5101-5400			]		
L5	4801-5100			]		
L6	4501-4800			]		
L7	4201-4500			]		
L8	3901-4200		•	]		
L9	3601-3900	4	4.34	]		
L10	3301-3600	4	4.34	72.81	67	
L11	3001-3300	6	6.52	]		
L12	2701-3000	25	27.17			
L13	2401-2700	25	27.17			
L14	2101-2400	17	18.47			
L15	1801-2100	9	9.78	]		
L16	1501-1800	2	2.17	]		
L17	1201-1500	-		]		
L18	901-1200			]		
		92	100			

### Table-4.3: IIT/ISM Proposal

Market of lignite is different from normal coal. Proposed Grading system may be like L1, L2, L3, L4..

In the present Proposed Grading system, band width of 300 Kcal/kg has been considered which can have a nomenclature of L1, L2, as given in table 4.3.

The Upper limit has been considered as >6000 Kcal/kg which has been considered keeping in mind any future lignite blocks having higher GCV values and the lower limit has been in range of 901 Kcal/kg to correlate with existing grade C of SLREC classification (GCV 1000-2000 Kcal/kg).

It was observed from table 4.3 that the frequency distribution of available blocks from L1 to L8 is nil, i.e., no blocks are available in GCV range 3901 to >6000 Kcal/kg.

81 number of blocks are occurring in GCV range of 3900 to 2400 Kcal/kg i.e., L9 to L14. Lower grades i.e., L15 to L18 are having few number of blocks as evident from Table 4.3.

### **Chapter 5: Recommendations of the Technical Committee**

The summary of the recommendations of the Technical Committee against the given ToR is as follows:

- 1. GCV is the appropriate energy efficiency parameter as no other parameter was found suitable to have direct relation with energy efficiency.
- 2. In-Situ moisture to be considered for calculation of GCV.
- 3. Band width of GCV interval from the existing GCV of 1000Kcal/kg has to be decreased. This will lead to the quality satisfaction assurance for customers/Client.
- 4. Uniform interval of GCV for all proposed grades. This will be in accordance with the grading system of Non-Coking Coal.
- 5. Total of 11 grades has been proposed. All grades will have uniform GCV band width of 300KCal/kg
- 6. The proposed Grading system. will be referred as GL1 to GL11 in band width of 300KCal/kg as given in Table -5.1.
- 7. The upper limit of GCV has been considered as >3900 Kcal/kg corresponding to GL1.
- 8. The lowermost limit of GCV has been considered in range of 901 to 1200 Kcal/kg corresponding to GL11.

PROPOSED GRADING SYSTEM				
GRADE RANGE GCV KCal/kg (in –situ moisture ba				
GL1	>3900			
GL2	3601-3900			
GL3	3301-3600			
GL4	3001-3300			
GL5	2701-3000			
GL6	2401-2700			
GL7	2101-2400			
GL8	1801-2100			
GL9	1501-1800			
GL10	1201-1500			
GL11	901-1200			

### Table- 5.1 Proposed Grading System

- Below 900 Kcal/kg GCV is in ungraded category.
- Carbonaceous clay having GCV <900 Kcal/kg of thickness upto 0.5m in between the seam will be included for resource purpose.

A comparison of existing grading system and proposed grading system is given in Table 5.2

Older classification (As per SLREC)	Proposed grading system
GCV KCal/kg (in –situ moisture basis)	GCV KCal/kg (in –situ moisture basis)
	GL1 >3900
	GL2 3601-3900
A >3000	GL3 3301-3600
	GL4 3001-3300
	GL5 2701-3000
	GL6 2401-2700
В 2001-3000	GL7 2101-2400
	GL8 1801-2100
	GL9 1501-1800
C 1000-2000	GL10 1201-1500
	GL 11 901-1200

Table- 5.2: Comparison of Existing and Proposed Grading Systems

### 5.1 Scope for further work

Since CIMFR and IIT-ISM had opined the role of high moisture content in lignite and its heat loss effect during combustion, it may be prudent to carry out some detailed exercise by these organizations along with NLCIL to study the usefulness and the commercial effect of GCV  $_{\rm eff}$ .

### 5.2 Confirmation of the committee members

The report including the minutes of meeting held was circulated to all members of technical committee through e-mail. All comments from the committee members and outcome of the meetings held have been suitably incorporated in the report. All correspondence of committee members is given in Annexure IV.

Confirmation regarding acceptability of the said report from committee members has been received which are given in Annexure 5.0.

### 5.3 Confirmation from Chairman of the Committee

The report including minutes of meeting on discussion carried out during technical meetings and confirmation on the report from committee members were sent to CMD CMPDIL who is also chairman of the committee. Consent/confirmation received from Chairman of the committee for submission of the report to Ministry of Coal and to all committee members is given at Annexure- 6.0

\*\*\*\*\*\*\*

Manoj Kumar (CMD CMPDIL)

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Zeba Imam HoD CC Lab (Member Secretary of the Committee)

### ANNEXURE - 1.0

640/642

### Letter from MoC

#### 34011/02/2016-CRC-I

#### 2456909/2022/MPS

1/29181/2022

No. 34011/02/2016-CRC-I [e- 328806] Government of India Ministry of Coal (CPIAM Section)

> Room No. 622-A, Shastri Bhawan, New Delhi, dated 1st April, 2022

Office Order Subject: Constitution of Technical Committee to consider and make suitable recommendations on grading/ categorization of lignite resource- regarding.

In order to promote allocation of lignite blocks, lignite resources are required to be appropriately categorized based on energy efficiency parameter or any other characteristic parameter of lignite as may be deemed necessary. In this regard, the undersigned is directed to convey the approval of the Competent Authority in the Ministry of Coal for constitution of Committee under Chairmanship of CMD, CMPDIL which will consider and make suitable recommendations on grading/ categorization of lignite resource. The composition of the Committee shall be as under-

SI. NO	). Name and designation	Designation in the Committee
1.	CMD, Central Mine Planning and Design Institute Limited	Chairman
2.	CMD, MECL	Member
3.	Director (Mining), NLCIL	Member
4.	Representative of IIT-ISM, Dhanbad	Member
5.	Representative of CIMFR, Dhanbad	Member
6.	Coal Controller CCO or his representative	Member
7.	General Manager (Exploration), CMPDI	Member

2. Chairman of this Committee may opt any other member to the Committee.

3. The terms of reference of the Committee shall be as under-

"Analyze and recommend different grades of lignite based on appropriate energy efficiency parameter, like Gross Calorific Value (GCV) or any other characteristic parameter of lignite as may be deemed necessary."

4. The Committee may submit its report within three (03) weeks to this Ministry.

1/1E O

(Hitlar Singh) Under Secretary to the Government of India Tel. 011-23382269 e-mail: hitlar.singh85@nic.in

To, The Members of the Committee

Copy to- PSO to Secretary, MoC/ PPS to AS (VKT), MoC/ PPS to Adviser(P), MoC/ PS to Director(Tech), MoC/

### Members of the approved committee

SI No	Name & Designation	Designation in the Committee
1	CMD, CMPDI	Chairman
2	CMD, MECL	Member
3	Director (Mining), NLCIL	Member
4	Representative of IIT-ISM, Dhanbad	Member
5	Representative of CIMFR, Dhanbad	Member
6	Coal Controller CCO or his representative	Member
7	General Manager (Exploration), CMPDI	Member
8	DDG, MII B NeNR, GSI	Co-opted Member
9	Dy GM, Lab, CMPDI	Co-opted member &
		Member Secretary

**ZEBA IMAM** 

### **Proceedings of 1<sup>st</sup> Technical Committee Meeting:**

3.1 Letter for first meeting of Technical Committee of Lignite on 19.04.2022 Email

https://email.gov.in/h/printmessage?id=21603&tz=Asia/Kolkata&xim=1

## 1st meeting of Technical committee of Lignite on 19.4.2022

From : MANOJ KUMAR <cmd.cmpdi.cil@coalindia.in> Subject : 1st meeting of Technical committee of Lignite on 19.4.2022</cmd.cmpdi.cil@coalindia.in>	Mon, Apr 18, 2022 04:24 PM 2 attachments
To: Dr. Ranjit Rath MECL <cmd@mecl.co.in>, RAKESH KUMAR <cmd@nlcindia.in>, DIRECTOR MINES <director.mines@nlcindia.in>, CCO HQ <coalcont- wb@nic.in&gt;, ddg nenr <ddg.nenr@gsi.gov.in>, Director CSIR CIMFR, Dhanbad <director@cimfr.nic.in>, director@iitism.ac.in</director@cimfr.nic.in></ddg.nenr@gsi.gov.in></coalcont- </director.mines@nlcindia.in></cmd@nlcindia.in></cmd@mecl.co.in>	
Cc : V K SRIVASTAVA <gmexpl.cmpdi@coalindia.in>, ZEBA IMAM <gmct.cmpdi@coalindia.in>, CMD SECRETARIAT <sectt.cmd.cmpdi@coalindia.in></sectt.cmd.cmpdi@coalindia.in></gmct.cmpdi@coalindia.in></gmexpl.cmpdi@coalindia.in>	

Sir,

Email

In pursuance of the Office Order dtd. 01.04.2022 (copy attached), Ministry of Coal (MoC) has constituted a "Technical Committee" under the Chairmanship of CMD, CMPDI, to make suitable recommendations on grading/ categorization of Lignite resource.

### Accordingly the 1st meeting of the above Committee is scheduled to be held under the Chairmanship of CMD, CMPDI, on 19.04.2022 at 3.30 pm in the Board Room of CMPDI.

The VC link for the above-said meeting through Webex platform is as follow:

Meeting link:

https://railtel.webex.com/railtel/j.php?MTID=m640451a59296209a4be015fdbb9a3229

Meeting number: 2510 413 1368

A PPT is also being attached with the mail on "Grading/Categorization of Lignite" for your ready reference and comments, if any.

All the members of the Committee are requested to kindly make it convenient to attend the meeting.

This issues as per the instruction of CMD, CMPDI.

