



Warnock Hersey Professional Services Ltd.

1423 D 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel. ~~264-9120~~ 276 -

604H-M36A

Report of Analysis of

Hat Creek Bulk Sample - W 77 Z

Includes Wet Attrition

PART I. "Z" only

Submitted, December 20, 1977

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Warnock Hersey Professional Services Ltd.

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Introduction

The Hat Creek Project took the form of a work program to the instructions of Simon Carves of Canada.

This was to examine, using the Warnock Hersey Professional Services Laboratory at Calgary, Canada, the physical properties of the three samples.

This analysis took the form of grading, float & sink characteristics, proximate analysis.

Also included was a scheme whereby the breakdown of the coal / clay could be measured using a Wet Attrition drum constructed to, and complying with, the standards of the Australian Method AS 1161 1977 p. 42/3.

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Description of Samples and Methods Used

One sample marked "Z" which was derived from trench "Z" weighing 11115 kgms. packed into 73 steel drums was delivered to Calgary on August 11, 1977. On opening these drums, it was immediately noticeable that polythene liners had not been used. A separate moisture sample was not delivered.

The methods used to obtain these samples were outside the terms of reference to Warnock Hersey Professional Services Ltd.

After air drying the coals very few lumps of clay were to be seen and even after separating the + 4 " material the amounts of pure clay was very small. Discrete inorganic material could be seen occluded in the clay, and when samples were placed in water, the coal could be seen to separate according to the clay content. High coal content pieces would stay in their original shape, but low coal content pieces, i.e. due to larger amounts of clay occlusions, broke up rapidly and became a slurry. After filtering, it was possible to settle the dispersion easily and a clear supernatant could be decanted.

Grading, using a Gilson mechanical sieving apparatus to separate the fractions, and Float & Sink analysis, in organic solutions at prescribed gravities were used to separate the coals further. Drying on down draught benches was followed by preparation of samples for analysis. Riffing was accomplished by means of a manual riffle.

The Flow sheet was supplied by Simon Carves and this was generally adhered to except some shale analysis had to be added, and moisture contents prior to analysis had also to be added to the flow sheets. All three samples were treated in the same way. The weights and % weights are also reported. In some cases a very small fractional weight resulted, but the test was completed noting this. A Float & Sink test on the + 4 " was carried out on "X" and "Z" samples only - "Y" did not produce a fraction at + 4 ". Since separate moisture samples were not received, air drying followed by loss in weight at 107 ° techniques were used to determine total moisture.

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During the processing of sample "Z" a Simon Carves representative was present in the lab and again during some of the later stages only.

No Ash Examination was requested.

A mechanical type of wet screening apparatus was not available, so careful control over water supplies and hand manipulation had to be used to separate the fines into respective size fractions. It was found that "conditioning" i.e. soaking in water prior to screening ensured the best separation and each sample was subjected to 10 minutes in water before screening.

Reference to the flow sheet will show a reserve sample was requested after the initial grading at + 4 " - this amounted to:

3,360 kgms. for "X"

13,000 kgms. for "Y"

800 kgms. for "Z"

Further requests from the flow sheet asked for hand selecting to be used for "bright, dull clay and rock". In practice this was less than feasible since we found agglomerates of these materials with coal and a reduction in particle size would have accompanied any mechanical breakage. The Simon Carves representative was present during this operation and was in agreement with what was done.

