K-Shell Ewin Pass 81(4)A

398

EWIN PASS PROJECT

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K-Shell Ewin Pass 81(4)A

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ASSESSMENT REPORT

00 398

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APPENDIX C

TEST RESULTS FOR THE PLANT WASH

FOR ADIT 1, SEAM 8 COAL

AND

TEST RESULTS FOR THE COMPOSITE

OF EWIN PASS ADIT 2, SEAM 4 COAL AND

ADIT 1, SEAM 8 COAL

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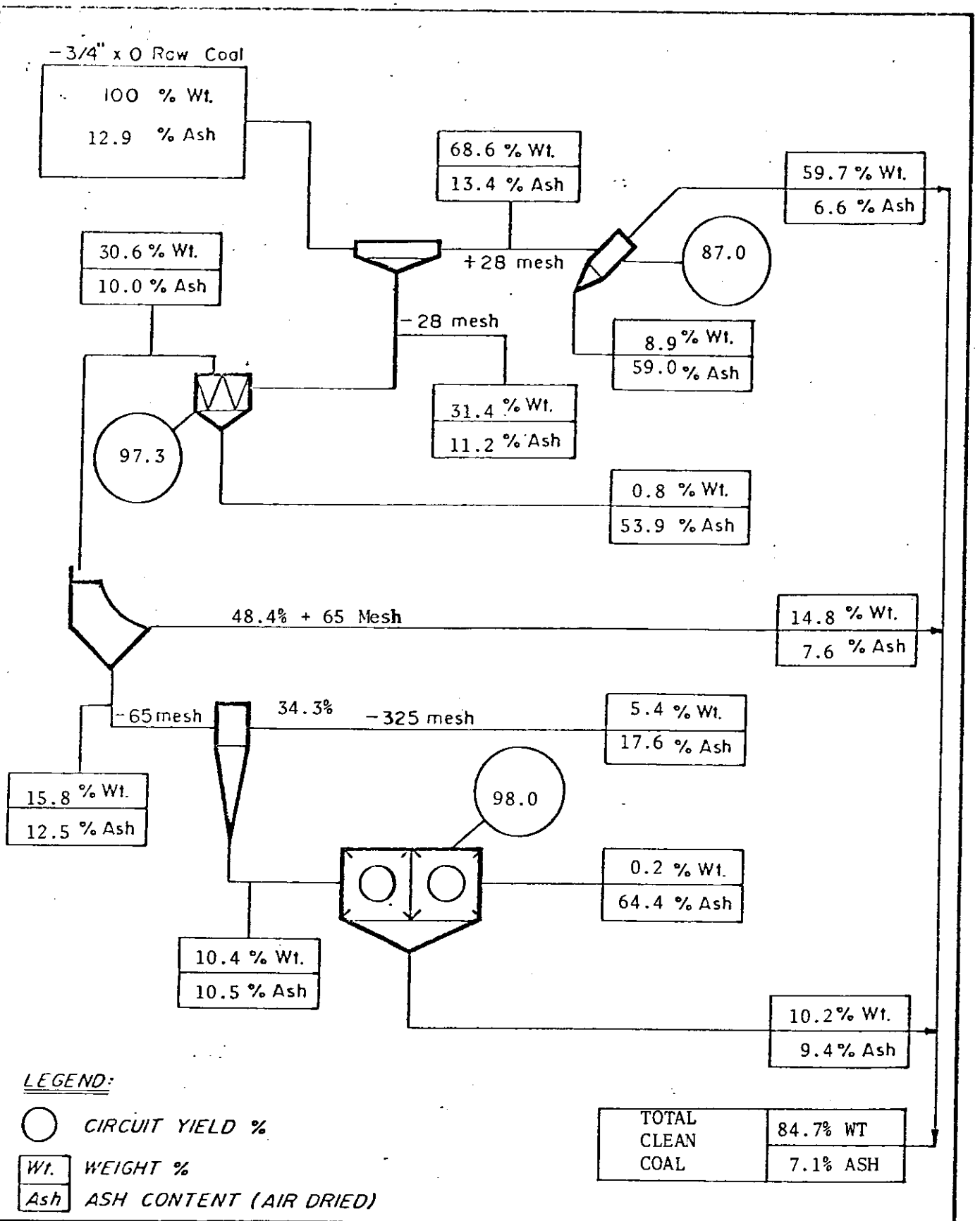

BIRTLEY COAL & MINERALS TESTING

Title PLANT BALANCE FLOW SHEET CROWS NEST RESOURCES ADIT 1/SEAM 8 BULK SAMPLE LAB NO. 6052	Date SEPT./80 Drawn

SUMMARY - BULK WASHING DATA *

Bulk Sample ADIT 1/ SEAM 8 Lab. No. 6052

Date Received August 1980 Date Washed Sept. 16/80

(a) RAW COAL

Delivered Weight 6.207 MT Washed Weight 6.063 MT

ADM % 4.0 ASH% 12.9 F.S.I. 8 1/2

(b) HEAVY MEDIA CIRCUIT: 3/4" x 28 Mesh= [redacted] % by weight

S.G. of Medium 1.33 Calculated Yield 87.0 %

Sample	ASH %	F.S.I.
Feed	13.4	8
Clean Coal	6.6	9
Reject	59.0	1

(c) WATER -ONLY CYCLONE CIRCUIT :28M x0 = [redacted].4 % by weight

V.F.C. #1 2 cm. #2 5 cm. Calculated Yield 97.3 %

Sample	ASH %	F.S.I.
Feed	11.2	8 1/2
Overflow	10.0	8 1/2
Underflow	53.9	1 1/2
S.B.O.	7.6	8 1/2
S.B.U.	12.5	8

(d) FROTH FLOTATION CIRCUIT: 65M x0 [redacted].8 %by Weight

4:1 =Kerosene: M.I.B.C. Calculated Yield 98.0 %

Sample	ASH %	F.S.I.
T.C.O.	17.6	1 1/2
Feed (T.C.U.)	10.5	8
Concentrate	9.4	8 1/2
Tailings	64.4	1

(e) FILTER CAKE: S.B.O. + CONCENTRATE = [redacted].4 ASH% 8 1/2 FSI

* All weights and analysis are on an Air Dried Basis unless otherwise indicated.

