

Warnock Hersey Professional Services Ltd.

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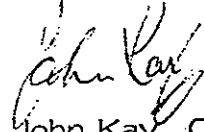
Report of Analysis of

Hat Creek Bulk Sample W 77 Y

Includes Wet Attrition

PART II. "Y" only

Submitted,



John Kay, C. Eng., M. Inst. F.
Manager of Laboratory

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 Y

LAB. NO. - 77 - 9015

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 "	0.4	14.4	0.4	14.4	26.1
4 " x 2 "	1.4	17.8	1.8	17.0	88.6
2" x 1 "	19.4	32.7	21.2	31.4	1216.0
1 " x ½ "	27.3	38.5	48.5	35.4	1706.8
½ " x ¼ "	19.2	44.4	67.7	37.9	214.5 (SUE)
¼ " x 1/8"	15.1	45.5	82.8	39.3	34.0 (SUE)
1/8" x 1/16"	6.3	51.1	89.1	40.2	13.8 (SUE)
1/16" x 28 M	5.0	55.5	94.1	41.0	10.7 (SUB)
28 M x 0	5.9	60.0	100.0	42.1	12.7
Total	100.0	42.1			

* No Clay + 4 "

* Insufficient + 4 " Coal for F/S

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CLIENT - B.C. HYDRO

SAMPLE - HAT CREEK - Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

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	0.4	1.4	19.4	27.3	99.6	51.5
Air Dried Loss	8.1	5.0	4.4	3.0	2.6	10.0
Inherent Moisture	20.1	16.1	15.5	16.0	14.2	9.9
Total Moisture	26.6	20.3	19.2	18.5	16.4	18.9
Ash (Air Dried)	11.5	15.0	27.6	32.3	36.3	44.8
Sulphur (Air Dried)	0.59	0.87	0.87	0.75	0.75	0.93
Btu / lb. (Air Dried)	8,336	8,391	6,735	6,099	5,687	4,940
<u>DRY BASIS</u>						
Ash	14.4	17.8	32.7	38.5	42.3	49.8
Sulphur	0.74	1.04	1.03	0.89	0.87	1.03
Btu / lb.	10,432	9,996	7,974	7,263	6,629	5,485
<u>DRY, ASH FREE BASIS</u>						
Btu / lb.	12,185	12,163	11,849	11,811	11,494	10,925

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. HYDRO

SAMPLE - HAT CREEK - Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

RAW COAL FRACTIONS - ANALYSIS % - Dry Screened

Size	<u>½" x ¼"</u>	<u>¼" 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	19.2	15.1	6.3	5.0	5.9
Air Dried Loss	5.0	4.1	5.8	6.6	5.5
Inherent Moisture	15.5	16.1	13.9	13.4	13.2
Total Moisture	19.7	19.5	18.9	19.2	18.0
Ash (Air Dried)	37.5	38.2	44.0	48.0	52.1
Sulphur (Air Dried)	0.79	0.73	0.81	0.95	1.05
Btu / lb. (Air Dried)	5,345	5,190	4,570	3,962	3,259
<u>DRY BASIS</u>					
Ash	44.4	45.5	51.1	55.5	60.0
Sulphur	0.93	0.87	0.94	1.10	1.21
Btu / lb.	6,322	6,187	5,308	4,573	3,753
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,363	11,347	10,863	10,270	9,389

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

RAW COAL SIZE / ASH DISTRIBUTION

Wet Screen Analysis of $\frac{1}{2}$ " x 0

<u>Size</u>	<u>Wt. %</u>	<u>Dry Ash %</u>	<u>Cum. Wt. %</u>	<u>Cum. Ash %</u>	<u>Wt. % Head</u>
$\frac{1}{2}$ " x $\frac{1}{4}$ "	21.0	29.1	21.0	29.1	10.8
$\frac{1}{4}$ " x $\frac{1}{8}$ "	22.5	42.0	43.5	35.8	11.6
$\frac{1}{8}$ " x $\frac{1}{16}$ "	9.2	51.8	52.7	38.6	4.7
$\frac{1}{16}$ " x 28 M	7.0	54.4	59.7	40.4	3.6
28 x 45 M	1.3	56.2	61.0	40.8	0.7
45 x 65 M	3.9	56.5	64.9	41.7	2.0
65 x 100 M	2.6	60.9	67.5	42.4	1.3
100 x 200 M	14.3	62.6	81.8	46.0	7.4
200 x 0	18.2	68.2	100.0	50.0	9.4
Total	100.0	50.0			51.5