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CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL SIZE / ASH DISTRIBUTION

	<u>WT. %</u>	<u>DRY ASH %</u>	<u>CUM. WT. %</u>	<u>CUM. ASH %</u>	<u>WEIGHT (kg.)</u>
+ 4 "	3.1	25.6	3.1	25.6	344
4 " x 2 "	6.4	27.1	9.5	26.6	723
2" x 1 "	24.8	27.9	34.3	27.5	2,352(SUB)
1 " x ½ "	32.8	26.1	67.1	26.8	3,107
½ " x ¼ "	12.7	28.5	79.8	27.1	302.4(SUB)
¼ " x 1/8"	10.1	28.5	89.9	27.3	55.3
1/8" x 1/16"	4.8	30.6	94.7	27.4	10.1 (SUB)
1/16" x 28 M	2.6	32.4	97.3	27.6	3.3 (SUB)
28 M x 0	<u>2.7</u>	<u>33.9</u>	100.0	27.7	3.4
TOTAL	100.0	27.7			

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CLIENT - B.C. HYDRO

SAMPLE - HAT CREEK - Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - Dry Screened

Size	<u>+ 4"</u>	<u>4" x 2"</u>	<u>2" x 1"</u>	<u>1" x 1/2"</u>	<u>4" x 0</u>	<u>1/2" x 0</u>
Wt. % Head	3.1	6.4	24.8	32.8	96.9	32.9
Air Dried Loss	4.6	6.8	6.4	4.0	7.1	7.5
Inherent Moisture	21.0	19.3	20.4	21.0	21.5	22.8
Total Moisture	24.6	24.8	25.5	24.2	27.1	28.6
Ash (Air Dried)	22.3	21.8	22.2	20.6	21.1	22.0
Sulphur (Air Dried)	0.16	-	-	-	0.24	0.33
Btu / lb. (Air Dried)	6,856	-	-	-	6,966	6,805
<u>DRY BASIS</u>						
Ash	25.6	27.1	27.9	26.1	26.9	29.1
Sulphur	0.20	-	-	-	0.31	0.42
Btu / lb.	8,681	-	-	-	8,873	8,695
<u>DRY, ASH FREE BASIS</u>						
Btu / lb.	12,087	-	-	-	12,142	12,259

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CLIENT - B.C. HYDRO

SAMPLE - HAT CREEK - - Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - Dry Screen

Size	<u>1/2" x 1/4"</u>	<u>1/4" x 1/8"</u>	<u>1/8" x 1/16"</u>	<u>1/16" x 28M</u>	<u>28 M x 0</u>
Wt. % Head	12.7	10.1	4.8	2.6	2.7
Air Dried Loss	5.4	3.8	4.6	6.7	1.8
Inherent Moisture	21.1	22.0	19.0	17.5	18.0
Total Moisture	25.4	25.0	22.7	23.0	19.5
Ash (Air Dried Basis)	22.5	22.2	24.8	26.7	27.8
Sulphur (Air Dried Basis)	0.22	0.24	0.32	0.48	0.86
Btu / lb. (Air Dried Basis)	6,696	6,638	6,648	6,600	6,479
<u>DRY BASIS</u>					
Ash	28.5	28.5	30.6	32.4	33.9
Sulphur	0.28	0.30	0.39	0.58	1.05
Btu / lb.	8,484	8,510	8,207	8,001	7,901
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,872	11,896	11,829	11,829	11,954

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CLIENT - B. C. HYDRO

Sample Identification - Hat Creek - Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL SIZE / ASH DISTRIBUTION

Wet Screen Analysis of ½" x 0

Size	<u>Wt. %</u>	<u>Dry Ash %</u>	<u>Cum. Wt. %</u>	<u>Cum. Ash %</u>	<u>Wt. % Head</u>
½ x ¼ "	46.9	27.2	46.9	27.2	15.4
¼ x 1/8"	5.3	28.0	52.2	27.3	1.7
1/8 x 1/16"	5.1	28.2	57.3	27.4	1.7
1/16 x 28M	3.8	29.6	61.1	27.5	1.3
28 x 45 M	3.5	28.9	64.6	27.6	1.2
45 x 65 M	7.1	27.2	71.7	27.5	2.3
65 x 100 M	7.1	39.8	78.8	28.6	2.3
100 x 200 M	10.6	38.9	89.4	29.9	3.5
200 x 0	10.6	45.3	100.0	31.5	3.5
Total	100.0	31.5			32.9

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77. Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - Wet Screened