Birtley Coal
& Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

SUMMARY -BULK WASHING DATA (Cont.)

BULK SAMPLE ADIT 1/ SEAM 8 LAB NO. 6052

(f) CLEAN COAL: H.M.C.C. + FILTER CAKE Calculated Yield 84.7 %

ADM	PROXIMATE				S		FSI		
	RM%	ASH%	VM %	FC %					
9.5	0.7	7.2	26.7	65.4	0.45		8 1/2		

DILATATION TEST				
ST (°C)	MDT (°C)	MC %	MD %	G
392	473	25	101	1.060

GIESELER FLUIDITY TEST		
	DDPM	TEMP (°C)
START	1	435
MAXIMUM	246	472
FINAL	0	505
RANGE		70

Birtley Coal
& Minerals Testing
A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK SAMPLE ADIT 1/ SEAM 8 LAB NO. 6052

SUMMARY BULK WASHING DATA (Cont.)

CLEAN COAL INVENTORY

DATE	SHIPPED		IN STOCK	
	BBLS	M.T.	BBLS	M.T.
Sept.19,1980	-	-	31	4.912

Birtley Coal
& Minerals Testing
A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK WASHING DATA

BULK SAMPLE ADIT 1/ SEAM 8 LAB NO. 6052

HEAVY MEDIUM CIRCUIT

CYCLONE: 14" DSM operating @ 52 KPa.

MAGNETITE MEDIUM maintained @ 1.33 S.G.

1. FEED(3/4 x 28 Mesh) 4.157 M.T. 13.4 ASH% 8 FSI

2. CLEAN COAL 3.601 M.T. 6.6 ASH% 9 FSI

3. REJECT 0.556 M.T. 59.0 ASH% 1 FSI

4. YIELD CLEAN COAL (Weighted) = $\frac{3.601}{4.157}$ = 86.6 %

5. YIELD CLEAN COAL (Calculated)= $\frac{59.0 - 13.4}{59.0 - 6.6}$ = 87.0 %

Birtley Coal
& Minerals Testing
A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK WASHING DATA

Bulk Sample ADIT 1/ SEAM 8 LAB NO. 6052

WATER - ONLY CYCLONE CIRCUIT

Primary Cyclone: 6" DSM operating @ 13.8 KPa

Vortex Finder Clearance set @ 2 c.m.

Secondary Cyclone: 4" DSM operating@ 3.5 KPa

Vortex Finder Clearance set @ 5 c m.

Sieve Bend : 65 Mesh

1.	Feed (28 Mesh x 0)	11.2	ASH %	8 1/2	FSI	
2.	Primary Cyclone Overflow	10.0	ASH %	8 1/2	FSI	
3.	Secondary Cyclone Underflow	53.9	ASH %	1 1/2	FSI	
4.	Sieve Bend Overflow(S.B.O.)	7.6	ASH %	8 1/2	FSI	
5.	Sieve Bend Underflow(S.B.U.)	12.5	ASH %	8	FSI	
6.	Yield (W.O. Cyclone)	$\frac{53.9 - 11.2}{53.9 - 10.0}$ =		97.3	%	
7.	WT% 28Mx65M in Primary Cyclone Overflow	=		48.4	%	
8.	Estimated Yield of 28M x65M (S.B.O. , as % of 28 M x 0 Feed)	=		47.1	%	

Birtley Coal
& Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK WASHING DATA

BULK SAMPLE ADIT 1/ SEAM 8 LAB NO. 6052

FROTH FLOTATION CIRCUIT

Flotation Cell: two(2) Birtley -Humboldt Multi-Wobble impellers in series.

Reagent : 4:1 = Kerosene:M.I.B.C.

Thickening Cyclone : 20° - 8" cyclone Hayl-Patterson

1. Thickening Cyclone Overflow (T.C.O. -325M) 17.6 ASH% 1 1/2 FSI

2. Flotation Feed(Thickening Cyclone Underflow) 10.5 ASH% 8 FSI

3. Concentrate 9.4 ASH% 8 1/2 FSI

4. Tailings 64.4 ASH% 1 FSI

5. Yield Concentrate $\frac{64.4 - 10.5}{64.4 - 9.4}$ = 98.0 %

Birtley Coal
& Minerals Testing
A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

CLIENT : CROWS NEST RESOURCES LIMITED

PROJECT: COMPOSITE OF EWIN PASS ~~SEAM~~ Pdit Seam 2 RAW COAL AND SEAM 8 CLEAN COAL

LAB NO.: 6100

ADM%	MOIST. %	ASH%	VOL %	F.C.%	S%	F.S.I.		CALC.BASIS
9.9	1.0	7.8	26.5	64.7	0.39	8 1/2		a.d.b.
	10.8	7.0	23.9	58.3	0.35	-		a.r.b.
		7.9	26.8	65.3	0.39	-		d.b.

DILATATION TEST				
S.T.(°C)	M.D.T.(°C)	M.C. %	M.D.%	G.NUMBER
380	464	27	78	1.051

GIESELER FLUIDITY TEST		
	DDPM	TEMP(°C)
START	1	434
MAXIMUM	171	467
FINAL	0	500
	RANGE=	66

Birtley Coal
& Minerals Testing

APPENDIX D

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

ADIT 2 SEAM 4

MOVABLE-WALL COKE OVEN TESTS AND RELATED ANALYSES OF INDIVIDUAL COAL SAMPLES AND COAL BLENDS FROM HORSESHOE RIDGE AND EWIN PASS SUBMITTED BY CROWS NEST RESOURCES LIMITED.