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

RAW COAL FRACTIONS - ANALYSIS % - Wet Screened

<u>Size</u>	<u>½" x ¼"</u>	<u>¼" x 1/8"</u>	<u>1/8" x 1/16"</u>	<u>1/16" x 28 M</u>	<u>28 x 45 M</u>
Weight (kg.)	2.05	2.20	0.90	0.69	0.010 (SU)
Wt. % Head	10.8	11.6	4.7	3.6	0.7
Moisture (As Run)	12.4	13.8	6.6	6.9	5.8
Ash	25.5	36.2	48.4	50.6	53.0
Sulphur	0.74	0.77	0.92	1.05	1.12
Btu / lb.	7,294	5,734	4,751	4,322	3,988
<u>DRY BASIS</u>					
Ash	29.1	42.0	51.8	54.4	56.2
Sulphur	0.84	0.89	0.98	1.16	1.19
Btu / lb.	8,331	6,656	5,085	4,644	4,232
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,750	11,475	10,551	10,184	9,663

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

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 M x 0</u>
Weight (kg.)	0.030	0.020	0.110	0.140
Wt. % Head	2.0	1.3	7.4	9.4
Moisture (As Run)	6.0	6.2	5.4	5.1
Ash	53.1	57.1	59.2	64.7
Sulphur	1.15	0.87	0.82	0.71
Btu / lb.	3,737	3,247	2,868	n.d.
<u>DRY BASIS</u>				
Ash	56.5	60.9	62.6	68.2
Sulphur	1.22	0.93	0.87	0.75
Btu / lb.	3,975	3,461	3,031	-
<u>DRY, ASH FREE BASIS</u>				
Btu / lb.	9,137	8,853	8,111	-

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CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

ANALYSIS OF CLEAN COAL 4" x 1/2" Size Fraction

	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Cum. Float	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Wt. % (Cum.)	41.5	54.3	62.5	72.2	81.1	100.0
Wt. (kg.)	66.7	88.4	113.3	110.0	121.7	
<u>As Run</u>						
Moisture	18.9	18.0	18.2	15.7	14.9	8.2
Ash	9.8	11.7	13.1	16.9	21.3	73.2
Sulphur	0.65	0.76	0.86	0.97	0.94	0.28
Btu / lb.	8,708	8,521	8,333	8,131	7,699	-
<u>Dry Basis</u>						
Ash	12.1	14.2	16.0	20.0	25.0	79.7
Sulphur	0.80	0.93	1.05	1.15	1.10	0.30
Btu / lb.	10,732	10,396	10,190	9,646	9,043	-
<u>Dry, Ash Free Basis</u>						
Btu / lb.	12,215	12,123	12,130	12,058	12,054	-
Cum. Sink						
<u>As Run</u>						
Wt. (kg.)	94.2	74.3	68.0	42.3	28.3	-
Wt. %	58.5	45.7	37.5	27.8	18.9	-
Moisture	12.5	12.2	11.6	11.0	8.2	-
Ash	45.6	52.8	60.3	67.2	73.2	-
Sulphur	0.83	0.63	0.52	0.35	0.28	-
<u>Dry Basis</u>						
Ash	52.1	60.2	68.3	75.4	79.7	-
Sulphur	0.95	0.72	0.59	0.39	0.30	-