Thanking you,

Office of CMD, CMPDI

Technical Committee \_OM.pdf 293 KB

Technical Committee Lignite.pptx 762 KB

2 of 2

21-06-2022, 02:40 pm

### 3.2 MoM of the First Technical Committee Meeting:

### Minutes of Meeting held under the chairmanship of CMD,CMPDI Ranchi on 19<sup>th</sup> April 2022 to analyze and recommend different grades of lignite based on appropriate energy efficiency parameter

Ministry of Coal (MoC) has constituted a "Technical Committee" under chairmanship of CMD, CMPDI to make suitable recommendations on grading/ categorization of lignite resource through office order dated 01.04. 2022 (OM No. 34011/02/2016-CRC-I [e- 328806]) received on 08.04.2022

The Terms of Reference (ToR) of the committee is "Analyze and recommend different grades of lignite based on appropriate energy efficiency parameter, like Gross Calorific Value (GCV) or any other characteristic parameter of lignite as may be deemed necessary".

#### The members of the approved committee are given in Annexure-I

The 1<sup>st</sup> meeting for analyzing the existing grading system of lignite for making suitable recommendations on grading/categorization of lignite resources was held through VC on 19<sup>th</sup> April 2022 under the Chairmanship of CMD CMPDI Ranchi.

The list of participants is given in Annexure II.

- 1. CMPDI made a presentation referring the ToR of the committee. The points elaborated upon are as follows:
  - The geological resources of Lignite available is 46,018.47 million tonne as on 01.04.2021. Of these, 7374.10 million tonne belongs to 'Measured (331)', 25650.53 million tonne indicated (332)' and 12993.84 million tonne belong to 'Inferred (333)' categories.
  - The lignite resources are mainly confined to Tamilnadu, Pondicherry, Rajasthan, Gujrat, Jammu & Kashmir, Kerala & West Bengal
  - The exploration of Lignite and resource estimation is carried out as per the guidelines mentioned in SYSTEM OF LIGNITE RESOURCE ESTIMATION AND CLASSIFICATION (SLREC), 2008, which is as per UNFC.
  - The earlier grading system was based on 'Ash content" on as received basis. Later classification/grading system is proposed for lignite, based on Gross Calorific Value (GCV) on in situ Moisture basis.
  - The lignite resource classification system as per the present practice classifies (Brown coal) lignite into Lignite A, Lignite B and Lignite C Grades based on GCV

GRADE	GROSS CALORIFIC VALUE (K.CAL. /KG.) ON IN-SITU MOISTURE BASIS
LIGNITE-A	MORE THAN 3000
LIGNITE-B	2001-3000
LIGNITE-C	1000-2000

- 2.0 Points to be discussed by the Technical Committee:
  - To study the existing three-fold category of grading of lignite based on GCV.
  - Scope of further sub-division of the existing grades of lignite.
  - Whether any other parameters apart from GCV may b considered as basis of grading of lignite.

- 3.0 The committee members were requested to share their views and opinion regarding suitable sub division of the existing grading system of lignite.
- 4.0 NLCIL briefed the committee that almost 70% of the lignite blocks are falling in Grade B. The major consumption of lignite is for captive power plants where the requirement is lignite having GCV in range of 2400 to 2600Kcal/ kg. This is being made available mostly from grade B category of lignite.
  - NLCIL suggested sub division of the existing grades based on GCV. Recommended sub division of Grade B category having GCV in range of 2001-3000 Kcal/kg, where as grade A and C does not need any sub division.
  - Grade B may be regrouped in range of 1800-3000 KCal/kg instead of existing 2001-3000 KCal/kg. It can be sub divided into 4 sub-groups of 300 K.Cal/kg GCV band width.
  - The new proposed grading system may be as given below;
    - Lignite A :>3000KCal/kg
    - Lignite B 1. B1 :2701-3000 KCal/kg, 2. B2 2401-2700 KCal/kg,
    - 3. B3 2101-2400 KCal /kg 4. B4 1801- 2100 KCal/kg
    - Lignite C : 1800-1000 KCal/kg

This sub division will be in accordance with the existing grading system of Non Coking coal (G1 - G17 having GCV band width of 300KCaL/Kg).

- 5.0 CIMFR desired to first study the effect of ratio of moisture and ash present in lignite at any given GCV value. CIMFR wanted to first analyze the available data to suggest suitable sub grouping of existing grades.
- 6.0 IIT ISM opined the same views of CIMFR. NCV (Net calorific value) data also to be studied. Sub groups in band width of 200Kcal/kg was also suggested as it would include all resources.
- 7.0 GSI emphasized that GCV should be the only parameter for consideration in grading of lignite. There should be few sub-groups as too many sub grouping will not serve any better purpose. It was suggested to have sub-groups in band width of 500 KCal/kg.
- 8.0 MECL indicated that in grade A (> 3000 KCal/kg) values up to 4500 KCal/kg have been reported, hence even grade A should also be subdivided into suitable sub groups.
- 9.0 CMPDI mentioned that in the recent geological reports of lignite, GCV in band width of 500 KCal/kg. is being reported. All the existing grades A, B and C can be sub grouped as :

A1 >3500KCal/kg, A2 3001-3500KCal/kg B1 2501-3000KCal/kg , B2 2001-2500KCal/kg C1 1501 -2000 KCal/kg C2 1500-1000 KCal/kg.

10.0 Since NLCIL is having maximum data on lignite, NLCIL was requested to share the available data with other committee members, so that more data analysis can be conducted to find out suitable grading options.

11.0 CIMFR and IIT-ISM will analyze the given set of available data. Possibility of parameters other than GCV may also be explored to consider for sub-division of existing grades. Based on data analysis if any new model of grading is proposed, it can be discussed in next meeting.

The committee decided to fix up another meeting shortly as per convenience of all members to further discuss with justification sub grouping of grades before making suitable recommendations.

The meeting ended with vote to thanks to the chair.

### ANNEXURE-I

Members of the approved Committee

SI	Name & Designation	Designation in the Committee
INU		
1	CMD, CMPDI	Chairman
2	CMD, MECL	Member
3	Director (Mining), NLCIL	Member
4	Representative of IIT-ISM, Dhanbad	Member
5	Representative of CIMFR, Dhanbad	Member
6	Coal Controller CCO or his representative	Member
7	General Manager (Exploration), CMPDI	Member
8	DDG, MII B NeNR, GSI	Co-opted Member
9	Dy GM, Lab, CMPDI	Co-opted member &
		Member Secretary

### ANNEXURE-II

### LIST OF PARTICIPANTS OF THE $1^{\rm ST}$ MEETING HELD ON $19^{\rm th}$ APRIL 2022

- 1. Shri Manoj Kumar CMD CMPDI
- 2. Shri Arvind Prasad Director MECL
- 3. Shri Suresh Chandra Suman Executive Director (Mines) NLCIL
- 4. Dr.P.K Banerjee -Scientist H/Outstanding Scientist CIMFR
- 5. Prof.Barun Kumar Nandi-IIT-ISM
- 6. Shri M.Bhaskaran GM(Exploration) MECL
- 7. Shri A Rai Choudhuri DDG-GSI
- 8. Shri V.K Srivastava GM(Exploration) CMPDI
- 9. Shri Arjun Hembrom GM (Exploration) CMPDI
- 10. Ms.Zeba Imam Dy.G.M Coal Characterization Lab CMPDI
- 11. Sri Pravin Kant Sharan Ch.Manager (Geology) CMPDI
- 12. Shri Rajiva Kr.Singh Ch.Manager (Geology) CMPDI
- 13. Dr.R. P Singh Sr.Manger (Geology) CMPDI
- 14. Shri Yadvendra Kr Manger (Geology) CMPDI

### 3.3 ATR of 1st MoM:

### 3.3.1 Comments from NLCIL:

		SLREC CAT	EGORIZATION		
	RANGE	BLOCKS-FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIGNITE BLOCKS
	<1000	2	2.13		
Lignite -C	1001-2000	7	7.45		
lignite -B	2001-3000	71	75.53	75.53	71
ignite -A	>3000	14	14.89		
		94	100.00		
		NLCIL's PROPOSI	ED CATEGORIZATIO	N .	
GRADE	RANGE	BLOCKS-FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIGNITE BLOCKS
С	<1800	3	3.19		
B4	1801-2100	9	9.57		
B3	2101-2400	17	18.09		
B2	2401-2700	26	27.66		
B1	2701-3000	25	26.60	04.04	
A4	3001-3300	6	6.38	81.91	//
A3	3301-3600	4	4.26		
A2	3601-3900	4	4.26		
A1	>3900	0	0.00		
		0.4	100.00		

### FREQUENCY DISTRIBUTION OF GCV OF 94 LIGNITE BLOCKS -TAMILNADU, GUJARAT AND RAJASTHAN

#### NLCIL SUGGESTED LIGNITE GRADING BASED ON CGV ( GCV calculated based on In-situ moisture)

- 1. The Wt. Avg. of Gross Calorific Value of lignite blocks falls within the range of 2000 to 3000 K.Cal/Kg.
- 2. As per the existing classification, out of 94 blocks, 71 blocks falls in the GCV range of 2001-3000 K.Cal/Kg with frequency percentage of 75.53.
- 3. As per NLCIL proposed grading,77 blocks falls in the GCV range of 1801 to 3000 K.Cal/Kg covering the most frequent GCV range of the lignite blocks with frequency percentage of 81.91 and 14 blocks falls in GCV range of 3001 to 3900 K.Cal/Kg. Only 3 blocks fall in GCV range less than 1800 K.Cal/Kg.
- 4. In order to maintain uniform grading for coal and lignite , it is proposed to have the same bandwidth of 300 K.Cal/Kg (starting with <1800 K.Cal/Kg to >3900 K.Cal/Kg) for lignite also.