Project No. 03-3-1/11-8
Job No. 3328R

J.G. JORGENSEN AND T.A. LLOYD
COAL RESOURCE AND PROCESSING LABORATORY

JUNE 1981

ENERGY RESEARCH PROGRAM
ENERGY RESEARCH LABORATORIES
REPORT ERP/ERL 81-41 (CF)

CONFIDENTIAL

Declassification Date:
July 1983

Movable-Wall Coke Oven Tests and Related Analyses of Individual Coal Samples and Coal Blends from Horseshoe Ridge and Ewin Pass Submitted by Crows Nest Resources, Limited

Project No. 03-3-1/11-8
Job No. 3328R

by

J.G. Jorgensen* and T.A. Lloyd**

INTRODUCTION

The evaluation of coals for Crows Nest Resources, Limited is a continuing divisional project in which periodic investigations are undertaken as requested by the company.

This report is Investigation 8 in the series and includes evaluation data on coals and blends specified originally in a letter dated December 4, 1980 and later extended in a letter dated March 4, 1981 from R. Crisafio, Senior Metallurgist, Crows Nest Resources Limited. Copies of these letters appear in Appendix 1.

The coals and blends which were carbonized are described in Table 1. The cleaned coal samples received from Birtley Engineering, Calgary, were crushed, blended and carbonized in the CANMET 12-inch width Movable-wall coke oven located at the CANMET Bells Corners Research Complex near Ottawa. Representative samples were taken for chemical, physical, thermal rheological, and petrographical analyses. The results of the project are tabulated in Tables 2 to 7.1.

*Head, Carbonization Evaluation Group, **Carbonization Operations, Coal Resource and Processing Laboratory, Energy Research Laboratories, Canada Centre for Mineral & Energy Technology (CANMET), Department of Energy, Mines & Resources, Ottawa, Canada.

TABLE 1. Description of Coals and Blends

Lab. No.	Test No.	Description
4867-80	821	Horseshoe Ridge Blend No. 1 4.5 Parts Seam 7 3.5 Parts Seam 8 Upper 3.5 Parts Seam 8 Lower 1.0 Part Seam 8 Rider (Prepared at Birtley Engineering)
4868-80	822	Ewin Pass Blend No. 1 2 parts Seam 8 1 part Seam 4 (R.O.M.) (Prepared at Birtley Engineering)
2321-81	840	Ewin Pass Seam 4 (Cleaned at CANMET to S.G. of 1.6)
2511-81	845	Horseshoe Ridge Adit 19, Seam 7
2512-81	846	Horseshoe Ridge Blend No. 2 4.5 parts Seam 7 3.5 parts Seam 8 upper 3.5 parts Seam 8 lower 1.0 part Seam 8 rider (Prepared at CANMET)
2517-81	847	Horseshoe Ridge Blend No. 3 4.75 parts Seam 7 3.75 parts Seam 8 upper 3.75 parts Seam 8 lower (Prepared at CANMET)
2574-81	848	Ewin Pass - Adit 2 Seam 4 (Cleaned at Birtley Engineering)
2633-81	849	Ewin Pass Blend No. 2 2 parts Seam 8 1 part Seam 4 (cleaned at Birtley Eng.) (Prepared at Birtley Engineering)

TABLE 2. Chemical Analyses of Component Coals

Identification				
Laboratory Number	4867-80	4868-80	2321-81	2511-81
Description	Horseshoe Ridge Blend #1	Ewin Pass Blend #1	100% Seam 4 Washed to S.G. 1.6	Test 845 100% Horse-shoe Ridge Adit 19, Seam 7
Classification				
Rank (ASTM)	mvb	mvb	mvb	mvb
International System	431	533	533	434
Specific Volatile Index	190	176	181	197
Carbon (dmmfb) .....%	88.7	87.8	87.9	88.2
Proximate Analysis (db)				
Ash .....%	9.5	8.2	5.9	8.7
Volatile Matter .....%	23.5	28.1	26.7	24.6
Fixed Carbon .....%	67.0	63.7	67.4	66.7
Gross Calorific Value (db)				
Btu per pound	14000	14030	14495	14320
Ultimate Analysis (db)				
Carbon .....%	79.5	79.8	82.1	79.7
Hydrogen .....%	4.8	5.0	5.2	4.9
Sulphur .....%	0.46	0.34	0.28	0.58
Nitrogen .....%	1.2	1.3	1.4	1.5
Ash .....%	9.5	8.2	5.9	8.7
Oxygen (by difference) .....%	4.5	5.4	5.1	4.6
Ash Analysis (db)				
SiO_2 .....%	54.2	54.1	56.3	52.6
Al_2O_3 .....%	31.2	29.0	34.1	29.2
Fe_2O_3 .....%	6.7	6.3	2.7	6.4
TiO_2 .....%	1.7	1.5	1.9	1.4
P_2O_5 .....%	2.0	1.2	0.1	3.1
CaO .....%	2.0	3.0	1.3	2.3
MgO .....%	0.5	0.9	0.7	0.7
SO_3 .....%	1.1	2.1	0.4	1.3
Na_2O .....%	0.1	0.2	0.4	0.1
K_2O .....%	0.8	0.9	0.6	1.2

TABLE 3. Physical Tests and Fusibility of Ash of Component Coals

Identification					
Laboratory Number		4867-80	4868-80	2321-81	2511-81
Description		Horseshoe Ridge Blend #1	Ewin Pass Blend #1	100% Seam 4 Washed to 1.60	100% Horseshoe Ridge Adit 19, Seam 7
Coal Pulverization					
Sieve Analysis					
Passing	Retained On				
	1/4 in. %	0.1	0.1	0.1	0.0
1/4 in.	6 mesh %	12.2	13.1	11.1	7.9
6 mesh	12 mesh %	16.7	17.8	17.9	14.5
12 mesh	20 mesh %	18.8	19.3	20.1	18.3
20 mesh	..... %	52.2	49.7	50.8	59.3
Total Passing	6 mesh %	87.7	86.8	88.8	92.1
Grindability					
Hardgrove Index		86	80	72	89
Fusibility of Ash					
Initial Deformation Temp. ... °F		2430	2430	2650	2270
Softening Temp. Spherical ... °F		2700+	2700+	2700+	2700+
Softening Temp. Hemispherical °F		2700+	2700+	2700+	2700+
Fluid Temp. ..... °F		2700+	2700+	2700+	2700+