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

ANALYSIS OF CLEAN COAL ½" X ¼" Size Fraction

	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Cum. Float	1.40	1.45	1.50	1.60	1.80	
Wt. % (Cum.)	30.1	40.4	46.2	55.6	71.9	-
Wt. (kg.)	8.7	13.8	15.9	21.3	22.8	-
<u>As Run</u>						
Moisture	16.3	16.3	17.0	17.2	15.8	12.2
Ash	9.1	11.5	12.9	16.5	23.8	74.9
Sulphur	0.71	0.83	0.91	0.95	0.89	0.37
Btu / lb.	9,129	8,913	8,560	8,115	7,235	-
<u>Dry Basis</u>						
Ash	10.9	13.7	15.6	19.9	28.3	85.3
Sulphur	0.85	0.99	1.10	1.15	1.06	0.42
Btu / lb.	10,902	10,651	10,307	9,807	8,598	-
<u>Dry, Ash Free Basis</u>						
Btu / lb.	12,231	12,195	12,206	12,141	11,986	-
Cum. Sink						
<u>As Run</u>						
Wt. (kg.)	20.2	20.4	18.5	17.0	8.9	-
Wt. %	69.9	59.6	53.8	44.4	28.1	-
Moisture	15.7	15.2	15.6	14.4	12.2	-
Ash	49.2	54.9	58.6	64.1	74.9	-
Sulphur	0.71	0.55	0.50	0.38	0.37	-
<u>Dry Basis</u>						
Ash	58.4	64.8	69.4	74.9	85.3	-
Sulphur	0.84	0.65	0.59	0.44	0.42	-



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

Sample Identification Hat Creek Bulk Sample W-77 Y

Size fraction 4" x 1/2"

Lab. No. (s) 77 - 9015

Wt % of head sample 48.1

Specific Gravity

FLOAT AND SINK ANALYSIS %

Sink	Float	Elementary			Cumulative Float			Cumulative Sink		
		Weight	Ash	Sulfur	Weight	Ash	Sulfur	Weight	Ash	Sulfur
	1.40	41.5	12.1		41.5	12.1		100.0	35.3	
1.40	1.45	12.8	21.0		54.3	14.2		58.5	51.8	
1.45	1.50	8.2	27.9		62.5	16.0		45.7	60.5	
1.50	1.60	9.7	45.8		72.2	20.0		37.5	67.6	
1.60	1.80	8.9	65.6		81.1	25.0		27.8	75.2	
1.80		18.9	79.7		100.0	35.3		18.9	79.7	
TOTAL		100.0	35.3							



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Sample Identification Hat Creek Bulk Sample W 77 Y

Size fraction 1/2" x 1/4"

Lab. No. (s) 77 - 9015

Wt % of head sample 19.2

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	30.1	10.9		30.1	10.9		100.0	44.3	
1.40	1.45	10.3	21.9		40.4	13.7		69.9	58.7	
1.45	1.50	5.8	28.8		46.2	15.6		59.6	65.1	
1.50	1.60	9.4	41.0		55.6	19.9		53.8	69.0	
1.60	1.80	16.3	57.0		71.9	28.3		44.4	74.9	
1.80		28.1	85.3		100.0	44.3		28.1	85.3	
TOTAL -		100.0	44.3							

Hat Creek Bulk Sample W 77 Y

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 Y

LAB. NO. - 77 - 9015

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"	9.1	18.7	9.1	18.7	4.03
1/2" x 1/4"	8.8	17.3	17.9	18.0	3.89
1/4" x 1/8"	15.8	20.7	33.7	19.3	7.00
1/8" x 1/16"	12.0	30.1	45.7	22.1	5.30
1/16" x 28 M	11.1	44.6	56.8	26.5	4.93
28 x 45 M	5.8	54.2	62.6	29.1	0.164 (Sub)
45 x 65 M	5.3	62.8	67.9	31.7	0.152 (Sub)
65 x 100 M	2.0	64.0	69.9	32.6	0.058 (Sub)
100 x 200 M	3.7	61.2	73.6	34.1	0.77
200 M x 0	26.4	76.2	100.0	45.2	5.43
Total	100.0	45.2			

38.4% - 1/4 mm

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W77 Y

LAB. NO. - 77 - 9015

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 28M</u>	<u>1/4" x 0</u>
Weight (kg.)	-	4.0	3.9	-	-
Wt. % Head	99.6	9.1	8.8	38.9	82.1
Moisture (As Run)	4.2	3.1	1.8	5.3	6.2
Ash	43.1	18.1	17.0	28.8	47.7
Sulphur	0.76	0.96	0.91	0.88	0.70
Btu / lb.	5,850	9,374	9,524	7,701	5,044
<u>DRY BASIS</u>					
Ash	45.0	18.7	17.3	30.4	50.9
Sulphur	0.79	0.99	0.93	0.93	0.75
Btu / lb.	6,106	9,680	9,699	8,132	5,377
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,100	11,910	11,728	11,686	10,952

