



Gujarat Mineral Development Corporation Limited

Request for Proposal

For

**“Setting up Lignite Beneficiation Plant on Turnkey basis at
GMDC’s Mata No Madh Lignite Project”**

RFP Number: GMDC/Power/Lignite/49/22-23

General Manager (Power & Purchase)
Gujarat Mineral Development Corporation Limited
(A Government of Gujarat Enterprise)
CIN No. - L14100GJ1963SGC001206, GST:24AAACG7987P1ZT
Khanij Bhavan, 132 Ft Ring Road, Near Gujarat University Ground, Vastrapur, Ahmedabad-
380052
EPABX:079-27913501,27913200
E mail ID: Power@gmdcltd.com, jndave@gmdcltd.co.in
Website; www.gmdcltd.com

Important Note:

GMDC reserves absolute right/discretion to accept and/or reject any or all the RFP received or invite fresh bid at any stage or split the work between more than one Bidders' as the case may be.

The bidders are required to quote the rate online strictly as per the terms and conditions mentioned in the RFP document. The conditional submission of RFP will not be entertained and shall be liable for outright rejection.

Amendments/corrigendum in the RFP documents, schedule, forms etc. may be done at any time by the GMDC during the period between publication of notice and submission of bids of the RFP on website. The bidders are required to visit the web site regularly till the last date of submission of the bid. No separate newspaper advertisement will be released for amendments/corrigendum.

GMDC reserve the rights to modify or alter any condition of RFP.

The bidders are advised to submit the price bid online on <https://www.gmdc.nprocure.com> only. Physical price bid shall not be accepted and shall be rejected summarily without assigning any reasons, whatsoever.

Failure in submission of bid online in stipulated time due to any reason whatsoever by any bidder shall not be entertained. In such circumstances, bid submitted physically for supporting documents, RFP processing fees, EMD amount etc. shall not be considered as bid submitted and returned to bidder without opening the same. GMDC reserves the right to take decision as deemed fit.

Table of Contents

Description	Pg. No.
SECTION - I	6
Summary of RFP	6
SECTION - II	8
Invitation of RFP	8
1. Introduction to GMDC	8
2. Description of Work	8
3 RFP Document / RFP Fee	9
4 The RFP and Offer	10
SECTION - III	11
Eligibility And Evaluation of RFP	11
1. Eligibility Criteria	11
1.1 Eligible Bidders	11
1.2 Consortium Condition	12
1.3 Experience	13
1.4 Human Resource	15
1.5 Financials	15
1.6 Blacklisting of the Bidder	15
2. Indicative Price Bid	16
3. Evaluation Process	17
3.1 Opening of Technical Bid	17
3.2 Evaluation of Technical Bid	17
3.3 Approach & Methodology	19
3.4 Opening of Price Bid	19
SECTION – IV	20
Instruction To Bidder(S)	20
1. RFP Fee	20
2. Earnest Money Deposit (EMD)	20
3 Acceptance of Letter of Intent (LOI) and Payment of Security Deposit	20

4	Security Deposit	21
5	Corrigendum	22
6	Validity of offer	22
7	Rate and Taxes	22
8	Declaration	22
9	Other Details	22
SECTION - V		24
Scope of Work and Terms And Conditions of Contract		24
1.	Principles of Interpretation	24
2	Site Visit	24
3	Scope of Work	26
4	Documents & Drawings to be submitted	33
5	Duration and Quantity of Work	34
6	OWNER'S LIEN ON EQUIPMENT	34
7	Guarantees/ warrantees and Liabilities	34
8	Liquidated Damages and Penalty	35
9	Subletting of Contract	35
10	Other scope: comprehensive operation and maintenance	36
11	Quality monitoring control & recording for O&M	36
12	Running account bills	38
13	Grafts and commissions etc	43
14	Termination of the Contract	43
15	Conflict of Interest	43
16	Disputes Resolution	45
17	Jurisdiction	45
18	Arbitration	45
19	Compliance of Statutes	45
20	Non-fulfillment of Terms and Conditions of the Contract	45
21	Foreclosure	46
22	Force Majeure	46

23	Safety	47
24	Insurance	47
25	Confidentiality	48
26	Severability	48
27	Change in law	48
28	Handling of Documents	48
29	Secrecy Clause:	49
30	Other Terms & Conditions	49
	Annexure -A: Instruction to Bidders for Online Tendering	50
	Letter of Submission	51
	CV Format For Experts	52
	Form PA to PJ	53
	Price bid form – PP	64
	Bank guarantee for security deposit (SD) format	65
	Annexure –B: List of Banks	68
	Annexure – C: Bank Cheque	69
	Annexure – D: Lignite Analysis Report	70
	Annexure – E: Indicative sketch for Lignite Beneficiation plant	110
	APPENDIX – I : A. Description of Beneficiation Scheme along with Flow Diagram, B. Detailed work program (PERT Network and Bar Chart with different activities and time schedule)	111
	APPENDIX - II: A. Format for Furnishing Technical Details of Main Mechanical & Electrical Equipment	112
	APPENDIX – III Format for Furnishing the Requirement of Power and Water	114

SECTION - I

SUMMARY OF RFP

RFP is invited in our prescribed form for the Work consisting of Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works; testing, commissioning of lignite beneficiation plant and all allied activities for beneficiation of lignite of requisite quality & quantity. Lignite beneficiation plant has to be setup on “Turnkey” model on GMDC funding at GMDC’s Mata no Madh lignite mines, Kutch, Gujarat. The bidder has to quote separately for 1 year operation and maintenance. GMDC reserves the right to accept or decline the optional 1 year operation and maintenance for the plant

Period of contract	9 Months for Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works; commissioning and successful testing, of Lignite Beneficiation plant & 1 year for comprehensive O&M
Availability of RFP	RFP documents will be available on the GMDC website (www.gmdcltd.com) and nprocure portal (https://gmdc.nprocure.com). Bids shall be required to be submitted online on the nprocure portal (https://gmdc.nprocure.com).
Cost of RFP Document	Rs. 15,000/- (Fifteen Thousands only) plus GST @ 18% aggregating to Rs. 17,700/- (Seventeen Thousand Seven Hundred) payable by Demand Draft/ Pay Order drawn in favor of “GMDC Ltd.” Payable at Ahmedabad.
EMD (Earnest Money Deposit)	Rs. 45.0 Lakh/- (Rupees Forty Five Lakh only) in any one of following form <ul style="list-style-type: none"> ➤ DD in favor of GMDC Ltd. Payable at Ahmadabad. ➤ Fixed Deposit from Banks approved by Govt. Of Gujarat (except Co-operative Bank) duly pledged in favor of GMDC for a period of not less than 6(six) months from the last date of submission of bid and shall be renewed from time to time in case of requirement. ➤ Bank Guarantee issued by banks approved by Govt. Of Gujarat from time to time (except Co-Operative bank) in the form and manner acceptable to GMDC (Govt. Gris annexed at Annexure-I for approved bank). It should be valid for a period of not less than 6 (six) months from the last date of submission of bid. ➤ Digital Mode, Please note if payment is made through Digital Mode kindly submit the receipt of the same in the attached documents. RTGS details for payment

	(Annexure-C) ICICI Bank, Ahmedabad Branch, Ahmedabad Account Number: 002405019379IFSC:ICIC0000024
Downloading of RFP Document	From 06/04/2023 from the website www.gmdcltd.com or https://www.gmdc.nprocure.com
Last date of submission of Pre-Bid query	15/04/2023
Pre-Bid Meeting	24/04/2023 at 15:00 hours at Corporate office, Ahmedabad
Last date of online submission of RFP	04/05/2023 up to 17:00 hours
Submission of RFP fee, EMD and Supporting documents for Technical Bid	04/05/2023 up to 17:00 hours at Corporate office, Ahmedabad
Date and time of online opening of technical bid	05/05/2023 at 11:00 hours at Corporate office, Ahmedabad
Date and time of opening and viewing of price bid	To Be Intimated

SECTION - II

INVITATION OF RFP

1. INTRODUCTION TO GMDC

Gujarat Mineral Development Corporation Limited (GMDC), a Government of Gujarat Enterprise, is a pioneer institution in the field of mining for more than five decades, catering to the needs of the minerals and solid fuel for the industries based in and outside Gujarat. GMDC's mining activities are spread over in Kutch, Devbhoomi Dwarka, Bhavnagar, Bharuch, Baroda, and Banaskantha districts of the State. It is currently dealing in minerals like Lignite, Bauxite, Fluorspar, Manganese, Ball Clay, Silica Sand, Bentonitic Clay and Limestone. The GMDC has also set up a 250 MW lignite based Thermal Power Station at Nani Chher in Kutch, Wind power plant of 200 MW at Maliya, Jodiya, Godsar, Bhanvad and Solar Power plant of 5 MW at Panandhro Project.

GMDC is operating its Lignite mines at Mata-No-Madh and Umarsar in Kutch district, at Rajparadi in Bharuch district, at Tadkeshwar in Surat District and at Surkha (North) lignite mine in Bhavnagar district.

GMDC intends to set up a Lignite Beneficiation Plant at Mata No Madh near the lignite mines on Turnkey concept through reputed, experienced and potential Mineral Beneficiation Plant Supplier/Designer/ operator. The assured raw lignite supply to the Lignite Beneficiation Plant shall be 0.3 MTPA of raw lignite on "ARB" (as received basis). The expected average ash content of Raw Lignite is around 10% to 30% on "ADB" (Air Dried basis). The total moisture content is 30% to 40 % on day-to-day basis with probable increase by 25% during rainy days. The Lignite Beneficiation Plant will be designed to produce Beneficiated Lignite & Rejects. Description of Beneficiation scheme shall be furnished by the bidder as per **Appendix – 1**. The bidder shall also furnish the list of major Plant & Machinery) items and Civil & Structural work as per **Appendix – 2**.

Mata no Madh mines comprised of five seams. Raw lignite samples were collected from Mata No Madh lignite mines on 17.07.2022 by a team from NML, Jamshedpur. The test results are attached at Annexure-D.

2. DESCRIPTION OF WORK

A key role of the Successful bidder shall be selection of efficient, cost effective & state-of-the-art dry beneficiation technology, judiciously considered to fetch higher yield of desired quality, Trial & commissioning of plant and handover to GMDC. Tentative Scope of Work of Successful bidder is specified below.

- The scope of Work of the Successful bidder will broadly cover design, planning, engineering, construction, erection and installation, testing and commissioning of a Lignite Beneficiation Plants for GMDC of throughput capacity of 0.3 million tonnes per annum (MTPA) based on dry beneficiation technology on Turnkey concept.
- Proposed Technology/solution shall comply to required statutory and regulatory requirements as prevalent from time to time in India including environmental regulations and safeguards as per Environment Management Plan (EMP) duly approved by State/Central Govt. agencies/departments concerned. This shall also comply with Social, health and safety related aspects as per the best industry practices.
- Install all allied activities for supporting operation of Lignite Beneficiation Plant.
- Plant complex in general needs to include the provision of raw lignite receiving and sizing arrangement; main plant; delivery arrangement of performance lignite and middling; emergency stockpile of raw lignite of 5000 ton, performance lignite & middling and all allied facilities.
- The plant is proposed to be located at GMDC Lignite Project, Mata No Madh, Taluka: Lakhpat, District: Kutch, State: Gujarat, Country: India.
- After Successful commissioning of the plant, the Successful bidder will hand-over the plant to GMDC. GMDC at its discretion may also give O&M to the same bidder. The operation will include Receipt of raw lignite of specified quantity at plant end provided by GMDC, process of raw lignite to meet requisite quality & quantity of beneficiated lignite and delivery of same to GMDC at designated delivery places.
- The ownership of raw lignite, beneficiated lignite, and rejects including slurry (if any) shall remain with GMDC.
- Desired specification of beneficiated lignite are:

Fixed Carbon	More than 30%
Volatile Matter	More than 25%
Moisture	Less than 30 %
Ash	Less than 17%
Lignite GCV	More than 3200 (kcal/kg)

3 RFP Document / RFP Fee

The RFP document can be downloaded from our website www.gmdcltd.com and <https://www.gmdc.nprocure.com>. The RFP Processing Fee is to be paid at the time of submission of supporting document of technical bid in the form of demand draft/ Pay Order of Rs. 15,000/- plus GST @ 18% (Rs. 2,700/-) aggregating **Rs 17,700/- (Seventeen Thousand Seven Hundred only)** as mentioned in RFP notice in the sealed technical bid cover. If the amount mentioned in the DD/Pay Order is found short, the RFP will not be considered for scrutiny and will be out rightly rejected.

4 The RFP and Offer

- 4.1 GMDC has adopted a bidding system which includes accepting single envelope offline for technical bid and accepting price bids online as detailed out in RFP for setting up of Lignite Beneficiation Plant on Turnkey basis at GMDC's Mata no Madh lignite mines, Kutch, Gujarat. Technical Bid shall be submitted physically in hard copy as well as in soft copy in portable storage device in sealed envelope, whereas Price Bid shall be submitted online through <https://gmdc.nprocure.com>. The Bids for which the Price Bid is submitted in hard copy / physical form shall be rejected as non-responsive. Complete Bid shall be submitted on or before the time and date fixed for submission of Bid. Bid delivered after Bid Due Date will be rejected.
- 4.2 The Bidders need to offer its Bid which conforms to Terms of Reference and Terms and Conditions provided as part of this RFP Document.
- 4.3 The supporting documents of Technical Bid shall be submitted in hard copy (physical submission) as mentioned in this RFP and should comprise of all documents required to be submitted as per the said Annexure.

The original instruments of the Bid Security of the required value and in approved format as specified and RFP Fees as specified in RFP document shall be sealed in an envelope on which the following shall be super scribed:

“RFP for Lignite Beneficiation Plant on Turnkey basis with comprehensive O&M for 1 year at GMDC's Mata No Madh lignite mines, Kutch, Gujarat – EMD and RFP Fees”

The supporting documents of Technical Bid shall be submitted in **hard copy** as well as in soft copy in portable storage device in sealed envelope (**physical submission**) as per the list of submittals provided in this RFP document and should comprise of all documents required to be submitted as per the said Annexure. All documents of the technical proposal/Bid shall be placed and sealed in an envelope on which the following shall be super scribed

“RFP for Lignite Beneficiation Plant on Turnkey basis with comprehensive O&M for 1 year at GMDC's Mata No Madh lignite mines, Kutch, Gujarat - Technical Bid”

Both envelopes specified as above shall be placed in outer envelopes, super scribed and delivered by the Due date as per the address given:

“RFP for Lignite Beneficiation Plant on Turnkey basis with comprehensive O&M for 1 year at GMDC's Mata No Madh lignite mines, Kutch, Gujarat, –Bid submission”

Addressed to:

The General Manager (Power & Purchase)
Gujarat Mineral Development Corp.
Khanij Bhavan, 132-ft. Ring Road,
Gujarat University Ground, Vastrapur, Ahmedabad- 380052

SECTION - III

ELIGIBILITY AND EVALUATION OF RFP

1. Eligibility Criteria

1.1 Eligible Bidders

The bidder may be a partnership firm/ body corporate /LLP/ Company registered under the Companies Act 2013 /Act as applicable in India/ Joint Venture. In case of Joint Venture (JV) or consortium unless otherwise specified, all the partners shall be jointly and severally liable.

All Indian bidders should be registered under GST and should possess GST Registration Certificate (with GSTIN).

- a) The Consortium is permitted to participate in this RFP. The maximum number of Consortium is limited to 2. Members of the consortium must meet the Qualification criteria together. The Bidder must meet the additional consortium criteria specified here under;
 - (i) A Bidding Consortium is required to nominate one of the members as a Lead Member. The Lead Member shall be authorized to sign the Proposal/Bid on behalf of the Consortium and do all deeds and acts on behalf of the Consortium. The nomination should be supported by a Power of Attorney in favor of the Lead Member as per format Provided in Annexure 10.
 - (ii) An entity cannot be a member of more than one bidding Consortiums. An entity bidding as single Bidder cannot be a part of Consortium. In such case Bids of the Bidders shall be considered non-responsive and rejected.
 - (iii) The role and responsibility of any member must be commensurate with the technical/financial capabilities that such member is contributing towards meeting the qualification criteria. Each consortium member is liable to contribute resources in terms of knowledge, skills and trained manpower commensurate with its role and responsibilities during the Contract Period. The Consortium Members should together meet Pre-Qualification and Technical Score criteria.
 - (iv) Each member of the Consortium, if awarded the Contract pursuant to this RFP, shall be jointly and severally liable for the Scope of work and discharging of all obligations resulting from the Agreement attached separately to this RFP document.
 - (v) The Bidding Consortium shall provide a Joint Bidding Agreement between the consortium members specifying the followings;
 - (1) Convey the intent to enter into Consortium Agreement and subsequently perform all the obligations of the Consultant under this RFP, in case the Project is awarded to

the Bidding Consortium;

- (2) Clearly outline the proposed roles and responsibilities, if any, of each member as per this clause.
 - (3) Include a statement to the effect that all members of the Consortium shall be liable jointly and severally for all obligations of the Consultant under this RFP during the Contract Period.
 - (4) Include a statement that if contract is awarded then Consortium members shall sign the Consortium Agreement and share the copy with GMDC.
 - (5) The Tenure of the Consortium Agreement shall be coinciding with the Contract Period. The Consortium shall continue to be in existence during the period of the contract and that any change will be subject to approval of the Authority (GMDC) only.
- b) The Bidder should not have been blacklisted for participation in this tender as on bid submission date by any Public Sector Undertaking (PSU) / Central or State Government in India / Central or State Government undertaking. In case the bidder is black listed on bid submission date by any Public Sector Undertaking (PSU) / Central or State Government in India / Central or State Government undertaking than the bidder is ineligible to participate in RFP. All members of the Consortium Members must meet this criteria.
- c) The Bidder should not have Conflict of Interest as per Clause 12. Consortium Members must together meet these criteria.

1.2 CONSORTIUM CONDITION

- (a) In case, the bidder is a Consortium then it shall submit a Consortium Agreement (the contract between the consortium members) comprising the terms specified herewith, within **20 days** from LOA to Authority for its review which shall become part of this Agreement.
- (b) The Consortium Agreement would be available for legal vetting and open to suggestions by the Authority. The Authority shall have rights to suggest binding corrections if it finds that such contract does not meet its requirements and interests as per the RFP in letter and spirit.
- (c) The Agreement should be on stamp paper and notarized. The signatories must be duly authorized. The Authority shall have the right to suggest role re allocation if it finds that the role and responsibilities allocated to each partner are not commensurate with qualifications and capability of that partner.
- (d) The Consortium shall perform all obligations and responsibilities of the Consultant specified in this Agreement during the Contract period and additionally adhere to the conditions specified hereunder.

- (i) Each member of the Consortium shall be jointly and severally liable for the TOR/ Scope of Work and discharge of all obligations resulting from the Agreement.
- (ii) Any modification in roles and responsibilities between consortium members during Contract Period shall be allowed only after approval from the Authority.
- (iii) Any Dispute arising during Contract Period between the Consortium Member shall be resolved amicably without adversely impacting Project. If in Authority's opinion, Dispute between Consortium members adversely impacting the Project then Authority may its sole discretion in the interest of the Project (a) Terminate the Contract after due process and/or (2) Provide a binding solution.
- (iv) All consortium members of the Bidder shall provide letter after it declared as Preferred Bidder stating that Authority shall have rights to make payments to individual consortium members according to their roles in case of any disputes between the Consortium members.

1.3 Experience

The Bidder should have minimum experience of having successfully completed similar work during **last 7 (Seven) years i.e from 01.01.2016 to 31.12.2022**, in India or abroad.

A. Three similar completed work each having amount of Rs 6 Crore (Rs Six Crore) (Excluding GST) or more during last 7 (seven) years.

OR

B. Two similar completed work each having amount of Rs 7.5 Crore (Rs Seven Crore Fifty Lakh) (Excluding GST) or more during last 7 (seven) years.

OR

C. One similar completed work having amount of Rs 12 Crore (Rs Twelve Crore) (Excluding GST) or more during last 7 (seven) years.

Similar completed works means the Bidders should have experience in

- Design, Engineering, Coal/Lignite/ Mineral Beneficiation Plant of minimum 0.3 mtpa and carried out under the single LOI/Work Order/Agreement/

OR

- Design, Engineering, Manufacturing, supply, Erection of Coal/ Lignite/ Mineral Beneficiation Plant of minimum 0.3mtpa and carried out under the single LOI/Work Order/Agreement

OR

- Manufacturing, supply of Coal/ Lignite Mineral Beneficiation Plant of minimum 0.3 mtpa and carried out under the single LOI/Work Order/Agreement

OR

- Supply of Coal/ Lignite Mineral Beneficiation Plant of minimum 0.3 mtpa and carried out under the single LOI/Work Order/Agreement

OR

- AMC for Coal/ Lignite/ Mineral Beneficiation Plant of minimum 0.3 mtpa and carried out under the single LOI/Work Order/Agreement

OR

- ARC for Coal/ Lignite/ Mineral Beneficiation Plant of minimum 0.3 mtpa carried out under the single LOI/Work Order/Agreement

OR

- O & M of Coal/Lignite/ Mineral Beneficiation Plant of minimum 0.3 mtpa carried out under the single LOI/Work Order/Agreement.

OR

- Owned, commissioned and operating Coal/ Lignite /Mineral Beneficiation Plant of minimum 0.3 mtpa independently or with JV or through outsource mechanism

1.3.1 Bidder shall submit work Completion Certificate with regard to his above experience from relevant organization where the project is in operation and maintenance about satisfactory performance of that project.

1.3.2 The bidder should clearly state its status and submit duly attested supporting documents as detailed in the Annexure

1.3.3 In respect of the above eligibility criteria the bidders are required to furnish the following information:

1.	Name of the Lignite/Lignite Beneficiation Plant/ Beneficiation plant/ Mineral Beneficiation Plant set up	
2.	Material Handled	
3.	Complete address of the plant	
4.	Whether Lignite/Lignite Beneficiation Plant/ Beneficiation plant/ Mineral Beneficiation Plant is owned by bidder/Associate/Client	
5.	Name of the Client (if owned by client, else N.A.)	
6.	Ref. No. & Date of Award of Work (if owned by Client, else N.A)	
7.	Whether the scope of Work for the reference plant included Planning, Design & Engineering, Procurement, Construction & Erection, Commissioning	
8.	Plant capacity (in tonnes per annum)	
9.	Date of Commissioning of the plant	
10.	Technology used in the referred plant ()	
11.	Experience of operation and maintenance shall be evaluated at the rated capacity of the referred plant	

1.4 Human Resource

The Bidders as on date of Bid submission, must have adequate qualified and experience personnel in their team. Following Key Personal CV should include as part of Bid evaluation

Sr. No.	Designation/Role	Minimum Basic Qualification	Area of Expertise/past experience
1	Team Leader	BE in Mechanical / Electrical /Mining or standard Engineering Discipline from reputed University	Min 10 years+ experience in engineering/relevant industries and minimum 10 years' experience in Design, Engineering, supply of equipment, supervision of erection & commissioning of Lignite/ Mineral Beneficiation Plant
2	Team Member	BE in Mechanical / Electrical or others Engineering Discipline from reputed University	Min 5 years+ experience in engineering/relevant industries and minimum 7 years' experience in Design, Engineering, supply of equipment, supervision of erection & commissioning for Lignite/ Mineral Beneficiation Plant
3	Team Supporter staff	BE/Diploma in Mechanical / Electrical or others Engineering Discipline from reputed University	Min 2-3 years of Experience in Lignite/ Mineral Beneficiation Plant

1.5 Financials

1.5.1. Bidder must have an average positive net worth as on financial year ending on 31.03.2020, 31.03.2021 and 31.03.2022. Bidder must have a Minimum Average Turnover of Rs 4.5 Crore (Rupees Four Crore Fifty Lakh Only) (Excluding GST) as on financial year ending on 31.03.2020, 31.03.2021 and 31.03.2022.