TABLE 4 Thermal Rheological Properties of Component Coals

Identification				
Laboratory Number	4867-80	4868-80	2321-81	2511-81
Description	Horseshoe Ridge Blend #1	Ewin Pass Blend #1	100% Seam 4 Washed to 1.60 S.G.	100% Horseshoe Ridge Adit 19, Seam 7
Linear Expansion				
Bd. 52 lb/ft^3 at 2% moisture...%				
Gieseler Plasticity				
Start .....°C	444	427	428	424
Fusion Temp. .....°C	462	442	441	441
Max. Fluid Temp. .....°C	471	462	460	461
Final Fluid Temp. .....°C	489	488	482	489
Solidification Temp. .....°C	496	491	486	492
Melting Range .....°C	45	61	58	65
Max. Fluidity .....dd/m	4.4	127.9	65.3	114
Torque .....g.in.	40	40	40	40
Dilatation				
Ti - Softening Temp. .....°C	410	393	394	402
Tii - Max. Contraction Temp. °C	456	440	441	444
Tiii - Max. Dilatation Temp. °C	-	471	469	479
Contraction .....%	22	26	28	27
Dilatation .....%	Nil	41	9	51
Free Swelling Index				
F.S.I.	7	8	8	8½

TABLE 4.1 Thermal Rheological Properties of Component Coals

Identification				
Laboratory Number	2512-81	2517-81	2574-81	2633-81
Description	Horseshoe Ridge Blend #2	Horseshoe Ridge Blend #3	100% Adit 2 Seam 4	Ewin Pass Blend #2
Linear Expansion				
Bd. 52 lb/ft^3 at 2% moisture...%				
Gieseler Plasticity				
Start .....°C	446	446	427	427
Fusion Temp. .....°C	-	-	441	439
Max. Fluid Temp. .....°C	468	468	460	458
Final Fluid Temp. .....°C	483	482	482	483
Solidification Temp. .....°C	489	487	486	488
Melting Range .....°C	37	36	55	56
Max. Fluidity .....dd/m	4.8	3.6	72.5	99.7
Torque .....g.in.	40	40	40	40
Dilatation				
Ti - Softening Temp. .....°C	416	418	400	400
Tii - Max. Contraction Temp. °C	467	464	445	444
Tiii - Max. Dilatation Temp. .°C	482	486	473	473
Contraction .....%	24	22	27	28
Dilatation .....%	-22	-20	18	36
Free Swelling Index				
F.S.I.	7	7	8	8

TABLE 5 Petrographic Analysis of Component Coals

Identification				
Laboratory Number.....	4867-80	4868-80	2321-80	2511-80
Description.....	Horseshoe Ridge Blend #1	Ewin Pass Blend #1	Seam 4 Washed to 1.60 S.G.	Horseshoe Seam 7 Adit 19
Distribution of Vitrinite Types				
V-6.....%				
V-7.....%				
V-8.....%				
V-9.....%		2.2	3.5	
V-10.....%		45.1	42.6	
V-11.....%	10.0	22.6	23.7	10.9
V-12.....%	24.8	2.9		58.6
V-13.....%	21.3			8.6
V-14.....%	3.0			
V-15.....%				
V-16.....%				
V-17.....%				
V-18.....%				
Reactive Components				
Total Vitrinite.....%	59.1	72.8	69.8	78.1
Reactive Semi-fusinite (1/3)...%	13.8*	5.3	5.7	3.8
Exinite.....%	0.5	1.9	2.8	0.2
Total.....%	73.4	80.0	78.3	82.1
Inert Components				
Inert Semi-fusinite (2/3).....%	13.8**	10.7	11.5	7.5
Micrinite.....%	1.5	1.5	1.6	1.2
Fusinite.....%	5.9	3.2	4.8	4.3
Mineral Matter.....%	5.4	4.6	3.8	4.9
Total.....%	26.6	20.0	21.7	17.9
Petrographic Indices				
Mean Reflectance.....%	1.27	1.08	1.07	1.25
Balance Index.....	1.58	0.72	0.78	0.88
Strength Index.....	5.22	4.04	4.04	4.83
Stability Index.....	60.0	54.5	55.3	62.9

*Reactive semi-fusinite (1/2) , **Inert semi-fusinite (1/2)

TABLE 6 - Carbonization Data

Test Identification Number.....	821		822		840		845	
Data of Test.....	3 Dec/80		4 Dec/80		17 Feb/81		17 Mar/81	
Laboratory Number.....								
Description.....	Horseshoe Ridge Blend #1		Ewin Pass Blend #1		Ewin Pass 100% Seam 4 washed to 1.6 S.G.		Horseshoe Ridge Adit 19 Seam 7	
CARBONIZATION DATA								
Net Weight of Charge (wet).....lb	564.8		566.7		558.5		559.3	
Moisture in Charge.....%	3.0		3.0		2.9		2.6	
ASTM Bulk Density (wet).....lb/ft^3	48.5		48.3		48.7		48.8	
Oven Bulk Density (db).....lb/ft^3	50.54		50.71		50.03		50.3	
CARBONIZATION RESULTS								
Gross Coking Time.....hr:min	9:00		9:15		9:30		9:55	
Maximum Wall Pressure.....lb/in^2	0.95		1.24		0.70		1.97	
Coke Yield Actual.....%	79.1		75.5		73.6		77.8	
Mean Coke size.....in	1.89		1.91		1.90		2.06	
Apparent Specific Gravity.....	0.971		0.883		0.900		0.885	
Screen Analysis of Coke (cumulative percentage retained on)								
3 inch sieve.....	4.2		3.4		4.0		5.7	
2 inch sieve.....	38.6		40.4		39.7		49.9	
1 1/2 inch sieve.....	71.5		74.9		72.8		81.4	
1 inch sieve.....	93.2		93.7		92.7		95.3	
3/4 inch sieve.....	95.5		95.8		94.8		96.3	
1/2 inch sieve.....	96.4		96.6		95.7		97.2	
Percentage -1/2 inch (breeze).....	3.6		3.4		4.3		2.8	
Tumbler Test (ASTM)								
Stability Factor.....	58.1		50.8		54.0		58.0	
Hardness Factor.....	70.4		64.5		65.9		66.4	
Japanese Drum Test (JIS) (cumulative percentage retained on)	*	**	*	**	*	**	*	**
50 mm sieve.....	12.0	3.2	10.3	—	9.9	2.8	16.2	4.5
25 mm sieve.....	84.3	68.5	85.2	67.3	87.2	67.1	90.2	74.9
15 mm sieve.....	93.6	83.0	92.9	81.0	92.9	80.9	94.5	83.7