<u>Size</u>	<u>½" × ¼"</u>	<u>¼" × 1/8"</u>	<u>1/8" × 1/16"</u>	<u>1/16" × 28M</u>	<u>28 x 45 M</u>
Weight (kg.)	4.35	0.49	0.47	0.35	0.010 (SUB)
Wt. % Head	15.4	1.7	1.7	1.3	1.2
Moisture (As Run)	15.7	18.5	9.4	14.2	4.7
Ash	23.0	22.8	25.6	25.4	27.6
Sulphur	0.22	0.27	0.40	0.64	0.95
Btu / lb.	7,319	6,972	7,702	7,228	8,032
<u>DRY BASIS</u>					
Ash	27.2	28.0	28.2	29.6	28.9
Sulphur	0.26	0.33	0.44	0.75	1.00
Btu / lb.	8,679	8,552	8,500	8,420	8,431
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,924	11,878	11,838	11,961	11,862

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CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - Wet Screened

<u>Size</u>	<u>45 x 65 M</u>	<u>65 x 100 M</u>	<u>100 x 200 M</u>	<u>200 x 0</u>
Weight (kg.)	0.021	0.020	0.031	0.029
Wt. % Head	2.3	2.3	3.5	3.5
Moisture (As Run)	5.2	6.7	5.5	4.9
Ash	25.8	37.1	36.8	43.1
Sulphur	1.23	0.81	0.57	0.34
Btu / lb.	8,110	6,556	6,680	5,529
<u>DRY BASIS</u>				
Ash	27.2	39.8	38.9	45.3
Sulphur	1.30	0.87	0.60	0.36
Btu / lb.	8,556	7,026	7,071	5,813
<u>DRY, ASH FREE BASIS</u>				
Btu / lb.	11,764	11,672	11,573	11,098

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CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W - 77 - Z

LAB. NO. - 77 - 8073

ANALYSIS OF CLEAN COAL - 4" x 1" Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Wt. % (Cum.)	64.5	76.8	87.9	95.9	99.1	100.0
Wt. (kg.)	257.4	280.2	324.6	346.3	309.5	
<u>As Run</u>						
Moisture	21.1	21.1	20.5	18.3	18.1	5.0
Ash	13.3	15.4	18.4	20.8	21.9	68.0
Sulphur	0.19	0.20	0.21	0.20	0.18	-
Btu / lb.	7,641	7,437	7,248	7,087	6,970	-
<u>Dry Basis</u>						
Ash	16.8	19.5	23.2	25.5	26.7	71.6
Sulphur	0.24	0.25	0.26	0.24	0.22	-
Btu / lb.	9,686	9,425	9,117	8,676	8,510	-
<u>Dry, Ash Free Basis</u>						
Btu / lb.	11,648	11,710	11,863	11,647	11,611	-
Cum. Sink						
<u>As Run</u>						
Wt. (kg.)	141.8	84.4	44.7	14.8	2.8	
Wt. %	35.5	23.2	12.1	4.1	0.9	
Moisture	19.6	18.6	16.6	10.5	5.0	
Ash	37.6	42.7	45.2	56.0	68.0	
<u>Dry Basis</u>						
Ash	46.8	52.4	54.3	62.5	71.6	

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CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W - 77 - Z