1.5.2. A certificate from Chartered Accountant regarding financial capacity shall be submitted as per format provided in FORM-PC of the RFP Document.

1.6 Blacklisting of the Bidder

The Bidder should not have been blacklisted for participation in this tender as on bid submission date by any Public Sector Undertaking (PSU) / Central or State Government in India / Central or State Government undertaking. In case the bidder is black listed on bid submission date by any Public Sector Undertaking (PSU) / Central or State Government in India / Central or State Government undertaking than the bidder is ineligible to participate in RFP. All members of the Consortium Members must meet this criteria. The Bidder will submit a declaration to this effect as per the format provided in FORM PD of the RFP Document. If at any time such declaration is found false, the bid will be rejected or if the contract Work is already awarded, it will be terminated forth with without payment of any compensation and the EMD/SD will be forfeited.

2. Indicative Price Bid

2.1 The Bidder shall quote rates online only for the entire scope of Work.

The bidder shall submit the price bid as per the format given below:

Bidders are requested to quote their Rate inclusive of all taxes except GST as under:

Sr. No.	Description of Work	Qty	Rate in Rs /Qty (Inclusive of all taxes and levies excluding GST)	Total Amount in Rs (Inclusive of all taxes and levies excluding GST)
1	Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, delivery, Construction, erection/ installation along with all associated equipment, auxiliaries, structural, building, etc, testing, commissioning of lignite beneficiation plant, based on dry beneficiation technology.	1		
2	Civil work for lignite beneficiation plant	1		
3	Comprehensive Operation and Maintenance for 1 st year (Rs/tonne basis)	3,00,000 tonne		
	Total amount (Excluding GST) (Total of 1 + 2 + 3)			

Note: Above all amount is excluding GST.

GMDC reserves the right to modify the scope of work or to award part of work only and get the remaining part done by separate contractor.

- 2.2 Price quoted shall be inclusive of all expenses towards the scope complete with boarding, lodging & travels to GMDC's Lignite Mine, Gujarat for the project related activities.
- 2.3 The quoted price for the scope of Work shall be exclusive of GST. GST will be reimbursed subject to production of documentary proof.
- 2.4 Successful bidder will mention the GST amount in the invoice/Bill after considering the abatement if any.
- 2.5 Any variation in taxes, levies & duties imposed after the due date of submission of offer will be reimbursed by GMDC, subject to submission of proof. Excess taxes, levies and duties reimbursed by GMDC shall be recoverable after tenure of contract if any.
- 2.6 Income tax as per prevailing rate shall be deducted from each invoice and the TDS certificate will be issued by GMDC.
- 2.7 Price Bid will be opened only for those bidder(s) who qualify technical criteria.

3. Evaluation Process

3.1 Opening of Technical Bid

- GMDC shall open the Technical Bids received to this RFP, at time, date and Place specified in RFP document.
- The Bidder's RFP Fees and EMD and such other details as Authority in its sole discretion may consider appropriate, at the opening of Technical Bid.
- GMDC will subsequently examine and evaluate Technical Bids in accordance with the provisions set out hereunder in RFP document.

3.2 Evaluation of Technical Bid

3.2.1 **The entire Bid shall be evaluated based on Quality Cum Cost Based System (QCBS) methodology as prescribed in subsequent clauses.**

3.2.2 The Bid evaluation shall be first on Technical Score of 100 marks, based on various scoring criteria outlined as per following Table.

Sr. No.	Criteria of Assessment	Parameters	Maximum Marks	Criteria for assigning score
A	Eligibility Criteria			
1	Experience of minimum seven years for Coal/Lignite/ Mineral Beneficiation Plant. (Orders should be successfully completed and having minimum amount of Rs 6.0 Crore for evaluation)	≥ 6 orders	30	30
		5 orders		25
		4 orders		20
		3 orders		15
		2 orders		10
		1 order		5
2	Average Annual turn-over of the company during last three years (in INR)	>30 Crore	20	20
		>20 Crore		16
		>10 Crore		12
		≥4.5 Crore		8
3	Proposed Team Member			
a	Team Leader	B.E. + Experience ≥10 years	10	5
b	Team member	B.E. + Experience ≥5 years		5
B	Proposed methodology and approach outlining a clear presentation and strong conceptual and analytical skills.		40	

	Total Technical Proposal Score (A+B)		100	
--	---	--	------------	--

3.2.3 GMDC will examine the Bid to determine whether the bid is complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bid is generally in order.

3.2.4 Evaluation of both Techno-Commercial (un-priced) bids and priced bids shall be done separately.

3.2.5 In no case, a Bidder shall have the right to claim to be the Successful bidder for its Bid.

3.2.6 Selection of Successful bidder shall be done as below:

- I. Technical bids will be opened after verification of receipt of payment towards RFP Processing Fee and EMD.
- II. After, meeting Eligibility Criteria (PQ), Responsiveness, Preliminary scrutiny of the Bid, the Technical Bid Evaluation shall be carried out.
- III. Technical Proposal will be evaluated for eligibility on the basis of Bidder's experience, presentation and financial capability. Scoring of Technical Proposals would be done only for the Eligible Bidders.
- IV. A minimum of 60 marks out of 100 should be scored in the Technical Evaluation for the bid to be declared technically qualified.
- V. All technical qualified Bidders shall be ranked from highest to lowest on the basis of their technical score.
- VI. The Financial Bids of only those Bidders who have obtained a technical score of 60 or more shall be opened.
- VII. The financial evaluation of the proposal will be carried out after determining whether the Financial Proposals are complete, qualified and unconditional.
- VIII. The lowest financial proposal (LFP) will be given a financial score (FS) of 100 points. The financial scores of other proposals will be computed as follows: $FS = 100 \times LFP/F$;

Where in, F=Amount of Financial
Proposal of the bidder LFP=
Lowest financial proposal

- IX. Final Evaluation Proposals will finally be ranked according to their Technical Score (TS) and Financial Scores (FS) as bellow:
 $CS = \text{Technical Score (TS)} \times 0.70 + \text{Financial Score (FS)} \times 0.30$
 Where CS is the combined score.
- X. **The contract will be awarded to the Bidder who scores highest (H1) in Combined Score (CS).**

Illustrative example for evaluation based on Quality Cum Cost Based System (QCBS) methodology is as under.

Sr. No.	Bidder name	Technical Score (out of 100 marks)	(TS) 70 % Weightage of technical Score	Estimated Price	(L) Price offered	Offered price as % against Estimated Price	(FS) Price weightage (30*L1/L)	Combined Score CS=TS + FS	Final Position
1	M/s. XX	65	45.5	100	90	90.00	26.67	72.17	H2
2	M/s. XY	70	49	100	80	80.00	30.00	79.00	H1

3.3 Approach & Methodology:

Bids to be accompanied by brief in PPT/word format. This to be followed up with presentation to leading to final evaluation based on the following criteria:

- Understanding and experience of the mining and minerals related for Lignite/ Mineral Beneficiation Plant.
- Experience pertaining to Design, Engineering, Supply & installation of Lignite/ Mineral Beneficiation Plant.
- Experience pertaining to operation and maintenance of Lignite/ Mineral Beneficiation Plant.
- Given the industry status, best practices and objectives of GMDC, what is the suggested best fit approach, design of plant and methodology for GMDC for running a Lignite/ Mineral Beneficiation Plant.

3.4 Opening of Price Bid

- a. Price Bids of only Technically Qualified Bidders will be opened after technical evaluation, meeting both the Responsiveness and Technical Qualification criteria. Evaluation of Price Bids of only Qualified Bids shall be carried out.
- b. The Price Bid shall be filled up by the Bidder as per RFP at designated places through <https://gmdc.nprocure.com> as per the indicative format specified in **PRICE BID FORM – PP** of this RFP.
- c. The time and date of opening of Price Bids shall be informed to the Bidders who are declared as Qualified Bidders in advance. Bidders can view the opened bid price at their home or office through their computer/laptop.
- d. The contract will be awarded to the Bidder who scores highest (H1) in Combined Score.

SECTION – IV

INSTRUCTION TO BIDDER(S)

1. RFP Fee

Bidder will need to submit non-refundable RFP Document/RFP Fee of **INR 17,700 (i.e RFP fees of INR 15,000 plus 18% GST)**. The RFP Document Fees shall be submitted in the form of a Demand Draft in favor of “**Gujarat Mineral Development Corporation Limited**” and payable at Ahmedabad along with the Bid as per marking and sealing section. This demand Draft for RFP document shall be non-refundable. Bids that are not accompanied by the RFP fees in acceptable amount and form shall considered non- responsive and shall be summarily rejected.

2. Earnest Money Deposit (EMD)

A non-interest bearing Earnest Money Deposit of **Rs. 45 Lakh (Rupees Forty Five Lakh only)** in any one of following form

- Demand Draft in favor of GMDC Limited Payable at Ahmadabad.

OR

- Fixed Deposit from Banks approved by Govt. Of Gujarat (except Co-operative Bank) duly pledged in favor of GMDC for a period of not less than 6 (six) months from the last date of submission of bid and shall be renewed from time to time in case of requirement.

OR

- Bank Guarantee issued by banks approved by Govt. Of Gujarat from time to time (except Co- Operative bank) in the form and manner acceptable to GMDC (Govt. GR is annexed at annexure “B” for approved bank). It should be valid for a period of not less than 6(six) months from the last date of submission of bid.

OR

- Digital Mode, Please note if payment is made through Digital Mode kindly submit the receipt of the same in the attached documents. RTGS details for payment (Annexure-C) ICICI Bank, Ahmedabad Branch, Ahmedabad Account Number: 002405019379IFSC:ICIC0000024

3. Acceptance of offer and Issuance of Letter of Intent (LOI) payment of Security Deposit

- A. The GMDC, on acceptance of the offer, will issue LOI to the Successful bidder, who will be required to confirm its acceptance of the LOI within **one week** of its receipt. If it does not accept the Letter of Intent within stipulated time period, the amount of the EMD paid will be forfeited and necessary further actions may be initiated as may be deemed fit by the GMDC.
- B. The Successful bidder shall make payment of security deposit (SD) Within 30 (Thirty) days of submission of its acceptance of LOI, in the manner prescribed in clause No. 4 of this section. After receiving of SD from successful bidder, GMDC will issue the detail work order.

4 Security Deposit

4.1 Security Deposit is measure of liquidated damages sustained by GMDC for not performing the contract satisfactorily. Nothing herein above shall disentitle GMDC from claiming the damages actually sustained in the value over and above the Security Deposit.

- The Successful bidder shall submit security deposit of 10% of the total contract value excluding Goods & Service Tax (GST). Security deposit shall be submitted within 30 days from the date of acceptance of LOI in any one of following form
- Demand Draft in favor of GMDC Limited Payable at Ahmedabad.

OR

- Fixed Deposit from Banks approved by Govt. Of Gujarat (except Co-operative Bank) duly pledged in favor of GMDC for a period of not less than contract period plus 6 (Six) Months from the date of receipt of LOI and shall be renewed from time to time in case of requirement.

OR

- Bank Guarantee issued by banks approved by Govt. Of Gujarat from time to time (except Co-Operative bank) in the form and manner acceptable to GMDC (Govt. GR is annexed at “B” for approved bank). It should be valid for a period of not less than contract period plus 6 (Six) Months from the date of receipt of LOI and shall be renewed from time to time in case of requirement.

OR

- Digital Mode, Please note if payment is made through Digital Mode kindly submit the receipt of the same in the attached documents. RTGS details for payment (Annexure-C) ICICI Bank, Ahmedabad Branch, Ahmedabad Account Number: 002405019379IFSC:ICIC0000024

4.2 It shall be valid for minimum six months after completion of contract period.

4.3 It shall be refunded to the Successful bidder, within a period of six months after satisfactory completion of the Work and removal of equipment, tools tackles, campsite etc, and the due fulfillment of all the terms and conditions of the contract.

4.4 The Successful bidder shall obtain “No Dues Certificate” and “Site Clearance “certificate to this effect from the General Manager [Project] / Project-in-Charge and shall submit the same to the General Manager [Power] at HO, who after verification of the fact will arrange for refund of SD.

4.5 The Successful bidder will also have to submit “NO DEMAND CERTIFICATE” along with the abovementioned certificate.

4.6 The SD deposited by the Successful bidder may be forfeited if the Successful bidder fails to adhere to fulfill the conditions of Work order.

4.7 Security deposit shall not bear any interest under any circumstances. Security Deposit is a measure of liquidated Damages sustained by GMDC for not providing the manpower, tools and tackles as required as per the contract.

4.8 GMDC will reserve the right to recover the charges or the liquidated damages from the Security Deposit at actual but not limited to SD, in the following circumstances-

4.8.1 If the Successful bidder or its employees causes any damage or destroy any property belonging to GMDC.

4.8.2 The shortfall amount of all compensations, penalties and other sums of money payable by the Successful bidder or recoveries to be made under the terms of this contract which is due but not paid by the Successful bidder in full, etc.

4.8.3 Any other dues on account of statutory compliance.

5 Corrigendum

- a) Corrigendum if any shall be uploaded on <https://nprocure.com> only.
- b) Please note that there is no provision to take out the list of bidder(s) downloading the RFP document from the above referred the websites. As such bidders are requested to see the website regularly before due date of RFP opening to ensure that they have not missed any corrigendum uploaded against the said RFP after downloading the RFP document. The responsibility of downloading the related corrigendum, if any, will be that of the downloading bidder(s).
- c) No separate intimation in respect of corrigendum will be sent to bidders who downloaded the RFP document from the website as information in this respect will not be available to websites.

6 Validity of offer

- a) The bidder agrees that the rates submitted shall remain valid for acceptance for a period of 180 days from the date of opening of the RFP and same may be extended unconditionally for further period of 60 days.
- b) The bidders are advised to read the instruction, evaluation norms and other terms and conditions described in these documents under different sections carefully before making its offer.

7 Rate and Taxes

- A. Rate to be paid to the Successful bidder shall be the rate offered by the Successful bidder or as decided/finalize by the management or agreed by both the parties, inclusive of all taxes and duties as applicable from time to time except GST.
- B. GST will be paid/adjusted/reimbursed to the Successful bidder as per prevailing rates and rules as per GST rule/act to the extent directly related to the services rendered by the Successful bidder under the said contract subject to production of documentary proof and Successful bidder will mention the GST amount separately in the invoice/bill after considering the abatement, if any.

8 Declaration

The bidder should give a declaration along with the technical bid that it has not enclosed any conditional offer.

9 Other Details

- A. Documents not properly filled, over-written or with arithmetical mistakes, delayed or generally not complying with the conditions are liable to be rejected.
- B. RFP documents submitted by the Bidder (s) without furnishing the full particulars and/or documents as asked in RFP documents or furnishing particulars or submitting RFP documents without strictly adhering to the directions given here in shall be rejected.

- C. The Bidder(s) shall upload the following documents/details online in Technical Bid section:
- D. Authorized signatory certificate of the company for the person signing the documents on letter head of the company
 - a. Letter of Submission (As per Annexure – I)
 - b. Details of Bidder (As per Annexure – II)
 - c. Details of similar assignments with proof (As per Annexure – III)
 - d. CV of experts to be deployed (As per Annexure-IV)
- E. The rates & quantities quoted in the RFP by the Bidder(s) shall be in figure as well as in words. In case of discrepancy in the rate(s) amount/ quantities between figure and words, the value written in words shall be taken as finally quoted rate(s)/amount/quantities.
- F. Any request from the Bidder(s) in respect of additions, alterations, modifications, corrections etc. of either terms & conditions or arithmetical correction or correction on account of overwriting/erasing of rates of his documents after opening of the RFPs, shall not be entertained under any circumstances. If the Bidder withdraws his RFP after opening of the RFP, but before the expiry of the validity period of the RFP, the Earnest Money Deposit shall be forfeited.
- G. By submitting a RFP for the project, the Bidder will be deemed to have satisfied himself that the rates quoted by him in the RFP document will be adequate to complete such Work according to the specifications and conditions attached here to and it has taken into account all conditions and difficulties that may be countered during its progress/execution. Any complaint in this regard after submission of RFP shall not be entertained.
- H. Canvassing in any form is strictly prohibited and RFPs submitted by the Bidder(s) who resort to canvassing, will be liable for rejection.
- I. RFP documents are not transferable.
- J. In the event of any doubt regarding the terms and conditions/formats, the person concerned may seek clarifications from the authorized officer of GMDC. In case any tampering/unauthorized alteration is noticed in the RFP submitted from the RFP Document available on the GMDC Website, the said RFP shall be summarily rejected and the bidder shall have no liability whatsoever on the matter.
- K. For any related clarifications please contact the following officer:

Shri Janardan N Dave

General Manager (Power & Purchase)

7th Floor, GMDC Limited, Khanij Bhavan, 132 Ft. Ring Road,

University Ground, Vastrapur, Ahmedabad–380052, Gujarat, India.

Phone:079–(D) 07927912960

Fax:079–Email: jndave@gmdcltd.co.in; power@gmdcltd.com

SECTION - V

SCOPE OF WORK AND TERMS & CONDITIONS OF CONTRACT

1. Principles of Interpretation

- a. The table of contents, numbers, headings and marginal headings in this documents are solely for the purpose of facilitating reference and shall not impact the construction or interpretation of this document.
- b. Words importing Persons or Parties shall include firms, companies, corporations, trusts, associations and any organizations, having legal capacity to sue and be sued in their names.
- c. Words importing the singular include the plural; the masculine includes the feminine and vice-versa where the context requires.
- d. Words importing one gender also include other gender.
- e. In case of ambiguities or discrepancies in this Agreement, the following shall apply:
 - (i) Between the Articles and the Schedules, the Articles shall prevail:
 - (ii) Between any value written in numerals and that in words, the latter shall prevail.
- f. The titles and headings in this document are inserted for convenient reference only and shall not be construed and limiting or extending the meaning of any provisions of this document.
- g. Any neglect or failure on the part of the Successful bidder in obtaining necessary and reliable information on the foregoing or any other matters affecting the contract shall not absolve him from any risks or liabilities or the entire responsibility from the completion of the work at the scheduled rates and time, in strict accordance with the contract documents.

2 Site Visit

- a. The bidders are advised to visit the GMDC's Lignite Mine, Mata no Madh, Gujarat and ascertain and satisfy themselves the site conditions, quality of Lignite, terrain, location, surroundings, climate, availability of power, water, applicable laws and regulations, and any other matter considered relevant by them for supply of equipment.
- b. It is the responsibility of the Bidder to deploy competent personnel/experts in the respective fields for carrying out the assignment prior to submission of RFP.
- c. There shall be no excuse from bidder side if bidder does not make site visit.
- d. The information/details given in the RFP document are only to describe magnitude of Work and mere guidance to the bidders..

- e. Any neglect or failure on the part of the bidder in obtaining necessary and reliable information on the foregoing or any other matters affecting the contract shall not absolve him from any risks or liabilities or the entire responsibility from completion of the work at the scheduled rates and time, in strict accordance with the contract documents.
- f. The Bidder should give a declaration of site visit as per the format provided in FORM PG of the Tender Document.

3 Scope of Work

The Major scope of Work covers the following:

The Work consists of Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works; testing, commissioning of lignite beneficiation plant based on dry beneficiation technology. Lignite beneficiation plant has to be setup on “Turnkey” model, at GMDC’s Mata No Madh lignite mines, Kutch, Gujarat.

Throughput Capacity: 0.3 MTPA raw Lignite (as received basis).

- The Beneficiation Plant shall be built, by the Successful bidder, who will select the technology, type & design of the plant with zero effluent discharge subject to various statutory & regulatory provisions, as prevalent in India, environmental regulations and safeguards as per norms etc. The plant shall be capable of efficient performance with the throughput capacity.
- The Bidder shall offer in the proposal and make available all the key resources/Team members as per the minimum qualification and experience specified in this RFP. Additionally, the Bidder shall commit to deploy any special domain area experts in mineral for Mineral Beneficiation as required for this engagement without any additional cost. Consortium Members must together meet these criteria.
- Bidder has to quote for 1 year comprehensive O&M as well. GMDC reserves the right to separately consider awarding the O&M contract to the same bidder.

a) BENEFICIATION PRODUCTS

The plant will be designed to produce Beneficiated Lignite & Rejects as elaborated hereafter:

I. Lignite Process /Product Lignite

Beneficiated lignite with target ash (day-to-day basis) below 17%. Also, total average moisture content not exceeding 30% (day-to-day basis) will be produced. GMDC reserves right to change the target quality parameter time to time base on requirement. Based on that Payment clause, LD Clause and Penalty clause will be revised accordingly.

II. Rejects

Beneficiation scheme shall take care of the ash content of the reject and it shall be as high as possible and minimum rejects to achieve optimum yield. Loading of rejects into dumpers of successful bidder will be carried out by Operator/MDO of GMDC. Successful bidder will be responsible for handling of all rejects. Successful bidder shall have to comply all statutory norms for the same.

III. Slurry

Slurry, if produced, shall either be handled separately or mixed with suitable product in consultation with the GMDC depending upon its quality. Successful bidder shall have to comply all statutory norms related with slurry.

