Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

CANMET
Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

PETROGRAPHIC AND RELATED ANALYSES OF A SAMPLE OF LINGAN PHALEN SEAM COAL SUBMITTED BY CAPE BRETON DEVELOPMENT CORPORATION SYDNEY, NOVA SCOTIA

Project No. 03-1-3/10-15
Job No. 3392R

J. G. Jorgensen
Combustion and Carbonization Research Laboratory

AUGUST 1982

ENERGY RESEARCH PROGRAM
ENERGY RESEARCH LABORATORIES
DIVISION REPORT 82-41 (CF)

[redacted]
Declassification Date:
September 1983

This document was produced by scanning the original publication.

Ce document est le produit d'une numérisation par balayage de la publication originale.

CONTENTS

Page

INTRODUCTION..... 1

REFERENCES..... 2

APPENDIX 1 8

TABLES

No.

1. Chemical Analyses of Component Coals 3

2. Physical Tests and Fusibility of Ash of Component Coals 4

3. Thermal Rheology Properties of Component Coals 5

4. Petrographic Analysis of Component Coals 6

FIGURES

1. Plot of the stability of the component coal from petrographic data 7

PETROGRAPHIC AND RELATED ANALYSES OF A SAMPLE OF LINGAN PHALEN SEAM COAL SUBMITTED BY CAPE BRETON DEVELOPMENT CORPORATION, SYDNEY, NOVA SCOTIA

Project No. 03-1-3/10-15
Job No. 3392R

by

J. G. Jorgensen*

INTRODUCTION

The evaluation of coals for Cape Breton Development Corporation is a continuing divisional project in which periodic investigations are undertaken as requested by the company.

This report includes evaluation data on a sample identified as CBDC Lingan Phalen seam coal. The project was initiated by B. Clyburn, Manager of Coal Preparation, Victoria Junction Coal Preparation Plant, Cape Breton Development Corporation in a letter dated March 10, 1982. A copy of this letter is included in Appendix 1.

The coal sample which represents 1000 tons of coal from the new Lingan Phalen mine was received in April 1982. The results of the chemical, physical, thermal rheological and petrographical analyses are tabulated in Tables 1 to 4.

---

*Head, Petrography Section, Combustion and Carbonization Research Laboratory, Energy Research Laboratories, CANMET, Energy, Mines and Resources Canada, Ottawa, Canada K1A 0G1

REFERENCES

1. ASTM Designation: D388-66; "Classification of Coals by Rank".

2. ASTM Designation: D720-67; "Test for Free Swelling Index of Coal".

3. ASTM Designation: D2639-71; "Test of Plastic Properties of Coal by the Constant-Torque Gieseler Plastometer". (Constant torque plastometer used with a torque of 40 gram-inch; start, 1 dd/m; fusion, 5 dd/m; final, 1 dd/m; solidification, no movement; range-temp., between start and final temperatures).

4. Burrough, E.J.; "Specific Volatile Index"; Fuels Division Memorandum 97/58-CG; Fuels and Mining Practice Division, Mines Branch, Dept of M and TS, Ottawa, Canada.

5. German Industrial Specification No. DIN 51739/March 1951.

6. ASTM Designation: D2797-72; "Preparing Coal Samples for Microscopical Analysis by Reflected Light".

7. ASTM Designation: D2798-72; "Determining Microscopically the Reflectance of the Organic Components in a Polished Speciment of Coal".

8. ASTM Designation: D2799-72; :Microscopical Determination of Volume Per Cent of Physical Components of Coal".

9. Schapiro, N., Gray, R.J.; "Petrographic Classification Applicable to Coals of All Ranks"; Proc III, Min Inst, 1960, 68, 83-97.

Table 1 - Chemical Analyses of Component Coals

Identification	
Laboratory Number.....	2900-82
Description.....	Lingan Phalen Seam
Classification	
Rank (ASTM).....	hvAb
International System.....	634
Specific Volatile Index....	163
Carbon (dmmfb).....%	84.5
Proximate Analysis (db)	
Ash.....%	2.8
Volatile Matter.....%	34.2
Fixed Carbon.....%	63.0
Gross Calorific Value (db)	
Btu/per pound.....	14630
Ultimate Analysis (db)	
Carbon.....%	81.8
Hydrogen.....%	5.1
Sulphur.....%	1.56
Nitrogen.....%	1.7
Ash.....%	2.8
Oxygen (by difference)....%	7.0
Ash Analysis (db	
SiO .....%	32.7
Al O .....%	16.9
Fe O .....%	36.8
TiO .....%	1.0
P_2O_5.....%	0.4
CaO.....%	3.4
MgO.....%	0.7
SO_3.....%	3.2
Na_2O.....%	0.6
K_2O.....%	1.2