NLCIL SUGGESTED LIGNITE GRADING BASED ON CGV (GCV calculated based on In-situ moisture)

- 5. From the data available, non of the lignite blocks fall more than 3900 K.Cal/Kg GCV and only 3 blocks fall less than 1800 K.Cal/Kg GCV.
- 6. Since GCV of most of the lignite blocks falls in Lignite B grade of the SLRCE classification, it is suggested to divided the Lignite-B grade to Grade B1, B2, B3 and B4 with a bandwidth 300 K.Cal/Kg similar to Coal grading which is also based on the Gross Calorific Value (GCV) and Lignite-A grade in to A1, A2, A3 and A4 with same bandwidth of 300 K.Cal/Kg as there is no lignite blocks having GCV grater than 3900 K.Cal/Kg.
- In addition to this, out of 94 blocks, 71 blocks fall in most frequent range (2000-3000 K.Cal/Kg) with a frequency distribution of 81.91 % and also the lignite blocks are almost evenly distributed in Grade B1(25), Grade B2(25), Grade B3(17,) except B4 Grade (9).
- 8. Since, Grade wise Geological Reserve in the Geological Reports (GR) is available as per SLRCE classification (Lignite A,B,C), the resources can be re-assessed as per the new lignite grading/categorisation before auctioning of lignite blocks.

### 3.3.2: Comments from IIT/ISM:

#### Grading criteria for lignite

Based on the data given and analysis of CIMFR, it can be observed that lignite coal GCV can be similar to normal coal. Hence lignite grading should be in line with the normal coal such as G1, G2 etc. In many cases moisture is higher ~50%. If we consider maximum moisture content is ~10% for normal coal, any moisture above ~10%, we may consider excess and results in heat loss during combustion. This heat is excess over the heat loss due presence of hydrogen in coal, which is considered during NCV calculation. For example, for 1 kg coal, with Moisture of 40%, total latent heat loss due to moisture is  $40 \times 540/100$  kcal/kg. After deducting normal moisture deduction of 10% for coal, excess latent heat loss can be expressed as (M-15)×540/100 or more specifically 5.4\*(M-10).

Hence effective GCV we may consider as GCV<sub>eff</sub>=GCV-5.4×(M-10); M=moisture in %.

All such values may as received basis at mines, as equilibrate basis (40 °C, 60%RH) is difficult for lignite. This **GCV**<sub>eff</sub> can be considered for grading of Lignite.

To differentiate the grading between normal coal and lignite coal, we may propose grading like L1, L2, L3, L4 etc. as market of lignite is different from normal coal. (It is similar to coking coal and non-coking coal grading). GCV difference between each grade may be 250/300/400 kcal as agreed by all the member. Such grading will be helpful for all the lignite mines as well as consumers.

Grading Table may be like or in reverse order

GCV <sub>eff</sub> (kcal/kg)	Grade	Or in Reverse order
1000<	L1	>6000
1001-1300	L2	5701-6000
1301-1600	L2	5401-5700

Barun Kumar Nandi IIT (ISM) Dhanbad

### 3.3.3 Comments from CIMFR:

### STUDY CARRIED OUT BY CIMFR

- From the available data CIMFR carried out detail analysis to ascertain whether CV alone is adequate for the categorization or any other parameter can also be considered for grading.
- At present CV is used as the criterion for grading different types of coal/lignite in India and also other countries.
- The available Proximate Analysis (Moisture, Ash, VM & FC) and Gross Calorific Value (GCV) of the Lignite from different basins of India was studied.
- Data of two randomly selected basins (one from Gujrat and Other from Neyveli, Tamil Nadu) were analyzed.
- An attempt was made to establish relationship of GCV with different parameters of Proximate analysis i.e. GCV with VM, Ash, Moisture and FC



### Lignite deposit of Gujarat, Rajpardi



### **KEY OBSERVATIONS**

- Negative relationship between ash and calorific value and positive relationship between volatile matter (VM) and fixed carbon (FC).
   VM should not be used to characterize lignite due to wide variability. Kerogen (organic matter) type input for lignite can be highly
- with should not be used to characterize fighte due to what warability. Rengen (digant matter) type input for fighte can be fightly variable depending on source kerogen, which includes both hydrocarbons and oxides.
   Whan coalification proceeds from part to lighte (brown coal) to bituminous coal, lot of oxygenated compounds are released i.e.
- When coalification proceeds from peat to lignite (brown coal) to bituminous coal, lot of oxygenated compounds are released i.e. lignites are marked by presence of large quantities of oxides which are released as volatiles during proximate analysis.
- If the kerogen input is marked by more sapropelic matter or H-rich organic matter, they would also crack during proximate analysis
  to generate hydrocarbons (volatiles).
- This is also reflected when VM <sup>daf</sup> is considered for the samples, which was observed to vary widely.
- Degree of correlation with CV was observed to further increase when VM and fixed carbon were considered together.
- For all samples role of moisture was not clear. The role of moisture can be especially significant for the end users and may thus need strong monitoring/attention. For valuation of lignite, one needs to pay significant attention to the moisture content
- At low rank stages such as lignite, bed moisture (on ash free basis) and CV (on moist. ash free basis) are considered as rank parameters (Taylor et al., 1998). For grading, an easy mechanism could be to air dry the samples, and then measure their CV. Since the CV value is well correlated with other parameters (except Moisture), this can be used for categorization of Lignite.



### 3.3.4 **Comments from GSI:**

GSI emphasized that GCV should be the only parameter for consideration in grading of lignite. There should be few sub-groups as too many sub grouping will not serve any better purpose. Grade A should be further classified because lignite having GCV of more than 3000 KCal/kg is not uncommon.

3.3.5 Comments from MECL:

MINERAL EXPLORATION AND CONSULTANCY LTD. (Formerly Mineral Exploration Corporation Ltd.)



### Suggestion of MECL for Grading of Lignite

- 1. Coal and Lignite, the solid fuels combined, contribute towards almost 80% of the total power generation capacity in India.
- 2. Lignite is the younger most member of the Coal family.
- 3. Lignite is considered as important fuel for power generation especially due to its lower ash content.
- 4. GCV as parameter for grading coal at every 300 Kcal/Kg intervals already exists.
- 5. Increase in GCV interval will lead to the quality satisfaction assurance for customers/Client.





### Suggestion of MECL for Grading of Lignite

- 6. Therefore, MECL's view is that the GCV based classifications which already exist for Coal may be applied for the lignite also i.e. 300 Kcal/kg intervals on In-Situ Moisture basis as ISM-IIT & NLCIL has recommended.
- 7. The GCV of majority of Lignite in India varies generally between 2500–3000 Kcal/Kg on In–Situ Moisture basis (more than 50%).



### 4: **Proceedings of 2<sup>nd</sup> Technical Committee Meeting:**

### 4.1: Letter for 2<sup>nd</sup> Technical Committee Meeting

Email

https://email.gov.in/h/printmessage?id=23096&tz=Asia/Kolkata&xim=1

Email	ZEBA IMAM
Re: draft ppt on proposed grading/categorization of lignite	e resources
From : ZEBA IMAM <gmct.cmpdi@coalindia.in></gmct.cmpdi@coalindia.in>	Fri, Jun 10, 2022 10:55 AM
<b>Subject :</b> Re: draft ppt on proposed grading/categorization of lignite resources	
<ul> <li>To: RAKESH KUMAR <cmd@nlcindia.in>, CGM GEOLOGY NLCIL <cgm.geo@nlcindia.in>, DIRECTOR MINES <director.mines@nlcindia.in>, Director CSIR CIMFR, Dhanbad <director@cimfr.nic.in>, director <director@iitism.ac.in>, Dr. Ranjit Rath MECL <cmd@mecl.co.in>, ddg nenr <ddg.nenr@gsi.gov.in>, CCO HQ <coalcont-wb@nic.in>, gm- exploration@mecl.gov.incm, baski rivas <baski.rivas@gmail.com></baski.rivas@gmail.com></coalcont-wb@nic.in></ddg.nenr@gsi.gov.in></cmd@mecl.co.in></director@iitism.ac.in></director@cimfr.nic.in></director.mines@nlcindia.in></cgm.geo@nlcindia.in></cmd@nlcindia.in></li> <li>Cc: MANOJ KUMAR <cmd.cmpdi@coalindia.in>, V.K. SRIVASTAVA <vk.srivastava@coalindia.in>, ARJUN HEMBROM <arjun.hembrom@coalindia.in>, RAJIV KUMAR SINGH <rajiv.singh@coalindia.in>, RAGAWENDRA PRATAP SINGH <singh.rp@coalindia.in>, YADVENDRA KUMAR <yadvendra.kumar@coalindia.in>, JYOTI DAHANGA <jyoti.dahanga@coalindia.in></jyoti.dahanga@coalindia.in></yadvendra.kumar@coalindia.in></singh.rp@coalindia.in></rajiv.singh@coalindia.in></arjun.hembrom@coalindia.in></vk.srivastava@coalindia.in></cmd.cmpdi@coalindia.in></li> </ul>	
Dear Sir,	
The second technical committee meeting on grading/categorisat be held on 14.06.2022 at 3.30pm through VC mode. All members are requested to make it convenient to attend the n The link shall be provided shortly.	ion of lignite resources will neeting.
Regards, Zeba Imam Dy. GM C C Lab CMPDI-HQ Ranchi contact no 8987789001, 9939252845	

From: "ZEBA IMAM" <gmct.cmpdi@coalindia.in> To: "RAKESH KUMAR" <cmd@nlcindia.in>, "CGM GEOLOGY NLCIL" <cgm.geo@nlcindia.in>, "DIRECTOR MINES" <director.mines@nlcindia.in>, "Director CSIR CIMFR, Dhanbad" <director@cimfr.nic.in>, "director" <director@iitism.ac.in>, "Dr. Ranjit Rath MECL" <cmd@mecl.co.in>, "ddg nenr" <ddg.nenr@gsi.gov.in>, "CCO HQ" <coalcont-wb@nic.in>, gm-exploration@mecl.gov.incm, "baski rivas" <baski.rivas@gmail.com>
Cc: "MANOJ KUMAR" <cmd.cmpdi@coalindia.in>, "V.K. SRIVASTAVA"

 vk.srivastava@coalindia.in>, "ARJUN HEMBROM" <arjun.hembrom@coalindia.in>, "RAJIV KUMAR SINGH" <rajiv.singh@coalindia.in>, "RAGAWENDRA PRATAP SINGH"
 singh.rp@coalindia.in>, "YADVENDRA KUMAR" <yadvendra.kumar@coalindia.in>, "JYOTI DAHANGA" <jyoti.dahanga@coalindia.in>
 Sent: Tuesday, June 7, 2022 7:04:47 PM

**Subject:** draft ppt on proposed grading/categorization of lignite resources

Dear Sir,

PFA a draft presentation which has been prepared taking into account the information/comment/observation received from the respective committee members.. It is requested that suggestions / corrections in the presentation may be made accordingly and communicated to undersigned latest by 9.6.22, so that final ppt can be forwarded again by 10.6.2022.for discussion in 2nd technical meeting.