LAB. NO. - 77 - 8073

ANALYSIS OF CLEAN COAL - 1" x 1/2" Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Wt. % (Cum.)	60.8	74.1	85.8	94.5	97.8	100.0
Wt. (kg.)	69.6	79.3	105.5	109.2	109.3	-
<u>As Run</u>						
Moisture	19.8	19.5	19.2	20.1	16.8	9.6
Ash	14.6	16.0	18.6	19.9	21.8	68.5
Sulphur	0.23	0.22	0.20	0.23	0.21	-
Btu / lb.	7,698	7,551	7,478	7,185	7,273	-
<u>Dry Basis</u>						
Ash	18.1	19.9	23.0	24.9	26.2	75.8
Sulphur	0.29	0.27	0.25	0.29	0.25	-
Btu / lb.	9,592	9,375	9,260	8,997	8,737	-
<u>Dry, Ash Free Basis</u>						
Btu / lb.	11,717	11,705	12,025	11,980	11,838	-
Cum. Sink						
<u>As Run</u>						
Wt. (kg.)	44.9	27.8	17.5	6.4	2.5	
Wt. %	39.2	25.9	14.2	5.5	2.2	
Moisture	9.8	8.9	10.5	8.2	9.6	
Ash	37.4	43.8	47.0	61.2	68.5	
<u>Dry Basis</u>						
Ash	41.5	48.1	52.5	66.6	75.8	

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CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W - 77 - Z

LAB. NO. - 77 - 8073

ANALYSIS OF CLEAN COAL ½" x ¼" Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Wt. % (Cum.)	61.9	65.9	83.9	93.6	99.6	100.0
Wt. (kg.)	13.8	16.6	19.3	21.8	23.1	
<u>As Run</u>						
Moisture	19.3	20.9	19.7	19.8	19.9	5.1
Ash	14.2	14.2	19.1	21.3	22.9	68.9
Sulphur	0.24	0.23	0.26	0.26	0.22	-
Btu / lb.	7,921	7,755	7,331	7,020	6,823	-
<u>Dry Basis</u>						
Ash	17.6	17.9	23.8	26.5	28.6	72.6
Sulphur	0.30	0.29	0.32	0.32	0.27	-
Btu / lb.	9,816	9,800	9,134	8,750	8,518	-
<u>Dry, Ash Free Basis</u>						
Btu / lb.	11,915	11,937	11,981	11,904	11,930	-
Cum. Sink						
<u>As Run</u>						
Wt. (kg.)	8.5	8.6	3.7	1.5	0.1	
Wt. %	38.1	34.1	16.1	6.4	0.4	
Moisture	16.0	14.4	14.7	9.4	5.1	
Ash	39.5	42.7	47.5	56.3	68.9	
<u>Dry Basis</u>						
Ash	47.0	49.9	55.6	62.2	72.6	



Sample Identification Hat Creek Bulk Sample Z
Lab. No. (s) 77 - 8073

Size fraction + 4"
Wt % of head sample 3.1

Specific Gravity

FLOAT AND SINK ANALYSIS % FROTH FLOTATION

<u>Sink</u>	<u>Float</u>	<u>WEIGHT</u> (kg.)	<u>Elementary</u>			<u>Cumulative Float</u>			<u>Cumulative Sink</u>		
			<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Shulphur</u>
	1.40	130.3	67.4	17.3		67.4	17.3		100.0	22.0	
1.40	1.45	35.8	18.5	28.4		85.9	19.7		32.6	31.8	
1.45	1.50	18.7	9.7	31.8		95.6	20.9		14.1	36.4	
1.50	1.60	8.5	4.4	46.5		100.0	22.0		4.4	46.5	
1.60	1.80	NIL	0.0	-		-	-		-	-	
1.80		NIL	0.0	-		-	-		-	-	
	TOTAL		100.0	22.0							



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Sample Identification Hat Creek Bulk Sample Z Size fraction 4" x 1"
 Lab. No. (s) 77 - 8073 Wt % of head sample 31.2

Specific Gravity

FLOAT AND SINK ANALYSIS %

<u>Sink</u>	<u>Float</u>	<u>Elementary</u>			<u>Cumulative Float</u>			<u>Cumulative Sink</u>		
		<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>
	1.40	64.5	16.8		64.5	16.8		100.0	27.1	
1.40	1.45	12.3	33.6		76.8	19.5		35.5	45.7	
1.45	1.50	11.1	48.8		87.9	23.2		23.2	52.1	
1.50	1.60	8.0	51.3		95.9	25.5		12.1	55.1	
1.60	1.80	3.2	60.1		99.1	26.7		4.1	62.6	
1.80		0.9	71.6		100.0	27.1		0.9	71.6	
	TOTAL	100.0	27.1							