Table 2 - Physical Tests and Fusibility of Ash of Component Coals

Identification

Laboratory Number.....	2900-82
Description.....	Lingan Phalen Seam

Coal Pulverization

Sieve Analysis

Passing	Retained On	
	1/4 in.	%
1/4 in.	6 mesh	%
6 mesh	12 mesh	%
12 mesh	20 mesh	%
20 mesh	.....	%
Total Passing	6 mesh	%

Grindability

Hardgrove Index	52

Fusibility of Ash

Initial Deformation Temp.....°F	1965
Softening Temp Shperical.....°F	2195
Softening Temp Hemispherical.°F	2290
Fluid Temp.....°F	2310

Table 3 - Thermal Rheological Properties of Component Coals

Identification	
Laboratory Number.....	2900-82
Description.....	Lingan Phalen Seam
Gieseler Plasticity	
Start.....°C	395
Fusion Temp .....°C	407
Max Fluid Temp .....°C	437
Final Fluid Temp .....°C	464
Solidification Temp .....°C	468
Melting Range .....°C	69
Max Fluidity.....dd/m	1410
Torque .....g/in.	40
Dilatation	
Ti - Softening Temp .....°C	369
Tii - Max Contraction Temp...°C	411
Tiii - Max Dilatation Temp....°C	447
Contraction.....%	30
Dilatation .....%	80
Free Swelling Index	
F.S.I.	7

Table 4 - Petrographic Analysis of Component Coals

Identification	
Laboratory Number.....	2900-82
Description	Lingan Phalen Seam
Distribution of Vitrinite Types	
V-6.....%	
V-7.....%	28.2
V-8.....%	49.6
V-9.....%	6.9
V-10.....%	0.9
V-11.....%	
V-12.....%	
V-13 .....%	
V-14.....%	
V-15.....%	
V-16.....%	
V-17.....%	
V-18.....%	
Reactive Components	
Total Vitrinite.....%	85.6
Reactive Semi-fusinite (1/3)....%	1.0
Exinite.....%	6.2
Total.....%	92.8
Inert Components	
Inert Semi-fusinite (2/3).....%	2.0
Micrinite.....%	2.0
Fusinite.....%	1.4
Mineral Matter.....%	1.8
Total.....%	7.2
Petrographic Indices	
Mean Reflectance.....%	0.82
Balance Index.....	0.22
Strength Index.....	2.69
Stability Index.....	0.00