The 2nd Technical committee meeting is proposed to be held on 14.6.2022 through VC. Confirmation will be communicated.

It may also be mentioned that we have received reminder from MoC to submit the recommendation report without further delay.

It is an earnest request to all members to kindly send their comments at earliest so that report can be submitted to MoC as early as possible.

Regards, Zeba Imam Dy.GM C C Lab CMPDI-HQ Ranchi contact no 8987789001, 9939252845

21-06-2022, 01:15 pm

### 4.2 MoM of the Second Technical Committee Meeting:

## Minutes of 2<sup>nd</sup> TECHNICAL COMMITTEE ON GRADING/CATEGORISATION OF LIGNITE RESOURCES held under the chairmanship of CMD, CMPDIL Ranchi on 14<sup>th</sup> June 2022.

Sub: Committee to make suitable recommendations on grading/categorization of lignite resources.

**Ref:** Constitution of Technical Committee under the chairmanship of CMD, CMPDIL through office order dated 01.04. 2022 (OM No. 34011/02/2016-CRC-I [E- 328806]). ANNEXURE-A

The Terms of Reference (ToR) of the committee "Analyze and recommend different grades of lignite based on appropriate energy efficiency parameter, like Gross Calorific Value (GCV) or any other characteristic parameter of lignite as may be deemed necessary". ANNEXURE-B

Attendees: The list of participants is given in Annexure-I.

The 2<sup>nd</sup> Technical meeting was convened on 14.06.2022 at CMPDIL HQ in hybrid mode i.e. in physical form for CMPDI members and video conferencing for other committee members.

At the outset, CMD, CMPDIL welcomed all the committee members and thereafter asked Member Secretary to start the proceedings of the 2nd Technical Meeting.

Member Secretary made an elaborate presentation with reference to the given ToR.

**Background**: In order to promote allocation of lignite blocks, lignite resources are required to be appropriately categorized based on energy efficiency parameters or any other characteristic parameter of lignite as may be deemed necessary.

- The objective of this grading/re-categorization of grading system of lignite is primarily to meet requirements of stakeholders.
- The economic viability of any deposit can change with demand pattern, mining technology, infrastructure development, environmental conditions, socio-economic contraints, surface contraints etc.
- The existing band width of GCV 1000 K Cal/Kg needs to be re-looked so that identified resources can be suitably categorized for better utilization.
  - The existing categorization of lignite resources is as per SLREC is given below:

Gross calorific value (K Cal/Kg.) On in-situ Moisture basis	
More than 3000	
2001 to 3000	
1000 to 2000	

· This will support stakeholders in fair pricing of the blocks as per its utilization.

ATR of 1st Technical Committee Meeting:

As per the discussion during the 1<sup>st</sup> Technical meeting, held on 19<sup>th</sup> April 2022, the MoM was circulated on 23<sup>rd</sup> April 2022 to all the committee members for their inputs, comments and necessary suggestions.

- NLCIL was requested to provide all relevant data needed to make suitable recommendations. Data on B/B, proximate analysis and GCV was made available by NLCIL. 94 nos. of blocks as per SLREC categorization mostly from Tamil Nadu, Gujarat and Rajasthan were considered. The Wt. Avg. of Gross Calorific Value of the 94 lignite blocks has been considered for the proposed grading system.
- CIMFR and IIT-ISM were requested to analyze the data and suggest if any other parameter can be suitable for defining energy efficiency for grading/categorization of lignite resources.
- All other committee members were requested to forward their suggestions for discussion and recommendations.

Upon receiving the comments from all committee members, the  $2^{nd}$  Technical Committee meeting was held

- for deciding the parameters to be adopted for grading of Lignite with respect to energy
  efficiency.
- To recommend different grades of lignite resources of India based on appropriate energy efficiency parameter according to the proposals submitted by committee members

The proceedings of 2<sup>nd</sup> Technical Committee meeting are given in Table-1

### TABLE-1

SI	Discussion/observation in 1 <sup>st</sup> Technical	ATR of 1 <sup>st</sup> meeting	Discussion during 2 <sup>nd</sup> meeting
no	Meeting		
1	<ul> <li>NLCIL suggested sub division of the existing grades based on GCV (on in-situ moisture).</li> <li>Recommended sub division of Grade B category having GCV in range of 2001-3000 KCal/kg, into 4 sup group in band width of 300Kcal/kg</li> <li>Grade A and C no sub division.</li> <li>The new proposed grading system is as follows:         <ul> <li>Lignite A: &gt;3000 KCal/kg</li> <li>Lignite B1: 2701-3000 KCal/kg, o B2: 2401-2700 KCal/kg, o B3: 2101-2400 KCal/kg</li> <li>B4: 1800 -2100 KCal/kg</li> <li>Lignite C: &lt;1800-1000 KCal/kg</li> </ul> </li> </ul>	<ul> <li>The proposal was revised.</li> <li>The existing Grades A and B are divided in 4 sub-groups in band width of 300 KCal/Kg</li> <li>Grade A1 having GCV &gt;3900K.Cal/Kg. till C Grade having GCV &lt;1800 KCal/Kg</li> <li>The new Proposed Grading system (on in-situ Moisture basis) is as follows:</li> <li>A1 &gt;3900 KCal/Kg.</li> <li>A2 3601-3900 KCal/Kg.</li> <li>A3 3301-3600K.Cal/Kg.</li> <li>B1 2701-3000K.Cal/Kg.</li> <li>B2 2401-2700K.Cal/Kg.</li> <li>B3 2101-2400K.Cal/Kg.</li> <li>B4 1801-2100K.Cal/Kg.</li> <li>C &lt;1800 KCal/Kg.</li> </ul> From the available data the frequency of occurrence of blocks of different grades as per GCV was tabulated which is given in Table-2	<ul> <li>In order to maintain uniform grading for coal and lignite, it is proposed to have the same bandwidth of 300 KCal/Kg (starting with grade A1 &gt;3900 KCal/Kg to grade C &lt;1800 KCal/Kg) for lignite also.</li> <li>From the data available, none of the lignite blocks have GCV &gt; 3900 KCal/Kg GCV and only 3 blocks show GCV &lt;1800 KCal/Kg GCV.</li> <li>Distribution of blocks</li> <li>Grade A of the SLREC classification divided into A1, A2, A3 and A4 (GCV 3001- &gt;3900 KCal/Kg). Blocks falling in Grade A1(nil), Grade A2(4), Grade A3 (4), Grade A4(6).</li> <li>Lignite-B grade of the SLREC classification divided into B1, B2, B3, B4 (GCV-1801-3000KCal/kg) 77 blocks fall in this grade with a frequency distribution of 81.91 %. The lignite blocks are almost evenly distributed in Grade B1(25), Grade B2(25), Grade B3(17,) except B4 Grade (9).</li> <li>Since, Grade wise Geological Reserve in the Geological Reports (GR) is available as per SLREC classification (Lignite A, B, C), the resources will require re-assessment as per the new lignite grading/categorization before auctioning of lignite blocks.</li> </ul>

2	<ul> <li>CMPDIL suggested Grade categorization based on GCV values (on in-situ Moisture basis)</li> </ul>	<ul> <li>The proposal as suggested in 1<sup>st</sup> meeting was maintained.</li> </ul>	The existing grades A, B, C of SLREC classification have been divided into 2 sub-group having GCV band of 500KCal/kg
	<ul> <li>All the existing grades of SLREC classification A, B and C to be sub-divided into 2 sub-groups. A1, A2, B1, B2 C1, C2</li> <li>Grades having GCV band width of</li> </ul>	<ul> <li>A1 :&gt;3500 KCal/kg,</li> <li>A2 :3001-3500 KCal/kg</li> <li>B1 :2501-3000 KCal/kg,</li> <li>B2 :2001-2500 KCal/kg</li> <li>C1 :1500 -2000 KCal/kg</li> <li>C2 :&lt;1500 KCal/kg</li> </ul>	<ul> <li>It was seen that the most frequent GCV range of the lignite blocks is falling in Grade A2-B2 in GCV range of 2001-3500KCal/kg with frequency percentage of 85.10 having 80 blocks</li> </ul>
	500 KCal/kg.	From the available data the frequency of occurrence of blocks of different grades as	<ul> <li>Distribution of blocks</li> </ul>
	follows A1 :>3500 KCal/kg, A2 :3001-3500 KCal/kg B1 :2501-3000 KCal/kg, B2 :2001-2500 KCal/kg C1 :1500 -2000 KCal/kg C2 :<1500 KCal/kg	per GCV was tabulated which is given in Table-3	<ul> <li>Grade A1 :5 blocks, Grade A2 :9 blocks</li> <li>Grade B1 :48 blocks .51% of blocks are occurring in this grade. Grade B2 :23 blocks.</li> <li>Grade C1: 7 blocks, Grade C2: Nil.</li> <li>&lt;1000 Kcal/Kg: 2 blocks</li> <li>Band width of GCV 500KCal/kg will suitably address the distribution of GCV for utilization purpose.</li> <li>As no blocks are reported in higher GCV range (&gt;6000-4200Kcal/kg) too many grades for higher GCV is not required. Grade A1 for GCV</li> </ul>
3	CIMFR desired to first study the effect of ratio of moisture and ash present in lignite at any given GCV value. CIMFR wanted to first analyze the available data to suggest suitable sub grouping of existing grades	<ul> <li>Data of two randomly selected basins (one from Gujrat and Other from Neyveli, Tamil Nadu) were analyzed</li> <li>The available Proximate Analysis (Moisture, Ash, VM &amp; FC) and Gross Calorific Value (GCV) of the above 2 areas was studied.</li> <li>Detailed analysis to ascertain whether CV alone is adequate for the categorization or any other parameter can also be considered for grading.</li> </ul>	<ul> <li>address the present requirement.</li> <li>Gross Calorific Value (GCV) is a direct measure of heat value (energy) that is measured by experimentation.</li> <li>It is the most important parameter to define the amount of heat that will be generated.</li> <li>Other parameters such as moisture, ash, volatile matter percent or Carbon, Hydrogen content etc. have an indirect bearing on heat value.</li> </ul>