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Sample Identification Hat Creek Sample Z Size fraction 1' x 1/2"
 Lab. No. (s) 77 - 8073 Wt % of head sample 32.8

Specific Gravity

FLOAT AND SINK ANALYSIS %

Sink	Float	Elementary			Cumulative Float			Cumulative Sink		
		Weight	Ash	Sulphur	Weight	Ash	Sulphur	Weight	Ash	Shulphur
	1.40	60.8	18.1		60.8	18.1		100.0	27.3	
1.40	1.45	13.3	28.1		74.1	19.9		39.2	41.7	
1.45	1.50	11.7	42.8		85.8	23.0		25.9	48.6	
1.50	1.60	8.7	43.9		94.5	24.9		14.2	53.4	
1.60	1.80	3.3	63.7		97.8	26.2		5.5	68.5	
1.80		2.2	75.8		100.0	27.3		2.2	75.8	
	TOTAL	100.0	27.3							



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Sample Identification Hat Creek Bulk Sample Z

Size fraction 1/8" x 1/4"

Lab. No. (s) 77 -8073

Wt % of head sample 12.7

Specific Gravity

FLOAT AND SINK ANALYSIS %

<u>Sink</u>	<u>Float</u>	<u>Elementary</u>			<u>Cumulative Float</u>			<u>Cumulative Sink</u>		
		<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Shulphur</u>
	1.40	61.9	17.6		61.9	17.6		100.0	28.8	
1.40	1.45	4.0	22.5		65.9	17.9		38.1	46.9	
1.45	1.50	18.0	45.4		83.9	23.8		34.1	49.8	
1.50	1.60	9.7	49.8		93.6	26.5		16.1	54.7	
1.60	1.80	6.0	61.4		99.6	28.6		6.4	62.1	
1.80		0.4	72.6		100.0	28.8		0.4	72.6	
	TOTAL	100.0	28.8							

Hat Creek Bulk Sample W 77 Z

Wet Attrition Test and Analysis

Warnock Hersey Professional Services Ltd.

Wet Attrition Test

The test apparatus consisted of a cylindrical drum, fabricated to the Australian Standards AS 1661 1977, with a measured volume of water and known amount of coal, together with steel cubes, the whole being subjected to rotation at a prescribed speed for a measured length of time. On completion of the test, the water was filtered through a specially designed cover made up from $\frac{1}{2}$ mm wedge wire and the attrited coal then subjected to the analysis as laid down per instructions.

The tumbling time was decided by the Hardgrove Index which was determined prior to the test being carried out. A calibration graph (also in the Australian Standards) was provided.

Details

Drum - volume capacity - 200 litres
Steel Cubes - 18 each edge 50 mm
Speed - 20 R.P. M.
Amount coal used - 50 kgm .
Water volume - 150 litres

In practice, during early commissioning of the drum, the wedge wire screen was not used as a filter, the drum was allowed to stand for a short while until settlement had taken place and the water decanted off - this shortened the time slightly and this water was collected and used for the subsequent wet screening.

We have in hand a slight alteration to the driving mechanism in so far as an additional crank, which will enable the drum to be slowly turned by hand in order to facilitate emptying.

Determined Hardgrove Indexes

"X"	"Y"	"Z"
53.9	49.7	56.7

The tumbling times from the calibration graph fall under the lowest point of the curve. However, in order to comply with the instructions issued by Simon Carves the tumbling times used were 30 seconds in all three cases.