*30 revs **150 revs

TABLE 6.1- Carbonization Data

Test Identification Number.....	846		847		848		849	
Data of Test.....	18 March/81		19 March/81		24 March/81		25 March/81	
Laboratory Number.....	Horseshoe Ridge		Horseshoe Ridge		Adit #2		Ewin Pass	
Description.....	Blend #2		Blend #3		Seam 4		Blend #2	
CARBONIZATION DATA								
Net Weight of Charge (wet).....lb	564.0		565.5		568.1		558.5	
Moisture in Charge.....%	3.0		3.0		3.0		2.7	
ASTM Bulk Density (wet).....lb/ft^3	49.0		48.2		48.7		48.7	
Oven Bulk Density (db).....lb/ft^3	50.47		50.60		50.84		50.13	
CARBONIZATION RESULTS								
Gross Coking Time.....hr:min	9:30		9:25		10:05		9:35	
Maximum Wall Pressure.....lb/in^2	0.56		0.56		0.54		0.71	
Coke Yield Actual.....%	78.3		77.7		74.7		75.7	
Mean Coke size.....in	2.02		2.01		1.94		1.93	
Apparent Specific Gravity.....	0.942		0.940		0.919		0.885	
Screen Analysis of Coke (cumulative percentage retained on)								
3 inch sieve.....	8.9		8.8		4.5		5.1	
2 inch sieve.....	45.6		45.7		41.6		40.0	
1 1/2 inch sieve.....	78.2		76.7		75.8		76.1	
1 inch sieve.....	93.5		93.5		93.9		93.1	
3/4 inch sieve.....	95.0		94.8		95.6		94.9	
1/2 inch sieve.....	95.7		95.7		96.5		95.7	
Percentage -1/2 inch (breeze).....	4.3		4.3		3.5		4.3	
Tumbler Test (ASTM)								
Stability Factor.....	53.2		53.9		50.2		52.1	
Hardness Factor.....	67.3		68.5		65.4		65.1	
Japanese Drum Test (JIS) (cumulative percentage retained on)	*	**	*	**	*	**	*	**
50 mm sieve.....	18.6	4.8	15.4	2.5	7.6	0.8	14.1	0.8
25 mm sieve.....	89.1	71.5	87.0	69.8	84.0	65.3	85.8	67.5
15 mm sieve.....	93.9	82.5	93.9	82.5	92.7	79.7	92.7	80.6

*30 revs **150 revs

TABLE 7

Analyses of Coke Oven Charges and Resultant Cokes

Identification				
Test Number.....	821	822	840	845
Date Charged.....	3/12/80	4/12/80	17/2/81	17/3/81
Description.....	Horseshoe Ridge Blend #1	Ewin Pass Blend #1	100% Seam 4 Washed to 1.60	100% Horseshoe Ridge Adit 19 - Seam 7
Coke Oven Charge				
Laboratory Number.....	4867-80	4868-80	2321-81	2511-81
Proximate Analysis (db)				
Ash.....%	9.5	8.2	6.7	8.7
Volatile Matter.....%	23.5	28.1	28.2	24.6
Fixed Carbon .....%	67.0	63.7	65.1	66.7
Sulphur (db).....%	0.46	0.34	0.70	0.58
Resultant Coke				
Laboratory Number.....	4972-80	4973-80	2525-81	2731-81
Proximate Analysis (db)				
Ash.....%	11.4	10.2	7.8	11.1
Volatile Matter.....%	2.0	1.6	1.3	1.3
Fixed Carbon.....%	86.6	88.2	90.9	87.6
Sulphur (db).....%	0.47	0.35	0.27	0.52

TABLE 7.1

Analyses of Coke Oven Charges and Resultant Cokes

Identification				
Test Number.....	846	847	848	849
Date Charged.....	18/3/81	19/3/81	24/3/81	25/3/81
Description.....	Horseshoe Ridge Blend #2	Horseshoe Ridge Blend #3	100% Adit 2 Seam 4	Ewin Pass Blend #2
Coke Oven Charge				
Laboratory Number.....	2512-81	2517-81	2574-81	2633-81
Proximate Analysis (db)				
Ash.....%	9.2	9.0	7.0	7.2
Volatile Matter.....%	22.4	21.9	26.9	26.5
Fixed Carbon .....%	68.4	69.1	66.1	66.3
Sulphur (db).....%	0.48	0.27	0.32	0.41
Resultant Coke				
Laboratory Number.....	2732-81	2733-81	2734-81	2735-81
Proximate Analysis (db)				
Ash.....%	11.3	11.1	9.3	9.6
Volatile Matter.....%	1.3	1.4	1.1	1.8
Fixed Carbon.....%	87.4	87.5	89.6	88.6
Sulphur (db).....%	0.44	0.43	0.28	0.35

TEST RESULTS FOR ADIT 4,

SEAM 5 BULK SAMPLE

1981

CLIENT : CROWS NEST RESOURCES LTD.

PROJECT: EWIN PASS ADIT 4, SEAM 5 BULK SAMPLE

LAB NO.: 8916

HEAD RAW ANALYSIS

ADM%	MOIST%	ASH%	VOL%	F.C.%	S%	F.S.I.	CALC. BASIS
3.2	1.2	8.7	26.3	63.8	0.63	8 1/2	a.d.b.
	4.4	8.4	25.5	61.7	0.61	-	a.r.b.
		8.8	26.6	72.6	0.64	-	d.b.

