Warnock Hersey Professional Services Ltd.
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Report of Analysis of

Hat Creek Bulk Sample W 77 X7

Includes Wet Attrition

PART III. "X" only

Submitted,

John Kay, C. Eng., M. Inst. F. 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.

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 separting 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 supernatent 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. Riffling 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.

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.

Warnock Hersey Professional Services Ltd.

CLIENT :- B. C. Hydro

Sample Identification :- Hat Creek Bulk Sample W 77 X

LAB. NO. :- 77 - 8400

RAW COAL SIZE / ASH DISTRIBUTION

	WT. %	DRY ASH %	CUM. WT. %	CUM. ASH %	WEIGHT (kg.)
+ 4 "	0.4	24.9	0.4	24.9	35.8
4 " x 2 "	2.2	36.5	2.6	34.7	192.5
2" x 1 "	16.6	35.6	19.2	35.5	1241.6 (SUB)
1 " x ½ "	28.0	40.9	47.2	38.7	2092.0 (SUB)
½ " x ¼ "	18.3	43.2	65.5	40.0	242.1 (SUB)
¼" x 1/8"	9.3	46.7	74.8	40.8	33.7 (SUB)
1/8" x 1/16"	14.2	52.9	89.0	42.7	25.3 (SUB)
1/16" x 28 M	4.0	58.2	93.0	43.4	4.4 (SUB)
28 M x 0	7.0	61.9	100.0	44.7	7.6 (SUB)
Total	100.0	44.7			

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CLIENT - B.C. HYDRO

SAMPLE - HAT CREEK - Bulk Sample W - 77 - X

LAB. NO. - 77 - 8400

RAW COAL FRACTIONS - ANALYSIS % - Dry Screen

Size	+ 4"	4" x 2"	2" x 1"	1" x ½"	¼" x 0	½ x 0
Wt. % Head	0.4	2.2	16.6	28.0	99.6	52.8
Air Dried Loss	0.7	7.1	9.4	7.7	6.5	8.2
Inherent Moisture	18.8	21.6	21.0	20.5	19.7	17.4
Total Moisture	19.4	27.2	28.4	26.6	24.9	24.2
Ash (Air Dried)	20.2	28.6	28.2	32.5	34.9	41.4
Sulphur (Air Dried)	2.10	-	-	-	1.11	1.24
Btu / lb. (Air Dried)	7,410	5,841	5,972	5,407	5,347	4,449
DRY BASIS						
Ash	24.9	36.5	35.6	40.9	43.4	50.1
Sulphur	2.59	-	-	-	1.38	1.50
Btu / lb.	9,122	7,454	7,555	6,803	6,662	5,386
DRY, ASH FREE BASIS						
Btu / lb.	12,150	11,738	11,733	11,512	11,778	10,788

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. HYDRO

SAMPLE - HAT CREEK - Bulk Sample X

LAB. NO. - 77 - 8400

RAW COAL FRACTIONS - ANALYSIS % - Dry Screen

Size	½" x ¼"	¼" x 1/8"	1/8" x 1/16"	1/16" x 28 M	28 M x 0
Wt. % Head	18.3	9.3	14.2	4.0	7.0
Air Dried Loss	13.2	4.2	4.2	3.8	9.3
Inherent Moisture	19.1	18.8	17.5	11.4	13.5
Total Moisture	29.8	22.2	21.0	14.8	21.5
Ash (Air Dried)	34.9	37.9	43.6	51.6	53.5
Sulphur (Air Dried)	1.25	1.13	1.17	1.12	1.29
Btu / lb. (Air Dried)	5,270	4,972	4,176	3,705	2,791
DRY BASIS					
Ash	43.2	46.7	52.9	58.2	61.9
Sulphur	1.55	1.39	1.42	1.26	1.49
Btu / lb.	6,516	6,125	5,064	4,180	3,227
DRY, ASH FREE BASIS					
Btu / lb.	11,469	11,496	10,744	9,992	8,468

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. HYDRO

Sample Identification - Hat Creek - Bulk Sample W 77 X

LAB. NO. - 77 - 8400

RAW COAL SIZE / ASH DISTRIBUTION

Wet Screen Analysis of ½" x 0

Size	Wt. %	Dry Ash %	Cum. Wt. %	Cum. Ash %	Wt. % Head	Det.
½ x ¼"	22.1	31.8	22.1	31.8	11.7	7372
¼ x 1/8"	13.1	45.3	35.2	36.8	6.9	5933
1/8 x 1/16"	10.6	53.1	45.8	40.6	5.6	4965
1/16 x 28M	10.5	59.4	56.3	44.1	5.6	4037
28 x 45 M	2.9	58.8	59.2	44.8	1.5	3927
45 x 65 M	6.7	57.1	65.9	46.1	3.5	
65 x 100 M	8.2	61.4	74.1	47.8	4.3	
100 x 200 M	11.1	69.1	85.2	50.5	5.9	
200 x 0	14.8	70.7	100.0	53.5	7.8	
Total	100.0	53.5			52.8	

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. - 77 - 8400

RAW COAL FRACTIONS - ANALYSIS % - Wet Screened

Size	½" x ¼"	¼" x 1/8"	1/8" x 1/16"	1/16" x 28 M	28 x 45 M
Weight (kg.)	2.15	1.28	1.03	1.02	0.060 (SUB)
Wt. % Head	11.7	6.9	5.6	5.65	1.51
Moisture (As Run)	4.1	5.5	9.1	4.8	2.8
Ash	30.5	42.8	48.3	56.6	57.2
Sulphur	1.51	1.46	1.35	1.46	1.38
Btu / lb.	7,072	5,606	4,513	3,845	3,817
DRY BASIS					
Ash	31.8	45.3	53.1	59.4	58.8
Sulphur	1.57	1.55	1.49	1.53	1.42
Btu / lb.	7,372	5,933	4,965	4,037	3,927
DRY, ASH FREE BASIS					
Btu / lb.	10,810	10,846	10,585	9,943	9,540