IV. Others

Successful bidder shall provide day ahead indenting of vehicles to GMDC/GMDC's contractor.

b) SUPPLY OF RAW LIGNITE / LIGNITE

Assured supply of run-of-mine Lignite of specified quantity by GMDC through dumpers. GMDC will supply lignite to raw lignite stock yard or Hopper. It is responsibility of successful bidder to reclaim the raw lignite from raw lignite stock yard. The receiving arrangement of the same for feeding to plant is to be done by Successful bidder along with weighbridge at suitable place. Weighment of raw lignite will be done by weighing arrangement installed at mine end and the same will be considered as raw lignite supply to the successful bidder. Calibration of all different types of weighing system used in the project shall be carried out by successful bidder as per standard norms.

c) STORAGE OF RAW LIGNITE

Successful bidder shall provide ground storage facility of 5,000 tonne for raw lignite with re-handling arrangement in the plant premises so that it can receive raw lignite even when the plant is not operating and the same shall be used when there is short/ no supply of raw lignite from mines. Stacking, reclaiming and prevention of stored raw lignite is Successful bidder's responsibility. The storage capacity shall be at least of 5,000 tonne.

d) BENEFICIATED LIGNITE DELIVERY & DISPATCH

- (i) Successful bidder shall make suitable arrangement at plant premises for delivery of beneficiated lignite into GMDC/MDO/Customer trucks.
- (ii) Transportation of beneficiated lignite from delivery Point to Power Station(s) / Customers will be done by designated operator/MDO of GMDC.
- (iii) Loading of beneficiated lignite into dumpers of designated operator/MDO of GMDC at delivery place, storage area will be carried out by Operator / MDO of GMDC.

e) STORAGE OF BENEFICIATED LIGNITE

The Successful bidder shall provide covered storage facility for beneficiated lignite with suitable reclamation arrangement. Stacking, reclaiming and prevention of stored beneficiated lignite is Successful bidder's responsibility. The storage capacity shall be at least of 5,000 tonne.

f) QUANTITY/ WEIGHMENT, MONITORING & RECORDING

- i. For keeping a record of raw lignite supplied, raw lignite beneficiated, beneficiated lignite & rejects produced/ dispatched on hourly/ daily basis, suitable no. of electronic weighment system with accuracy within BIS limits with computer display, memory storage & print out

facility shall be provided at suitable locations in the beneficiation plant. The weight of beneficiated lignite as loaded into the truck / dumpers shall be signed jointly by representatives of both the successful bidder & GMDC and shall be considered as final beneficiated lignite supplied to GMDC.

g) QUALITY MONITORING CONTROL & RECORDING FOR COMMISSIONING AND TRIAL

- (i) Facilities for sample collection and adequate number of automatic samplers complete with all required accessories shall be provided by the successful bidder at all relevant points where quality parameters are required to be determined for raw lignite received, beneficiated lignite and rejects produced from the beneficiation plant. The provision of required infrastructure for sampling and testing as per BIS norms will be the responsibility of the successful bidder.
- (ii) Besides above, on-line analysers for ash and moisture shall be provided on respective conveyors/points of beneficiation plant for instantaneous monitoring and recording of ash & moisture of raw lignite, beneficiated lignite and rejects. This shall also provide a tool to control the operation of beneficiation plant within the agreed parameters of the outputs. If Ash content in raw lignite is less than or equals to desired ash content ($\leq 17\%$), Raw lignite shall be bypassed from process and delivered directly to beneficiated lignite dispatch hopper or beneficiated lignite storage yard with weight measurement. For that Process bypass system shall be designed by successful bidder.
- (iii) The successful bidder shall keep provision of necessary equipments for carrying out proximate analysis of lignite and measurement of ash, moisture & GCV etc. in the laboratory of the beneficiation plant.
- (iv) The test will be carried out in presence of representatives from both GMDC and the successful bidder on day-to-day basis as well as monthly basis.
- (v) Testing and Analysis of Raw lignite & Products:
 - a. An independent agency will be appointed and paid by GMDC for sampling and analysis of both raw lignite and products. However, 50% of the charge paid by GMDC to the independent agency will be recovered/ adjusted from successful bidder from their bills.
 - b. Sampling shall be done for both raw lignite and products in each shift as per BIS. One part of raw lignite sample collected in each shift shall be kept for carrying out washability test at the end of each month.
 - c. Determination of ash and moisture for both raw lignite and products will be carried out in each shift.
 - d. Raw lignite samples collected in each shift will be blended for all the days of a month from which a representative sample will be prepared. From this representative sample, washability test and other tests will be carried out to determine optimum theoretical yield of washed lignite for that particular month.
 - e. One representative sample of raw lignite will be kept as reserved for testing in case any dispute arises.
 - ii. The test results certified by the independent agency shall be binding on both GMDC & successful bidder.
 - iii. GMDC reserves the right to change the independent agency in consultation with successful

bidder.

iv. Quality of Rejects shall be derived from balance of product

h) POWER SUPPLY

- (i) **Power Supply during Construction:** GMDC will provide electric power as required for construction of Beneficiation plant at one point within 100 m from plant premises. However, withdrawal of power from the available source will be the responsibility of the successful bidder.
- (ii) **Power Supply during Operation:** Successful bidder shall have to tap power from provided at one point within 100 m from plant premises. However, drawl of power will be responsibility of successful bidder with due permission and Power Purchase Agreement with utility if require any to be carried out by Successful bidder.
- (iii) Requirement of power during construction & operation shall be furnished by bidder.

i) WATER SUPPLY

- (i) GMDC will provide water required for construction of Beneficiation plant, from available mines water within 100 m from Beneficiation plant site. However, necessary processing or treatment of water is to be carried out by successful bidder to get the desire quality of water. Withdrawal of water from the identified source will be responsibility of the successful bidder.
- (ii) Requirement of water during construction & operation shall be furnished by bidder.

j) ENVIRONMENT MANAGEMENT PLAN AND OTHER STATUTORY & REGULATORY CLEARANCES

Successful bidder has to obtain Environment clearance and other statutory clearances under Environment Protection Act 1986, Air (prevention & control of pollution) Act 1981, Water (prevention & control of pollution) Act 1974, other environment acts including their amendments and rules:

- a) Obtaining all necessary statutory/ regulatory and other clearances etc. prevalent in the country including Environment Clearance and Forest Clearance shall be the responsibility of successful bidder. GMDC will give necessary assistance/ support to the successful bidder to the extent possible. Compliance of EC regulations and other statutory & regulatory clearances during the entire period of contract or extension, if any, shall be the responsibility of successful bidder and for this purpose, any information/data required from GMDC, if available, will be provided to the successful bidder. Different statutory authorization under EP Act 1986 and rules will be the responsibility of successful bidder. Periodic submission of compliances of environmental clearances and returns under water cess act will also be the responsibility of successful bidder. The Successful bidder shall be responsible for planning, designing, constructing, operating and maintaining the Beneficiation plant in an environmentally compatible/ friendly manner as per

norms laid down by MoEFCC and State & Central Pollution Control Boards.

b) Compliance of environmental laws and rules:

If any action in court is brought against GMDC or engineer or an officer or agent of GMDC for failure or neglect on part of the successful bidder to perform any pollution control or environmental management activities, act matters, covenants or things under the contract, or for any damage or injury or death or damage to any public property caused by the alleged omission or negligence on part of the successful bidder, his agent, representative or his sub-contractor, Workmen, suppliers or employees, the successful bidder shall in all such cases keep GMDC and EIC indemnified and/ or his representative harmless from all losses, liabilities, expenses or decrees arising of such action. Prospective bidders shall also elaborate slurry handling/ treatment section, if any, in detail in the Technical part of their offers.

k) PRODUCT SIZE

There is no product size limit, however successful bidder has to install the crushing / sizing equipments as per process requirement.

l) REJECT WEIGHMENT AND DISPOSAL

GMDC is the sole owner of the rejects produced from the beneficiation plant. The rejects produced from the plant shall be transported & temporarily stacked/dumped separately by GMDC. Rejects produced from the plant shall have to be weighed in presence of representatives of both, the GMDC & successful bidder, and record of the same shall be signed jointly. Quantity of Rejects shall be in consonance with that derived from balance of products.

Further, sale/ disposal of rejects shall be done suitably by GMDC. The weighment of such rejects shall be done at the weighbridges of GMDC/ on line weighing system in presence of representatives of both GMDC and successful bidder and shall be jointly signed and final.

m) FIRE FIGHTING ARRANGEMENT

The Successful bidder shall have to provide a suitable, reliable and adequate fire fighting system having fire-fighting hydrant points at strategic locations on all the floors as per BIS regulations and relevant norms. In addition to this, fire extinguishers of different types suitable for industrial use shall be provided at all the required vulnerable locations.

n) LAND

- (i) As the site proposed for 0.3 MTPA Beneficiation plant, GMDC shall provide land for setting up of Beneficiation plant on no charge basis.
- (ii) GMDC shall pay all taxes and impositions, as applicable in respect of the said land and buildings including the enhancement of rates and taxes payable either to Panchayat/ Municipality/ Government.
- (iii) The Successful bidder shall be responsible for surveying, soil testing, levelling and grading

of sites and all pre-constructional development work.

- (iv) The Successful bidder shall not be entitled to transfer, assign or mortgage the land and shall use the said land only for construction of this Beneficiation plant. The Successful bidder shall also not be entitled to let out, transfer, assign, mortgage or allow others to use the said land as well as structure/ building constructed thereon.
- (v) The Successful bidder shall bear all expenses and charges for special or temporary way leaves required by successful bidder in connection with access to the site.
- (vi) All operations necessary for the execution of the works at site and for the construction of any temporary works shall, so far as compliance with the requirements of the Contract permit, be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads and footpaths or to or of properties whether in possession of the other agency or any other person and the Successful bidder shall save harmless and indemnify GMDC in respect of all claims, demands, proceedings, damages, cost charges and expenses whatsoever arising out of or in relation to any such matters in so far as the bidder is responsible thereof.

o) DEMONSTRATION OF GUARANTEED THROUGHPUT & EFFICIENCY

During commissioning and trial run, the successful bidder shall demonstrate the performance of the plant at rated capacity with desired parameters for a period of 10 days. During this period, the GMDC shall ensure to supply required quantity of lignite to the successful bidder to carry out the above tests. No payment will be done to successful bidder for demonstration of the performance (Trial Run) of the plant at rated capacity with specified parameters.

a) The Organic Efficiency :

The successful bidder shall guarantee that the Organic Efficiency (OE) is not less than 95% and shall have to demonstrate the same during performance test. OE below 95% shall not be acceptable. In case of shortfall of OE from 95%, the successful bidder shall modify the plant to achieve minimum OE of 95%.

b) Throughput Capacity :

The successful bidder shall guarantee for 100% throughput capacity of the plant. Failing to prove the above, plant will not be accepted and the successful bidder shall modify the plant to achieve the same.

TESTS LIKE START-UP, TRIAL OPERATION & PERFORMANCE GUARANTEE TESTS (PGT)

- a. The final test as to the performance guarantees shall be conducted at site by the Successful bidder in presence of the Owner. Such tests will be commenced within a period of two (2) weeks after successful completion of trial operations. Any extension of time beyond the above two (2) weeks shall be mutually agreed upon.
- b. These tests shall be binding on both the parties of the contract to determine compliance of the

Prevailing rate of power and water at the time of construction/ operation will be charged from successful bidder. The charges for water and power will be realised on monthly basis.

r) Other scope of works

- (i) Detailed Design, Planning and Engineering, Supply and installation plant along with all its accessories, Manpower, Tools & Tackle, Fuel, Consumables etc.
- (ii) Construction, fabrication and Supply of all Equipment/ items.
- (iii) All the expenses for the use of electricity shall be borne by Successful bidder.
- (iv) All the expenses for the use of water shall be borne by Successful bidder
- (v) The Successful bidder shall have to follow Mines Act 1952, MMR1961, Mines Rules1955, Mine vocational training rule 1966, Mine Creche rule 1966, DGMS circulars issued from time to time, Explosive rule 2008, Ammonium Nitrate rule 2012, MCR 1960 and MCDR 1988, MCDR 2015, Environment Protection Act, Contract Labor (R&A) Act, Minimum Wages Act, P.F. Act and related Labor laws, applicable and maintain registers, records etc. in prescribed format, under the laws.
- (vi) The Successful bidder shall be responsible to construct and maintain proper and adequate lighting and taking necessary safety measures for all work under the contract as may be necessary or guided by the General Manager (Project)/Mines Manager at their cost.
- (vii) The power and light connections, wiring, equipment etc. shall be maintained by the Successful bidder throughout the contract period, till taking over of the physical possession of Work site by the GMDC. The power and light connection, wiring, equipment and other installations shall be subject to the inspection and passing by the General Manager (Project)/ Mines Manager or other authorized officials and the authorities of Central Government under the Electricity Act & Indian Electricity Rules, subject to conditions of electricity supply by the State Electricity Authorities, as applicable.
- (viii) The Successful bidder shall have to pay wages to his manpower which shall not be less than the minimum wages notified by the Government of India (GoI) from time to time.
- (ix) The Successful bidder shall ensure that manpower shall not go on strike in any case.

4 Documents & Drawings to be submitted

- a. General layout plan.
- b. System drawings of the plant including overall payout, plot plan, single line diagram, process flow diagram.
- c. Sample GA drawing of conveyor system indicating plan, elevation, belt profile with idler location & switches, foundation plan.
- d. System drawings of other associated systems like dust suppression, fire fighting & plant cleaning, power supply, illumination, control, communication etc.
- e. Broad Pollution control measures for the selected technology
- f. List of major equipment.
- g. PERT Chart of construction activities for the period of construction.
- h. Operation and maintenance manual.
- i. Any other documents and drawing necessary for the plant.
- j. Manpower planning.

- k. The Successful bidder shall submit soft copies also.

5 DURATION AND QUANTITY OF WORK:

a) CONSTRUCTION PERIOD OF THE PROJECT

The Lignite Beneficiation plant Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works, commissioning and successful testing, of Lignite Beneficiation plant shall be completed within 9 month from acceptance of LOI OR from the mutual agreed date OR from handing over the Lignite beneficiation plant Land to the successful bidder by GMDC and whichever is later.

b) COMPREHENSIVE O & M CONTRACT PERIOD

Contract for one year Comprehensive O&M shall be provided to successful bidder on sole discretion of GMDC.

6 OWNER'S LIEN ON EQUIPMENT

The Owner shall have lien on all equipment of the successful bidder including those of his sub-contractor(s), if any, brought to the site for the purpose of erection, testing and commissioning of the plant. The Owner shall continue to hold the lien on all such equipment throughout the period of contract. No material brought to the site, shall be removed from the site by the successful bidder Operator and/ or his subcontractors without the prior written approval of the site incharge.

Penalty for lower capacity & Lower organic efficiency of the Plant

The successful bidder shall have to demonstrate the organic efficiency and throughput capacity (hourly & daily) in performance test and shall conform to it. Failure to conform to organic efficiency as 95% and capacity as mentioned in the bid document in performance test and subsequently in regular operation of the plant, suitable penalties will be levied as mentioned hereafter.

7 Guarantees/ warrantees and Liabilities

The Contractor will be responsible for performance of Lignite beneficiation plant to achieve the 95 % organic efficiency.

For non-achievement of organic efficiency liquidity damaged will be levied to the successful bidder specified in clause 8 of this RFP documents.

The Contractor will be responsible for soundness of the construction in respect of correctness of structural designs. In case, any damage occurs or is likely to occur due to defective designs, GMDC will be entitled to recover the same from the Contractor through recovery from the fees payable. The Contractor will also be responsible for workmanship and use of quality materials in the work and for any damages, resulting or likely to result due to any deficiencies in this regard on account of failure of proper supervision and services expected from Contractor under this PROJECT. Contractor will also be responsible for any ambiguity in the specifications and or Description of the items for which GMDC suffers financial losses.

8 Liquidated Damages and Penalty

- a) Liquidated Damages due to Delay in Plant **Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works, commissioning and successful testing, of Lignite Beneficiation plant from acceptance of LOI OR from the mutual agreed date OR from handing over the Lignite beneficiation plant Land to the successful bidder by GMDC and whichever is later:**

The bidders in their offer shall guarantee the construction period (including commissioning) of 9 months which will be effective from the date of acceptance of LOI or intimation by GMDC to the successful bidder or handing over the site, whichever is later.

In case, the commissioning and successful testing of the plant is delayed beyond the schedule period, the successful bidder shall have to pay liquidated damage at the rate of 0.5 percent of the contract value per week of delay in commissioning and successful testing of the plant, subject to a maximum of 10% of the contract value of **Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works, commissioning and successful testing, of Lignite Beneficiation plant** *along with applicable GST* Of this liquidated damage at the pro rata basis on number of days of delay.

- b) Liquidated Damages due to non-achievement of Organic Efficiency:

The successful bidder not able to achieve the Organic Efficiency of 95 % then for every 1% drop in Organic Efficiency, the liquidated damages applicable shall be estimated as follows:
" Liquidated Damages " (INR Cr) = $Y\% \times \text{Contract value}$, subject to maximum limit of 10% of the contract value of **Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, supply, construction, erection/ installation along with all associated civil & structural works, commissioning and successful testing, of Lignite Beneficiation plant.** .

$$Y = (95-x)$$

X= Organic Efficiency < 95%

- c) **Maximum applicable Liquidated Damages:** The upper ceiling for total liquidated damages shall be **maximum 10% of the total contract value for Erection & Commissioning.**
- d) If the Successful bidder or its employees causes any damages or destroy any property belonging to GMDC, GMDC reserves the right to recover the charges or the liquidated damage from the Security Deposit EMD/ Payment Invoice.
- e) Under any circumstances GMDC shall not be liable to pay any compensation to the Successful bidder.

9 Subletting of Contract

The whole of the Work included in the contract shall be executed by the successful bidder. However in case of requirement, the successful Bidder may sublet any portion of work with prior permission from GMDC.

10 SCOPE FOR COMPREHENSIVE OPERATION AND MAINTENANCE (O & M)

GMDC may award the comprehensive operation and maintenance of plant for a period of 1 year on sole discretion of GMDC. The bidder has to provide separate quote for operation and maintenance on per ton basis for 0.3 MT lignite per annum. GMDC reserves the right to award the work of operation and maintenance contract through a separate O&M contract based on bidder's quote for their plant.

In such case, the Successful Bidder shall be responsible for comprehensive operating & maintaining the plant & equipment always in good running condition to the satisfaction of the Owner. Successful Bidder shall prepare & follow the system of preventive maintenance, scheduled maintenance and other regular maintenance works as prescribed in the maintenance manuals/ brochures etc. and approved by the authorized representative of Owner. Proper cleaning & housekeeping of the plant, equipment, structures, buildings, gantries, floors, roads, gardens etc. must be done regularly by the Successful Bidder to the satisfaction of the Owner.

- c) The likely quantity of lignite beneficiation is approximately 300000 +/-10% MT per Annum and can be increased or reduced depending upon the requirement of GMDC.
- d) The Monthly Target Quantity of lignite beneficiation shall be provided by General Manager (Project).
- e) The annual quantity mentioned as 3,00,000 MT per Annum is indicative quantity only.
- f) In case of any reason including adverse Working conditions during execution of the contract that may compel suspension/closure of the contract, GMDC shall be at liberty to conclude/postpone/complete/terminate/foreclose this contract. No compensation or payment shall be made on account of afore-stated events. Decision of GMDC in this regard shall be final and binding to the Successful bidder.
- g) All the activities arising under the scope of the work shall be complied with various statute/laws/Rules/Regulations etc. including Environmental laws and if the Successful bidder fails to comply the laws; it will be done at the risk and cost of the Successful bidder and expenses will be recovered from RA Bills of the Successful bidder.
- h) The Successful bidder shall have to follow all safety norms. The Successful bidder shall be responsible for safety of equipment and plants.
- i) GMDC shall not be made liable for any damage to and /or compensation for the manpower and/or tools and tackles provided by the Successful bidder.

11 QUALITY MONITORING CONTROL & RECORDING FOR COMPREHENSIVE O&M

- a) Facilities for sample collection and adequate number of automatic samplers complete with all required accessories shall be provided by the successful bidder at all relevant points where quality parameters are required to be determined for raw lignite received, beneficiated lignite and rejects produced from the beneficiation plant. The provision of required infrastructure for sampling and testing as per BIS norms will be the responsibility of the successful bidder. The samples collected shall be jointly signed and sealed.

- b) Besides above, on-line analysers for ash and moisture shall be provided on respective conveyors of beneficiation plant for instantaneous monitoring and recording of ash & moisture of raw lignite, beneficiated lignite and rejects. This shall also provide a tool to control the operation of beneficiation plant within the agreed parameters of the outputs. If Ash content in raw lignite is less than or equals to desired ash content ($\leq 17\%$), Raw lignite shall be bypassed from process and delivered directly to beneficiated lignite dispatch hopper or beneficiated lignite storage yard with weight measurement and sizing and screening up to 150 mm. For that Process bypass system shall be designed by successful bidder. 5% of process charge shall be paid to successful bidder for bypassed raw lignite quantity.
- c) The successful bidder shall keep provision of necessary equipments for carrying out proximate analysis of lignite and measurement of ash, moisture & GCV etc. in the laboratory of the beneficiation plant.
- d) The test will be carried out in presence of representatives from both GMDC and the successful bidder on day-to-day basis as well as monthly basis.
- e) **Testing and Analysis of Raw lignite & Products:**
1. An independent agency will be appointed and paid by GMDC for sampling and analysis of both raw lignite and products. However, 50% of the charge paid by GMDC to the independent agency will be recovered/ adjusted from successful bidder from their bills.
 2. Sampling shall be done for both raw lignite and products in each shift as per BIS. One part of raw lignite sample collected in each shift shall be kept for carrying out washability test at the end of each month.
 3. Determination of ash and moisture for both raw lignite and products will be carried out in each shift.
 4. Raw lignite samples collected in each shift will be blended for all the days of a month from which a representative sample will be prepared. From this representative sample, washability test and other tests will be carried out to determine optimum theoretical yield of washed lignite for that particular month.
 5. One representative sample of raw lignite will be kept as reserved for testing in case any dispute arises.
- ii. The test results certified by the independent agency shall be binding on both GMDC & successful bidder.
 - iii. GMDC reserves the right to change the independent agency in consultation with successful bidder.
 - iv. Quality of Rejects shall be derived from balance of product

12 RUNNING ACCOUNT BILLS:

Terms of Payments for Turnkey Execution of Erection, Commissioning and Successful Testing:

- a. All the payments will be made in Indian Rupees.
- b. The successful bidder shall complete the entire work in line with the RFP specification within the stipulated time frame. No extra time or extension of contract period is allowed unless specifically agreed to in writing by GMDC.
- c. 10% advance payment to successful bidder against submission of equivalent amount of Bank Guarantee.
- d. 70% of the lump sum agreed rate is payable on receipt of the components of equipment/plant at site as per the mutually agreed billing schedule signed by the Head of the Project.
- e. 10% of the lump sum agreed rate is payable on successful completion of erection and installation of equipment/plant at site based on certificate issued by the Head of the Project.
- f. Balance 10% of the lump sum agreed rate is payable on successful completion of commissioning based on certificate issued by the Head of the Project.
- g. The payments shall be made by Electronic fund transfer to the Bank account of the firm for which details shall be submitted by the firm.
- h. Payments shall be made by the GMDC Corporate office, Ahmedabad, after receiving the bills/invoices along with certificates as mentioned above. All such payments would be made by GMDC after deducting Income Tax, other statutory taxes and Levies as applicable and Security Deposit if any as per RFP document.

Terms of Payments for O&M Charges

- 12.1 The Successful bidder shall submit monthly Running account bills for the Work executed during the period (a calendar month or a period not less than 30 days) within 15 days of the completion of the period for work. However, in case of requirement, necessity or circumstances prevailing, if any, the period of the RA Bill may be more or less than 30 days. Running account bill shall be processed after execution of the Work order only.
- a) The bills shall be raised by the successful bidder for each billing period, complete in all respects and supported by all relevant documents.
 - b) The successful bidder shall submit the bills for beneficiation charges for every month by 15th of the following month during the billing period.
 - c) At the time of submission of bill for the month as mentioned above, a statement with respect to total parameters regarding raw lignite, beneficiated lignite and parameter such as raw lignite processed, raw lignite bypassed, raw lignite stock, beneficiated/clean lignite stock, if any, beneficiated lignite dispatched along with quality parameters, etc. related to preceding month is to be furnished by the successful bidder for enabling the payment and also adjustment regarding Liquidated Damage, Penalties etc. if any.
 - d) The total beneficiation charges payable in a billing period shall be calculated by multiplying the quantity of raw lignite on dry basis with agreed beneficiation charges.

- e) For payment of bypassed raw lignite charges payable in a billing period shall be calculated by multiplying the quantity of raw lignite bypassed with 5% of agreed beneficiation charges.
- f) Commitment Charges for Short Supply of Raw Lignite
In case, GMDC is unable to supply Monthly targeted quantity of raw lignite from the date of start of commercial operation of the plant, GMDC will pay Commitment Charges as follows:
- 1) If the quantity of raw lignite supplied is equal to or more than 95% of the Monthly targeted quantity, no commitment charges shall be paid to the successful bidder.
 - 2) In case, the quantity of raw lignite supplied is less than 95% of Monthly targeted quantity, commitment charges shall be paid for the quantity less than 95% (i.e. 95% quantity – actual quantity supplied) @ 60% of basic beneficiation charges calculated as shortfall.
 - 3) In case, GMDC supplies less quantity of raw lignite than the Monthly targeted quantity on monthly basis but fulfils the annual programmed quantity then the commitment charge already paid to the successful bidder will be refunded to GMDC by the successful bidder after annual reconciliation.
- g) In case, the quantity of raw lignite processed in the Beneficiation plant by successful bidder in the particular month is more or less than the quantity of raw lignite supplied by the GMDC, then the Successful bidder shall give declaration to the satisfaction of GMDC regarding the actual quantity of raw lignite Beneficiated.
- h) The bills shall be accompanied with all the relevant documents/ certificates indicating invoice numbers, net weight etc.
- i) All relevant taxes & duties pertaining to beneficiation charges shall be reimbursed by GMDC to the successful bidder on actual after producing documentary evidences in support of taxes & duties paid by the successful bidder. However, timely payment of all the taxes & duties shall be the responsibility of successful bidder.
- j) Penalty, if any, is paid by the successful bidder to the concerned agency(ies) shall not be reimbursed by GMDC and shall be borne by the successful bidder.