4 of 14

		An attempt was made to establish relationship of GCV with different parameters of Proximate analysis i.e. GCV with VM, Ash, Moisture and FC From the study carried out, it was concluded that CV value is well correlated with other parameters (except Moisture), hence GCV can be used for categorization of Lignite	<ul> <li>GCV (on in situ moisture basis) to be taken as grading parameter.</li> <li>GCV in band width of 300Kcal/kg should be acceptable. New nomenclature for the proposed grading system to be adopted.</li> </ul>
4	IIT ISM opined the same views of CIMFR. NCV (Net calorific value) data also to be studied. Sub groups in band width of 200Kcal/kg was also suggested as it would include all resources.	<ul> <li>GCV to be considered for Grading of Lignite.</li> <li>Nomenclature of new proposed grading system should be in line with the normal coal such as G1, G2 etc. but with difference such as L1, L2, L3</li> <li>GCV Bandwidth of grades can be 250/300/450Kcal/kg</li> <li>It was suggested to use an empirical formula Effective GCV which is GCV eff = GCV-5.4*(M-10); M= moisture in %.</li> <li><u>Reason:</u> Lignites are having high moisture content ~50%. Considering normal coal having moisture~10% any moisture excess and this result in heat loss during combustion. This heat is excess over the heat loss due presence of hydrogen in coal, which is considered during NCV calculations.</li> <li>From the available data the frequency of occurrence of blocks of different grades as per GCV was tabulated which is given in Table -4</li> </ul>	<ul> <li>This proposal follows the Non-Coking coal grading system, adopting band width of 300KCal/kg for all proposed Grades.</li> <li>The upper limit has been considered as &gt;6000Kcal/kg</li> <li>This grading system adopts the nomenclature of L1, L2, L3 (L for lignite) L1 corresponding to L1 as GCV &gt;6000KCal/kg, and at interval of 300Kcal/kg all the remaining grades till 900 Kcal/kg.</li> <li>The most frequent GCV range of the lignite blocks i.e. L12-L14 in GCV range of 2101-2700 KCal/kg with frequency percentage of 72.81 having 67 blocks.</li> <li>The GCV (on in situ moisture) to be considered for the present report.</li> </ul>

<ul> <li>GSI emphasized that GCV should be to only parameter for consideration in grading lignite.</li> <li>There should be few sub-groups as the many sub grouping will not serve any bet purpose.</li> </ul>	<ul> <li>be Grade-A should be further classified because lignite having GCV &gt; 3000 KCal/kg are not uncommon.</li> <li>because lignite having nearly 6000 KCal/kg GCV are also reported.</li> <li>Since economic consideration is one of the important issues behind the new scheme of classification, the class intervals should be decided keeping the economic aspect in mind.</li> <li>The number of subgroups should not be too many because that may not serve any better purpose.</li> </ul>	<ul> <li>The previously mentioned occurrence of blocks having GCV nearly 6000K Cal/kg was re-looked.</li> <li>Prior to 2004, the GCV of lignite resources is on calculated basis and not on-in-situ basis, hence higher values are reported. These values will be much lower on in-situ basis.</li> <li>GCV values of lignite resources prior to 2004 will have to be recalculated.</li> <li>Since no blocks reported GCV &gt; 4200Kcal/kg, the upper limit of proposed grading can be lowered to &gt;3900Kcal/kg.</li> <li>It was agreed that the inventory of lignite will be issued based on depthwise resources as per the current practice.</li> </ul>
<ul> <li>MECL indicated that in grade A (&gt; 30 KCal/kg) blocks having GCV of 45 KCal/kg have been reported.</li> <li>The sub-division of Grade A into suita sub groups was suggested</li> </ul>	<ul> <li>&gt; GCV based classification for lignite resources also as existing for grading of Non-Coking Coal.</li> <li>&gt; Grade interval of 300 Kcal/kg on In-Situ Moisture basis</li> <li>&gt; Proposal of NLCIL or ISM-IIT is acceptable for grading of lignite</li> </ul>	<ul> <li>GCV to be considered as grading parameter.</li> <li>The proposal of NLCIL or ISM-IIT having GCV grade interval of 300KCal/kg can be considered for grading.</li> <li>The upper limit of grade to be &gt;3900KCal/kg</li> <li>The lower limit of the grade to be in range of GCV 901 to 1200 Kcal/Kg</li> <li>Below 900 Kcal/kg GCV is in ungraded category.</li> <li>Carbonaceous clay having GCV &lt;900 Kcal/kg of thickness upto 0.5m in between the seam will be included for resource purpose.</li> </ul>

CCO was unable to attend the 1 <sup>st</sup> meeting	It was informed that as per the data of
	Amod Lignite mine, the GCV reported
	is 4342 Kcal/kg., hence blocks having
	GCV value >3900Kcal/kg. are
	reported.

NLCIL'S PROPOSED CATEGORIZATION					
GRADE	RANGE	BLOCKS- FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIGNITE BLOCKS
A1	>3900	0	0.00		
A2	3601-3900	4	4.26		
A3	3301-3600	4	4.26		
A4	3001-3300	6	6.38		
B1	2701-3000	25	26.60	91.01	77
<b>B</b> 2	2401-2700	26	27.66	01.91	11
<b>B</b> 3	2101-2400	17	18.09		
<b>B</b> 4	1801-2100	9	9.57		
с	<1800	3	3.19		
		94	100.00		

TABLE-2

TABLE-3

20

	CMPDI's PROPOSED CATEGORIZATION					
GRADE	RANGE	BLOCKS-FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIGNITE BLOCKS	
A1	>3500	5	5.32			
A2	3001-3500	9	9.57			
B1	2501-3000	48	51.06			
B2	2001-2500	23	24.47	85.10	80	
C1	1501-2000	7	7.45	85.10	80	
C2	1000-1500	0				
	<1000	2	2.13			
		94	100.00			

TA	BL	E-4

	FR	EQUENCT DIST	RIBUTION OF GCV O	F 94 LIGINITE BLOCKS- III (ISIN	) PROPUSAL
GRADE	RANGE	BLOCKS- FREQUENCY	FREQUENCY %	MOST FREQUENT RANGE	NO. OF LIFNITE BLOCKS
L1	>6000		-		
L2	5701-6000				
L3	5401-5700				
L4	5101-5400				
L5	4801-5100	-			
L6	4501-4800				
L7	4201-4500	-			
L8	3901-4200	-	-		
L9	3601-3900	4	4.34		
L10	3301-3600	4	4.34	72.81	67
L11	3001-3300	6	6.52		
L12	2701-3000	25	27.17		
L13	2401-2700	25	27.17		
L14	2101-2400	17	18.47		
L15	1801-2100	9	9.78		
L16	1501-1800	2	2.17		
L17	1201-1500				
L18	901-1200				
		92	100		

### Take Away of the meeting

- GCV is the appropriate parameter for energy efficiency for grading.
- Increase in GCV interval from the existing GCV interval of 1000Kcal/kg. This will lead to the quality satisfaction assurance for customers/Client.
- Uniform interval of GCV for all proposed grades. This will be in accordance with the grading system of Non-Coking Coal, The GCV in band width for lignite also to be 300Kcal/kg.
- The proposal of NLCIL and IIT-ISM suggested interval of 300Kcal/kg for all identified grades.
- NLCIL has suggested upper limit of the GCV grade as >3900Kcal/kg and lower limit GCV i.e., grade C <1800 Kcal/kg, whereas IIT-ISM suggested upper limit of GCV >6000KCal/kg and lower limit of GCV in range of 901-1200 Kcal/kg.
- NLCIL suggested nomenclature as A1, A2, A3, A4, B1, B2, B3 B4 and C. IIT-ISM proposed nomenclature as L1>6000Kcal/kg, L2, L3, L4... (L for lignite).in band width of 300KCal/kg up to L18 GCV 901-1200Kcal/kg
- Since blocks having higher GCV >6000-4200Kcal/kg were not reported, it was decided to fix the upper limit of GCV at >3900KCal/kg
- NLCIL suggested to add G (for GCV based grading) to the proposal of IIT-ISM L1.L2.. so that it should be GL1, GL2, GL3 and so on.

### Recommendations

- 1. GCV is the appropriate energy efficiency parameter as no other parameter was found suitable to have direct relation with energy efficiency.
- 2. In-Situ moisture to be considered for calculation of GCV.
- 3. All proposed grades will have uniform GCV band width of 300KCal/kg
- 4. The proposed Grading system. will be referred as GL1 to GL10 in band width of 300KCal/kg as given in Table -5
- 5. A comparison of existing grading system and proposed grading system is given in Table-  $\ensuremath{\mathbf{6}}$

### Scope for further work

 Since CIMFR and IIT-ISM had opined the role of high moisture content in lignite and its heat loss effect during combustion, it may be prudent to carry out some detailed exercise by these organizations along with NLCIL to study the usefulness and the commercial effect of GCV eff.

The meeting ended with vote to thanks to the chair.