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL SIZE / ASH DISTRIBUTION

Wet Screen Analysis After Wet Attrition

<u>Size</u>	<u>Wt. %</u>	<u>Dry Ash %</u>	<u>Cum. Wt. %</u>	<u>Cum. Ash %</u>	<u>Weight (kg.)</u>
4" x 1/2"	26.5	21.0	26.5	21.0	11.45
1/2" x 1/4"	22.4	27.6	48.9	24.0	9.65
1/4" x 1/8"	27.2	31.2	76.1	26.6	11.70
1/8" x 1/16"	9.5	30.9	85.6	27.1	4.10
1/16" x 28 M	4.5	31.7	90.1	27.3	1.95
28 x 45 M	1.2	29.1	91.3	27.3	0.047
45 x 65 M	0.6	32.7	91.9	27.4	0.024
65 x 100 M	0.1	35.5	92.0	27.4	0.002
100 x 200 M	3.7	34.4	95.7	27.6	1.59
200 M x 0	4.3	52.4	100.0	28.7	1.85
Total	100.0	28.7			42.363

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - After Wet Attrition

<u>Size</u>	<u>4 " x 0</u>	<u>4 " x 1/2 "</u>	<u>1/2" x 1/4 "</u>	<u>1/4 " x 28 M</u>	<u>1/4 " x 0</u>
Weight (kg.)	-	11.45	9.65	-	-
Wt. % Head	96.9	26.5	22.4	41.2	51.1
Moisture (As Run)	7.2	5.6	2.0	9.0	7.9
Ash	26.6	19.9	27.0	28.4	30.6
Sulphur	0.31	0.25	0.23	0.25	0.32
Btu / lb.	7,863	9,011	8,452	7,508	7,434
<u>DRY BASIS</u>					
Ash	28.7	21.0	27.6	31.2	33.2
Sulphur	0.33	0.26	0.24	0.27	0.35
Btu / lb.	8,473	9,551	8,624	8,254	8,072
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,878	12,097	11,904	11,997	12,088

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - After Wet Attrition

<u>Size</u>	<u>¼" x 1/8"</u>	<u>1/8" x 1/16"</u>	<u>1/16" x 28M</u>	<u>28 M. x 45 M</u>	<u>45 x 65 M</u>
Weight (kg.)	11.70	4.10	1.95	0.047	0.024
Wt. % Head	27.2	9.5	4.5	1.2	0.6
Moisture (As Run)	11.9	5.0	3.3	2.8	11.5
Ash	27.5	29.3	30.6	28.4	29.0
Sulphur	0.24	0.23	0.39	0.54	0.70
Btu / lb.	7,276	7,737	7,734	8,203	7,605
<u>DRY BASIS</u>					
Ash	31.2	30.9	31.7	29.1	32.7
Sulphur	0.27	0.24	0.40	0.56	0.79
Btu / lb.	8,255	8,142	8,000	8,443	8,596
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	12,000	11,778	11,711	11,902	12,779

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

RAW COAL FRACTIONS - ANALYSIS % - After Wet Attrition

<u>Size</u>	<u>65 x 100 M</u>	<u>100 x 200 M</u>	<u>200 M x 0</u>	<u>28 x 100 M</u>
Weight (kg.)	0.002	1.59	1.85	-
Wt. % Head	0.1	3.7	4.3	1.9
Moisture (As Run)	I. S.	3.1	1.6	5.7
Ash	-	33.8	51.6	30.0
Sulphur	I. S.	1.12	0.42	0.58
Btu / lb.	I. S.	7,478	4,799	7,836
<u>DRY BASIS</u>				
Ash	35.5	34.4	52.4	31.8
Sulphur	-	1.16	0.43	0.61
Btu / lb.	-	7,720	4,876	8,313
<u>DRY, ASH FREE BASIS</u>				
Btu / lb.	-	11,773	10,254	12,188