12.2 Payment of RA Bill

- a) Payment for the quantity of Work as per Schedule by General Manager (Project)

12.3 Monthly Running Account Bill shall be submitted to the office of the General Manager (Project) with following documents:

- Duly Certified Monthly report of quantity by EIC.
- Duly certified Date wise availability of plant by EIC.
- Check List.
- Compliance of all law relevant with the Work carried out by Successful bidder such as Labour, and Factories Act etc.

The Running Account bills, submitted at the office of General Manager (Project) will be processed there considering following deductions.

- a) Income tax as per provision of Income Tax Act, and other Taxes (and surcharges) applicable in force from time to time
- b) Cost of any other services provided / material supplied by the GMDC except water and electricity charges, if any plus 15% administrative charge.
- c) 5% of RA bill amount towards security deposit.
- d) Liquidated damages leviable as per clause No. 13 of the RFP Document.
- e) Water and electricity charges at actuals
- f) Other deductions, if any.
- g) An ad-hoc payment @ 80% of the payable amount arrived after considering above deduction, will be paid by office of the G.M. [Project], within 30 days of submission of the bill along with its details.
- h) The bill shall then be sent to GMDC's Corporate Office at Ahmedabad for verification, auditing and approval. Balance 20% payable amount of Running account bills shall become payable by Project within two weeks of the receipt of the approved bill from Corporate Office
- i) The payments shall be made by Electronic fund transfer to the Bank account of the firm for which details shall be submitted by the firm.

A. ESCALATION FOR O&M CHARGES

The beneficiation charges quoted by the successful bidder and accepted by GMDC in terms of per tonne of raw lignite (dry basis) for the first year shall be firm. Escalated Beneficiation charge for each subsequent year will be arrived in accordance with the formula given hereafter.

- A. 35% of the base price of beneficiation charges (excluding taxes & duties), say X. quoted in the Price Bid will be constant and no escalation shall apply to it.
 - B. 20% of the base price of beneficiation charges (excluding taxes & duties), say Y shall be subject to price variation based on All India Consumer Price Index (AICPI),
 - C. 45% of the base price of beneficiation charges (excluding taxes & duties), say Z shall be subject to price variation based on Wholesale Price Index (WPI).
- 1) The formula for escalation of beneficiation charges for subsequent years shall be as follows:

$$W = X + Y * \frac{AICPI1}{AICPI0} + Z * \frac{WPI1}{WPI0}$$

Where,

W	Escalated Beneficiation Charge
AICPI0	All India Consumer Price Index as on the date of start of commercial operation of the Beneficiation plant
AICPI1	All India Consumer Price Index on the subsequent year i.e. the date on completion of the 1 st year of commercial operation of the Beneficiation plant
WPI0	Wholesale Price Index as on the date of start of commercial operation of the Beneficiation plant

WPI1 Wholesale Price Index on the subsequent year i.e. the date on completion of the 1st year of commercial operation of the Beneficiation plant

The determination of beneficiation charges for the subsequent years after first year of commercial operation shall be calculated based on (A), (B) and (C) above. This escalation is applicable only if O&M extended for second year and onward.

PENALTIES (O&M)

- The desired quality of Beneficiated Lignite is with maximum 17% Ash and maximum 30% Total Moisture.
- GMDC reserves right to change the desired quality parameter time to time base on requirement. Payment clause, LD Clause and Penalty clause will be revised accordingly.
- The penalty amount will be calculated based on sampling results of beneficiated lignite loaded into Dumpers/Trucks/Tippers/ belt conveyors on Daily weighted average basis for the purpose of imposition of penalty, if any on the Successful bidder.

a) Penalty for not meeting Quality of Beneficiated Lignite

- 1) In case ash content in the beneficiated lignite is found to be more than 17%, the penalty will be imposed as follows:

Penalty will be imposed @ Rs. 0.50 per tonne for every 0.1% increase in ash% above 17% in beneficiated lignite.

For example, if the ash content of beneficiated lignite will be 18%, the penalty amount will be Rs. 5.00 = $((18\% - 17\%) / (0.1\%)) * 0.5$ per ton.

The penalty charges of Rs. 0.50 per tonne for 0.1% increase in ash% above 17% in will be escalated as per the escalation formula as brought out in the bid document.

b) Penalty for not meeting in Organic Efficiency

Organic Efficiency

The successful bidder shall guarantee that the Organic Efficiency (OE) is not less than 95% OE below 95% shall not be acceptable. In case, OE is less than the 95% during operation, the penalty for lower OE shall be worked out and it will be equivalent to double the price of loss of beneficiated lignite on this account. Any decrease in organic efficiency below the fraction of 0.05% shall be ignored whereas variation in organic efficiency for 0.05% and above will be treated as 0.1%.

If the OE achieved is less than 95% during operation of the plant in successive months, the successful bidder shall take corrective measures to establish minimum 95% OE of the plant within a week. However, penalty shall remain in force till the successful bidder achieves the 95% OE.

c) Penalty for Mismatch in Balance of Products

Product balancing (beneficiated lignite and reject) including slurry, if any will be done on dry basis, i.e.

Qty of Raw Lignite Feed_(dry basis) = Qty of Beneficiated Lignite_(dry basis) + Qty of By Passed Lignite_(dry basis) + Qty of Reject_(dry basis) + Qty of Slurry_(dry basis)

In case the quantity of products do not match with that of raw lignite supplied within a specified time frame then penalty will be imposed on the successful bidder for amount of double the price with applicable taxes of raw lignite, equivalent to the shortage of products. This may further be illustrated as follows:

Let, Q1= Raw lignite quantity (Tonne) supplied

Q2 = Beneficiated and bypassed Lignite (Tonne) supplied

Q3 = Reject including slurry if any (Tonne) supplied

Q4 = Shortage of products (Tonne)

P= Prevailing Price of Raw Lignite (Rs/Tonne)

If $Q1 - (Q2 + Q3) = 0$, No penalty and

If $Q1 - (Q2 + Q3) = Q4$, then penalty of Rs 2 X (Q4 x P) shall be imposed on successful bidder.

The lignite Transit and Handling loss of maximum 0.2% of raw lignite supplied shall be allowed for internal handling and storage of lignite.

d) Maximum applicable Penalty:

The upper ceiling limit for total penalty shall be maximum 25% of the total Contract Value of O & M.

13 GRAFTS AND COMMISSIONS ETC.

Any graft, commission, gift or advantage given, promised or offered by or on behalf of the BOM Operator or his partner, agent, officers, director, employee or servant or any one of his or their behalf in relation to the obtaining or to the execution of this or any other contract with the Owner, shall, in addition to any criminal liability which it may incur, subject the BOM Operator to the cancellation of this and all other contracts and also to payment of any loss or damage to the Owner resulting from any cancellation. The Owner shall then be entitled to deduct the amount so payable from any moneys otherwise due to the BOM Operator under the contract.

14 Termination of the Contract

- a) If the Successful bidder does not complete construction and commissioning of the plant within the period specified in Clause above, GMDC may, by not less than 1 (one) weeks' notice to the Successful bidder, declare this contract to be null and void, and in the event of such a declaration, the contract shall stand terminated and the Successful bidder shall be deemed to have accepted such termination and EMD/SD will be forfeited.
- b) If Successful bidder found in any offensive act or inappropriate act which is causing loss/damage to the corporation or violating the code of conduct, GMDC reserves the right to terminate the contract with immediate effect and Successful bidder will be blacklisted and the EMD/SD will be forfeited.
- c) The Successful bidder fails to remedy any material breach hereof or any failure in the performance of its obligations, as specified in a notice of suspension issued by GMDC, within 30 (thirty) days of receipt of such notice of suspension or within such further period as GMDC may have subsequently granted in writing;
- d) The Successful bidder becomes insolvent or bankrupt or enters into any agreement with its creditors for relief of debt or take advantage of any law for the benefit of debtors or goes into liquidation or receivership whether compulsory or voluntary;
- e) The Successful bidder fails to comply with any final decision reached as a result of arbitration;
- f) The Successful bidder submits to GMDC a statement which has a material effect on the rights, obligations or interests of GMDC and which the Successful bidder knows to be false;
- g) Any document, information, data or statement submitted by the Successful bidder in its Proposals, based on which the Successful bidder was considered eligible or successful, is found to be false, incorrect or misleading;
- h) As the result of Force Majeure, the Successful bidder is unable to perform a material portion of the Services for a period of not less than 60 (sixty) days

15 CONFLICT OF INTEREST

- a) The Bidder shall not have a conflict of interest that may affect the Selection Process .Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, GMDC shall forfeit and appropriate the Bid Security, if available, or as mutually agreed genuine pre-estimated compensation and damages payable to GMDC for, inter alia, the time, cost and effort of GMDC including consideration of such Bidder's Proposal/Bid, without prejudice to any other right or remedy that may be available to GMDC hereunder or otherwise.
- b) Without limiting the generality of the above, shall be deemed to have a Conflict of Interest

affecting the Selection Process, if the relationship between two Bidders is established through common holding, either directly or through Associates, of at least 26% holding of equity/profit sharing in another company/firm, or in each other and other terms as specified hereunder;

- A. The Bidder, its Member or Associate (or any constituent thereof) and any other Bidder, its Member or Associate (or any constituent thereof) have common controlling ownership interest. Common controlling ownership interest for Company, Limited Liability Partnership Firm is defined as follows. Associates of the Bidding firm shall mean Parent and/or Subsidiary and/or sister concerned firm having meaning specified in **definition section**.
- (1) **If Bidder is a Company:** In such case, the Bidder (including its Associate or any shareholder thereof of Bidder and/or its Associates) possessing over 26% of the paid up and subscribed capital in its own company or Associate as the case may be, also holds:
- a) more than 26% of the paid up and subscribed equity capital in the other Bidder, its Member or Associate of such other Bidder or Associates is Company; and/or
 - b) more than 26% of profit sharing in other Bidder or Associates such other Bidder or Associates is a Limited Liability Partnership firm. and/or
- (2) **If Bidder is a Limited Liability Partnership Firm:** In such case, the Bidder or its Partners or Associate having a profit sharing of more than 26% of such Bidder or its Partners or Associate as the case may be also holds;
- a) more than 26% of the paid up and subscribed equity capital in the other Bidder or Associate of such other Bidder, its Member or Associates is Company; and/or
 - b) more than 26% of profit sharing in other Bidder or its Associates such other Bidder or its Associates is a Limited Liability Partnership firm. and/or
- B. a constituent of such Bidders is also a constituent of another Bidders; or.
- C. such Bidders receives or has received any direct or indirect subsidy or grant from any other Bidder/s, or has provided any such subsidy to any other Bidders; or
- D. such Bidder has the same legal representative for purposes of this Bid as any other Bidders; or
- E. such Bidders has a relationship with another Bidders, directly or through common third parties, that puts them in a position to have access to each other's' information about, or to influence the Bid of either or each of the other Bidders; or
- F. there is a conflict among this and other consulting assignments of the Bidder (including its personnel and other members, if any) and any subsidiaries or entities controlled by such Bidder or having common controlling shareholders. The duties of the Consultant will depend on the circumstances of each case. While providing consultancy services to GMDC for this particular assignment, the Consultant shall not take up any assignment that by its nature will result in conflict with the present assignment; or
- G. Bidder shall furnish an affirmative statement as to the existence of, or potential for conflict of interest on the part of the Bidder or any prospective subcontractor due to prior, current contracts, engagements, or affiliations with Authority. Additionally, such disclosure shall address any and all potential elements (time frame for service delivery, resource, financial or

other) that would adversely impact the ability of the Bidder to complete the requirements as given in the RFP.

16 Disputes Resolution

The Successful bidder and/or Bidder as the case may be, shall endeavor, in the first instance, to resolve any dispute, disagreement or difference arising out of or in connection with this RFP and/or Agreement and/or LOI, including any question regarding its interpretation, performance, existence, validity, termination and the rights and liabilities of the Successful bidder and/or Bidder as the case may be to this RFP and/or Agreement and/or LOI (a "Dispute") through good faith negotiations.

17 Jurisdiction

The matter related to any dispute or difference arising out of this RFP and subsequent contract shall be subject to the exclusive jurisdiction of Court at Ahmedabad only.

18 Arbitration

All questions, disputes, differences whatsoever which may at any time arises between the parties to this RFP and subsequent contract in connection with the RFP and subsequent contract or any matter arising out of or in relation thereto, shall be referred to Sole Arbitrator as per the provisions of Arbitration and Conciliation Act, 1996 and subsequent amendment thereto and the venue of arbitration proceedings shall be at Ahmedabad only. The Language of the Arbitration shall be in English only.

19 Compliance of Statutes

The Successful bidder will strictly abide by all the laws governing employment, payment of wages, Safety and welfare of his labour and staff and provision of Minimum Wages Act, PF/ Gratuity Act, the Employee Compensation Act, Contract labour (Abolition and Regulation) Act, the Mines Act, the Indian Explosives Act, Mines Creche Rules (in case employing female Workers), Industrial Dispute Act, Maternity Benefit Act, Bonus Act, Building & Other Construction Act& Rules and other Statutory provisions as existing now or as may be introduced later as well as those orders of Govt. of India or State applicable to GMDC and the Rules and Regulations framed under the said Acts. If any amount becomes payable by GMDC as a result of any claim or application in terms of the provisions of the said Acts and the Rules and Regulations, By-laws or the Orders made there under, such amount shall be recoverable from the Successful bidder. Any consequences arising out of non-compliance of Safety Provisions will be at risk and cost of the Successful bidder. The Successful bidder shall maintain all the statutory registers under the above Acts and Regulations and shall submit the same on demand by the GMDC Management.

20 Non-fulfillment of Terms and Conditions of the Contract

- a) If the Successful bidder fails to carry out the Work as per the terms and conditions of the contract to the complete satisfaction of GMDC, GMDC shall be entitled to forfeit the Security Deposit paid by the Successful bidder.
- b) In case of any change in the directives / rules of the Central / State Government related involving directly or indirectly the Work awarded to the Successful bidder under this RFP,

the same shall have to be strictly adhered to and shall be binding upon the Successful bidder. GMDC will not be responsible for any compensation for any damages suffered by the Successful bidder due to such changes.

- c) If required for any reason, GMDC reserves the right to terminate, amend and/or alter the contract and/or bifurcate and/or reduce the contract Work, at any time, without giving any notice to the Successful bidder and without incurring any responsibility for such termination, modification and/or alteration and in such an event the Successful bidder shall have to take away his labour, tools, tackles, machinery, equipment etc. and shall leave the site at once and fully comply with the instructions of GMDC.

21 Foreclosure

- a) In case of any necessity arising due to local working conditions, land/lease issues, major deviation in geological data/information, unexpected sliding of the benches or dumps or any unforeseen reason not in the control of the GMDC or of the Contractor, Committee comprising of representative of GMDC, Contractor and Outside Expert from Technical and Financial background shall be constituted and Committee will look into the reasons/causes and analyze the conditions as to whether the work awarded is feasible to continue with the existing terms and conditions of the contract or any other available option or to Fore Close the contract in the interest of both the GMDC and the Contractor.
- b) If after study of the prevailing condition of the contract under execution, committee recommends to Fore Close the contract keeping in view the financial implication to both the GMDC and Contractor, guideline/Modality of the Fore Closure of the contract shall be decided by the committee considering the work executed and unexecuted, period of the contract completed and balance period of the contract, value of the work executed and value of the work unexecuted etc.

22 Force Majeure

- a) Force majeure is herein defined as any cause which is beyond the control of the Successful bidder or the GMDC as the case may be which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the contract, such as:
- b) Natural phenomena including but not limited to flood, draughts Cyclone, earthquake and epidemics, declaration of war.
- c) Acts of any government, including but not limited to war, declared or undeclared priorities, quantities, embargoes, providing either party shall within fifteen (15) days from the occurrence of such a cause notify the other in writing of such cases.
- d) The Successful bidder will advise, in the event of his having resort to this clause by a registered letter duly certified by the statutory authorities, the beginning and end of the cause of delay, within fifteen days of the occurrence and cessation of such Force Majeure condition. In the event of delay lasting over Two months, if arising out of Force Majeure, the contract may be terminated at the discretion of the GMDC.
- e) For delay arising out of Force Majeure, the Successful bidder will not claim extension in completion date for a period exceeding the period of delay attributable to the causes of force Majeure and neither GMDC nor the Successful bidder shall be liable to pay extra costs (like increase in rates, remobilization, advance, idle charges for labour and machinery etc.) provided it is mutually established that the Force Majeure conditions did actually exist.

- f) If any of the Force Majeure conditions exists in the place of operation of the Successful bidder even at the time of submission of bid, he will categorically specify them in his bid and state whether they have been taken into consideration in their quotations.
- g) The work of the GMDC shall not be liable for delays in performing his obligations resulting from any force majeure cause as referred to and/ or defined above. The date of completion will, subject to hereinafter provided, be extended by a reasonable time given though such cause any occur after Successful bidder 's performance of his obligations has been delayed for other causes.
- h) The decision regarding the occurrence of force majeure to be considered shall be decided jointly.

23 Safety

The Successful bidder shall comply safety regulations as per statutory requirements under the relevant Acts.

24 Insurance

- a) The successful bidder shall insure all plant and machinery, working personnel to receive the compensation money against risks of fire, riot, lightning, explosion, earthquake, storm, tempest, flood, war, malicious damage, theft, civil commotion or such other acts from time to time.
- b) Any proceeds receivable from the Insurance Company shall be used by the successful bidder to make good the damages and payment of compensation.
- c) In the event of any irreparable loss or damage to the plant and machinery as a whole or the Insurance Company refusing to pay the claim arising out of any loss on the gross negligence and violation of the condition of insurance policy, the Successful bidder shall replace the damaged plant/equipment at its own cost to resume the operations.
- d) In the event of any loss or expense or damage suffered by GMDC due to any claim made against GMDC by any person for suffering any injury or damages to any person/ property whatsoever arising out of or in consequence of any action or omission or commission on the part of the successful bidder or in violation of statutory provisions in connection with erection, operation and maintenance of the plant, the successful bidder shall keep GMDC indemnified for any claim, demand, proceeding, damages, cost, charges and expenses whatsoever in respect of or in relation thereto by taking suitable insurance policy.
- e) The successful bidder shall ensure that the insurance policy/ policies are kept alive till full expiry of the work order by timely payment of premiums and similar insurance policies are also taken by his sub-contractors, if any. The cost of premiums shall be borne by the successful bidder. The successful bidder's failure in this regard shall not relieve him of any of his contractual responsibilities and obligations.
- f) The successful bidder shall provide GMDC with a copy of all insurance policies and documents taken out by him in pursuance of the contract. Such copies of documents shall be submitted to GMDC immediately after such insurance coverage. The successful bidder shall also inform the GMDC in writing at least sixty (60) days in advance, regarding the expiry, cancellation and/or change in any of such documents and ensure revalidation/ renewal, etc. as may be necessary well in time. Copy of the premium receipts and such records which evidences that the policy remains valid and alive and shall also be furnished regularly to GMDC by the successful bidder without failure.

25 Confidentiality

All the information, in any form, provided by the GMDC to the Successful bidder in connection with the assignment, shall be kept “Strictly Confidential” by the Successful bidder. All information gathered there from and therein shall not be disclosed to any third bidder. The Successful bidder is required to furnish an undertaking to the GMDC for this purpose.

26 Severability

Should any provision of this CONTRACT be found to be invalid, illegal or otherwise not enforceable by any court of law, such finding shall not affect the remaining provisions here to and they shall remain binding on the PARTIES here to.

27 Change in law

- a) In the event of any change or amendment of any ACT or law, Rules or Regulations of Government of India or Public authorities or any change in the interpretation or enforcement of any said Act or law, rules or regulations by Government of India or Public authorities which becomes effective after the date as advised by the GMDC for submission of the price bid for this contract and which results in increased cost of the services under the contract through increased liability of taxes (other than corporate and personal taxes), duties, the successful bidder shall be indemnified for any such increased cost by the GMDC subject to the production of documentary proof to the satisfaction of the GMDC to the extent which is attributable to such change or amendments mentioned above.
- b) Similarly, if any change or amendment in any law, Rules or Regulations of Government or Public Body or any change in the interpretation or enforcement of any said Act or law, rules or regulations by Government of India or Public Body which becomes effective after the date as advised by the GMDC for submission of the price bid for this contract and which results in any decrease in the cost of the services under the contract through reduced liability of taxes (other than Corporate and Personal Taxes), duties, the Successful bidder shall pass on the benefits of such reduced cost, taxes or duties to the GMDC.
- c) Notwithstanding the above-mentioned provisions, the GMDC shall not bear any liability in respect of (1) Personal Taxes on the employees of the Successful bidder (2) Corporate taxes in respect of the Successful bidder.

28 Handling of Documents

- a) All documents prepared in connection with this Work and to be provided by Successful bidder will be the property of the GMDC. As and when required or upon termination of the Work, the aforesaid documents prepared specifically for this Assignment (including originals) shall be handed over to the GMDC before final acceptance or thereafter.
- b) Successful bidder will have to take all necessary steps to ensure confidential handling of all matters pertaining to any information developed or acquired by the Successful bidder from GMDC under terms of the Work or in performance thereof.
- c) Successful bidder will not prepare articles or photographs for publication or speeches about the Work and/or plant Successful bidder and installation in which GMDC has an interest without prior written consent of GMDC.

29 Secrecy Clause:

- a) The Successful bidder shall not disclose to any third party, any Technical information, process, data, design, drawings, plans, specification etc. received from GMDC at any time either in whole or in part, shall use all the reasonable efforts to preserve the secrecy of the above Technical Information and shall not use the same for any purpose other than the intended purpose including construction, maintenance and operation of the resultant plant.
- b) However, the disclosure of such Technical Information to Government of India or Statutory Authorities of the Government of India shall not be deemed to be a violation of the Secrecy understanding contained herein.

30 Other terms & Conditions

- a) The bidder shall not involve himself or any of his representatives in Price manipulation of any kind directly or indirectly by communicating with other bidder(s).
- b) The bidder shall not reveal either his documents or any other exclusive details of GMDC to any other bidder.
- c) GMDC's decision on award of work order shall be final and binding on all the bidder(s).
- d) GMDC shall not have any liability to Bidders for any interruption or delay in access to the site irrespective of the cause.
- e) GMDC is not responsible for any damages, including damages that result from, but are not limited to negligence.
- f) GMDC Ltd will not be held responsible for consequential damages, including but not limited to systems problems, inability to use the system, loss of electronic information etc.
- g) If the RFP documents and forms referred to in the RFP are not submitted or are submitted but not found duly filled in and unsigned, the RFP will be rejected.
- h) In the event of space being insufficient for furnishing required information, additional sheets may be used and signed.
- i) Canvassing In any form will lead to rejection of the offer.
- j) Bid documents once submitted shall not be returned and shall remain the property of GMDC.
- k) The bidder(s) who have earlier been awarded contract by GMDC for any job which they either did not accept or have abandoned or whose contract has been terminated by the GMDC for breach of conditions, shall be considered ineligible to participate in this RFP.
- l) To assist in the scrutiny of technical bid documents, evaluation and comparison of technical bids, the Corporation may, at its discretion, seek from any or all bidders, clarification(s) of his/their Bids, including technical information, documents and materials after the Technical Bid Opening but before opening of the Price Bid (Part-II). The bidder will have to submit clarification within timeline stipulated at the time of scrutiny. The requests for clarification and response shall be through mail or physical copy, but no change in the final price or substance of the bid shall be permissible.