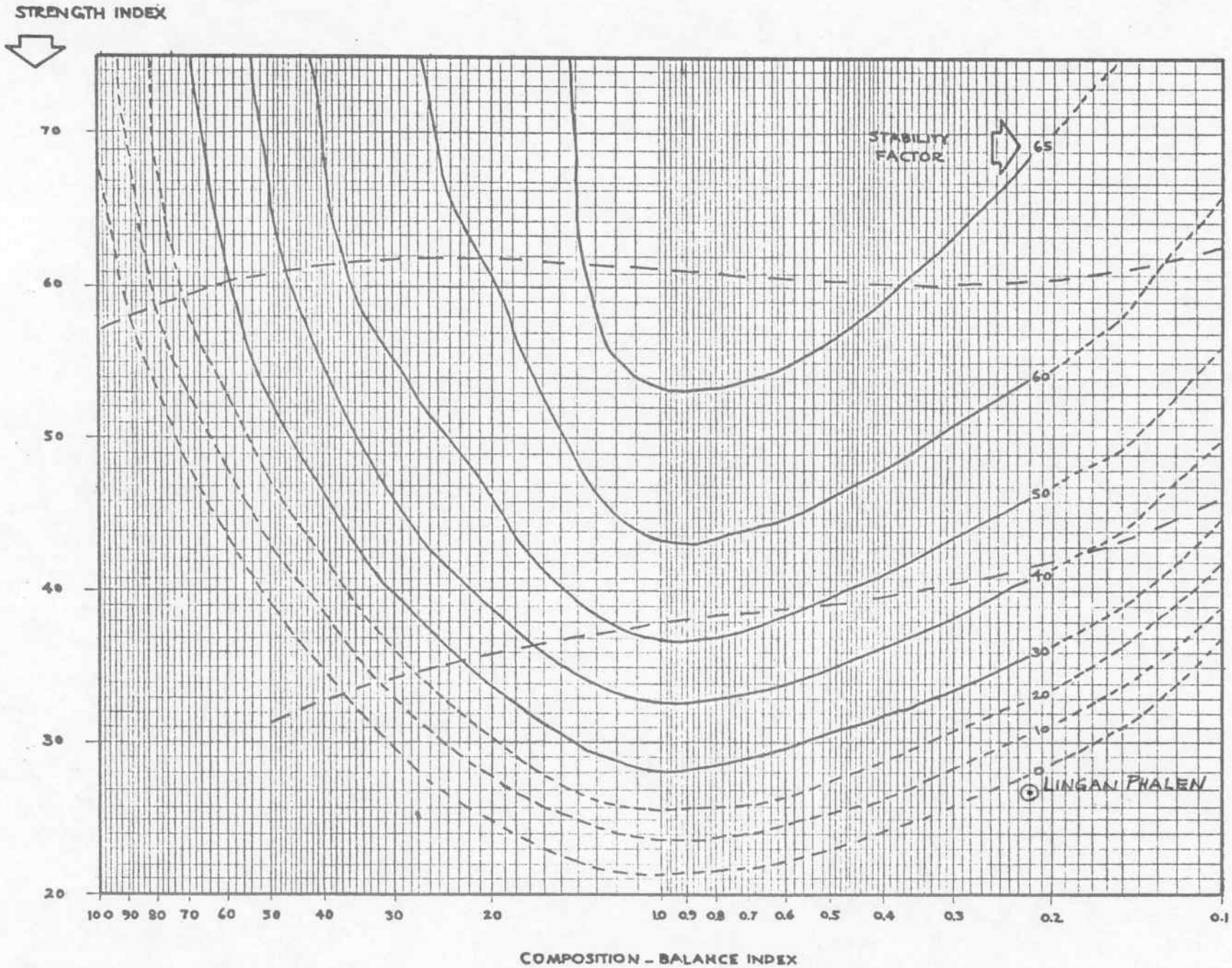

Fig. 1 - Plot of the stability factor of the component coal from petrographic data

APPENDIX 1

Letter dated March 10, 1982 from

B. Clyburn, Manager of Coal Preparation

Victoria Junction Coal Preparation Plant

Cape Breton Development Corporation

Sydney, Nova Scotia

Government of Canada | Gouvernement du Canada

Cape Breton Development Corporation | Société de développement du Cap-Breton

March 10, 1982

Mr. Basil I. Parsons,
Chief, Energy Research Laboratories,
Canmet,
555 Booth St.,
Ottawa, Ont.
K1A 0G2

Dear Mr. Parsons:

RE: CBDC LINGAN PHALEN SEAM

Recently the Cape Breton Development Corporation has begun developing a new mine, Lingan Phalen, in the Sydney coal field.

A trial quantity of 1000 tonnes is scheduled for cleaning at the Victoria Junction facilities on the week ending March 20.

We would like to arrange shipment of approximately 150kgs. to your Canmet Laboratories to check the petrographic and coking properties of the metallurgical coal produced from this seam.

We would request all tests be carried out that you feel are essential to define completely the coking properties and would suggest the following:

1. Proximate Analysis
2. Ultimate Analysis
3. Hargrove
4. F.S.I.
5. Gieseler Plasticity
6. Dilatation
7. Ash Analysis
8. Petrographic Analysis
9. Fusibility of Ash

We would issue an appropriate purchase order as soon as you have determined the cost of these tests.

Yours truly,

B. Clyburn

Bruce Clyburn,
Manager of Coal Preparation,
Victoria Junction Coal Preparation Plant.

c.c. Mr. R.W. MacKenzie
Director of Surface Operations,
Cape Breton Development Corporation

P. O. Box 2500
Sydney, Nova Scotia
B1P 6K9
Telex 019-35132
Telephone 902-562-5525

C. P. 2500
Sydney, Nouvelle-Écosse
B1P 6K9
Telex 019-35132
Téléphone 902-562-5525

270