SIZE CONSIST:Raw Coal As Rec'd

SIZE FRACTION	WT%	CUM WT%
50 mm x 25 mm	10.6	10.6
25 x 12	14.4	25.0
12 x 6	15.0	40.0
6 x 0.6	46.9	86.9
0.6 x 0.3	6.9	93.8
0.3 x0.15	3.4	97.2
0.15 x0.075	1.8	99.0
0.075 x0	1.0	100.0

WT% + 50 mm = 3.4 - crushed to pass 50 mm.

SIZE AND RAW ANALYSES ,adb: ATTRITED 50 mmx0 Raw Coal

SIZE FRACTION	WT%	RM%	ASH%	VOL%	F.C.%	S%	F.S.I.	CUMULATIVE WT%	CUMULATIVE ASH%
50 mm x 25 mm	2.0	1.1	12.3	23.7	62.9	0.52	4 1/2	2.0	12.3
25 x 12	5.7	0.9	13.7	23.4	62.0	0.53	3 1/2	7.7	13.3
12 x 6	8.8	0.8	13.4	24.3	61.5	0.55	5 1/2	16.5	13.4
6 x 0.6	57.1	0.9	8.2	26.7	64.2	0.59	8 1/2	73.6	9.4
0.6 x 0.3	9.5	1.1	6.0	27.6	65.3	0.58	9	83.1	9.0
0.3 x 0.15	7.9	1.1	5.7	27.7	65.5	0.61	9	91.0	8.7
0.15 x 0.075	3.6	1.2	5.9	27.3	65.6	0.64	8 1/2	94.6	8.6
0.075 x 0	5.4	1.3	7.2	26.3	65.2	0.67	8 1/2	100.0	8.5

ATTRITION PARAMETERS: ASTM Attrition Drum 17 kg load attrited for 20 minutes, at 40 r.p.m.

Birtley Coal
& Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

CLIENT : CROWS NEST RESOURCES LTD.

PROJECT: EWIN PASS ADIT 4, SEAM 5 BULK SAMPLE

LAB NO.: 8916

SINK-FLOAT ANALYSIS,adb: ATTRITED 50mm x 6 mm

SG FRACTION	WT%	RM%	ASH%	F.S.I.	CUMULATIVE WT%	CUMULATIVE ASH%
- 1.30	45.3	0.9	3.4	6 1/2	45.3	3.4
1.30 - 1.35	18.9	0.9	7.8	3 1/2	64.2	4.7
1.35 - 1.40	12.0	0.7	14.9	3	76.2	6.3
1.40 - 1.45	4,5	0.8	20.3	3	80.7	7.1
1.45 - 1.50	5.0	0.5	24.5	2 1/2	85.7	8.1
1.50 - 1.55	4.3	0.8	29.6	1 1/2	90.0	9.1
1.55 - 1.60	1.9	0.5	34.9	1 1/2	91.9	9.7
1.60 - 1.70	2.0	0.6	40.3	1	93.9	10.3
1.70 - 1.80	1.2	0.6	47.5	1	95.1	10.8
+1.80	4.9	0.6	74.4	N.A.	100.0	13.9

SINK-FLOAT ANALYSIS, adb : ATTRITED 6mm x 0.6mm

SG FRACTION	WT%	RM%	ASH%	F.S.I.	CUMULATIVE WT%	CUMULATIVE ASH%
- 1.30	75.5	0.9	2.8	8 1/2	75.5	2.8
1.30 - 1.35	9.5	0.8	8.1	4 1/2	85.0	3.4
1.35 - 1.40	4.8	0.7	13.8	4	89.8	3.9
1.40 - 1.45	2,2	0,7	18.8	2 1/2	92.0	4.3
1.45 - 1.50	1.7	0.6	24,2	2	93.7	4.7
1,50 - 1,55	1,1	0.7	29.1	1 1/2	94.8	4.9
1.55 - 1,60	0,7	0.5	34,4	1	95.5	5.2
1.60 - 1,70	0.9	0,7	40,3	1	96.4	5.5
1.70 - 1,80	0,7	0,6	48,6	1	97.1	5.8
+ 1.80	2,9	0.7	71.7	N.A.	100.0	7.7

Birtley Coal
& Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

CLIENT : CROWS NEST RESOURCES LTD.

PROJECT: EWIN PASS ADIT 4, SEAM 5 BULK SAMPLE

LAB NO.: 8916

SINK-FLOAT ANALYSIS, adb: ATTRITED 0.6mmx0.3mm

SG FRACTION	WT%	RM%	ASH%	F.S.I.	CUMULATIVE WT%	CUMULATIVE ASH%
- 1.30	78.9	0.4	1.8	9	78.9	1.8
1.30 - 1.35	9.0	0.7	6.5	5	87.9	2.3
1.35 - 1.40	6.1	0.9	11.9	2 1/2	94.0	2.9
1.40 - 1.45	1.2	0.9	16.4	1 1/2	95.2	3.1
1.45 - 1.50	0.7	1.1	22.8	1 1/2	95.9	3.2
1.50 - 1.55	0.6	1.2	27.9	1	96.5	3.4
1.55 - 1.60	0.4	1.1	33.1	1	96.9	3.5
1.60 - 1.70	0.5	1.2	39.3	1	97.4	3.7
1.70 - 1.80	0.4	1.1	47.2	1	97.8	3.9
+1.80	2.2	0.8	72.4	N.A.	100.0	5.4

FROTH FLOTATION TEST, adb: ATTRITED 0.3 mm x 0

PRODUCT	WT%	RM%	ASH%	F.S.I.	CUMULATIVE WT%	CUMULATIVE ASH%
STAGE 1	83.6	0.6	4.1	9	83.6	4.1
STAGE 11	8.8	1.0	7.8	8 1/2	92.4	4.5
TAILINGS	7.6	1.7	25.4	3 1/2	100.0	6.0

F.F. PARAMETERS: Pulp Density = 10%
Reagent/Dosage = 4:1=Kerosene:MIBC:0.48 lb/T
Conditioning Time = 60 seconds
Stage 1 = 1st minute froth
Stage 11 = 2nd minute froth

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CLIENT : CROWS NEST RESOURCES LTD.