Annexure "A"

Instruction to Bidders for Online Tendering

1. All Bidders must submit their bid online through the website <https://gmdc.nprocure.com>
2. Bidders who wish to participate in online tenders will have to procure / should have legally valid Digital Certificate (Class III) as per Information Technology Act-2000, using which they can sign their electronic bids. Bidders can procure the same from any of the license certifying Authority of India or can contact (n) code solutions- a division of GNFC Limited, who are licensed Certifying Authority by Government of India at address mentioned below at clause 5.
3. All bids should be digitally signed. For details regarding digital signature certificate and related training involved at the below mentioned address should be contacted:

Address:

(n)Procure Cell

(n)Code solutions A division of GNFC

403, GNFC Info-Tower, Bodakdev, Ahmedabad- 380 054 (India)

Tel: +91 26857316/17/18 Fax: +91 79 26857321, Toll Free: 1800-233-1010

E-mail : nprocure@gnfc.net

4. Kindly take note that, valid Digital Signature Certificates is a must for all the interested Bidders. Online tendering process is not possible without a valid digital signature certificate.
5. Interested Bidders are also requested to complete their procedure for taking digital signature certificate in respect to filling of application form, supporting documents with necessary fees at least 3 days before last date of tender submission.
6. (n) code solutions reserves the rights to issue digital signature certificate after verification of application forms / supporting documents submitted by Bidder. (n) code solutions is fully authorized to issue digital signature certificate to Bidders.
7. Bidders who have no facility to participate in on-line tenders are requested to contact (n) code solutions for the same.
8. Free vendor training camp will be organized every Saturday between 4.00 to 5.00 P.M. at (n) code solutions-A Division of GNFC Ltd. at address mentioned. Bidders are requested to take benefit of the same.
9. All the correspondence in respect to training, support or digital signature certificate should be addressed to (n) code solutions directly on the above mentioned address. In case the Bidders face any difficulty, they may contact the officials of the GMDC or GNFC on the below mentioned details:

a. GMDC:

Contact Person: General Manager (Power & Purchase)

Contact numbers: 079-27913200/3501 Ext No 1760

E-Mail: power@gmdcltd.com; jndave@gmdcltd.co.in

b. GNFC:

Contact Number: 079- 26857316/17/18

E-Mail: nprocure@gnfc.net

LETTER OF SUBMISSION

To,
General Manager (Power & Purchase)
Gujarat Mineral Development Corporation Limited
Khanij Bhavan, 7th Floor,
132 Ft. Ring Road, University Ground,
Vastrapur, Ahmedabad-380052, Gujarat, India

Dear Sir,

Sub: Submission of Offer against - RFP Reference No.....

I/We hereby offer to carry out the Work detailed in the e-RFP Specification issued by Gujarat Mineral Development Corporation Limited, Ahmedabad in accordance with the terms and conditions thereof.

I/We further agree to execute all work referred to in the said e-RFP documents upon terms and conditions contained or referred to there in without any conditional offer.

I/We have deposited/depositing herewith the requisite Earnest Money Deposit (EMD) and RFP processing fee as per details furnished in the RFP document.

Place:

Authorized Representative of RFP:

Date:

Name:

Address:

Signature:

CV FORMAT FOR EXPERTS

Sr. No.	Particulars	Details
1	Name	
2	Address	
3	Contact No.	
4	Email	
5	Qualification (Highest qualification to SSC with percentage, passing year and University)	
6	Similar assignments in detail (Projects undertaken, project duration, Roles & responsibilities etc.)	
7	Employment record (company, designation, duration, year)	
8	Similar Total Experience in years	

FORM – PA
CHECK LIST OF DOCUMENTS ENCLOSED WITH TENDER
TECHNICAL BID

<u>Sr. No.</u>	<u>Document</u>	Declaration (Strike out whichever is not applicable)
1.	Tender Processing Fee	Yes/No
2.	EMD	Yes / No
3.	Form PA (check list of documents enclosed with tender)	Yes / No
4.	Form PB (Status of the Bidder)	Yes / No
5.	Form PC (CA Certification for Financial Details and Work carried out during the last seven years of bidder)	Yes / No
6.	Form PD (Declarations)	Yes / No
7.	Form PE (Undertaking of Genuineness of Document)	Yes / No
8.	Form PF (Undertaking of Indemnity)	Yes / No
9.	Form PG (Site Visit)	Yes / No
10.	Form PH (Undertaking of Confidentiality)	Yes / No
11.	Power of Authority to sign the documents (Duly Notarized on Stamp paper of Rs. 300)	Yes / No

PRICE BID

1	Online Price bid submission in Form PP	Yes / No
----------	---	----------

FORM - PB

STATUS OF THE BIDDER

Particulars	Details
Name of the Bidder:	
Address :	
Registered office :	
For correspondence :	
Telephone No.	
Fax No.	
E-mail Address	
Attested copies of Deeds, Articles of association to be enclosed	
Name & contact number of person holding power of attorney (Attested copy of power of attorney to be enclosed)	
Names of Partners with their Present and permanent address	
Name of Bankers with full address and Telephone No& Bank Account Details (Cancelled Cheque to be enclosed)	
PAN of Bidder	
GST Registration No. of Bidder	
PF Registration No.	
Whether enlisted in other dept., if yes, then furnish the details pertaining to class and the amount qualified to tender	
Whether the applicant or its partners or Directors black listed in past by any Govt. or any other body.	
Details pertaining to the Work incomplete, if any	
Details of the litigation, court cases and arbitration either completed or under progress during last 10 years by the entity or any partner/proprietor of present entity as associated in any capacity.	

Signature and Stamp of the Bidder

FORM PD

Declaration

(On letter head of the Bidder)

DATE:

To,
The General Manager (Power & Purchase),
Gujarat Mineral Development GMDC Ltd.,
“Khanij Bhavan”, 132 ft. Ring Road,
University Ground, Vastrapur,
Ahmedabad-380015

Dear Sir,

I/we here by solemnly declare that

1. Any of our Directors or Partners, jointly or severally and/or individually or our firm/GMDC have not been black listed at the time of submission of contract by the Central Govt. or the State Govt. or its undertakings.
2. We have not put any condition in our offer with respect to RFP No. _____,
3. We have accepted all the terms and conditions, including Annexure, Corrigendum if any, as specified in the RFP Document No. _____ unconditionally.

I/we here by further declare that, if the declaration is found untrue, the GMDC shall be entitled to take any action against us severally and/or individually or our firm/GMDC in this regard in any manner that may be deemed fit by GMDC.

Yours faithfully,

Signature and Stamp of the Bidder

FORM PE
(Format for Affidavit)
A F F I D A V I T

Undertaking Regarding Geniuses Of Documents
(On Non-Judicial Stamp Paper Of Rs 300/-)

I/We, _____, Partner/Director/Legal Attorney/Accredited
Representative of M/s. _____ solemnly declare that:

1. I/We are submitting Tender for the Work _____
_____ against Tender No. _____
2. None of the Partners/Directors of our firm/GMDC is relative of employee of GMDC.
3. All information furnished by us in respect of fulfillment of eligibility criteria and qualification information of this Tender is complete, correct and true.
4. All documents/credentials submitted along with this Tender are genuine, authentic, true and valid.
5. If it is found at any point of time that our documents are not genuine then in that case our tender will be rejected, earnest money deposited by us will be forfeited and we will be debarred from participating in further/future GMDC tenders and/or any action as deemed fit by GMDC may be taken against us, including termination of the contract, forfeiture of all dues including Earnest Money / Security deposit and banning/delisting of our entity and all related persons etc.

SIGNATURE OF THE BIDDER

WITH SEAL

Dated

FORM PF

**Undertaking Of Indemnity
(On Letter head of the Bidder)**

To,

The General Manager (Power & Purchase)
Gujarat Mineral Development Corporation Ltd.
Khanij Bhavan
132' Ring Road, University Ground,
Vastrapur,
Ahmedabad.

Dear Sir,

We M/s. ----- hereby undertake that, we shall at all times, indemnify and keep indemnified that GMDC Limited from any and all liability for damages resulting from or arising out of or in any way connected with the operations covered by the Tender No. _____. We shall be responsible for all risk arising in connection with or on account of the operations covered by the contract covered by the above tender and shall make good all losses and damages arising there from. In case, the GMDC Limited shall incur any cost or expense or suffer any loss on account of any claim demand or course of action brought against us and arising out of the operations covered by the Bidder/tender, the GMDC Limited shall have the power (without being bound to do so) to define, contest or compromise any such claim demand or cause of action. Any amount that may become payable by GMDC Limited and any cost expense etc. that may be incurred by the GMDC Limited in this behalf, shall also be recoverable from us, without prejudice to your other rights.

Yours faithfully,

For -----

(Signature & Stamp of the Bidder)

FORM PG

Declaration

(On letter head of the Bidder)

Site Visit

We _____ hereby certify that we have fully understood the site condition in respect of Tender No. _____ for all the Successful bidder mentioned above at _____.

We have obtained all relevant details, information, data, existing Working conditions, existing industrial environment etc. We have also studied the Working conditions as proposed in the tender and availability of power supply, water supply, man power, machineries, transportation facility etc.

We hereby agree and undertake not to raise any dispute and/or objection at any stage on any ground whatsoever, during the currency of the contract if awarded to us.

SIGNATURE OF THE BIDDER WITH SEAL

Dated

SIGNATURE OF THE PROJECT AUTHORITY

FORM PH
Undertaking Of Confidentiality
(On Letter head of the Bidder)

To,

The General Manager (Power & Purchase)
Gujarat Mineral Development Corporation Ltd.
Khanij Bhavan
132' Ring Road, University Ground,
Vastrapur,
Ahmedabad.

Dear Sir,

We M/s. ----- hereby undertake that, we shall not, either during the term or after the expiration of this Contract, disclose any proprietary or information relating to the Project, the Services, this Contract or GMDC's business or operations without the prior written consent of GMDC,

Yours faithfully,

For -----

(Signature & Stamp of the Bidder)

FORM PI

Format of power of attorney for authorizing Bidder's Signatory

[To be provided by Single Bidder/ All members of Consortium is the Bidder is a Consortium]

(On a Stamp Paper of Value Rs 100)

KNOW ALL MEN by these presents that we,[name of the firm], a FIRM incorporated under the _____ and having its Registered Office/ office at[Address of the Company firm] (hereinafter referred to as "Company/firm"):

WHEREAS in response to the RFP for _____ [Name of the Assignment] ("Project"), the Company/ firm is submitting Bid for the project and GMDC and is desirous of appointing an attorney for the purpose thereof.

WHEREAS the Company deems it expedient to appoint or authorize Mr ___ son of ___ resident of _____, holding the post of _____ as the authorized signatory of the company/ firm in connection with the request for proposal titled (Name of the RFP) RFP Number: _____ dated _____, issued by the (Name of the other party) (the "RFP") and to execute and deliver for and on behalf of the Company the RFP documents and to comply with any other requirements connected to or arising from the RFP documents and/or from the RFP process for the firm/company in its name and on its behalf, that is to say:

To act as the Company's/firm's official representative for submitting the Bid comprising Technical Bid and Price Bid for the said project and other relevant documents in connection therewith;

To sign all the necessary documents, papers, testimonials, applications, representations and correspondence necessary and proper for the purpose aforesaid RFP;

To RFP documents, receive and make inquiries, make the necessary corrections and clarifications to the Proposal and other documents, as may be necessary;

To do all such acts, deeds and things in the name and on behalf of the Company as necessary for the compliance of the requirements with any other requirements connected to or arising from the RFP documents and/or from the RFP process.

The common seal of [name of the company/firm] was here unto affixed pursuant to a resolution passed at the meeting of Committee of Directors held on --- Day of -----, 20__ in the presence of [name & designation of the person] and countersigned by [name & designation of the person] of the Company/firm of [name of the company]	----- [name & designation of the person] ----- [name & designation of the person]
--	--

FORM PJ

Power of Attorney to Lead Member

[Applicable in case the Bidder is a Consortium]

Whereas the GMDC (the “Authority”) has invited bids from interest parties for the **Appointment of Project Management Consultant for revamping GMDC’s existing Fluorspar beneficiation Plant** (the “Project/ Consulting Assignment”). Whereas, and(collectively the “Consortium”) being Members of the Consortium are interested in bidding for the Project in accordance with the terms and conditions of the Request for Proposal and other connected documents in respect of the Project, and Whereas, it is necessary for the Members of the Consortium to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium’s bid for the Project and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

We, M/s having our registered office at, and

M/s., having our registered office at, and

(hereinafter collectively referred to as the “Principals”) do hereby irrevocably designate, nominate, constitute, appoint and authorize M/s, having its registered office at, being one of the Members of the Consortium, as the Lead Member and true and lawful attorney of the Consortium (hereinafter referred to as the “Attorney”) and hereby irrevocably authorise the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Consortium and any one of us during the bidding process and, in the event the Consortium is awarded the Contract, during the execution of the Project, and in this regard, to do on our behalf and on behalf of the Consortium, all or any of such acts, deeds or things as are necessary or required or incidental to the submission of its bid for the Project, including but not limited to signing and submission of all applications, bids and other documents and writings, accept the Letter of Award, participate in bidders’ and other conferences, respond to queries, submit information/ documents, sign and execute contracts and undertakings consequent to acceptance of the bid of the Consortium and generally to represent the Consortium in all its dealings with the Authority, and/ or any other Government Agency or any person, in all matters in connection with or relating to or arising out of the Consortium’s bid for the Project and/ or upon award thereof till the Agreement is entered into with the Authority. AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/ Consortium.

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF, 20....

For

(Signature, Name & Title)

For

(Signature, Name & Title)

(Executants)

(To be executed by all the Members of the Consortium)

PRICE BID FORM – PP

(To be submitted online)

Sr. No.	Description of Work	Qty	Rate in Rs/Qty (Inclusive of all taxes and levies excluding GST)	Total Amount in Rs (Inclusive of all taxes and levies excluding GST)
1	Planning, Design & Engineering, Selection of necessary equipment and machinery, procurement, delivery, Construction, erection/ installation along with all associated civil & structural works. testing, commissioning of lignite beneficiation plant, based on dry beneficiation technology.	1		
2	Civil work for lignite beneficiation plant	1		
3	Comprehensive Operation and Maintenance for 1 st year (Rs/tonne basis)	3,00,000 tonne		
	Total amount (Excluding GST) (Total of 1 + 2 + 3)			

Note: Above all amount is excluding GST

(*) Note: Beneficiation charge for first year of operation to be quoted above. Annual escalation, if any will be as per the formula given in the RFP

Please note the following details for Compulsory e-confirmation for Bank Guarantee through ICICI Bank through SFMS under our:

IFS Code: ICIC0000024 and UIC GMDC530265584 for Field 7037.

Bank Name: ICICI BANK LTD.

BANK GUARANTEE FOR SECURITY DEPOSIT (SD)

Name of the Bank :
Address :
Guarantee No :
Name of the Contractor : M/s _____
Date of Expiry :
Limit to liability : Rs _____/- (**Rupees** _____ **only**)

Ref: Tender bearing No. _____

Subject: Bank Guarantee towards Security Deposit.

Date.....20

To
General Manger (____),
Gujarat Mineral Development Corporation Ltd, GMDC.
132 Ft Ring Road, Near University Ground
Vastrapur, Ahmedabad.

Dear Sir,

In consideration of Gujarat Mineral Development GMDC (hereinafter called "GMDC") which expression shall unless repugnant to the subject of context include his successors and assigns having agreed to exempt M/s _____ (hereinafter called "Contractor") from demand under the terms and conditions of "Technical Bid Document" (hereinafter called the said "Bidding Document") issued by the GMDC vide Tender _____. **The present** Bank Guarantee is towards Security Deposit (SD) of Bid in terms of Clause No. ____ of Chapter – ____ of the afore-said bidding document for the due fulfillment by the Contractor of the terms and conditions contained in the said Bidding Document on production of Bank Guarantee for **Rs** _____/- (**Rupees** _____ **only**)

- 1) We the _____ (Name of the Bank) hereinafter referred to as "Bank" having our registered office at _____ do hereby undertake and agree to indemnify and keep indemnified GMDC to extent of **Rs** _____/- (**Rupees** _____ **only**) against any losses, damage cost, charges and expenses caused to or suffered by or that may be caused or suffered by GMDC by reason of any breach or breaches by the Contractor of any of the terms and conditions contained in the said Bidding Document and unconditionally pay the amount claimed by GMDC on demand and without demur to the extent aforesaid.
- 2) We _____ (Name of the Bank) do hereby undertake to pay the amounts due and payable under the guarantee without any demur merely on a demand by you stating that the amount claimed is due by way of loss or damage caused to or would be caused or suffered by you by reason of any breach by the said Contractor of any of the terms or conditions contained in the said Bidding

Document by reason of the Contractor's failure to perform according to the terms and conditions of said Bidding Document. Any such demand on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs _____/- (**Rupees _____ only**).

- 3) We _____ (Name of the Bank) further agree that GMDC shall be the sole judge of and as to whether the Contractor has committed any breach or breaches of terms and conditions of the said Bidding Document and the extent of loss, damages, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by GMDC on account hereof to the extent of the Bid Security required to be deposited by the Contractor in respect of the said document and the decision of GMDC that the Contractor has committed such breach or breaches and as to the amount or amounts of loss, damages, costs, charges, and expenses caused to or suffered by or that may be caused to or suffered by GMDC shall be final and binding on us.
- 4) We _____ (Name of the Bank) undertake to pay to the GMDC any money so demanded notwithstanding any dispute or disputes raised by the said contractor (s) in any suit or proceeding pending before any forum of law relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the said contractor (s) shall have no claim against us for making such payment.
- 5) We _____ (Name of the Bank) further agree that guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance on the said Bidding Document and that it shall continue to be enforceable till you certify that terms and conditions of the said Bidding Document have been fully and properly carried out by the said Contractor and accordingly discharge the guarantee. Unless a demand or claim under this guaranteed is made on us in writing on or before the (date) _____ we shall be discharged from all liability under this guarantee thereafter.
- 6) We _____ (Name of the Bank) further agree with you that you have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Bidding Document or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by you against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Bidding Document and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor or for any forbearance act or omission on your part or any indulgence by you to the said Contractor or any such matter or thing whatsoever under the law relating to sureties would but for this provision have effect of so relieving us. The Bank further agrees that in case this guarantee is required for a longer period, the bank may extend the same.
- 7) We _____ (Name of the Bank) further undertake to unconditionally pay the amount claimed by GMDC merely on demand and without demur to the extent aforesaid.
- 8) We, the said Bank lastly undertake not to revoke this guarantee during its currency except with the previous consent of GMDC in writing.
- 9) This Guarantee will not be discharged due to the change in the constitution of the Bank or the said contractor.
- 10) The Bank has under its constitution power to give this guarantee and _____ Mr. _____ who has signed it on behalf of the Bank have authority to do so.

Yours faithfully

For.....

(Name of the Bank)

Notwithstanding anything contained hereinabove

- (I) Our liability under this Bank Guarantee shall not exceed **Rs _____/- (Rupees _____ only)**
- (II) This Bank Guarantee is valid up to _____ (Date).
- (III) We are liable to pay the guarantee amount or any part thereof under this bank Guarantee only and only if you serve upon us a written claim or a demand on or before _____ (date).
- (IV) This bank guarantee is operative only when accompanied with SFMS advice from us.

Yours faithfully

For _____(Name of the Bank)

Finance Department, GR. No.: EMD/4/2022/0002/DMO

Date: 20/05/2022

(A) Guarantees issued by the following banks will be accepted as SD/EMD on permanent basis:

❖ **All Nationalized Banks**

(B) Guarantees issued by the following Banks will be accepted as SD/EMD for the period up to March 31, 2023. The validity cut-off date in the GR is with respect to the date of issue of Bank Guarantee irrespective of the date of termination of Bank Guarantee.

- A U Small Finance Bank
- Ahmedabad Mercantile Co-Operative Bank Limited
- Axis Bank
- City Union Bank
- DBS Bank India Limited
- DCB Bank
- Equitas Small Finance Bank
- Federal Bank
- HDFC Bank
- ICICI Bank
- IndusInd Bank
- Kalapur Commercial Co-Operative Bank Limited
- Kotak Mahindra Bank
- Nutan Nagrik Sahakari Bank Limited
- Rajkot Nagarik Sahakari Bank Limited
- RBL Bank
- Saraswat Co-operative Bank
- Saurashtra Gramin Bank
- Standard Chartered Bank
- Tamilnadu Mercantile Bank
- The Gujarat State Co-Operative Bank
- The Mehsana Urban Co-operative bank Limited
- The Surat District Co-operative Bank
- The Surat Peoples Co-Operative Bank
- Ujjivan Small Finance Bank

Annexure - C

VALID FOR THREE MONTHS ONLY

D	M	Y	Y	Y	Y	Y	Y	Y	Y

OR ORDER

₹

FOR GUJARAT MINERAL DEVE CORP LTD

ICICI Bank
Ahmedabad Branch
Jmc House, Opp. Parimal Garden, Ahmedabad - 380006
RTGS / NEFT / IFSC Code : ICIC000024

RIVILEGE
REWARDS

James J. J.

Pay Rupees

A/c No. 002405019379

CBS
BUSINESS BANKING - NEW CURRENT ACCOUNT
Payable at par at all branches of ICICI Bank Limited in India

AUTHORISED SIGNATORIES
Please sign above

SESHASNI (M) 175-2019

28/12/12 N S1

⑈1491099⑈ 380229002⑈ 019379⑈ 29

Annexure – D Lignite Analysis Report

**Processing of High Ash & High Sulphur Lignite Coal
from Matana Madh Mines, GMDC**

Sponsor: M/s GMDC Ltd

FINAL REPORT

Project No. SSP 1334



MINERAL PROCESSING DIVISION

**CSIR -NATIONAL METALLURGICAL LABORATORY COUNCIL OF
SCIENTIFIC AND INDUSTRIAL RESEARCH JAMSHEDPUR – 831007**

November 2022

ACKNOWLEDGMENTS

The project team members wish to express their sincere thanks and gratitude to Director, CSIR-NML, Jamshedpur for his keen interest in the project. They express their sincere thanks to Gujrat Mineral Development Co-operation Limited, Gujrat for entrusting this project to CSIR-NML, Jamshedpur. They are thankful to Mr. Janardan N Dave, GM (Power), Mr. D.K. Patel, Dy GM (Coal), P Shaktawat, Assistant Manager (Geology) and their team for the useful interaction and cooperation during executing the project. They are also thankful to the scientists and staff from MNP, RPBD divisions and Finance Section of CSIR-NML for providing the necessary support.

TEAM MEMBERS

Shobhana Dey (Project Leader)

Vinod Kumar (Co-Project Leader)

Abhishek Kumar

Kalicharan Hembrom

RK Rath

Ari Vidyadhar

RK Singh

Ganesh Chalavadi

Sunati Mohanty

Ruby Kumari

EXECUTIVE SUMMARY

Lignite samples from five different seams of Matana Madh were received at CSIR-NML, Jamshedpur for carrying out the characterization and dry processing for lowering the ash and sulphur content. Individual samples were characterized with respect to the proximate analysis, Ultimate analysis, Calorific value, Hardgrove Grindability Index and particle size distribution in five different as-received samples. The ash content of samples 1,4 and 5 was found to be less than 20% and the samples 2 and 3 are of more than 20% ash. As the Seam-2 sample contains 28.5% ash, detailed washability study was carried out. It was found from the study that yield is 75% at the ash level of 17%. The Shatter, Tumbler and Abrasion Indices were determined for all the five samples. The composite sample was prepared by mixing all the five lignite samples in equal proportions. The detailed characterization and physical properties of the composite sample was studied. Washability study of the Composite sample was studied. It was found that yield could be 95% at the ash level of 17%.

Dry processing of the composite sample was studied by using different techniques using dry high intensity magnetic separator (DHIMS), FGX- dry coal separator and Air Jig separator with different feed sizes. The ash content of -150+50mm fraction of the composite sample is 14.79% and it does not require any processing. It could be used directly. The -50mm fraction contains high ash (19.3%) and was subjected to dry processing using (DHIMS) and FGX-dry coal separators. The fraction -150+6mm also contains less than 17% ash. It could be used as a direct product. The -6mm fraction generated from composite lignite sample contains 22.30% ash. This fraction was processed by Air jig and dry Permroll separators to reduce the ash level to 17%. The dry processing of -13mm fraction using Air Jig separator was carried out as M/S GMDC Ltd was interested. Five different process schemes were developed from the detailed dry processing studies. It was found that Scheme-2 is more effective than other process schemes with respect to yield at 17% ash level.