### Table 5

### Proposed Grading system of Lignite resources

PROPOSED GRADING SYSTEM				
GRADE	RANGE GCV KCal/kg (in –situ moisture basis)			
GL1	>3900			
GL2	3601-3900			
GL3	3301-3600			
GL4	3001-3300			
GL5	2701-3000			
GL6	2401-2700			
GL7	2101-2400			
GL8	1801-2100			
GL9	1501-1800			
GL10	1201-1500			
GL11	901-1200			

TABLE -6 Comparison of proposed grading system with the existing grading system

Existing grading system (As per SLREC) GCV KCal/kg (in –situ moisture basis)	Proposed grading system GCV KCal/kg (in –situ moisture basis)
,	GL1 >3900
A > 3000	GL2 3601-3900
A > 3000	GL3 3301-3600
	GL4 3001-3300
	GL5 2701-3000
2 2224 2222	GL6 2401-2700
B 2001 - 3000	GL7 2101-2400
	GL8 1801-2100
	GL9 1501-1800
C 1001-2000	GL10 1201-1500
	GL11 901-1200

### ANNEXURE-A

Members of the approved Committee

CLN	Name 8 Destantion	Desting of a line the Committee
SINO	Name & Designation	Designation in the Committee
1	CMD, CMPDI	Chairman
2	CMD, MECL	Member
3	Director (Mining), NLCIL	Member
4	Representative of IIT-ISM, Dhanbad	Member
5	Representative of CIMFR, Dhanbad	Member
6	Coal Controller CCO or his representative	Member
7	General Manager (Exploration), CMPDI	Member
8	DDG, MII B NeNR, GSI	Co-opted Member
9	Dy GM, Lab, CMPDI	Co-opted member &
		Member Secretary

ANNEXURE-B

### Constitution of Technical Committee and ToR

		340	11/02/2016-CRC-I		640/6
456909/2022/MI	PS				
1/29181/2	2022				
		No.	34011/02/2016-CRC-I [e- 3288 Government of India Min stry of Coal	06]	
			(CPIAM Section)		
				Room No. 622-A, Shastri Bhawan,	
			Office Order	New Delhi, dated 1st April, 2022	
	Subjec	ct: Constitution of Technical C ng/ categorization of lignite reso	committee to consider and m urce- regarding.	ake suitable recommendations on	
	catego deeme Author conside of the (	In order to promote allocation rized based on energy efficiency of necessary. In this regard, the ity in the Ministry of Coal for cons or and make suitable recommenc Committee shall be as under-	In of lignite blocks, lignite resol parameter or any other charac undersigned is directed to co titulion of Committee under Cha lations on crading/ categorizatio	arces are required to be appropriately teristic parameter of lighte as may be nvey the approval of the Competent irmanship of CMD, CMPDIL which will n of lightle resource. The composition	
	SI. No.	Name and designation		Designation in the	
				Committee	
	1.	CMD, Central Mine Planning and	Design Institute Limited	Chairman	
	2.	CMD, MECL		Member	
	3.	Director (Mining), NLCIL		Member	
	4.	Representative of IIT-ISM, Dhant	bad	Member	
	5.	Representative of CIMFR, Dhant	bad	Member	
	6.	Coal Controller CCO or his repre-	sentative	Member	
	7.	General Manager (Exploration), (	CMPDI	Member	
	4. The	e Committee may submit its report	within three (03) weeks to this t	Alinistry. Por Cit Rick (Hillar Singh)	_
			Under	Tel. 011-23382269	
	To.			e-mail: hitlar.singh85@nic.in	
		The Members of the Committee			
	Copy to	- PSO to Secretary, MoC/ PPS to	AS (VKT), MoC/ PPS to Adviser	(P), MoC/ PS to Director(Tech), MoC/	
	11				

### ANNEXURE-I

### LIST OF PARTICIPANTS OF THE 2nd MEETING HELD ON 14th June 2022

- 1. Shri Manoj Kumar CMD CMPDI
- 2. Shri Suresh Chandra Suman Executive Director (Mines) NLCIL
- 3. Shri Arvind Prasad Director MECL
- 4. Shri M.Baskaran GM(Exploration) MECL
- 5. Shri A Rai Choudhuri DDG-GSI
- 6. Dr.P.K Banerjee -Scientist H/Outstanding Scientist CIMFR
- 7. Prof. Barun Kumar Nandi-IIT-ISM
- 8. Shri Jogindra Singh,CCO
- 9. Shri V.K Srivastava GM(Exploration) CMPDI
- 10. Shri Arjun Hembrom GM (Exploration) CMPDI
- 11. Ms. Zeba Imam Dy.G.M Coal Characterization Lab CMPDI
- 12. Sri Pravin Kant Sharan (Ch.Manager Geology) T.S to Dir (T)CRD /ES ,CMPDI
- 13. Shri Rajiva Kr.Singh Ch.Manager (Geology) CMPDI
- 14. Dr. R. P Singh, Sr.Manger (Geology) CMPDI
- 15. Ms. Jyoti Dahanga Sr.Manager (Geology) CMPDI
- 16. Shri Yadvendra Kr. Manager (Geology) CMPDI
- 17. Shri Vikas Rajak Manager (Geology) CMPDI
- 18. Ms. Sayani Adhikari Dy. Manager (Geology) CMPDI
- 19. Shri Vishal Mishra Dy. Manager (Geology) CMPDI
- 20. Shri Rahul Rai, Dy. Manager (Geology) CMPDI

### **E-Mail of acceptance of Committee Members:** Email

### **ANNEXURE 5.0**

https://email.gov.in/h/printmessage?id=23492&tz=Asia/Kolkata&xim=1

Email	ZEBA IMAM
Re: lignite grading	
From : V K SRIVASTAVA <gmexpl.cmpdi@coalindia.in> Subject : Re: lignite grading To : ZEBA IMAM <gmct.cmpdi@coalindia.in></gmct.cmpdi@coalindia.in></gmexpl.cmpdi@coalindia.in>	Wed, Jun 22, 2022 03:50 PM
Dear Madam	
The report is as per deliberations and minutes recorded in the meeting held on 14.06.2022 which may be accepted.	ne technical committee
Regards	
V K Srivastava GM (Exploration)	
From: "ZEBA IMAM" <gmct.cmpdi@coalindia.in> To: "RAKESH KUMAR" <cmd@nlcindia.in>, "Dr. Ranjit Rat "DIRECTOR MINES" <director.mines@nlcindia.in>, "GM Ex <gm-exploration@mecl.co.in>, "CGM GEOLOGY NLCIL" &lt; "Director CSIR CIMFR, Dhanbad" <director@cimfr.nic.in>, c Kumar Banerjee" <pkbanerjee@cimfr.nic.in>, "ddg nenr" <d Singh" <joginder.cco@gov.in> Cc: "MANOJ KUMAR" <cmd.cmpdi@coalindia.in>, "V K SR <gmexpl.cmpdi@coalindia.in>, "ARJUN HEMBROM" <arjur "RAJIV KUMAR SINGH" <rajiv.singh@coalindia.in>, "RAGA <singh.rp@coalindia.in>, "JYOTI DAHANGA" <jyoti.dahang "YADVENDRA KUMAR" <yadvendra.kumar@coalindia.in> Sent: Monday, June 20, 2022 6:51:58 PM Subject: lignite grading</yadvendra.kumar@coalindia.in></jyoti.dahang </singh.rp@coalindia.in></rajiv.singh@coalindia.in></arjur </gmexpl.cmpdi@coalindia.in></cmd.cmpdi@coalindia.in></joginder.cco@gov.in></d </pkbanerjee@cimfr.nic.in></director@cimfr.nic.in></gm-exploration@mecl.co.in></director.mines@nlcindia.in></cmd@nlcindia.in></gmct.cmpdi@coalindia.in>	h MECL" <cmd@mecl.co.in>, ploration, MECL, Nagpur" cgm.geo@nlcindia.in&gt;, lirector@iitism.ac.in, "Pradip dg.nenr@gsi.gov.in&gt;, "Joginder IVASTAVA" h.hembrom@coalindia.in&gt;, WENDRA PRATAP SINGH" a@coalindia.in&gt;,</cmd@mecl.co.in>
Dear Sir,	
PFA the draft Mom of 2nd Technical meeting held on 14.6.2 required may pls be done. The draft recommendation report is also being submitted for through the content of the report, meanwhile the layout etc out which will be incorporated in final report.	2. Any corrections/suggestion your kind perusal. Kindly go of the report is being carried

As we are under tremendous pressure from MoC to submit the report any how by Thursday, it is our sincere request to kindly submit your comments on MoM and draft report by tomorrow evening without further delay...If the report is found acceptable, kindly

22-06-2022, 04:16 pm

send your acceptance by mail . Your kind cooperation is solicited.

Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

Email

22-06-2022, 04:16 pm

### Email

### **ZEBA IMAM**

### **Re: lignite grading**

From : CGM GEOLOGY NLCIL <cgm.geo@nlcindia.in>

Wed, Jun 22, 2022 12:20 PM

Subject : Re: lignite grading

To:ZEBA IMAM <gmct.cmpdi@coalindia.in>

Cc : TS DIR MINES <ts.dir.mines@nlcindia.in>

Sir,

Please refer to the trailing mail. The draft report on Grading/categorization of lignite and the draft MoM of the 2nd Technical Committee meeting on the above subject has been seen. No additional comments/remarks on the report/MoM and it is accepted by NLCIL.

With Regards,

N.Sampath Kumar DGM/Head of Geology, NLC India Limited.