PROJECT: EWIN PASS BULK SAMPLE -ADIT 4, SEAM 5

SIZE ANALYSIS, a.d.b.: PLANT SAMPLES

LAB NO.: 8917

I HEAVY MEDIA FEED

SIZE FRACTION	WT%	ASH%	CUMULATIVE WT%	CUMULATIVE ASH%
19.1mm x 12mm	13.5	16.3	13.5	16.3
12 x 6	28.8	12.3	42.3	13.6
6 x 3	19.0	9.6	61.3	12.3
3 x 1.18	19.8	7.7	81.1	11.2
1.18 x 0.6	15.4	6.2	96.5	10.4
0.6 x 0	3.5	12.0	100.0	10.5

II WATER ONLY CYCLONE FEED

SIZE FRACTION	WT%	ASH%	CUMULATIVE WT%	CUMULATIVE ASH%
+ 0.6 mm	3.0	6.2	3.0	6.2
0.6 x 0.212	47.4	5.8	50.4	5.8
0.212x 0.150	10.0	6.6	60.4	6.0
0.150x 0.075	15.4	7.2	75.8	6.2
0.075x 0.045	5.7	10.8	81.5	6.5
0.045x 0	18.5	18.9	100.0	8.8

III FROTH FLOTATION FEED

SIZE FRACTION	WT%	ASH%	CUMULATIVE WT%	CUMULATIVE ASH%
+ 0.6mm	0.6	4.7	0.6	4.7
0.6 x 0.212	6.2	6.6	6.8	6.4
0.212 x 0.150	31.2	8.2	38.0	7.9
1.150 x 0.075	24.9	7.5	62.9	7.7
0.075 x 0.045	12.4	9.4	75.3	8.0
0.045 x 0	24.7	16.5	100.0	10.1

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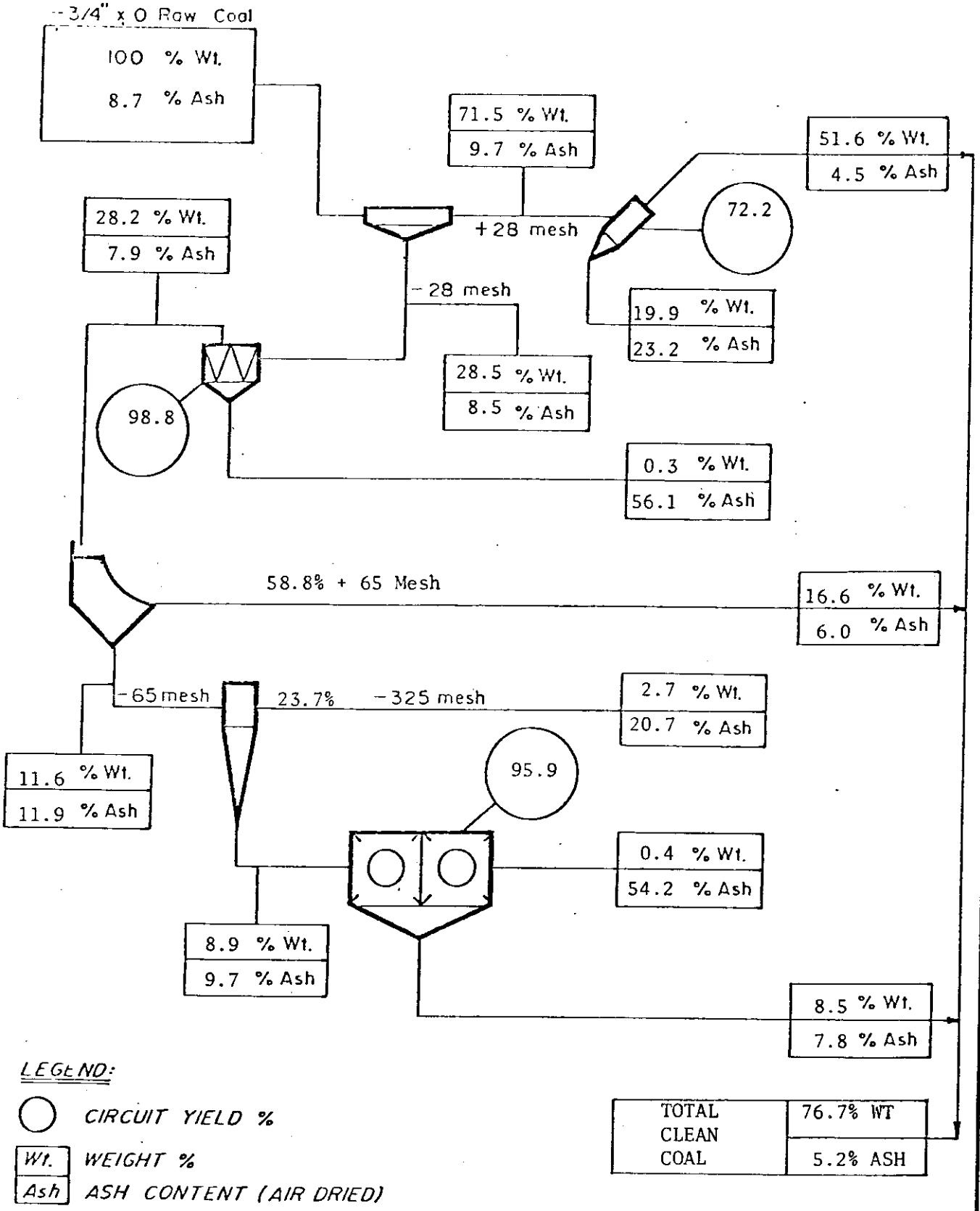

BIRTLEY COAL & MINERALS TESTING

Title PLANT BALANCE FLOW SHEET CROWS NEST RESOURCES LTD. EWIN PASS BULK SAMPLE FROM ADIT 4 ,SEAM 5 LAB NO. 8917	Date Aug. /81 Drawn