Froth flotation studies were carried out for the fractions -0.5mm, -0.5+0.25mm, -25+0.15mm and 0.15mm. The response to froth flotation was very poor. The pyrite has intrinsic hydrophobicity It reports alongwith the coal particles in the froth predominantly by entrainment and by mechanical locking with floatable coal particles.

Settling and dewatering studies of fine fractions of composite lignite sample were also carried out as per the scope of work of GMDC. However, the results are not encouraging. The settling rate was very slow.

CONTENTS

S.N.	Details	Page No.
	Acknowledgements	ii
	Executive Summary	iii
	Contents	iv
	Preamble	1
	Samples	1
1.	Characterization of individual Lignite Samples	2
1.1	Proximate analysis	2
1.2	Ultimate analysis	2
1.3	Gross Calorific Value	3
1.4	Sizing of as-received ROM Lignite samples	3
2.	Physical Characterization of individual samples	6
2.1	Tumbler and Abrasion Indices	6
2.2	Shatter Index	7
2.3	Hardgrove Grindability Index	8
3.	Study of Composite Lignite Sample	8
3.1	Bulk Density	8
3.2	Proximate and Ultimate analysis	9
3.3	Gross Calorific Value	9
3.4	Hardgrove Grindability Index	9
4.	Physical Characterization of Composite Sample	9
4.1	Tumbler, Abrasion and Shatter Indices	9
4.2	Sizing of Composite Sample	10
5.	Washability Study of Composite Sample	11
6.	Dry Processing of Composite Lignite Sample	15
6.1	Dry Processing of Composite Lignite Sample at Coarser size (-50mm)	15
6.1.1	Dry High Intensity Magnetic Separation	16
6.1.2	FGX Dry Coal Separator	16
6.2	Dry Processing by Air Jig Separator	17

6.2.1	Dry processing of -6mm fraction	18
6.2.2	Dry processing of -13mm fraction	18
6.3	Dry processing of fine coal by Permroll magnetic separator	19
7.	Summary: Dry Processing of Composite Lignite Coal Matana Madh Mines	19
8.	Process Flowsheets for different Schemes	21
9.	Flotation of Fine Fractions of Composite Lignite Sample	26
10.	Settling Study of Fine Fractions of Composite Lignite Sample	27
11.	Dewatering Study of Fine Fractions of Composite Lignite Sample	28
12.	Washability Study of Seam-2 Lignite Sample	29
13.	Summary of the Study	32

Processing of High Ash and High Sulphur Lignite Coal from Matana Madh Mines, GMDC

Preamble

Lignite samples from the top five different seams of Matana Madh Mines of GMDC were sent to CSIR-NML for details characterization and processing for lowering ash and sulphur content in the product towards the development of the process technology. GMDC intends to set up a lignite processing plant based on the developed process technology. About 9.45 MT of lignite samples in eleven bags were received at CSIR-NML.

Samples

The lignite samples from five top seams of Matana Madh Mines received at CSIR-NML are shown in Fig.1. The lignite samples from seams 1 to 4 look very friable in nature and contain more fines than the sample of seam 5. Samples 1 and 3 appear to have more sulphur content. Homogenization of each sample was carried out by thorough mixing.



Fig. 1: Lignite samples from five top seams of Matana Madh Mines of GMDC received at CSIR-NML.

1. Characterization of Individual Lignite Samples

Proximate Analysis

The proximate analysis (moisture, ash, volatile matter) of the five lignite samples were carried out by taking -72 mesh (212 μ m) sized samples in a TGA-1000 automated proximate analyser (Navas Instruments, USA) as per BIS 1350.

Table 1: Proximate analysis of five lignite samples

Samples	Moisture, %	Ash, %	Volatile matter, %	Fixed Carbon, %
Seam 1	38.21	10.1	34.16	17.53
Seam 2	20.50	28.5	30.54	20.46
Seam 3	28.42	23.7	34.30	13.60
Seam 4	35.10	11.8	33.78	19.32
Seam 5	31.80	13.5	36.54	18.16

Ultimate Analysis

The elemental compositions like carbon (C), hydrogen (H), nitrogen (N) and sulphur (S) of the individual samples and composite sample were determined by Vario EL III CHNS analyser (Elementar GmbH, Germany).

Table 2: Ultimate analysis of five lignite samples

Samples	C, %	H,%	N, %	S,%
Seam 1	54.50	4.26	0.77	4.2
Seam 2	32.87	3.05	0.50	5.8
Seam 3	38.09	3.50	0.56	4.9
Seam 4	57.29	4.97	0.68	4.7
Seam 5	54.95	5.18	0.50	3.2

Gross Calorific Value

The Gross Calorific value (GCV) of five lignite samples were determined using a Bomb calorimeter following IS standard 1350-Part 2 (ADB).

Table 3: Gross Calorific values of five lignite samples

Samples	GCV (Kcal/Kg)
Seam 1	3263
Seam 2	3014
Seam 3	2773
Seam 4	3777
Seam 5	3939

Sizing of as-received ROM Lignite samples

About 200 kg representative ROM lignite sample from each seam were taken to carry out the size analysis. It has been found that all the five lignite samples received at CSIR-NML are of less than 200mm. Therefore, crushing of the samples to reduce the size below 200mm was not required. As the samples received at CSIR-NML was completely wet, surface moisture was determined for all the samples, and the results are given in Table 4.

Table 4: Surface moisture of as-received ROM samples

Samples	Surface moisture, %
Seam1	12.9
Seam 2	16.44
Seam 3	12.37
Seam 4	10.06
Seam 5	11.79

Dry screening was carried out using screen sizes of 150mm, 100mm, 75mm, 50mm, 25mm, 13mm and 6mm. Wet screening was carried out for 3mm, 1mm, 0.5mm, 0.25mm, 0.15mm and 0.05mm fractions. Size-wise ash and sulphur content were analyzed for all the fractions and given in Tables 5-9.

Table 5: Size and size-wise ash analysis of as-received sample of Seam 1

Size, mm	Wt%	Ash%	Cum. Wt %	Cum Ash%
-150+100	2.8	8.48	2.8	8.48
-100+75	5.4	9.05	8.2	8.86
-75+50	8.1	9.65	16.4	9.25
-50+25	17.1	12.00	33.5	10.66
-25+13	15.7	11.48	49.2	10.92
-13+6	17.4	16.50	66.6	12.38
-6+3	6.9	13.15	73.4	12.45
-3+1	17.9	13.06	91.3	12.57
-1+0.5	5.8	14.79	97.1	12.70
-0.5+0.25	1.5	16.33	98.6	12.75
-0.25+0.15	0.4	18.50	99.0	12.78
-0.15+0.05	0.3	14.50	99.3	12.78
-0.05	0.7	33.30	100.0	12.92
Feed (Calc)	100.0	12.92		

Table 6: Size and size-wise ash analysis of as-received sample of Seam 2

Size, mm	Wt, %	Ash, %	Cum Wt%	Cum Ash%
-150+100	0.5	12.95	0.5	12.95
-100+75	1.8	29.10	2.3	25.47
-75+50	5.0	28.91	7.3	27.81
-50+25	13.7	24.31	21.0	25.53
-25+13	14.9	30.07	35.9	27.41
-13+6	21.8	20.08	57.7	24.64
-6+3	9.4	19.30	67.1	23.89
-3+1	15.3	20.66	82.4	23.29
-1+0.5	4.5	21.61	86.9	23.20
-0.5+0.25	3.1	24.31	90.1	23.24
-0.25+0.15	1.7	28.03	91.7	23.33
-0.15+0.075	1.4	32.64	93.1	23.47
-0.075+0.05	0.6	37.00	93.6	23.55
-0.05	6.4	52.19	100.0	25.37
Feed(Calc.)	100.0	25.37		

Table 7: Size and size-wise ash analysis of as-received sample of Seam 3

Size, mm	Wt, %	Ash, %	Cum Wt, %	Cum Ash, %
-150+100	2.2	14.10	2.2	14.10
-100+75	2.4	13.00	4.6	13.53
-75+50	4.1	16.34	8.7	14.84
-50+25	12.4	17.99	21.1	16.69
-25+13	16.0	23.58	37.2	19.66
-13+6	26.0	24.65	63.1	21.71
-6+3	12.5	28.43	75.6	22.82
-3+1	16.4	30.40	92.0	24.17
-1+0.5	4.6	32.80	96.5	24.58
-0.5+0.25	2.2	34.83	98.7	24.80
-0.25+0.15	0.7	39.13	99.4	24.91
-0.15+0.05	0.2	33.10	99.6	24.93
-0.05	0.4	75.62	100.0	25.11
Feed (Calc.)	100.0	25.11		

Table 8: Size and size-wise ash analysis of as-received sample of Seam 4

Size, mm	Wt, %	Ash, %	Cum Wt, %	Cum Ash, %
-150+100	0.7	7.98	0.7	7.98
-100+75	7.5	8.86	8.2	8.78
-75+50	15.1	7.94	23.4	8.24
-50+25	18.5	9.99	41.9	9.01
-25+13	15.8	10.58	57.7	9.44
-13+6	16.3	15.23	74.0	10.72
-6+3	5.5	14.95	79.4	11.01
-3+1	11.7	16.91	91.1	11.77
-1+0.5	4.8	18.48	95.9	12.10
-0.5+0.25	2.6	18.20	98.5	12.26

-0.25+0.15	0.5	17.72	99.0	12.29
-0.15+0.05	0.4	18.22	99.4	12.31
-0.05	0.6	32.97	100.0	12.44
Feed(Calc.)	100.0	12.44		

Table 9: Size and size-wise ash analysis of as-received sample of Seam 5

Size, mm	Wt, %	Ash, %	Cum Wt, %	Cum ash%
-150+100	2.6	9.05	2.6	9.05
-100+75	24.1	14.50	26.7	13.96
-75+50	19.7	12.39	46.4	13.29
-50+25	18.5	12.97	65.0	13.20
-25+13	8.8	11.48	73.7	12.99
-13+6	10.2	15.85	84.0	13.34
-6+3	3.2	16.01	87.2	13.44
-3+1	6.2	18.51	93.3	13.77
-1+0.5	2.8	18.63	96.1	13.92
-0.5+0.25	1.8	21.06	97.9	14.05
-0.25+0.15	0.6	23.76	98.5	14.11
-0.15+0.05	0.6	28.07	99.1	14.19
-0.05	0.9	32.18	100.0	14.35
Feed(Calc.)	100.0	14.35		

2. Physical Characterization of Individual Samples

Representative samples were drawn from each of five lignite sample to determine the physical properties by finding the Tumbler Index (TI), Abrasion Index (AI) and Shatter Index (SI).

Tumbler and Abrasion Indices:

Tumbler index gives the sign of susceptibility of the raw material to break due to abrasion during transportation, handling and loading into the blast furnace. Tumbler Index was determined following the IS: 6495-1984. To carry out the test, 15 kg of as-received sample was taken. The test sample (m) was charged in a tumbler drum and the drum was rotated at 25 rpm for a total of 200 revolutions. The material was removed and sieved on 6.3mm and 0.5mm screens. The mass of +6.3 mm (m1) retained on the 6.3mm screen and passing through the 0.5mm screen (m2) were recorded. The results of all the samples are indicated in Table 10.

Tumbler (TI) and Abrasion (AI) indices were calculated from the following equations:

$$TI = (m_1/m) \times 100 \text{-----(1)}$$

$$\text{and, } AI = (m_2/m) \times 100 \text{-----(2)}$$

Table 10: Results of Tumbler and Abrasion Indices of five Lignite samples

Samples	Tumbler Index	Abrasion Index
Seam 1	79.15	7.17
Seam 2	63.48	10.51
Seam 3	72.63	8.14
Seam 4	76.20	12.29
Seam 5	64.84	15.52

Shatter Index

The drop shatter test covers the determination of the relative size stability and its complement, the friability of sized coal. It affords a means of indicating the ability of coal to withstand breakage when subjected to handling at the mine and during transit to the consumer.

Shatter Index (SI) was determined as per standard (IS: 9963-1981). The sample of -100+10mm was placed into a container with bottom closed and tightly fixed. The container was raised by a mechanical device on the stands so that the bottom of the container is at a height of 1.5m from the steel plate. Then, bottom of the container was opened to allow the sample to drop on the base plate. The Shatter indices obtained after 5 drops for five lignite samples are given in Table 11.

Table 11: Results of shatter indices of five Lignite samples

Samples	Drop 1	Drop 2	Drop 3	Drop 4	Drop 5
Seam 1	89.4	85.5	82.1	79.7	77.9
Seam 2	84.4	79.1	73.9	69.1	65.6
Seam 3	88.9	83.2	78.3	74.4	71.2
Seam 4	92.8	88.9	85.8	83.4	81.2
Seam 5	92.3	88.9	85.5	82.1	79.9

Hargrove Grindability Index

The Hargrove Grindability Index (HGI) is designed to determine the ease with which coal can be pulverized. The HGI value provides information for determining grinding power consumption and pulverizer capacities. Grindability is an index, therefore it has no unit. The higher the HGI, the easier is coal texture and more grindable is the coal. HGI of coal depends on the coal composition. HGI of five Lignite samples determined as per standard procedure are given in Table 12.

Table 12: Results of HGI of five Lignite samples

Samples	Seam 1	Seam 2	Seam 3	Seam 4	Seam 5
HGI	98	89	87	90	89

Discussion with GMDC

After completing the characterization of individual seam samples, CSIR-NML called a virtual meeting with GMDC team on 28th July 2022 to brief about the characteristics of the individual samples. During the discussion, GMDC team suggested for preparing a composite sample by blending the seams of all the five sample in equal ratio.

3. Study of Composite Lignite Sample

About 8.5 tonnes of composite sample (Fig. 2) was prepared at CSIR-NML based on the suggestion made by GMDC team. Representative sample was drawn from the heap of the composite sample for characterization and processing studies. Detailed material characterization with respect to size and size-wise ash and sulphur analysis of the fractions, Proximate analysis, Ultimate analysis, GCV, HGI were carried out. The physical properties like Tumbler Index, Abrasion Index, Shatter Index, Bulk density, Crushing Index were ascertained for composite lignite sample. The Crushing strength of the composite sample is found to be 8 MPa.

Bulk Density: Bulk density of the composite sample prepared by blending the as-received samples of five top seams (about 100mm size) was measured and found to be 773 Kg/m³.



Fig. 2: Composite sample: blending of five different seam samples in equal proportion.

Proximate and Ultimate analysis

Proximate and Ultimate analysis of the Composite sample were determined and results are given in Tables 13 and 14. The sulphur in the lignite sample was studied by following IS1350 (Part-3) method.

Table 13: Proximate analysis of composite sample

Moisture, %	Ash, %	Volatile matter, %	Fixed Carbon, %
30.42	17.51	30.72	21.35

Table 14: Ultimate analysis of composite sample

C, %	H, %	N, %	S, %
46.23	4.06	0.58	4.93

The ash of composite sample was analysed to ascertain the silica content. The silica content in the ash was found to be 23.15%.

Gross Calorific Value

The Gross Calorific Value (GCV) of the composite sample was determined using Bomb calorimeter and is found to be 3387 Kcal/Kg.

3.4. Hargrove Grindability Index

Hargrove Grindability Index (HGI) of the composite sample is 98.8.

4. Physical Properties of Composite Sample

Tumbler, Abrasion and Shatter Indices

About 250 kg of representative composite sample was drawn from heap of composite sample to

prepare the feed sample for determination of the physical properties like Tumbler Index (TI), Abrasion Index (AI) and Shatter Index (SI).

Table 15: Tumbler Index & Abrasion Index

Tumbler Index	Abrasion Index
69.9	12.83

Table 16: Result of Shatter Index of Composite sample

Drop 1	Drop 2	Drop 3	Drop 4	Drop 5
91.1	85.5	81.1	77.7	75.2

4.2. Sizing of Composite Sample

A representative Composite sample of about 500 kg was taken to carry out the size analysis. It has been found that all the five lignite samples received at CSIR-NML are less than 200mm. Therefore, crushing of the samples to reduce the size below 200mm do not require. As the samples received at CSIR-NML were found wet, surface moisture was determined for all the samples and given in Table 4. Dry screening was carried out using screen sizes of 150mm, 100mm, 75mm, 50mm, 25mm, 13mm and 6mm. Wet screening was carried out for 3mm, 1mm, 0.5mm, 0.25mm, 0.15mm and 0.05mm fractions. Size-wise ash and sulphur content were analyzed for all the fractions and given in Tables 5-9.

Table 17: Size and size-wise ash analysis of as-received Composite Sample

Size, mm	Wt,%	Ash,%	S,%	Cum Wt,%	Cum ash,%	Cum. S,%
-150+100	0.4	10.31	3.32	0.4	10.31	3.30
-100+75	5.3	11.38	3.46	5.7	11.38	3.46
-75+50	9.7	16.80	4.28	15.5	14.79	3.98
-50+25	12.6	16.20	4.83	28.1	15.42	4.36
-25+13	13.1	17.15	5.02	41.2	15.97	4.57
-13+6	21.0	17.00	5.10	62.1	16.32	4.75
-6+3	6.9	19.16	4.93	69.1	16.60	4.77
-3+1	19.3	21.62	5.11	88.4	17.70	4.84
-1+0.5	5.4	23.33	5.18	93.8	18.02	4.86

-0.5+0.25	3.6	24.55	5.74	97.3	18.26	4.89
-0.25+0.15	1.4	27.86	5.83	98.7	18.40	4.91
-0.15+0.05	0.6	29.30	6.87	99.3	18.46	4.92
-0.05	0.7	36.09	6.89	100.0	18.58	4.93
Feed(Calc.)	100.0	18.58	4.93			

It has been found from the size analysis of composite sample (Table 17) that the -100+50mm fraction is 15.5% by weight with 14.79% ash. The fraction of -100+6mm is 62.2% by weight with 16.32% ash. The ash content increases in the finer fractions. The weight of -6mm fraction is 37.8% with 22.30% ash. The -0.5mm fraction in the composite sample is only 6.2% with ash of 27%.

5. Washability Study of Composite Sample

Washability study was carried out to ascertain the maximum amount of product that could be recovered at the targeted ash level from any gravity processing technique. This study is carried out under very controlled conditions. Therefore, the yield determined from the washability study at the specified ash level is called the theoretical yield.

The study was carried out with the size fractions of -100+50mm, -50+25mm, -25+13mm, -13+6mm, -6+1mm and -1+0.5mm (Table 18) of Composite Lignite Sample. As the presence of -0.5mm fraction reduces the efficiency of separation process, it is separated out from the feed material while subjected to any gravity separator. Therefore, washability study is restricted to +0.5mm fraction. It has been also observed that the weight% of the fractions of -0.5+0.25 mm and -0.25+0.15mm is very less in quantity in composite sample.

Table 18: Size fractions used for washability study

Size, mm	Wt%	Ash%	S,%
-100+50	16.5	14.79	3.98
-50+25	13.5	16.20	4.83
-25+13	13.9	17.15	5.02
-13+6	22.4	17.00	5.10
-6+1	27.9	20.97	5.06
-1+0.5	5.8	23.33	5.18
Feed (Calc)	100.0	18.02	4.86

The washability study was carried out by preparing the solution (medium) having a density of 1.3 gm/cm³ to 2.0 gm/cm³ at interval of 0.1. The results of washability study of the fractions of -100+50mm, -50+25mm, -25+13mm, -13+6mm, -6+1mm and -1+0.5mm are given in Tables 19-24. The composite result of washability study carried out for the prepared composite lignite sample and the graph plotted are indicated in Table 25 and Fig. 3 respectively.

Table 19: Results of Washability study of -100+50mm fraction

Products	Wt%	Ash%	WRO	S,%
1.3F	73.1	10.06	12.1	3.07
1.4F	11.2	23.73	1.8	3.39
1.5F	1.6	26.55	0.3	4.77
1.6F	0.9	32.53	0.1	5.16
1.7F	3.6	43.39	0.6	5.72
1.8F	3.0	46.62	0.5	6.04
2.0F	0.6	49.14	0.1	6.37
2.0S	6.0	54.81	1.0	15.43
Feed (Calc)	100.0	16.25	16.5	4.10

Table 20: Results of Washability study of -50+25mm fraction

Products	Wt%	Ash%	WRO	S,%
1.3F	46.3	10.30	6.3	3.90
1.4F	29.4	11.30	4.0	4.29
1.5F	10.9	28.25	1.5	5.84
1.6F	4.3	30.85	0.6	6.83
1.7F	3.1	36.03	0.4	7.70
1.8F	0.3	40.03	0.04	9.31
2.0F	1.0	48.29	0.1	9.77
2.0S	4.8	59.24	0.6	10.85
Feed (Calc)	100.0	17.02	13.5	4.87

Table 21: Results of Washability study of -25+13mm fraction

Products	Wt%	Ash%	WRO	S,%
1.3F	72.7	10.30	10.1	3.79

1.4F	6.9	16.55	1.0	4.93
1.5F	3.5	21.66	0.5	6.09
1.6F	2.1	24.15	0.3	6.38
1.7F	3.9	32.00	0.5	7.44
1.8F	1.2	40.62	0.2	8.62
2.0F	2.4	50.55	0.3	9.10
2.0S	7.2	52.04	1.0	14.08
Feed (Calc)	100.0	16.63	13.9	5.08

Table 22: Results of Washability study of -13+6mm fraction

Products	Wt%	Ash%	WRO	S,%
1.3F	50.8	8.60	11.4	3.72
1.4F	11.5	13.00	2.6	4.73
1.5F	12.6	18.32	2.8	5.04
1.6F	6.4	24.58	1.4	5.63
1.7F	5.5	36.34	1.3	6.02
1.8F	8.2	49.30	1.8	7.16
2.0F	0.3	49.50	0.1	8.09
2.0S	4.6	61.00	1.0	17.67
Feed (Calc)	100.0	18.77	22.4	5.19

Table 23: Results of Washability study of -6+1mm fraction

Products	Wt%	Ash%	WRO	S,%
1.3F	46.7	8.6	13.04	3.26
1.4F	9.3	13.08	2.58	3.87
1.5F	9.3	20.42	2.58	4.68
1.6F	9.1	25.27	2.53	5.09
1.7F	3.8	30.95	1.06	6.13
1.8F	3.8	41.06	1.06	7.06
2.0F	9.3	45.26	2.58	8.09
2.0S	8.8	56.27	2.47	16.18
Feed (Calc)	100.0	21.31	27.90	5.46

Table 24: Results of Washability study of -1+0.5mm fraction

Products	Wt%	Ash%	WRO	S,%
1.3F	15.1	8.97	0.88	3.45
1.4F	27.6	11.22	1.60	4.02
1.5F	12.5	17.80	0.72	5.26
1.6F	16.9	25.82	0.98	5.18
1.7F	12.6	34.96	0.72	5.73
1.8F	9.0	46.39	0.52	6.31
2.0F	3.3	53.37	0.19	7.50
2.0S	3.0	63.15	0.18	20.02
Feed (Calc)	100.0	23.29	5.80	5.31

Table 25: Results of Washability study of Composite lignite sample

Products	Wt%	Ash%	S,%	Cum Wt%	Cum Ash%	Cum. S,%
1.3F	53.7	9.45	3.49	53.7	9.45	3.49
1.4F	13.6	14.03	4.18	67.3	10.37	3.63
1.5F	8.4	21.13	5.14	75.7	11.56	3.80
1.6F	6.0	25.86	5.47	81.7	12.61	3.92
1.7F	4.6	35.25	6.28	86.3	13.81	4.05
1.8F	4.1	46.05	6.97	90.4	15.28	4.18
2.0F	3.4	46.55	8.17	93.8	16.42	4.32
2.0S	6.2	56.63	15.53	100.0	18.96	5.03
Feed(Calc)	100.0	18.96	5.03			

It has been found from the washability curve (Fig. 3) that at 15% ash level, yield of the product is 88%. The yield increases to 95% at 17% ash level.