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

RAW COAL FRACTIONS - ANALYSIS % - After Wet Attrition

<u>Size</u>	<u>1/4" x 1/8"</u>	<u>1/8" x 1/16"</u>	<u>1/16" x 28M</u>	<u>28M x 45M</u>	<u>45 x 65M</u>
Weight (kg.)	7.0	5.3	4.9	0.16	0.15
Wt. % Head	15.8	12.0	11.1	5.8	5.3
Moisture (As Run)	6.3	7.3	2.4	3.5	1.4
Ash	19.4	27.9	43.5	52.3	61.9
Sulphur	0.90	0.90	0.82	0.63	0.70
Btu / lb.	8,844	7,722	6,026	4,665*	3,518*
<u>DRY BASIS</u>					
Ash	20.7	30.1	44.6	54.2	62.8
Sulphur	0.96	0.97	0.84	0.65	0.71
Btu / lb.	9,442	8,325	6,174	4,834	3,567
<u>DRY, ASH FREE BASIS</u>					
Btu / lb.	11,906	11,903	11,139	10,553	9,589

NB - * mean run with Benzoic Acid

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015

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.)	0.06	0.8	5.4	-
Wt. % Head	2.0	3.7	26.4	13.1
Moisture (As Run)	1.8	2.8	1.6	2.3
Ash	62.8	59.5	75.1	57.8
Sulphur	0.65	0.62	0.53	0.66
Btu / lb.	3,293*	3,665*	-	3,980
<u>DRY BASIS</u>				
Ash	64.0	61.2	76.3	59.2
Sulphur	0.66	0.64	0.54	0.68
Btu / lb.	3,354	3,770	-	4,073
<u>DRY, ASH FREE BASIS</u>				
Btu / lb.	9,315	9,714	-	9,974

NB - * means run with Benzoic Acid

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CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample - W 77 Y

LAB. NO. - 77 - 9015 After Wet Attrition

ANALYSIS OF CLEAN COAL - 1/2" x 1/4" Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80
Wt. % (Cum.)	54.0	72.8	82.7	92.6	97.8
Wt. (kg.)	0.357	0.658	0.683	0.797	0.660
<u>As Run</u>					
Moisture	1.6	1.8	2.1	2.9	3.0
Ash	9.1	11.1	12.3	13.7	15.3
Sulphur	0.66	0.76	0.77	0.85	0.85
Btu / lb.	10,767	10,364	10,161	9,803	9,496
<u>Dry Basis</u>					
Ash	9.2	11.3	12.5	14.1	15.8
Sulphur	0.67	0.77	0.79	0.88	0.88
Btu / lb.	10,942	10,557	10,381	10,093	9,795
<u>Dry, Ash Free Basis</u>					
Btu / lb.	12,052	11,907	11,868	11,756	11,622
Cum. Sink					
<u>As Run</u>					
Wt. (kg.)	0.304	0.246	0.143	0.064	0.015
Wt. %	46.0	27.2	17.3	7.4	2.2
Moisture	1.6	1.6	1.6	2.1	2.2
Ash	27.0	32.0	38.7	47.6	58.9
Sulphur	1.25	1.40	1.40	1.21	1.15
Btu / lb.	8,088	7,554	6,400	4,946	4,497*
<u>Dry Basis</u>					
Ash	27.4	32.5	39.4	48.6	60.2
Sulphur	1.27	1.42	1.42	1.24	1.18
Btu / lb.	8,220	7,674	6,504	5,052	4,598

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015 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.)	33.8	41.5	58.3	70.0	80.3
Wt. (kg.)	1.3	1.3	1.8	2.3	2.9
<u>As Run</u>					
Moisture	3.3	4.1	3.4	5.5	3.1
Ash	7.3	9.3	12.4	14.4	17.6
Sulphur	0.84	0.74	0.72	0.80	0.77
Btu / lb.	10,690	10,226	9,770	9,119	9,005
<u>Dry Basis</u>					
Ash	8.3	9.7	12.8	15.2	18.2
Sulphur	0.87	0.77	0.74	0.85	0.79
Btu / lb.	11,049	10,663	10,109	9,652	9,293
<u>Dry, Ash Free Basis</u>					
Btu / lb.	11,948	11,808	11,593	11,382	11,361
Cum. Sink					
<u>As Run</u>					
Wt. (kg.)	2.6	1.8	1.3	0.9	0.7
Wt. %	66.2	58.5	41.7	30.0	19.7
Moisture	4.3	5.2	3.3	4.4	5.3
Ash	37.6	40.1	47.4	55.9	63.1
Sulphur	0.89	0.83	0.91	0.94	0.91
Btu / lb.	6,405	6,006	5,093	-	-
<u>Dry Basis</u>					
Ash	39.3	42.3	49.0	58.5	66.6
Sulphur	0.93	0.88	0.94	0.98	0.96
Btu / lb.	6,689	6,333	5,269	-	-