SUMMARY - BULK WASHING DATA *

Bulk Sample Ewin Pass Adit 4/Seam 5 Lab. No. 8917

Date Received Aug. 11/81 Date Washed Aug. 26/81

(a) RAW COAL

Delivered Weight 4.534 MT Washed Weight 1.832 MT

ADM % 3.2 ASH% 8.7 F.S.I. 8 1/2

(b) HEAVY MEDIA CIRCUIT: 3/4" x 28 Mesh= 71.5 % by weight

S.G. of Medium 1.30 Calculated Yield 72.2 %

Sample	ASH %	F.S.I.
Feed	9.7	8
Clean Coal	4.5	8 1/2
Reject	23.2	5

(c) WATER -ONLY CYCLONE CIRCUIT :28M x0 = 28.5 % by weight

V.F.C. #1 0 cm. #2 5 cm. Calculated Yield 98.8 %

Sample	ASH %	F.S.I.
Feed	8.5	8 1/2
Overflow	7.9	8 1/2
Underflow	56.1	N.A.
S.B.O.	6.0	8 1/2
S.B.U.	11.9	7 1/2

(d) FROTH FLOTATION CIRCUIT: 65M x0 11.6 %by Weight

4:1 =Kerosene: M.I.B.C. Calculated Yield 95.9 %

Sample	ASH %	F.S.I.
T.C.O.	20.7	N.A.
Feed (T.C.U.)	9.7	8
Concentrate	7.8	8 1/2
Tailings	54.2	N.A.

(e) FILTER CAKE: S.B.O. + CONCENTRATE = 7.0 ASH% 8 1/2 FSI

* All weights and analysis are on an Air Dried Basis unless otherwise indicated.

Birtley Coal
& Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

SUMMARY -BULK WASHING DATA (Cont.)

BULK SAMPLE Ewin Pass Adit 4/Seam 5 LAB NO. 8917

(f) CLEAN COAL: H.M.C.C. + FILTER CAKE Calculated Yield 76.7 %

ADM	PROXIMATE				S	C.V. Cal/gm	FSI		
	RM%	ASH%	VM %	FC %					
7.5	0.5	5.3	27.8	66.4	0.63	8107	8 1/2		

DILATATION TEST				
ST (°C)	MDT (°C)	MC %	MD %	G
383	470	28	80	1.052

GIESELER FLUIDITY TEST		
	DDPM	TEMP (°C)
START	1	428
MAXIMUM	342	468
FINAL	0	505
RANGE =		77

Birtley Coal
& Minerals Testing
A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK SAMPLE Ewin Pass Adit 4/Seam 5 LAB NO. 8917

SUMMARY BULK WASHING DATA (Cont.)

CLEAN COAL INVENTORY

DATE	SHIPPED		IN STOCK	
	BBLS	M.T.	BBLS	M.T.
Aug. 31/81	-	-	8	1.228
Sept. 2/81	2	0.307	6	0.921

Birtley Coal
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A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK WASHING DATA

BULK SAMPLE Ewin Pass Adit 4/Seam 5 LAB NO. 8917

HEAVY MEDIUM CIRCUIT

CYCLONE: 14" DSM operating @ 52 KPa.

MAGNETITE MEDIUM maintained @ 1.30 S.G.

1. FEED(3/4 x 28 Mesh) 1.309 M.T. 9.7 ASH% 8 FSI

2. CLEAN COAL 0.887 M.T. 4.5 ASH% 8 1/2 FSI

3. REJECT 0.422 M.T. 23.2 ASH% 5 FSI

4. YIELD CLEAN COAL (Weighted) = $\frac{0.887}{1.309}$ = 67.8 %

5. YIELD CLEAN COAL (Calculated) = $\frac{23.2 - 9.7}{23.2 - 4.5}$ = 72.2 %

Birtley Coal
& Minerals Testing
A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK WASHING DATA

BULK SAMPLE Ewin Pass Adit 4/ Seam 5 LAB NO. 8917

WATER-ONLY CYCLONE CIRCUIT

Primary Cyclone: 6" DSM Operating	@	138	KPa
Vortex Finder Clearance set	@	0	c.m.
Secondary Cyclone: 4" DSM Operating	@	35	KPa
Vortex Finder Clearance Set	@	5	c.m.

Sieve Bend : 65 Mesh

1. Feed (28Mesh x 0)	8.5	ASH%	8 1/2	F.S.I.
2. Primary Cyclone Overflow	7.9	ASH%	8 1/2	F.S.I.
3. Secondary Cyclone Underflow	56.1	ASH%	N.A.	F.S.I.
4. Sieve Bend Overflow (S.B.O.)	6.0	ASH%	8 1/2	F.S.I.
5. Sieve Bend Underflow(S.B.U.)	11.9	ASH%	7 1/2	F.S.I.

6. Yield (W.O. Cyclone) $\frac{56.1 - 8.5}{56.1 - 7.9}$ = 98.8 %

7. WT% 28M x 65M in Primary Cyclone Overflow = 58.8 %

8. Estimated Yield of 28M x 65M (S.B.O., as % of 28M x 0 Feed) = 58.1 %

Birtley Coal
& Minerals Testing

A DIVISION OF GREAT WEST STEEL INDUSTRIES LTD

BULK WASHING DATA

BULK SAMPLE Ewin Pass Adit 4/Seam5 LAB NO. 8917

FROTH FLOTATION CIRCUIT

Flotation Cell: two(2) Birtley -Humboldt Multi-Wobble impellers in series.

Reagent : 4:1 = Kerosene:M.I.B.C.

Thickening Cyclone : 20° - 8" cyclone Hayl-Patterson

1. Thickening Cyclone Overflow (T.C.O. -325M) 20.7 ASH% N.A. FSI

2. Flotation Feed(Thickening Cyclone Underflow) 9.7 ASH% 8 FSI

3. Concentrate 7.8 ASH% 8 1/2 FSI

4. Tailings 54.2 ASH% N.A. FSI

5. Yield Concentrate $\frac{54.2-9.7}{54.2-7.8}$ = 95.9 %

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