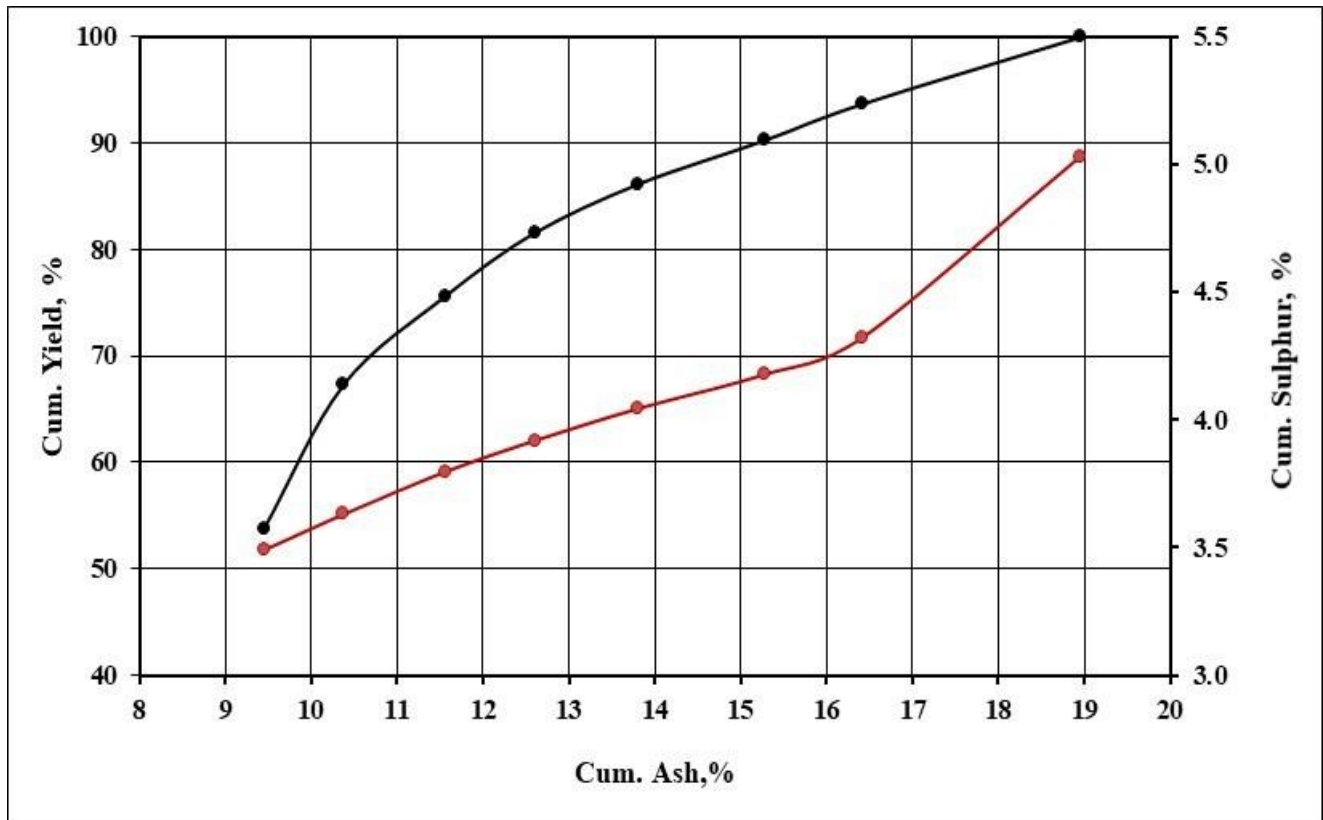


Fig. 3: Washability curve of Composite Lignite sample.

6. Dry Processing of Composite Lignite Sample

The present section covers the dry processing of Composite lignite sample. From the size analysis of the Composite sample prepared from the ROM as-received samples of five different Seams (Table 17), it was found that -150+50mm fraction contains less than 15% ash. This fraction can be treated as a direct product. However, the fraction below 50mm is 84.5% by weight containing ash of 19.64% and needs dry processing to reduce the ash level to below 17%. The dry processing of -50mm was carried out using (i) dry Permroll magnetic separator, (2) FGX-1 dry coal separator and (3) Air Jig separator. The results obtained from different separators are presented in Tables 26-30.

Results of size analysis of composite sample (Referring Table 17)

Size, mm	Wt, %	Ash, %	Cum Wt, %	Cum Ash, %
-150+100	0.4	10.31	0.4	10.31
-100+75	5.3	11.38	5.7	11.38
-75+50	9.8	16.80	15.5	14.79
-50+25	12.6	16.20	28.1	15.42

-25+13	13.1	17.15	41.2	15.97
-13+6	21.0	17.00	62.1	16.32
-6+3	6.9	19.16	69.1	16.60
-3+1	19.3	21.62	88.4	17.70
-1+0.5	5.4	23.33	93.8	18.02
-0.5+0.25	3.6	24.55	97.3	18.26
-0.25+0.15	1.4	27.86	98.7	18.40
-0.15+0.05	0.6	29.30	99.3	18.46
-0.05	0.7	36.09	100.0	18.58
Feed(Calc.)	100.0	18.58		

Dry processing of Lignite Composite Sample at Coarser size (-50mm)

Dry processing of Composite Lignite sample at coarser size (-50mm) was carried out adopting different techniques.

Dry High Intensity Magnetic Separation

The -50mm fraction was subjected to dry high intensity magnetic separator (DHIMS) to remove the ash bearing pyritic minerals in the magnetic fraction. The non-magnetic fraction (clean coal) contains more carbon and less ash bearing minerals as indicated by ash content. The tests were carried out under the following conditions (Table 26) keeping the magnetic field constant at 1 Tesla to obtain the best results.

Table 26: Results of Dry processing of -50mm fraction using DHIMS

Test No.	Roll speed= 80rpm, Belt speed= 70 Hz; Feeder vibration= 90 Hz				
	Products	Wt%	WRO	Ash%	S,%
1	Non-Mag(Clean coal)	88.0	74.4	18.62	4.93
	Magnetics (Reject)	12.0	10.1	23.97	6.90
	Feed (Calc)	100.0	84.5	19.26	5.17
2	Roll speed= 70rpm, Belt speed= 60 Hz; Feeder vibration= 80 Hz				
	Products	Wt%	WRO	Ash%	S,%

	Non-Mag(Clean coal)	72.6	61.3	16.88	4.08
	Magnetics (Reject)	27.4	23.2	25.42	7.65
	Feed (Calc)	100.0	84.5	19.22	5.06
3.	Roll speed= 60rpm, Belt speed= 60 Hz; Feeder vibration= 90 Hz				
	Products	Wt%	WRO	Ash%	S,%
	Non-Mag(Clean coal)	76.0	64.2	17.58	4.53
	Magnetics (Reject)	24.0	20.3	23.77	6.86
	Feed (Calc)	100.0	84.5	19.07	5.10

WRO= with respect to original feed; Cum= Cumulative

From the above studies, it was found that increase of the roll speed of the magnets increases the recovery of non-magnetic fraction. However, the recovery decreases at roll speed of 60 rpm. The reduction of ash below 17% (achieved 16.88%) was possible to obtain the product with a yield of 61.3%.

FGX Dry Coal Separator

The FGX-1 dry separator works on the principle of air fluidization technique. The dry separation was carried out under different conditions and the results are given in Table 27. The lighter product is the clean coal having less sulphur and ash. The rejects contain more ash and high sulphur. From the Table 27 it has been observed that ash level could be reduced to 12.50% in the product (test no. 1). However, the recovery is low. In the third condition, yield could be improved to 49.1% (with respect to feed) at the ash level of 16.28%. In this condition, reject ash (33.97%) is found to be more than the other conditions.

Table 27: Results of dry processing of -50mm fraction using FGX separator

Test No.	0.85 m³/sec, V2=0.85 m³/sec, V3=0.85 m³/sec, FV=40 Hz						
1.	Products	Wt%	Ash%	WRO	Cum Wt%, WRO	Cum ash,%	S,%
	Clean coal	44.7	12.50	37.8	37.8	12.50	3.69
	Middling	41.3	24.78	34.9	72.7	18.40	5.55
	Reject	14.0	27.65	11.8	84.5	19.69	8.11
	Feed (Calc)	100.0	19.69	84.5			5.08
	0.85 m³/sec, V2=0.85 m³/sec V3=0.85 m³/sec, FV=40 Hz						
	Products	Wt%	Ash%	WRO	Cum Wt%, WRO	Cum ash,%	S,%

2.	Clean coal	49.6	16.73	41.9	41.9	16.73	4.07
	Middling	39.3	19.60	33.2	75.1	18.00	5.34
	Reject	11.1	31.84	9.4	84.5	19.53	9.11
	Feed (Calc)	100.0	19.53	84.5			5.13
3.	Condition: TA=8°, LA=-2°, V1=0.85 m³/sec, V2=0.85 m³/sec, V3=0.85 m³/sec , FV= 45Hz						
	Products	Wt%	Ash%	WRO	Cum Wt%, WRO	Cum ash,%	S,%
	Clean coal	58.1	16.28	49.1	49.1	16.28	3.87
	Middling	32.2	19.59	27.2	76.3	17.46	5.60
	Reject	9.7	33.97	8.2	100.0	19.07	10.28
	Feed (Calc)	100.0	19.07	84.5			5.09

LA= Longitudinal angle, TA= Transverse angle, FV= Feeder vibration, V1, V2 and V3 are air flow rate of three air chambers

Dry Processing by Air Jig Separator

The Air Jig separation is carried out in a closed size range because its performance reduces when a feed sample having a wide size range is used. Under the combined effect of the mechanical vibration of the separating deck and the upward pulsating air flow, feed become gradually stratified and separation occurs. To get the effective separation, fraction -50+0mm was split into two size fractions, namely, the -50+6mm (coarser fraction) and -6+0mm (fine). The weight % of -50+6mm is 46.7% with ash content of 16.83% and does not require any ash reduction. However, the -6mm fraction is 37.9% by weight with 22.30% ash and subjected to Air Jig separator for ash reduction (Table 28).

Dry Processing of -6mm fraction

The fine fraction (-6mm) was subjected to Air Jig separator for reduction of ash level from 22.30% to 17% ash. Table 28 indicates that yield of 10.2% with 16.55% ash could be recovered from the dry processing using Air Jig. As the separation principle of Air Jig depends on the density of the particles present in the sample, the response was not encouraging as compared to the other techniques.

Feed size: -6mm, Fraction wt = 37.9%, Ash= 22.30% , S= 5.23%

Table 28: Results of Air Jig of -6mm fraction

Products	Wt%	WRO	Ash, %	Cum wt%, WRO	Cum ash,%	S,%

Condition: Air Flow= 3.9 Km ³ /m ² .h; Air Pressure= 2233 Pa						
Clean coal	26.80	10.2	16.55	10.2	16.55	4.30
Middling	40.50	15.3	23.4	25.5	20.67	5.06
Reject	32.7	12.4	27.09	37.9	22.77	6.23
Feed (Calc)	100.0	37.9	22.77			5.27
Condition: Air Flow= 4.1 Km ³ /m ² .h; Air Pressure= 2233 Pa						
Products	Wt%	WRO	Ash, %	Cum wt%,WRO	Cum ash,%	S,%
Clean coal	30.3	11.5	18.15	11.5	18.15	4.55
Middling	33.4	12.7	22.22	24.1	20.28	5.12
Reject	36.3	13.7	28.09	37.9	23.12	6.07
Feed (Calc)	100.0	37.9	23.12			5.29

Dry Processing of -13mm fraction

As per the scope of work mentioned in the work order of GMDC, dry processing of -13mm was carried out using Air jig separator. The -150+13mm fraction containing 15.97% ash was removed. This fraction does not require any ash reduction, and can be used as a product. The - 13+0mm fraction was subjected to Air Jig. The results are given in Table 29.

Feed size: -13mm, Fraction wt= 38.4%, Ash= 20.41%, S= 5.18%

Condition: Air Flow= 3.9 Km³/m².h; Air Pressure= 2233 Pa

Table 29: Results of Air Jig of -13mm fraction

Products	Wt%	WRO	Ash, %	Cum wt%,WRO	Cum ash,%	S,%
Clean coal	34.7	20.4	16.74	20.4	16.74	4.61
Middling	36.2	21.3	18.30	41.7	17.54	5.12
Reject	29.1	17.1	27.47	58.8	20.43	6.19
Feed (Calc)	100.0	58.8	20.43			5.26

Dry Processing of fine coal by Permroll magnetic separator

The fraction -150+6mm generated from dry size analysis of composite sample contains 16.32% ash and could be used as a direct product because ash content is less than 17%. The -6mm fraction contains 22.30% ash. The attempt was made to reduce the ash level to 17% of -6mm fraction by dry processing using Permroll magnetic separator (Table 30). The test was carried out under the following

condition. In the non-magnetic fraction (Clean coal), ash level could be reduced to 16.75%. The product yield of 13.8% (with respect to original feed) could be recovered from the -6mm fraction.

Condition: Roll speed of magnet= 30 rpm, Feeder vibration= 8 Hz

Table 30: Results of Magnetic Separation of -6mm fraction

Products	Wt%	WRO	Ash%	Cum wt%,WRO	Cum ash,%	S,%
Non-magnetics	36.4	13.8	16.75	13.8	16.75	3.65
Middling	62.2	23.6	25.74	37.4	22.42	5.96
Magnetics	1.4	0.5	34.71	37.9	22.60	7.32
Feed (Calc)	100.0	37.9	22.60			5.14

7 Summary: Dry Processing of Composite Lignite Coal Sample of Matana Madh Mines

Dry processing of Composite lignite sample of five different seams of Matana Madh Mines was studied by different techniques. The five different process schemes derived from the experimental results are presented in Table 31. Schemes I & II indicate the processing of -50mm fraction by dry magnetic separation and FGX-1 separator respectively. The recovery is found to be more in Scheme II (84.8% yield with ash content of 17.01%) than Scheme I. In Schemes III and IV, dry processing was carried out for -6mm fraction by magnetic separation and Air Jig separator respectively. The response of magnetic separation is found to be better than Air Jig separation. The dry processing of coarse coal by FGX is found to be better than dry magnetic separation as the ash rejection is high.

Table 31: Summarized results of Dry Processing of Composite sample of Lignite

Schemes	Process	Products	Wt, %	Ash, %	S,%
I	Dry Sieving of ROM Composite Sample	-150+50mm fraction	15.5	14.79	3.98
	Magnetic Separation of -50mm fraction Wt of -50mm: 84.5% Ash: 19.3%	Concentrate	61.3	16.88	4.08
		Reject	23.2	25.48	7.65
		Total Concentrate	76.8	16.46	4.87
II	Dry Sieving of ROM Composite Sample	-150+50mm fraction	15.5	14.79	39.8
	FGX-Separator	Concentrate	69.3	17.01	3.75

	Wt of -50mm: 84.5% Ash: 19.3%	Reject	15.2	32.17	10.96
		Total Concentrate	84.8	16.60	3.79
III	Dry Sieving of ROM Composite Sample	-150+6mm fraction	62.1	16.32	4.74
	Magnetic Separation of -6mm fraction Wt of -6mm: 37.9% Ash: 22.30%	Concentrate	13.8	16.70	3.65
		Reject	24.1	25.96	5.99
		Total Concentrate	75.9	16.40	4.54
IV	Dry Sieving of ROM Composite Sample	-150+6mm fraction	62.1	16.32	4.74
	Air Jig Separator Wt of -6mm: 37.9% Ash: 22.30%	Concentrate	10.2	16.55	4.3
		Reject	27.7	25.05	5.58
		Total Concentrate	72.3	16.35	4.68
V	Dry Sieving of ROM Composite Sample	-150+13mm fraction	41.2	15.97	4.56
	Air Jig Separator Wt of -13mm: 58.8% Ash: 20.41%	Concentrate	20.4	16.74	4.61
		Reject	38.4	22.39	5.60
		Total Concentrate	61.6	16.06	4.58

8. Process Flowsheets for different Schemes

Process Flowsheet of Scheme I

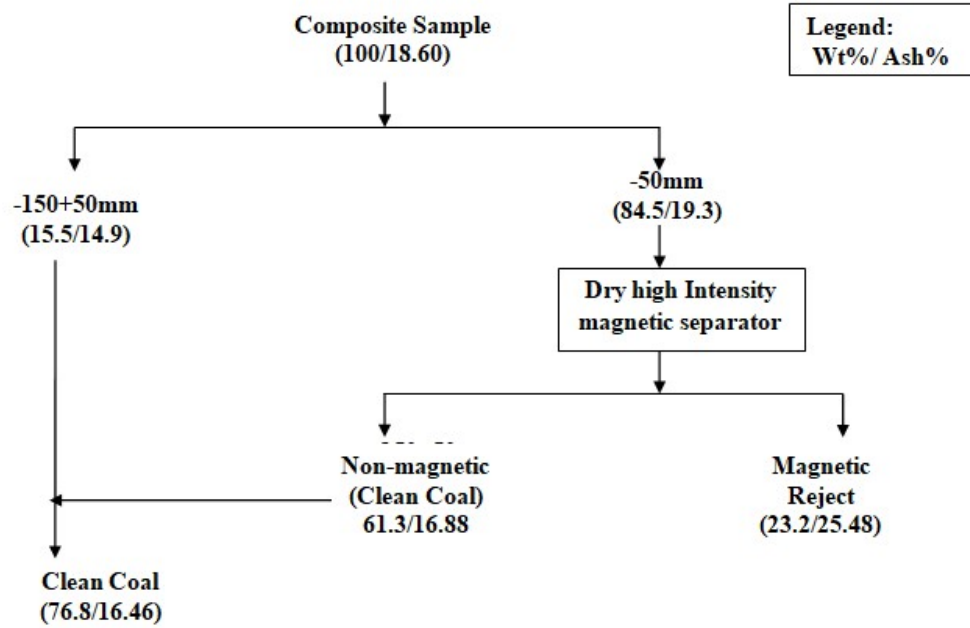


Fig. 4: Process flowsheet of Composite lignite sample involving dry high intensity magnetic separation for processing of -50mm fraction.

Process Flowsheet of Scheme-II

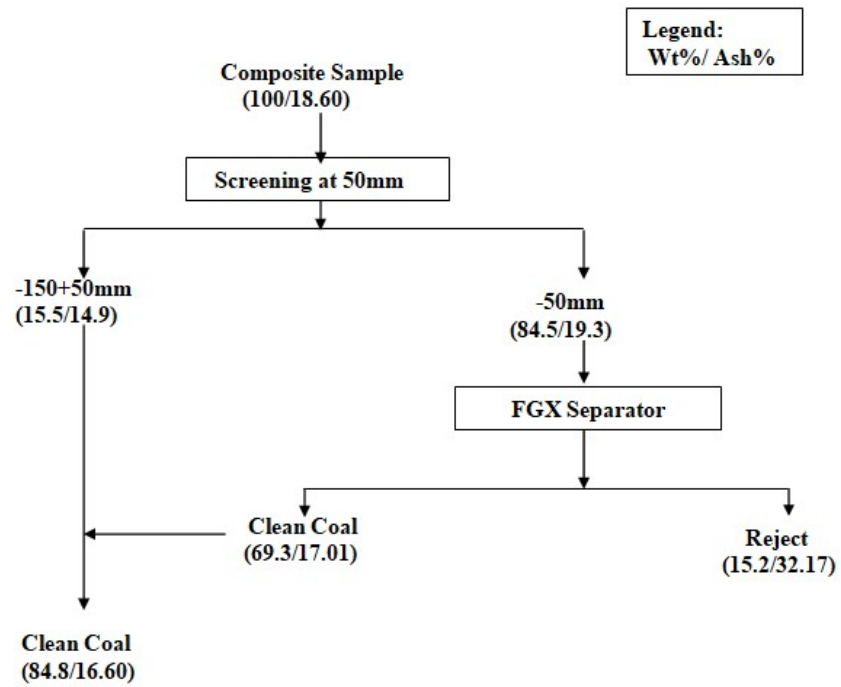


Fig. 5: Process flowsheet of Composite lignite sample using FGX-1 separator to process the -50mm size fraction.

Process Flowsheet of Scheme III

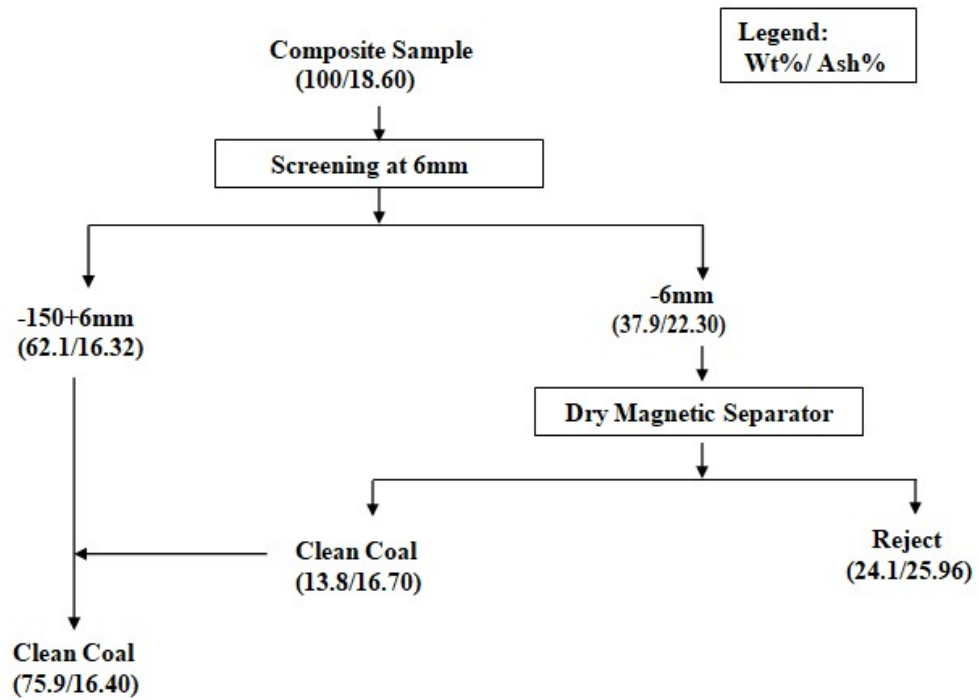


Fig. 6: Process flowsheet of Composite lignite sample using dry high intensity PermRoll magnetic separator for processing of -6mm fraction.

Process Flowsheet of Scheme IV

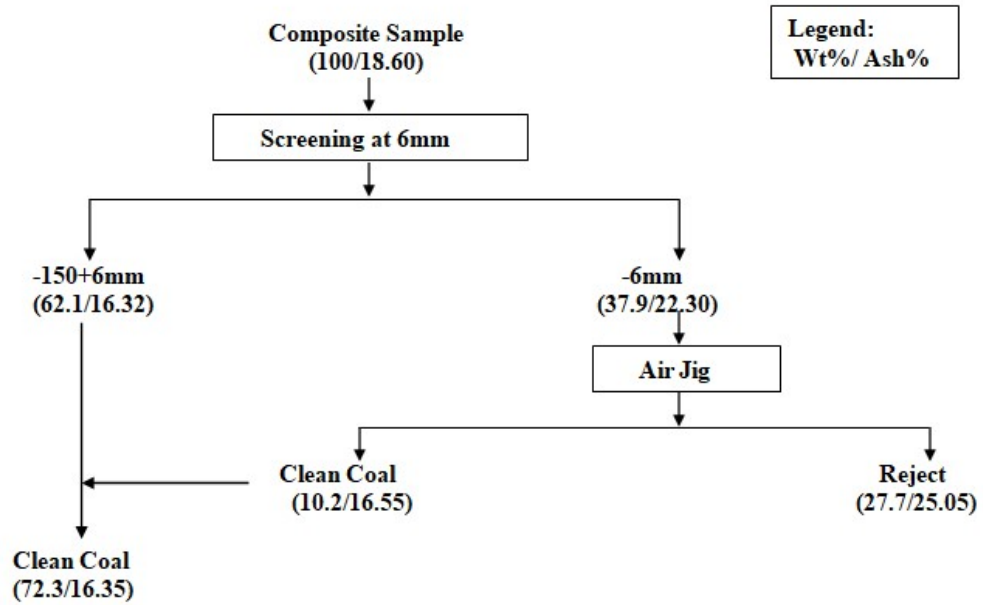


Fig. 7: Process flowsheet of Composite lignite sample emerging Air Jig separator for processing of -6mm fraction.