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073 After Wet Attrition

ANALYSIS OF CLEAN COAL $\frac{1}{2}$ " x $\frac{1}{4}$ " Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80
Wt. % (Cum.)	43.9	58.3	65.5	75.0	91.2
Wt. (kg.)	0.82	1.05	1.33	1.35	1.55
<u>As Run</u>					
Moisture	3.8	2.8	5.2	3.3	4.0
Ash	10.9	13.6	14.7	17.1	21.4
Sulphur	0.22	0.26	0.31	0.22	0.21
Btu / lb.	10,361	10,114	9,563	9,263	8,678
<u>Dry Basis</u>					
Ash	11.3	14.0	15.5	17.7	22.3
Sulphur	0.23	0.27	0.33	0.23	0.22
Btu / lb.	10,769	10,403	10,083	9,582	9,038
<u>Dry, Ash Free Basis</u>					
Btu / lb.	12,139	12,102	11,936	11,782	11,636
Cum. Sink					
<u>As Run</u>					
Wt. (kg.)	1.05	0.75	0.70	0.45	0.15
Wt. %	56.1	41.7	34.5	25.0	8.8
Moisture	2.6	2.7	2.7	2.8	2.1
Ash	35.5	40.4	41.8	48.1	57.1
Sulphur	0.16	0.22	0.20	0.15	0.16
Btu / lb.	7,054	6,355	6,136	5,185	3,855
<u>Dry Basis</u>					
Ash	36.5	41.6	43.0	49.5	58.3
Sulphur	0.16	0.23	0.21	0.15	0.16
Btu / lb.	7,242	6,531	6,309	5,332	3,937 ₂₃

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073 After Wet Attrition

ANALYSIS OF CLEAN COAL ¼" x 28 M Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80
Wt. % (Cum.)	19.8	28.2	37.8	56.5	81.5
Wt. (kg.)	0.542	0.875	1.275	1.700	2.910
<u>As Run</u>					
Moisture	2.8	3.2	3.3	3.4	6.0
Ash	5.9	8.2	10.9	15.4	20.0
Sulphur	0.31	0.35	0.38	0.28	0.31
Btu / lb.	11,074	10,629	10,176	9,403	8,269
<u>Dry Basis</u>					
Ash	6.1	8.5	11.2	16.0	21.3
Sulphur	0.32	0.36	0.39	0.29	0.33
Btu / lb.	11,393	10,978	10,520	9,734	8,792
<u>Dry, Ash Free Basis</u>					
Btu / lb.	12,133	11,997	11,850	11,584	11,174
Cum. Sink					
<u>As Run</u>					
Wt. (kg.)	2.200	2.225	2.095	1.310	0.660
Wt. %	80.2	71.8	62.2	43.5	18.5
Moisture	3.0	4.3	4.6	3.3	1.7
Ash	33.9	35.7	37.9	44.1	61.0
Sulphur	0.21	0.20	0.19	0.23	0.18
Btu / lb.	7,096	6,781	6,368	5,409	4,287
<u>Dry Basis</u>					
Ash	35.0	37.3	39.2	45.6	62.1
Sulphur	0.22	0.21	0.20	0.24	0.18
Btu / lb.	7,317	7,088	6,677	5,592	4,363

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Z

LAB. NO. - 77 - 8073

After Wet Attrition

ANALYSIS OF CLEAN COAL 28 x 100 M. Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80
Wt. % (Cum.)	21.5	27.8	31.5	44.6	61.5
Wt. (gm.)	29	39	51	83	96
<u>As Run</u>					
Moisture	2.4	2.5	1.3	1.4	2.1
Ash	6.2	7.3	8.8	12.3	17.7
Sulphur	0.30	0.30	0.27	0.27	0.34
Btu / lb.	11,969	11,609	11,350	10,601	9,492
<u>Dry Basis</u>					
Ash	6.4	7.5	9.0	12.5	18.1
Sulphur	0.31	0.31	0.27	0.27	0.35
Btu / lb.	12,266	11,909	11,504	10,753	9,695
<u>Dry, Ash Free Basis</u>					
Btu / lb.	13,099	12,875	12,636	12,288	11,838
Cum. Sink					
<u>As Run</u>					
Wt. (gm.)	106	101	111	103	60
Wt. %	78.5	72.2	68.5	55.4	38.5
Moisture	2.0	1.3	1.2	1.4	1.6
Ash	33.7	36.2	37.6	42.5	46.1
Sulphur	0.35	0.38	0.48	0.77	0.90
Btu / lb.	7,927	7,569	7,102	6,259	5,714
<u>Dry Basis</u>					
Ash	34.4	36.7	38.1	43.1	46.9
Sulphur	0.36	0.38	0.49	0.78	0.92
Btu / lb.	8,093	7,669	7,189	6,350	5,808



Warnock Hersey Professional Services Ltd.

