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MOVABLE-WALL COKE OVEN TESTS OF FOUR SMOKY RIVER COAL SAMPLES SUBMITTED BY McINTYRE MINES LIMITED

Project No. 03-5-1/20-9
Job No. 3448R

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ENERGY RESEARCH PROGRAM
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SUMMARY

The evaluation of coals for McIntyre Mines Limited is a continuing divisional project in which periodic investigations are undertaken as requested by the company.

This report includes coke oven evaluation data on four samples from the Smoky River property. The project was initiated by K. Watai, Area Sales Manager, McIntyre Mines Limited in a letter dated November 2, 1983. A copy of this letter is given in Appendix 1.

The cleaned coal samples received from Birtley Coal and Mineral Testing, Calgary were crushed, blended and carbonized in the 460-mm wide Carbolite movable-wall coke oven located at the Coal Research Laboratories at Edmonton. The results of the testing program are tabulated in Tables 1 to 3.

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Essais en four à coke à paroi mobile réalisés avec quatre échantillons de charbon de Smokey River fournis par la McIntyre Mines Limited

Projet 03-5-1/20-9

Contrat n° 3448R

par

J.G. Jorgensen* et A.B. Fung**

RÉSUMÉ

À la demande de la McIntyre Mines Limited, la Division effectue périodiquement des essais visant à évaluer le charbon dans le cadre d'un projet continu.

Le présent rapport contient les données relatives à l'évaluation en four à coke de quatre échantillons provenant de Smokey River. Le projet a débuté par une lettre de K. Watai, Directeur régional des ventes de la McIntyre Mines Limited, datée du 2 novembre 1983. Une copie de cette lettre se trouve à l'Annexe 1.

Les échantillons de charbon nettoyés envoyés par la Birtley Coal and Mineral Testing de Calgary ont été broyés, mélangés et carbonisés dans le four à coke à paroi mobile de Carbolite (largeur de 460 mm) du laboratoire de recherche sur le charbon d'Edmonton. Les résultats du programme d'essai sont présentés aux tableaux 1 à 3.

*Spécialiste en pétrographie, Laboratoire de recherches sur la combustion et la carbonisation, Laboratoires de recherche sur l'énergie, Ottawa et
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TABLES

Table 1 - Carbonization conditions

Test Identification Number	C-207	C-208	C-209	C-210
Date of Test	16/11/83	17/11/83	21/11/83	24/11/83
Coke Oven Identification.....				
Description.....	Drums 1-2-3	Drums 4-5-6	Drums 7-8-9	Drums 10-11-12
	Ash 7.1%	Ash 8.2% (product)	Ash 8.2% (stockpile)	Ash 7.7%
Charge Properties				
Proximate Analysis (db) Ash.....%				
Volatile Matter ....%				
Fixed Carbon.....%				
Moisture in Charge .....%	3.8	3.6	3.5	3.7
Minus 3.35 mm .....%	84.6	85.6	84.0	85.3
Other				
.....				
Carbonization Conditions				
Net Weight of Charge (wet).....kg	296.7	297.1	298.1	297.0
ASTM Cone Bulk Density (wet).....kg/m^3	783.4	788.2	793.0	788.2
Calc. Charge Dry Bulk Density in Oven... kg/m^3	813.8	815.4	820.2	815.4
Carbonization Results				
Gross Coking Time (at Push).....h:min	19:20	19:45	19:25	19:33
Final Centre Temp.....°C	1032	1050	1037	1052
Time to 900°C Centre Temp.....h:min	15:49	16:10	15:39	16:00
Time to 950°C Centre Temp.....h:min	16:20	16:45	16:25	16:33
Time to 1000°C Centre Temp.....h:min	17:21	17:43	17:51	17:36
Maximum Wall Pressure.....kPa	18.27	6.14	4.62	13.31
Coke Yield Actual .....%	79.8	78.3	77.8	78.2

Table 2 - Coke properties

Test Identification Number.....	C-207	C-208	C-209	C-210
Screen Analysis of Coke (cum. % retained on)				
100 mm sieve.....%	3.0	3.3	3.1	1.4
75 mm sieve.....%	17.8	21.0	22.4	18.0
50 mm sieve.....%	61.4	59.0	59.6	61.1
37.5 mm sieve.....%	85.0	75.8	74.6	82.6
25.0 mm sieve.....%	91.9	83.4	80.7	91.0
19.0 mm sieve.....%	92.9	84.8	81.9	92.2
12.5 mm sieve.....%	93.7	85.9	83.0	93.0
Total -12.5 mm (breeze).....%	6.3	14.1	17.0	7.0
Mean Coke Size.....mm	57.66	54.86	54.36	56.90
Coke Chemical Analysis				
Proximate Analysis (db)				
Ash.....%				
Volatile Matter.....%				
Fixed Carbon.....%				
Sulphur (db).....%				
Coke Apparent Specific Gravity.....	0.919	0.988	0.985	0.956
ASTM Coke Tumbler Test				
Stability Factor (cum. % + 25.0 mm).	58.0	47.5	44.8	57.5
Hardness Factor (cum. % + 6.3 mm).	65.2	59.4	57.8	65.3
JIS Coke Tumbler Test (cum. % retained on)				
30 revs: 50 mm sieve.....%	23.0	16.4	16.1	14.4
25 mm sieve.....%	90.2	83.3	82.0	89.0
15 mm sieve.....%	94.1	88.2	87.2	93.5
150 revs: 50 mm sieve.....%	4.6	0.8	1.0	4.7
25 mm sieve.....%	75.4	63.6	60.9	72.1
15 mm sieve.....%	81.6	71.8	70.4	81.1

Table 3 - Coal pulverization for coking test

Identification					
Laboratory Number.....		C-207	C-208	C-209	C-210
Description.....					
Coal Pulverization					
Sieve Analysis					
Passing	Retained On				
	6.3 mm %	6.0	4.5	5.9	4.8
6.3 mm	3.35 mm %	9.4	9.9	10.1	9.9
3.35 mm	1.70 mm %	14.4	15.2	13.9	14.5
1.70 mm	850 µm %	11.6	12.4	12.0	12.7
850 µm	.....%	58.6	58.0	58.1	58.1
Total Passing	3.35 mm %	84.6	85.6	84.0	85.3
Grindability					
Hardgrove Index					
Fusibility of Ash					
Initial Deformation Temp.....°C					
Softening Temp Spherical.....°C					
Softening Temp Hemispherical.°C					
Fluid Temp.....°C					

APPENDIX 1 - Letter Initiating Project

McINTYRE MINES

EXECUTIVE OFFICES
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THREE CALGARY PLACE
355 FOURTH AVENUE S.W.
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November 2, 1983

Dr. B. Parsons
Director
Coal Resources Processing Laboratory
Energy Research Laboratories
CANMET
555 Booth Street
Ottawa, Ontario
K1A 0G1

Dear Dr. Parsons:

Re: Coal Carbonization Test

McIntyre Mines is a member of the Coal Carbonization Research Association and the producer of Smoky River metallurgical coal. We would like to conduct three carbonization tests at your Edmonton facility and would appreciate your approval. We will be responsible for the cost recovery of these tests.

Yours sincerely,

McINTYRE MINES LIMITED

Ken Watai
Area Sales Manager

KW/pmf

cc: Mr. J.G Jorgensen, Head, Coal Resource & Processing Lab. ✓
Mr. A. Fung, Engineer, Energy Mines & Resources Canada
Dr. D. Brown, Director, Energy Mines & Resources Canada
Dr. H. Hanzam, Manager, Energy Mines & Resources Canada