Process Flowsheet of Scheme V

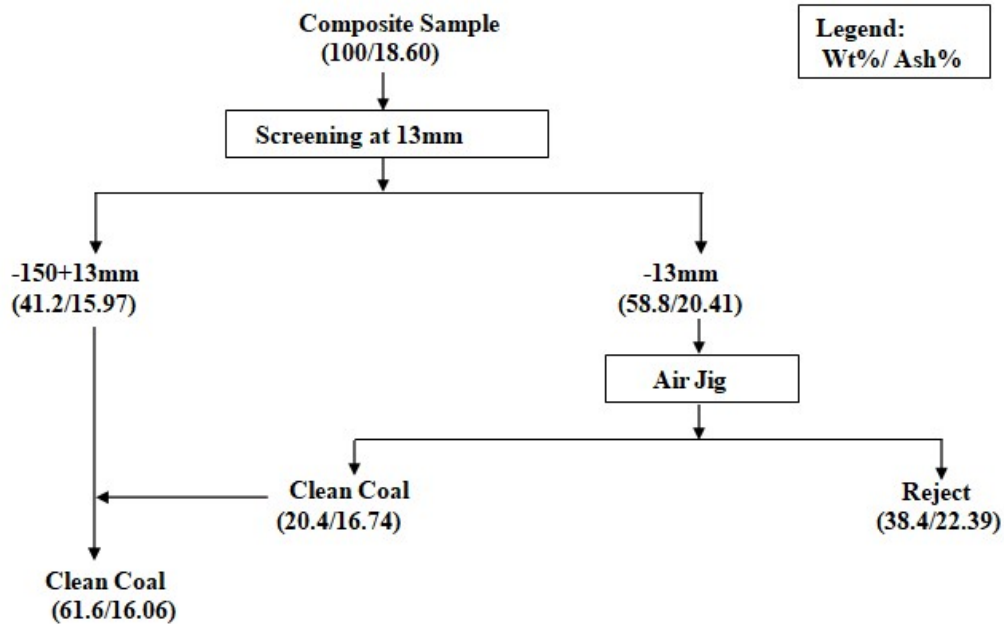


Fig. 8: Process flowsheet of Composite lignite sample emerging Air Jig separator for processing of -13mm fraction.

9. Flotation of Fine Fractions of Composite Lignite Sample

The froth flotation study of fine fractions of -0.5+0.25mm, -0.25+0.15mm and -0.15mm of composite sample were carried out with diesel and Montanol as collectors. Due to inherent hydrophobicity of pyrite in the sample, flotation responses were not good. Pyrite tends to report to the float. In case of Montanol (dosage= 17 mg/ kg), the tailings (P2) generated contain less ash than the floats (P1). The results are given in the Table 32.

Table 32: Flotation results of fine fraction of Composite lignite sample

Feed size, mm	Condition	Products	Wt, %	Ash,%
-0.5+0.25	Diesel oil 1 kpt	P1	0.6	26.81
		P2	99.4	23.94
		Head (Calc)	100.0	23.95
	Montanol 0.5 kpt	P1	30.1	31.27
		P2	69.9	20.58
		Head (Calc)	100.0	23.80
-0.25+0.15	Diesel oil 1 kpt	P1	2.7	28.12
		P2	97.3	24.87
		Head (Calc)	100.0	24.96
	Montanol 0.5 kpt	P1	75.0	25.25
		P2	25.0	22.58
		Head (Calc)	100.0	23.95
-0.15	Diesel oil 1 kpt	P1	9.7	18.28
		P2	90.3	30.13
		Head (Calc)	100.0	28.98
	Montanol 0.5 kpt	P1	24.8	36.25
		P2	75.2	25.76
		Head (Calc)	100.0	28.36

10. Settling Study of Fine Fractions of Composite Lignite Sample

Setting studies at 10% pulp density were carried out with the fine sizes of -0.5mm, -0.25mm and -0.15mm. The studies were carried out with and without adding flocculant for all the three sizes. The results obtained are given in Tables 33 to 35. Settling rates were found to be very slow.

Table 33: Results of Settling studies of -0.5mm fines

Parameters	Without Flocculant	With magnafloc, (Flocculant), 30gpt
Pulp density	10%	10%

Liquid solid ratio in feed (F)	9	9
Rate of settling in cm/min	0.057	0.038
Rate of settling in ft/hr (R)	0.112	0.074
Liquid solid ratio at ultimate pulp density (D) after 19 hrs	1.590	1.970
Settling area per tonne	7.435	6.026
Settling area required at 125% of above in sq. ft/tonne	9.294	7.532
Settling area required in sq. m/tonne	0.864	0.700

Table 34: Results of Settling studies of -0.25mm fines

Parameters	Without Flocculant	With magnafloc (Flocculant), 30gpt
Pulp density	10%	10%
Liquid solid ratio in feed (F)	9	9
Rate of settling in cm/min	0.044	0.060
Rate of settling in ft/hr (R)	0.09	0.12
Liquid solid ratio at ultimate pulp density (D) after 19 hrs	2.36	48.86
Settling area per tonne	5.023	4.174
Settling area required at 125% of above in sq. ft/tonne	6.279	5.218
Settling area required in sq. m/tonne	0.584	0.485

Table 35: Results of Settling studies of -0.15mm fines

Parameters	Without Flocculant	With magnafloc (Flocculant), 30gpt
Pulp density	10%	10%
Liquid solid ratio in feed (F)	9	9
Rate of settling in cm/min	0.037	0.048
Rate of settling in ft/hr (R)	0.072	0.095

Liquid solid ratio at ultimate pulp density (D) after 19 hrs	2.550	2.880
Settling area per tonne	4.656	4.112
Settling area required at 125% of above in sq. ft/tonne	5.821	5.140
Settling area required in sq. m/tonne	0.541	0.478

11. Dewatering Study of Fine Fractions of Composte Lignite Sample

Dewatering studies for the fines of -0.25mm and -0.15mm were carried out with 10% solid and 15% solid pulp densities. The results are given in Table 36. The moisture content in the cake was found to be high.

Table 36: Dewatering Study of Fine Fractions of Composte Lignite Sample

Trial	Parameter	Moisture, %	Cake thickness, mm	Filtrate volume, ml
1	Particle Size = -25mm	34.46	3	450
	Pulp density: 10 % solid			
	Filtration time=5min.			
2	Particle Size = -25mm	30.72	4	380
	Pulp density: 15% solid			
	Filtration time =5min.			
3	Particle Size = -0.15mm	36.66	8.5	400
	Pulp density: 10% solid			
	Filtration time=5min.			
4	Particle Size = -0.15mm	35.88	8	310
	Pulp density: 15% solid			
	Filtration time=5min.			

12. Washability Study of Seam-2 Lignite Sample

Washability study of Seam-2 Lignite sample of Matana Madh mines was carried out using size fractions of -100+50mm, -50+25mm, -25+13mm, -13+6mm, -6+3mm and -3+0.5mm (Table 32). The medium having variant specific gravity of 1.3 to 2.0 gm/cm³ used for the study was prepared by

mixing benzene and bromoform. Ash content of all the washability products were analysed at CSIR-NML and sulphur analyses of the products were done at GMDC which are reported in Tables 38-44. Based on that S-analysis and ash analysis, washability curves of Seam-2 lignite sample with respect to yield vs ash and ash vs Sulphur are shown in Fig. 9.

Table 37: Size fractions used for washability study of Seam-2 (Ref: Table 6)

Size, mm	Wt%	Ash%
-100+50	7.3	27.81
-50+25	13.7	24.31
-25+13	14.9	30.07
-13+6	21.8	20.08
-6+3	9.4	19.3
-3+0.5	19.8	20.9
-0.5	13.1	39.77
Feed (Calc)	100.0	25.37

Table 38: Washability study of -100+50mm fractions

Products	Wt%	WRO	Ash%	S%
1.3F	0.2	0.02	8.19	3.1
1.4F	60.1	5.05	15.82	4.2
1.5F	9.6	0.81	17.18	4.3
1.6F	4.0	0.34	18.20	4.5
1.8F	12.0	1.01	36.11	3.5
2.0F	13.6	1.15	57.19	4.8
2.0S	0.4	0.03	58.19	2.8
Head (Calc)	100.0	8.40	24.28	4.2

Table 39: Washability study of -50+25mm fractions

Products	Wt%	WRO	Ash%	S,%
1.3F	14.9	2.35	10.43	2.6
1.4F	31.9	5.05	14.31	2.8
1.5F	4.3	0.69	18.97	3.4
1.6F	6.0	0.95	19.00	3.9

1.8F	6.5	1.03	36.89	3.6
2.0F	5.4	0.85	38.00	3.8
2.0S	30.9	4.89	54.98	5.2
Head (Calc)	100.0	15.80	29.54	3.7

Table 40: Washability study of -25+13mm fractions

Products	Wt%	WRO	Ash%	S,%
1.3F	10.6	1.8	9.84	4.8
1.4F	40.0	6.8	14.39	4.4
1.5F	6.8	1.2	18.56	5.3
1.6F	5.8	1.0	27.02	2.6
1.8F	7.4	1.3	38.84	4.8
2.0F	11.8	2.0	56.79	4.0
2.0S	17.7	3.0	57.40	2.3
Head (Calc)	100.0	17.1	29.33	4.0

Table 41: Washability study of -13+6mm fractions

Products	Wt%	WRO	Ash%	S,%
1.3F	2.2	0.6	10.64	2.0
1.4F	67.3	16.9	15.74	2.2
1.5F	1.1	0.3	18.97	3.6
1.6F	3.2	0.8	24.93	2.5
1.8F	9.1	2.3	34.69	4.5
2.0F	8.2	2.1	55.90	1.90
2.0S	8.9	2.2	59.52	2.4
Head (Calc)	100.0	25.1	24.85	2.4

Table 42: Washability study of -6+3mm fractions

Products	Wt%	WRO	Ash%	S,%
----------	-----	-----	------	-----

1.3F	1.3	0.1	10.36	3.30
1.4F	66.8	7.2	13.26	3.60
1.5F	1.5	0.2	17.59	2.50
1.6F	10.0	1.1	26.51	3.30
1.8F	5.0	0.5	37.40	2.70
2.0F	9.5	1.0	54.41	3.10
2.0S	6.0	0.6	57.71	2.80
Head (Calc)	100.0	10.8	22.40	3.4

Table 43: Washability study of -3+0.5mm fractions

Products	Wt%	WRO	Ash%	S,%
1.3F	1.6	0.38	10.76	2.9
1.4F	50.4	11.48	12.71	2.5
1.5F	4.8	1.09	18.85	3.2
1.6F	13.6	3.09	24.49	3.2
1.8F	8.4	1.92	34.34	4.1
2.0F	16.7	3.80	48.12	2.9
2.0S	4.6	1.04	57.43	3.4
Head (Calc)	100.0	22.80	24.34	2.9

Table 44: Composite results of Washability study of Seam-2 lignite sample

SG	Wt%	Ash%	Cum Wt%	Cum Ash%	S,%
1.3F	5.3	10.26	5.3	10.26	3.34
1.4F	52.5	14.43	57.8	14.05	2.99
1.5F	4.2	18.42	62.0	14.35	4.03
1.6F	7.2	24.17	69.2	15.37	3.21
1.8F	8.0	35.90	77.2	17.51	4.09
2.0F	10.9	51.95	88.1	21.77	3.20
2.0S	11.9	56.82	100.0	25.93	3.64
Head (Calc)	100.0	25.93			3.26

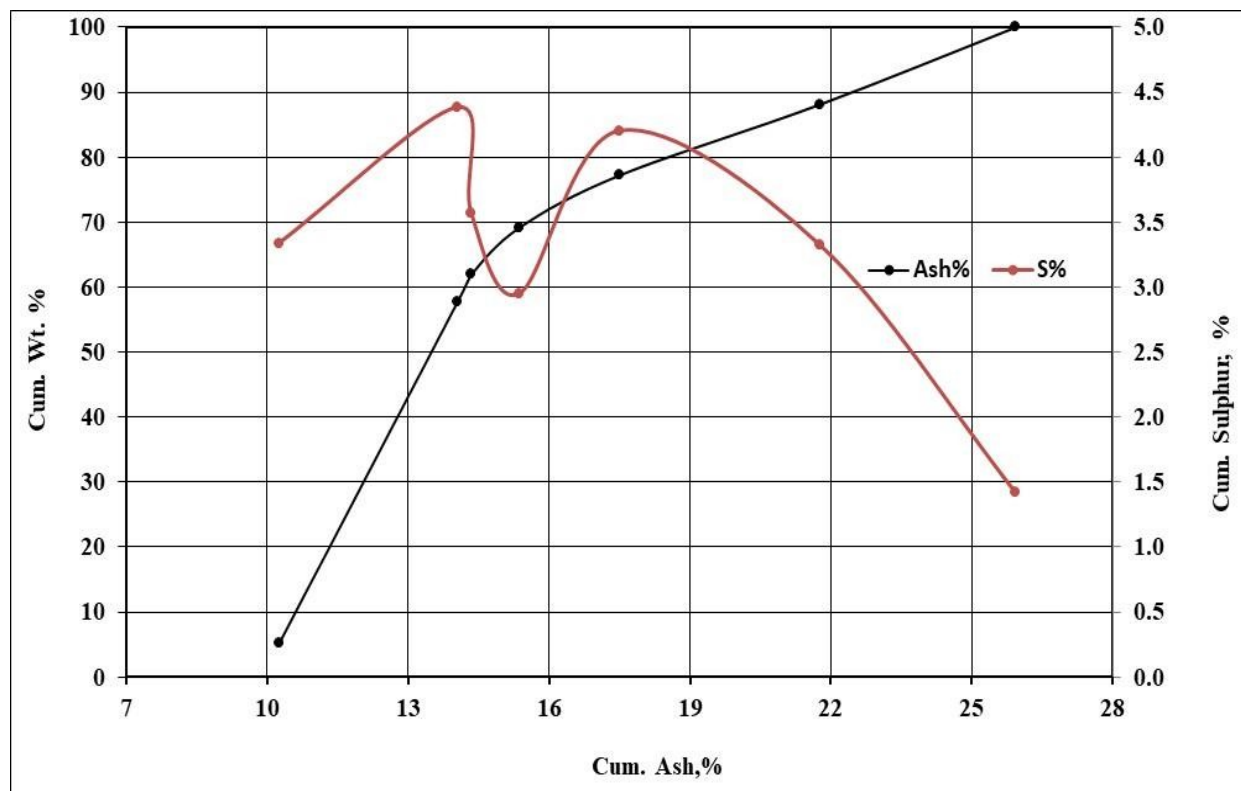


Fig. 9: Washability study of Seam-2 Lignite sample.

13. Summary of the Study

Lignite samples from Matana Madh mines of GMDC were studied for carrying out the detailed characterization and dry processing for lowering the ash and sulphur content in the product. Samples from five different seams were individually characterized with respect to Proximate analysis, Ultimate analysis, Calorific value, Hardgrove Grindability Index, Tumbler Index, Abrasion Index, Shatter test and particle size distribution in as-received lignite samples. It was found that Seam-2 sample contains high ash. Other three seam-samples contain less than 20% and Seam-3 sample contains marginally higher than 20% ash. Washability study was carried out for Seam-2 sample as it was suggested by GMDC. From the study it was found that yield is 75% at the ash level of 17%.

Composite Lignite sample was prepared by mixing all the five seam-samples in equal proportions. The detailed characterization and physical properties of the composite sample was studied. Washability study of the Composite sample was studied. It was found that yield is 95% at the ash level of 17%.

Composite Lignite sample was processed by dry method using dry high intensity magnetic separator (DHIMS), FGX-dry coal separator and Air Jig separator for different feed sizes. The -150+50 mm fraction of composite sample contains 14.79% ash. So, this fraction does not require any processing and it could be used directly as a product. The fraction -50mm contains 19.3% ash and was subjected to dry processing using DHIMS and FGX-dry coal separators for lower the ash level to 17%.

The -150+6mm fraction of composite lignite sample also contains less than 17% ash. It could be used as a direct product. The -6mm fraction contains 22.30% ash and processed by Air jig and dry Permroll separators to reduce the ash level to 17%. The response to the dry magnetic separation is found to be better than Air Jig separator. The dry processing of -13mm fraction using Air Jig separator was carried out as GMDC was interested. The results of Air Jig were not encouraging with respect to ash reduction.

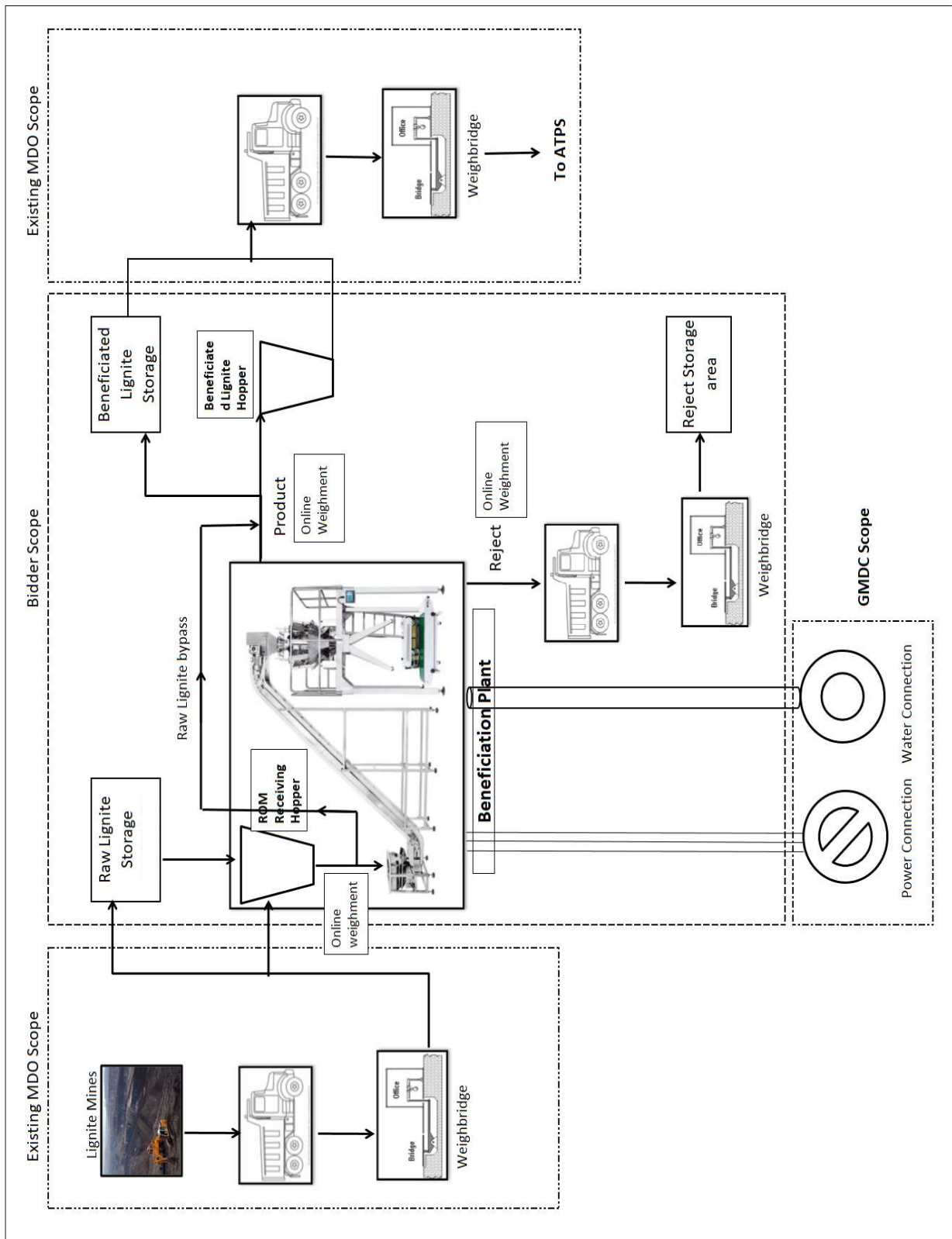
Based on the results of dry processing studies of composite lignite sample, five different process schemes were developed. The Scheme-2 is found to be more effective than other schemes with respect to yield at the 17% ash level.

Froth flotation studies were carried out using diesel oil and Montanol as collectors for the fractions of -0.5+0.25mm, -25+0.15mm and 0.15mm. Because of the presence of the high sulphur in the finer fractions and the natural floatability of sulphur, response to froth flotation was very poor.

Settling and filtration studies for the fine fractions (-0.5mm, -0.25mm and -0.15mm) of composite lignite sample were also carried out as per the scope of work of GMDC. The settling rate was very slow even with the flocculant. The results are not encouraging.

Annexure – E Indicative sketch for Lignite Beneficiation plant

Indicative sketch for Lignite Beneficiation plant



APPENDIX – I :

- A.** Description of Beneficiation Scheme along with Flow Diagram

- B.** Detailed work program (PERT Network and Bar Chart with different activities and time schedule)

APPENDIX - II : A. Format for Furnishing Technical Details of Main Mechanical & Electrical Equipments

Sl. No.	Name of the Equipment	Type	No.	Capacity of each	Technical Specification
1	Primary Crusher				
2	Feeders/ Reclaimers				
3	Secondary Crusher				
4	Classification Screen				
5	Main Beneficiation equipment				
6	Dewatering Equipment				
7	Rapid loading system				
8	Power transformers				
9	OCB' s/ACB' s				
10	H.T./ L.T. Motors				
11	PLC control				
12	Instrumentation (solid/ liquid level sensors, belt weighers, ash & moisture monitor, density monitor, etc.)				
13	Cables (Power control)				
14	Illumination				
15	Communication system				
16	DG set				
17	Any other				

APPENDIX - II: B. Format for Furnishing Details of Civil Buildings & Structural

Sl. No.	Name of Building / Structure	Type	Cap./size & Other details	Any other information
1	Raw lignite receiving hopper			
2	Primary crushing unit			
3	Secondary crushing unit			
4	Raw lignite storage system			
5	Beneficiation plant			
6	Thickener			
7	Storage system for saleable product			
8	Reject bunker/ hopper			
9	Slime pond			
10	Fresh water reservoir			
11	Fire-fighting storage tank			
12	Service buildings			
13	Roads and culverts			
14	Any other			

APPENDIX - III

A. Format for Furnishing the Requirement of Power

Sl. No.	Particulars	Electricity requirement
1	During construction of Beneficiation plant (kW)	
2	During regular operation of Beneficiation plant (kWh/ tonne of raw lignite on 'arb')	

B. Format for Furnishing the Requirement of Water

Sl. No.	Particulars	Water requirement
1	During construction of Beneficiation plant (cum/day)	
2	During regular operation of Beneficiation plant (cum/ tonne of raw lignite on 'arb')	

APPENDIX - IV: List of Recommended Spares & Critical Spares as per of the Bid Document