1423 D 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel: 264-9120 276 - 9138

Sample Identification Hat Creek Bulk Sample W 77 Z Size fraction 1/2" x 1/4"
 Lab. No. (s) 77 - 8073 After Wet Attrition Wt % of head sample 22.4

Specific Gravity

FLOAT AND SINK ANALYSIS %

<u>Sink</u>	<u>Float</u>	<u>Elementary</u>			<u>Cumulative Float</u>			<u>Cumulative Sink</u>		
		<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u> <u>Dry</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>
	1.40	43.9	11.3		43.9	11.3		100.0	25.5	
1.40	1.45	14.4	22.2		58.3	14.0		56.1	36.5	
1.45	1.50	7.2	27.6		65.5	15.5		41.7	41.5	
1.50	1.60	9.5	32.9		75.0	17.7		34.5	44.4	
1.60	1.80	16.2	43.6		91.2	22.3		25.0	48.8	
1.80		<u>8.8</u>	<u>58.3</u>		100.0	25.5		8.8	58.3	
TOTAL		100.0	25.5							



Warnock Hersey Professional Services Ltd.

1423 D 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel. 264-9120 276 - 9138

Sample Identification Hat Creek Bulk Sample W 77 Z

Size fraction ¼ " x 28 M

Lab. No. (s) 77 - 8073 After Wet Attrition

Wt % of head sample 41.2

Specific Gravity

FLOAT AND SINK ANALYSIS %

<u>Sink</u>	<u>Float</u>	<u>Elementary</u>			<u>Cumulative Float</u>			<u>Cumulative Sink</u>		
		<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>
	1.40	19.8	6.1		19.8	6.1		100.0	28.8	
1.40	1.45	8.4	14.2		28.2	8.5		80.2	34.5	
1.45	1.50	9.6	19.1		37.8	11.2		71.8	36.3	
1.50	1.60	18.7	25.7		56.5	16.0		62.2	39.6	
1.60	1.80	25.0	33.3		81.5	21.3		43.5	45.5	
1.80		18.5	62.1		100.0	28.8		18.5	62.1	
TOTAL		100.0	28.8							



Warnock Hersey Professional Services Ltd.

1423 D 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel: 264-9120 x 276 - 9138

Sample Identification Hat Creek Bulk Sample W 77 Z Size fraction 28 M x 100
 Lab. No. (s) 77 - 8073 After Wet Attrition Wt % of head sample 1.9

Specific Gravity

FLOAT AND SINK ANALYSIS %

<u>Sink</u>	<u>Float</u>	<u>Elementary</u>			<u>Cumulative Float</u>			<u>Cumulative Sink</u>		
		<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u> <u>Dry</u>	<u>Sulphur</u>	<u>Weight</u>	<u>Ash</u>	<u>Sulphur</u>
	1.40	21.5	6.4		21.5	6.4		100.0	29.2	
1.40	1.45	6.3	11.2		27.8	7.5		78.5	35.4	
1.45	1.50	3.7	20.3		31.5	9.0		72.2	37.5	
1.50	1.60	13.1	20.9		44.6	12.5		68.5	38.5	
1.60	1.80	16.9	32.9		61.5	18.1		55.4	42.6	
1.80		<u>38.5</u>	<u>46.9</u>		100.0	29.2		38.5	46.9	
TOTAL		100.0	29.2							