From: "TS DIR MINES" <ts.dir.mines@nlcindia.in> To: "CGM GEOLOGY NLCIL" <cgm.geo@nlcindia.in>, "GM MINEPLANNING" <gm.mineplanning@nlcindia.in> Cc: "CGM MINE II" <cgm.mine2@nlcindia.in> Sent: Tuesday, June 21, 2022 9:43:08 AM Subject: Fwd: lignite grading

From: "RAKESH KUMAR" <cmd@nlcindia.in> To: "DIRECTOR MINES" <director.mines@nlcindia.in>, "SURESH CHANDRA SUMAN" <suresh.suman@nlcindia.in>, "TS DIR MINES" <ts.dir.mines@nlcindia.in>, "TECHNICAL SECRETARY" <tstocmd@nlcindia.in> Sent: Monday, June 20, 2022 7:11:31 PM Subject: Fwd: lignite grading From: "ZEBA IMAM" <gmct.cmpdi@coalindia.in>

To: "RAKESH KUMAR" <cmd@nlcindia.in>, "Dr. Ranjit Rath MECL" <cmd@mecl.co.in>, "DIRECTOR MINES" <director.mines@nlcindia.in>, "GM Exploration, MECL, Nagpur" <gm-exploration@mecl.co.in>, "CGM GEOLOGY NLCIL" <cgm.geo@nlcindia.in>, "Director CSIR CIMFR, Dhanbad" <director@cimfr.nic.in>, director@iitism.ac.in, "Pradip Kumar Banerjee" <pkbanerjee@cimfr.nic.in>, "ddg nenr" <ddg.nenr@gsi.gov.in>, "Joginder Singh" <joginder.cco@gov.in> Cc: "MANOJ KUMAR" <cmd.cmpdi@coalindia.in>, "V K SRIVASTAVA" <gmexpl.cmpdi@coalindia.in>, "ARJUN HEMBROM" <arjun.hembrom@coalindia.in>, "RAJIV KUMAR SINGH" <rajiv.singh@coalindia.in>, "RAGAWENDRA PRATAP SINGH" <singh.rp@coalindia.in>, "JYOTI DAHANGA" <jyoti.dahanga@coalindia.in>, "YADVENDRA KUMAR" <yadvendra.kumar@coalindia.in> Sent: Monday, June 20, 2022 6:51:58 PM Subject: lignite grading

Dear Sir,

PFA the draft Mom of 2nd Technical meeting held on 14.6.22. Any corrections/suggestion required may pls be done.

The draft recommendation report is also being submitted for your kind perusal. Kindly go through the content of the report , meanwhile the layout etc of the report is being carried out which will be incorporated in final report.

As we are under tremendous pressure from MoC to submit the report any how by Thursday, it is our sincere request to kindly submit your comments on MoM and draft report by tomorrow evening without further delay..If the report is found acceptable, kindly send your acceptance by mail . Your kind cooperation is solicited.

Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

### Email

Email

### **ZEBA IMAM**

### Re: lignite grading

From : barun@iitism.ac.in

Tue, Jun 21, 2022 01:45 PM

Subject : Re: lignite grading

To: ZEBA IMAM <gmct.cmpdi@coalindia.in>

### \*\*The authenticity of this message cannot be vouched for. It may be spoofed. Please treat hyperlinks and attachments in this email with caution\*\*

It is okay from my side.

On Mon, Jun 20, 2022 at 6:56 PM Secretary of Director IIT(ISM) <<u>dtsect@iitism.ac.in</u>> wrote:

------ Forwarded message -------From: **ZEBA IMAM** <<u>gmct.cmpdi@coalindia.in</u>> Date: Mon, Jun 20, 2022 at 6:52 PM Subject: lignite grading To: RAKESH KUMAR <<u>cmd@nlcindia.in</u>>, Dr. Ranjit Rath MECL <<u>cmd@mecl.co.in</u>>, DIRECTOR MINES <<u>director.mines@nlcindia.in</u>>, GM Exploration, MECL, Nagpur <<u>gmexploration@mecl.co.in</u>>, CGM GEOLOGY NLCIL <<u>cgm.geo@nlcindia.in</u>>, Director CSIR CIMFR, Dhanbad <<u>director@cimfr.nic.in</u>>, director <<u>director@iitism.ac.in</u>>, Pradip Kumar Banerjee <<u>pkbanerjee@cimfr.nic.in</u>>, ddg nenr <<u>ddg.nenr@gsi.gov.in</u>>, Joginder Singh <<u>joginder.cco@gov.in</u>> Cc: MANOJ KUMAR <<u>cmd.cmpdi@coalindia.in</u>>, V K SRIVASTAVA <<u>gmexpl.cmpdi@coalindia.in</u>>, ARJUN HEMBROM <<u>arjun.hembrom@coalindia.in</u>>, RAJIV KUMAR SINGH <<u>rajiv.singh@coalindia.in</u>>, RAGAWENDRA PRATAP SINGH <<u>singh.rp@coalindia.in</u>>, JYOTI DAHANGA <<u>jyoti.dahanga@coalindia.in</u>>, YADVENDRA KUMAR <<u>yadvendra.kumar@coalindia.in</u>>

Dear Sir,

PFA the draft Mom of 2nd Technical meeting held on 14.6.22. Any corrections/suggestion required may pls be done.

The draft recommendation report is also being submitted for your kind perusal. Kindly go through the content of the report , meanwhile the layout etc of the report is being carried out which will be incorporated in final report.

As we are under tremendous pressure from MoC to submit the report any how by Thursday, it is our sincere request to kindly submit your comments on MoM and draft report by tomorrow evening without further delay..If the report is found acceptable,

21-06-2022, 04:47 pm

kindly send your acceptance by mail . Your kind cooperation is solicited.

Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

-----

Dr. Barun Kumar Nandi Associate Professor Department of Fuel, Minerals and Metallurgical Engineering Indian Institute of Technology (ISM) Dhanbad Dhanbad, Jharkhand-826004, India Phone: +91-326-2235139, 9471192317

2 of 2

21-06-2022, 04:47 pm

Email

### Email

### **ZEBA IMAM**

### **Re: lignite grading**

From : Pradip Kumar Banerjee <pkbanerjee@cimfr.nic.in> Tue, Jun 21, 2022 03:12 PM Subject : Re: lignite grading To: ZEBA IMAM <gmct.cmpdi@coalindia.in> Cc: Dr. Ranjit Rath MECL <cmd@mecl.co.in>, DIRECTOR MINES <director.mines@nlcindia.in>, GM Exploration, MECL, Nagpur <gm-exploration@mecl.co.in>, CGM GEOLOGY NLCIL <cgm.geo@nlcindia.in>, Director CSIR CIMFR, Dhanbad <director@cimfr.nic.in>, director@iitism.ac.in, Pradip Kumar Banerjee <pkbanerjee@cimfr.nic.in>, ddg nenr <ddg.nenr@gsi.gov.in>, Joginder Singh <joginder.cco@gov.in>, MANOJ KUMAR <cmd.cmpdi@coalindia.in>, V K SRIVASTAVA <gmexpl.cmpdi@coalindia.in>, ARJUN HEMBROM <arjun.hembrom@coalindia.in>, RAJIV KUMAR SINGH <rajiv.singh@coalindia.in>, RAGAWENDRA PRATAP SINGH < singh.rp@coalindia.in>, JYOTI DAHANGA <jyoti.dahanga@coalindia.in>, YADVENDRA KUMAR <yadvendra.kumar@coalindia.in>

Dear Ms Zeba Imam

Thank you for sharing the draft report. The report has well captured the key points discussed and recommendations made. One observation from my side, Tables 7 refers 10 categories (GL 1-10); whereas, Table 8 refers 11 categories (GL 1-11). We need to recommend either 10 or 11 categories. Also, the lowest category could be open ended, like GL 10 is <1500 or GL 11 < 1200 kcal/kg.

You may go ahead with the finalization of the report.

Regards Dr PK Banerjee CIMFR, Dhanbad

#### From: "ZEBA IMAM" <gmct.cmpdi@coalindia.in>

**To:** "RAKESH KUMAR" <cmd@nlcindia.in>, "Dr. Ranjit Rath MECL" <cmd@mecl.co.in>, "DIRECTOR MINES" <director.mines@nlcindia.in>, "GM Exploration, MECL, Nagpur" <gm-exploration@mecl.co.in>, "CGM GEOLOGY NLCIL" <cgm.geo@nlcindia.in>, "Director CSIR CIMFR, Dhanbad" <director@cimfr.nic.in>, director@iitism.ac.in, "Pradip Kumar Banerjee" <pkbanerjee@cimfr.nic.in>, "ddg nenr" <ddg.nenr@gsi.gov.in>, "Joginder Singh" <joginder.cco@gov.in> **Cc:** "MANOJ KUMAR" <cmd.cmpdi@coalindia.in>, "V K SRIVASTAVA" <gmexpl.cmpdi@coalindia.in>, "ARJUN HEMBROM" <arjun.hembrom@coalindia.in>, "RAJIV KUMAR SINGH" <rajiv.singh@coalindia.in>, "RAGAWENDRA PRATAP SINGH" <singh.rp@coalindia.in>, "JYOTI DAHANGA" <jyoti.dahanga@coalindia.in>, "YADVENDRA KUMAR" <yadvendra.kumar@coalindia.in> **Sent:** Monday, June 20, 2022 6:51:58 PM **Subject:** lignite grading

Dear Sir,

PFA the draft Mom of 2nd Technical meeting held on 14.6.22. Any corrections/suggestion required may pls be done.

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Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

Email

Re: lignite grading	
From : GM Exploration, MECL, Nagpur <gm- exploration@mecl.co.in&gt; Subject : Re: lignite grading To : ZEBA IMAM <gmct cmpdi@coalindia="" in=""></gmct></gm- 	Wed, Jun 22, 2022 12:04 PM
Cc : RAKESH KUMAR <cmd@nlcindia.in>, Dr. Ranjit Rath MECL <cmd@mecl.co.in>, DIRECTOR MINES <director.mines@nlcindia.in>, CGM GEOLOGY NLCIL <cgm.geo@nlcindia.in>, Director CSIR CIMFR, Dhanbad <director@cimfr.nic.in>, director@iitism.ac.in, Pradip Kumar Banerjee <pkbanerjee@cimfr.nic.in>, ddg nenr <ddg.nenr@gsi.gov.in>, Joginder Singh <joginder.cco@gov.in>, MANOJ KUMAR <cmd.cmpdi@coalindia.in>, V K SRIVASTAVA <gmexpl.cmpdi@coalindia.in>, ARJUN HEMBROM <arjun.hembrom@coalindia.in>, RAJIV KUMAR SINGH <rajiv.singh@coalindia.in>, RAGAWENDRA PRATAP SINGH <singh.rp@coalindia.in>, JYOTI DAHANGA <jyoti.dahanga@coalindia.in>, YADVENDRA KUMAR <yadvendra.kumar@coalindia.in></yadvendra.kumar@coalindia.in></jyoti.dahanga@coalindia.in></singh.rp@coalindia.in></rajiv.singh@coalindia.in></arjun.hembrom@coalindia.in></gmexpl.cmpdi@coalindia.in></cmd.cmpdi@coalindia.in></joginder.cco@gov.in></ddg.nenr@gsi.gov.in></pkbanerjee@cimfr.nic.in></director@cimfr.nic.in></cgm.geo@nlcindia.in></director.mines@nlcindia.in></cmd@mecl.co.in></cmd@nlcindia.in>	
Dear Ms. Zeba Imam,	

With reference to the trailing mail the draft report has been received from your end regarding recommendation of grading system for lignite is in order as discussed in the meeting.

