

Certificate of Analysis

Client	Enugu State Natural Resources	Reference Number	14517
Contact Person	Samuel Onyi	Sample Submitted	13/02/2025
Address	No 4C	Analysis Date	13-14/02/2025
	4th floor Abuja Building	Sample Description	Coal
	Government House Enugu	Contact Person	Sabelo Mkhabela
		Report Date	20/02/2025
Contact Numbers		Report Status	Final
Email Address		Page/s	1 of 2
Sample Mark	Submitted Sample - No Marking		
Sample Mass	14.70 Kg		

Proximate Analysis	Unit	Method	As Received Basis	Air Dried Basis	Dry Basis
Total Moisture	%	Based on ISO 589	10.0		
Moisture in Analysis Sample	%	Based on SANS 5925		5.3	
Ash Content	%	Based on ISO 1171	9.3	9.8	10.4
Volatile Matter	%	Based on ISO 562	37.6	39.6	41.8
Fixed Carbon	%	By Difference	43.1	45.3	47.8
Total Sulphur	%	Based on ASTM D4239	0.71	0.75	0.79
Gross Calorific Value	MJ/kg	Based on ISO 1928	27.24	28.65	30.26
Gross Calorific Value	Kcal/kg	Based on ISO 1928	6504	6841	7226
Net Calorific Value	Kcal/kg	Based on ISO 1928	6240	6593	6995

Ultimate Analysis	Unit	Method	As Received Basis	Air Dried Basis	Dry Basis
Total Carbon	%	Based on ISO 29541			
Hydrogen (Calculated)	%	Based on ISO 29541	4.27	4.49	4.74
Total Nitrogen	%	Based on ISO 29541			
Oxygen by Difference (Excl. O in Moisture)	%	Based on ISO 29541			

Total Chlorine * #	ppm	Based on ASTM D4208		
Total Fluorine * #	ppm	Based on ASTM D3761		

Hardgrove Grindability Index (HGI) * #	Units	Based on ISO 5074	36	
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Dry Sizing Analysis	Unit	Method	Size Fraction (mm)	Fractional Mass (kg)	Percentile Retained (%)
	%	Based on ISO 1953			
	%	Based on ISO 1953			
	%	Based on ISO 1953			
	%	Based on ISO 1953			
	%	Based on ISO 1953			
	%	Based on ISO 1953			
	%	Based on ISO 1953			
	%	Based on ISO 1953	Total		

Ash Fusion Temperature (AFT) * #	Unit	Method	Result
Reducing Atmosphere			
Initial Deformation (IDT)	Deg. C	Based on ISO 540	
Spherical (Softening)	Deg. C	Based on ISO 540	
Hemispherical	Deg. C	Based on ISO 540	
Flow (Fluid)	Deg. C	Based on ISO 540	

(Condition of test item if abnormal / additional information)	
1. Due to not being able to access the entire volume of the cargo, the samples collected may have indicative value only and will not necessarily be representative of the entire cargo, but only that part accessible and sampled. Cotecna South Africa has no responsibility and/or liability for the consequences of any action taken or not taken on the basis of this certificate/report.	
2. The sample(s) to which the findings recorded herein (the "Findings") relate was/were drawn and/or provided by the Client or by a third party acting at the Client's direction. The Findings constitute no warranty of the sample's representativeness of any goods and strictly relate to the submitted sample(s). Cotecna South Africa accepts no liability with regard to the origin or source from which the sample(s) is/are said to be.	
3. While the sampling method was agreed upon by all parties to this report, due to the limited ability to extract representative increments from the cargo, the samples collected will not necessarily be representative of the entire cargo. Cotecna South Africa has no responsibility and/or liability for the consequences of any action taken or not taken on the basis of this certificate/report. Please take note that one or more of the above disclaimers may be applicable to samples analysed.	
Analysis Marked "#" in this report are Subcontracted to another laboratory	Keshnee Moonsamy
Tests Marked "***" in this report are not included in the SANAS schedule of accreditation for this laboratory.	Technical Signatory

While every endeavour has been made to ensure that the results reported are accurate, the laboratory shall not be liable for any error nor for any damage or loss what so ever that may arise from the issuing of this certificate. This certificate may not be reproduced in part or full without written permission from the Technical Manager of the laboratory. A signed copy of this certificate is available at the laboratory. This document is not intended to relieve the parties from their contractual obligation or any sales contract. Liability shall be limited to an amount equal to the fee paid for this service and claims in respect of this document will only be considered if based on proven gross negligence. A summary of QC data is available upon request.	  T0974
Keshnee Moonsamy Technical Signatory	



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Reference Number	14517	Page/s 2 of 2
Analytical Methods Used		
Analysis	Method	Status
Manual Sampling	COT/01/SAMP	Not Accredited
Sample Preparation	COT/01/PREP	Accredited
Calorific Value (MJ/kg)	COT/02/CV	Accredited
Moisture in Analysis Sample (%)	COT/03A/MOIST	Accredited
Ash Content (%)	COT/05/ASH	Accredited
Volatile Matter (%)	COT/04/VOL	Accredited
Fixed Carbon by difference (%)	COT/06/FC	Accredited
Total Sulphur (%)	COT/07/S	Accredited
Total Moisture (%)	COT/09/TMOIST	Accredited
Sizing Analysis	COT/10/PSD	Accredited
Ultimate Analysis	COT/08/CHN	Accredited
Float and Sink Analysis	Analytical (*) (#)	Subcontracted Analysis
Ash Fusion Temperature	Analytical (*) (#)	Subcontracted Analysis
Hardgrove Grindability Index	Analytical (*) (#)	Subcontracted Analysis
Abrasiveness Index	Analytical (*) (#)	Subcontracted Analysis
True Relative Density	Analytical (*) (#)	Subcontracted Analysis
Crucible Swelling Number	Analytical (*) (#)	Subcontracted Analysis
Roga Index	Analytical (*) (#)	Subcontracted Analysis
Ruhr Dilatometer Test (%)	Analytical (*) (#)	Subcontracted Analysis
Gieseler Fluidity Plastometer (ddpm)	Analytical (*) (#)	Subcontracted Analysis
Fischer Assay	Analytical (*) (#)	Subcontracted Analysis
Gray-King Index	Analytical (*) (#)	Subcontracted Analysis
Ash Analysis (Major & Minor Elements)	Analytical (*) (#)	Subcontracted Analysis
Forms of Sulphur	Analytical (*) (#)	Subcontracted Analysis
Phosphorus in Coal (%)	Analytical (*) (#)	Subcontracted Analysis
Trace Elements	Analytical (*) (#)	Subcontracted Analysis
Analysis Marked "Subcontracted analysis" in this report are Subcontracted to another laboratory and indicated with a hash "#"		
Tests Marked "Not SANAS Accredited" in this report are not included in the SANAS schedule of accreditation for this laboratory and indicated with an asterisk "**"		
*Sampling Plan: Sampling carried out by the client.		
Date of Sampling:		
Identification of sample type:		
Sample Size:		
Number of increments taken per sample:		
Equipment used:		
Location of sampling (Diagrams/Photographs included):		
Sampling Plan:		
Environmental Conditions:		
Deviations, Additions or Exclusions:		