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 Y

LAB. NO. - 77 - 9015 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.)	3.7	4.6	11.7	15.1	20.6
Wt. (kg.)	0.02	0.03	0.1	0.1	0.1
<u>As Run</u>					
Moisture	3.0	3.9	2.8	2.0	2.5
Ash	7.2	7.7	10.2	15.4	24.0
Sulphur	0.58	0.58	0.61	0.66	0.67
Btu / lb.	11,296	10,819	10,540	9,784	8,444
<u>Dry Basis</u>					
Ash	7.5	8.1	10.5	15.8	24.6
Sulphur	0.60	0.60	0.63	0.67	0.69
Btu / lb.	11,648	11,264	10,846	9,987	8,661
<u>Dry, Ash Free Basis</u>					
Btu / lb.	12,587	12,251	12,116	11,854	11,484
<u>Cum. Sink</u>					
<u>As Run</u>					
Wt. (kg.)	0.5	0.6	0.5	0.5	0.5
Wt. %	96.3	95.4	88.3	84.9	79.4
Moisture	5.9	5.1	6.0	6.9	9.2
Ash	58.2	61.5	63.9	64.0	64.3
Sulphur	0.59	0.56	0.54	0.56	0.53
Btu / lb.	-	-	-	-	-
<u>Dry Basis</u>					
Ash	61.8	64.7	68.0	68.7	70.9
Sulphur	0.63	0.59	0.58	0.60	0.58
Btu / lb.	-	-	-	-	-



Warnock Hersey Professional Services Ltd.

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

Sample Identification Hat Creek Bulk Sample W77 Y Size fraction 1/2" x 1/4"
 Lab. No. (s) 77 - 9015 After Wet Attrition Wt % of head sample 8.8

Specific Gravity

FLOAT AND SINK ANALYSIS %

Sink	Float	Elementary			Cumulative Float			Cumulative Sink		
		Weight	Ash	Sulphur	Weight	Ash Dry	Sulphur	Weight	Ash	Sulphur
	1.40	54.0	9.2		54.0	9.2		100.0	16.8	
1.40	1.45	18.8	17.3		72.8	11.3		46.0	25.7	
1.45	1.50	9.9	21.3		82.7	12.5		27.2	31.4	
1.50	1.60	9.9	27.5		92.6	14.1		17.3	37.2	
1.60	1.80	5.2	46.1		97.8	15.8		7.4	50.3	
1.80		2.2	60.2		100.0	16.8		2.2	60.2	
TOTAL		100.0	16.8							



Warnock Hersey Professional Services Ltd.

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

Sample Identification Hat Creek Bulk Sample W 77 Y

Size fraction 1/4" x 28 M

Lab. No. (s) 77 - 9015 After Wet Attrition

Wt % of head sample 38.9

Specific Gravity

FLOAT AND SINK ANALYSIS %

Sink	Float	Elementary			Cumulative Float			Cumulative Sink		
		Weight	Ash	Sulphur	Weight	Ash Dry	Sulphur	Weight	Ash	Sulphur
	1.40	33.8	8.3		33.8	8.3		100.0	27.8	
1.40	1.45	7.7	16.0		41.5	9.7		66.2	37.7	
1.45	1.50	16.8	20.5		58.3	12.8		58.5	40.6	
1.50	1.60	11.7	27.2		70.0	15.2		41.7	48.6	
1.60	1.80	10.3	38.6		80.3	18.2		30.0	57.0	
1.80		19.7	66.6		100.0	27.8		19.7	66.6	
TOTAL		100.0	27.8							