सधन्यवाद/Thanking you

सादर/With regards

एम भास्करन / M Baskaran

महाप्रबंधक (गवेषण)

General Manager (Exploration)

एमईसीएल, नागपुर/ MECL, Nagpur

1 of 3

22-06-2022, 02:08 pm

Email

### **ZEBA IMAM**



From: "ZEBA IMAM" <gmct.cmpdi@coalindia.in>

To: "RAKESH KUMAR" <cmd@nlcindia.in>, "Dr. Ranjit Rath MECL" <cmd@mecl.co.in>, "DIRECTOR MINES" <director.mines@nlcindia.in>, "GM Exploration, MECL, Nagpur"
<gm-exploration@mecl.co.in>, "CGM GEOLOGY NLCIL" <cgm.geo@nlcindia.in>, "Director CSIR CIMFR, Dhanbad" <director@cimfr.nic.in>, director@iitism.ac.in, "Pradip Kumar Banerjee" <pkbanerjee@cimfr.nic.in>, "ddg nenr" <ddg.nenr@gsi.gov.in>, "Joginder Singh" <joginder.cco@gov.in>
Cc: "MANOJ KUMAR" <cmd.cmpdi@coalindia.in>, "V K SRIVASTAVA"
<gmexpl.cmpdi@coalindia.in>, "ARJUN HEMBROM" <arjun.hembrom@coalindia.in>, "RAJIV KUMAR SINGH" <rajiv.singh@coalindia.in>, "RAGAWENDRA PRATAP SINGH"<<singh.rp@coalindia.in>, "JYOTI DAHANGA" <jyoti.dahanga@coalindia.in>, "YADVENDRA KUMAR" <yadvendra.kumar@coalindia.in>
Sent: Monday, June 20, 2022 6:51:58 PM
Subject: lignite grading

Dear Sir,

PFA the draft Mom of 2nd Technical meeting held on 14.6.22. Any corrections/suggestion required may pls be done.

The draft recommendation report is also being submitted for your kind perusal. Kindly go through the content of the report , meanwhile the layout etc of the report is being carried out which will be incorporated in final report.

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Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

22-06-2022, 02:08 pm

Email

### Email

### **ZEBA IMAM**

**From :** Joginder Singh <joginder.cco@gov.in>

Tue, Jun 21, 2022 10:30 PM

### Subject : Re: lignite grading

To: ZEBA IMAM <gmct.cmpdi@coalindia.in>

Madam/sir

Thank you very much sharing the minutes of meeting . The proposed grading system seems to be well prepared with the existing data available with in frquency range. But in one of the mine GCV up to the range of around 4200 kcal is reported. So that 3900 to 4200 range can be thought of for grading. However, This range are lignite awailable is very less. Other wise proposed grading system is alright.

With Regards, Joginder Singh Officer on Special DutyCoal Controller's Organisation, DelhiContact: +919491145117, +918309411420

----- Original Message -----From: ZEBA IMAM <qmct.cmpdi@coalindia.in> To: RAKESH KUMAR <cmd@nlcindia.in>, Dr. Ranjit Rath MECL <cmd@mecl.co.in>, DIRECTOR MINES <director.mines@nlcindia.in>, GM Exploration, MECL, Nagpur <gm-exploration@mecl.co.in>, CGM GEOLOGY NLCIL <cgm.geo@nlcindia.in>, Director CSIR CIMFR, Dhanbad <director@cimfr.nic.in>, director@iitism.ac.in, Pradip Kumar Banerjee <pkbanerjee@cimfr.nic.in>, ddg nenr <ddg.nenr@gsi.gov.in>, Joginder Singh <joginder.cco@gov.in> Cc: MANOJ KUMAR <cmd.cmpdi@coalindia.in>, V K SRIVASTAVA <gmexpl.cmpdi@coalindia.in>, ARJUN HEMBROM <arjun.hembrom@coalindia.in>, RAJIV KUMAR SINGH <rajiv.singh@coalindia.in>, RAGAWENDRA PRATAP SINGH <singh.rp@coalindia.in>, JYOTI DAHANGA <jyoti.dahanga@coalindia.in>, YADVENDRA KUMAR < yadvendra.kumar@coalindia.in> Sent: Mon, 20 Jun 2022 18:51:58 +0530 (IST) Subject: lignite grading

#### Dear Sir,

PFA the draft Mom of 2nd Technical meeting held on 14.6.22. Any corrections/suggestion required may pls be done. The draft recommendation report is also being submitted for your kind perusal. Kindly go through the content of the report , meanwhile the layout etc of the report is being carried out which will be incorporated in final report.

As we are under tremendous pressure from MoC to submit the report any

22-06-2022, 02:09 pm

Email

how by Thursday, it is our sincere request to kindly submit your comments on MoM and draft report by tomorrow evening without further delay..If the report is found acceptable, kindly send your acceptance by mail . Your kind cooperation is solicited.

Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

2 of 2

22-06-2022, 02:09 pm

#### Email

Tue, Jun 21, 2022 03:19 PM

3 attachments

### Email

### **ZEBA IMAM**

### Re: [ External ]lignite grading

From : ddg nenr <ddg.nenr@gsi.gov.in>
Subject : Re: [ External ]lignite grading

To:ZEBA IMAM <gmct.cmpdi@coalindia.in>

Madam,

Attached please find the draft MoMs and the Report. The necessary corrections/ suggestions are indicated in red colour. This is for your kind information and necessary action.

सादर / With regards,

उप महानिदेशक/ Deputy Director General प्राकृतिक ऊर्जा संसाधन प्रभाग, मि.-II बी./ NEnR, Mission-IIB, भारतीय भूवैज्ञानिक सर्वेक्षण/ Geological Survey of India, केंद्रिये मुख्यालय/Central Headquarter, कोलकता/ Kolkata-700 091.

From: ZEBA IMAM <gmct.cmpdi@coalindia.in>

**Sent:** Monday, June 20, 2022 6:51:58 PM

To: RAKESH KUMAR; Dr. Ranjit Rath MECL; DIRECTOR MINES; GM Exploration, MECL, Nagpur; CGM GEOLOGY NLCIL; Director CSIR CIMFR, Dhanbad; director; Pradip Kumar Banerjee; DDG M-IIB NEnR; Joginder Singh Cc: MANOJ KUMAR; V K SRIVASTAVA; ARJUN HEMBROM; RAJIV KUMAR SINGH; RAGAWENDRA PRATAP SINGH; JYOTI DAHANGA; YADVENDRA KUMAR

Subject: [External]lignite grading

Dear Sir,

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21-06-2022, 04:35 pm

Regards, Zeba Imam Dy GM/HoD Coal characterization Lab CMPDI-Hq Ranchi # 8987789001, 9938252845

- MoM 14th June\_lignite\_Minutes\_drafts.docx 955 KB
- MoM 19th April\_lignite\_Minutes.docx 33 KB

report on grading of lignite.docx 1 MB

Email

21-06-2022, 04:35 pm

**ANNEXURE-6.0** 

https://email.gov.in/h/printmessage?id=23524&tz=Asia/Kolkata&xim=1

### Email

Email

### ZEBA IMAM

## Re: final technical Committee Report on Grading/categorization of Lignite resources.

From : MANOJ KUMAR <cmd.cmpdi.cil@coalindia.in></cmd.cmpdi.cil@coalindia.in>	Thu, Jun 23, 2022 11:18 AM
Subject : Re: final technical Committee Report on	
Grading/categorization of Lignite resources.	
To:ZEBA IMAM <gmct.cmpdi@coalindia.in></gmct.cmpdi@coalindia.in>	

Accepted

From: "ZEBA IMAM" <gmct.cmpdi@coalindia.in>

To: "MANOJ KUMAR" <cmd.cmpdi@coalindia.in>, "RAKESH KUMAR" <cmd@nlcindia.in>, "Dr. Ranjit Rath MECL" <cmd@mecl.co.in>, "DIRECTOR MINES" <director.mines@nlcindia.in>, "ARVIND KUMAR" <dt@mecl.co.in>, "Director CSIR CIMFR, Dhanbad" <director@cimfr.nic.in>, director@iitism.ac.in, "CGM GEOLOGY NLCIL" <cgm.geo@nlcindia.in>, "GM Exploration, MECL, Nagpur" <gm-exploration@mecl.co.in>, "V K SRIVASTAVA" <gmexpl.cmpdi@coalindia.in>, "ddg nenr" <ddg.nenr@gsi.gov.in>, "Pradip Kumar Banerjee" <pkbanerjee@cimfr.nic.in>, barun@iitism.ac.in, "Joginder Singh" <joginder.cco@gov.in>

Sent: Wednesday, June 22, 2022 6:57:48 PM

Subject: final technical Committee Report on Grading/categorization of Lignite resources.

Dear Sir,

This has reference to the Technical committee constituted by MoC GoI vide office order dated 01.04. 2022 (OM No. 34011/02/2016-CRC-I [e- 328806]) under the chairmanship of CMD CMPDI regarding the subject cited above. In this connection ,I would first like to thank you all for your active participation in the meetings of the committee.

A report of the committee has been prepared based on the data/information received, discussion/suggestion and outcome of the meetings. The said report is attached herewith for your kind perusal and observations, if any.

The report is to be submitted to MoC on urgent basis. In view of this, a line of confirmation on the report ,if agreed may please be sent by 23.6.22 for further necessary action at our end.

Thanking you, Encl:as above

(Zeba Imam) Dy G.M/HoD Member Secretary Contact no 8987789001/9939252845