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. - 77 - 8400

RAW COAL FRACTIONS - ANALYSIS % - Wet Screened

Size	45 x 65 M	65 x 100 M	100 x 200 M	200 M x 0
Weight (kg.)	0.140	0.170	0.230	0.310
Wt. % Head	3.5	4.34	5.9	7.8
Moisture (As Run)	2.7	5.8	3.4	5.4
Ash	55.5	57.9	66.7	66.9
Sulphur	1.26	1.32	1.37	0.79
Btu / lb.	3,827	n.d.	n.d.	n.d.
DRY BASIS				
Ash	57.1	61.4	69.1	70.7
Sulphur	1.30	1.40	1.42	0.84
Btu / lb.	3,935	- -	- -	- -
DRY, ASH FREE BASIS				
Btu / lb.	9,173	- -	- -	- -

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Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. - 77 - 8400

ANALYSIS OF CLEAN COAL - +4" Size Fraction

Elem Float	1.40	1.40-1.45	1.45-1.50	1.50-1.60	1.60-1.80	1.80 Sink
Wt. % (Cum.)	80.2	5.8	NIL	8.6	NIL	5.4
Wt. (Kg.)	22.32	1.61	NIL	2.42	NIL	1.51
As Run						
Moisture	21.9	17.5		14.5		9.5
Ash	18.4	23.1		43.7		65.2
Sulphur	1.08	0.86		0.86		0.77
Btu / lb.	7,177	7,038		4,594		N.D.
Dry Basis						
Ash	23.5	28.0		51.1		72.1
Sulphur	1.39	1.04		1.01		0.85
Btu / lb.	9,193	8,529		5,372		-
Dry, Ash Free Basis						
Btu / lb.	12,022	11,844		10,980		-

Cum. Sink

As Run

Wt.

Wt. %

Moisture

Ash

Sulphur

Btu / lb.

Dry Basis

Ash

Sulphur

Btu / lb.

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. 77 - 8400

ANALYSIS OF CLEAN COAL 4" x ½" Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80	1.80 Sink
Wt. % (Cum.)	43.2	53.5	62.6	71.0	87.0	100.0
Wt. (kg.)	64.4	81.8	93.1	109.5	123.5	-
As Run						
Moisture	25.3	26.1	24.9	24.4	24.6	15.0
Ash	11.4	13.7	16.0	18.9	25.0	68.3
Sulphur	0.97	1.02	1.15	1.20	1.20	0.99
Btu / lb.	7,677	7,252	7,084	6,821	6,021	-
Dry Basis						
Ash	15.3	18.5	21.4	25.0	33.1	80.3
Sulphur	1.30	1.38	1.53	1.59	1.59	1.16
Btu / lb.	10,283	9,809	9,438	9,024	7,891	-
Dry, Ash Free Basis						
Btu / lb.	12,139	12,041	12,003	12,024	11,932	-
Cum. Sink						
As Run						
Wt. (kg.)	84.6	71.2	55.6	44.8	18.5	-
Wt. %	56.8	46.5	37.4	29.0	13.0	-
Moisture	21.2	20.4	19.5	18.5	15.0	-
Ash	45.4	50.7	55.5	61.8	68.3	-
Sulphur	1.29	1.32	1.21	1.08	0.99	-
Dry Basis						
Ash	57.7	63.7	69.0	75.8	80.3	-
Sulphur	1.64	1.66	1.50	1.33	1.16	-

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CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. 77 - 8400

ANALYSIS OF CLEAN COAL ½" x ¼" Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80	1.80.00 Sink
Wt. % (Cum.)	35.5	44.7	55.2	66.3	83.7	100.00
Wt. (kg.)	11.0	14.0	16.0	18.9	25.6	-
As Run						
Moisture	26.9	26.7	22.5	22.1	22.4	12.4
Ash	10.5	12.8	16.3	20.2	27.2	70.30
Sulphur	1.05	1.05	1.15	1.18	1.16	1.41
Btu / lb.	7,498	7,284	7,277	6,853	5,972	-
Dry Basis						
Ash	14.4	17.4	21.0	25.9	35.0	80.30
Sulphur	1.44	1.43	1.48	1.51	1.49	1.61
Btu / lb.	10,259	9,939	9,387	8,794	7,694	-
Dry, Ash Free Basis						
Btu / lb.	11,987	12,040	11,887	11,873	11,846	-
Cum. Sink						
As Run						
Wt. (kg.)	20.0	17.3	13.0	9.6	5.0	-
Wt. %	64.5	55.3	44.8	33.7	16.3	-
Moisture	19.0	17.7	17.0	15.7	12.4	-
Ash	46.6	51.4	57.6	63.0	70.3	-
Sulphur	1.21	1.27	1.27	1.14	1.41	-
Dry Basis						
Ash	57.5	62.4	69.4	74.8	80.3	-
Sulphur	1.49	1.54	1.53	1.35	1.61	-

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Sample Identification: Hat Creek Bulk Sample W 77 X
Size fraction: + 4 "
Lab. No. (s): 77 - 8400
Wt % of head sample: 0.3 (coal)

Specific Gravity Sink	Specific Gravity Float	weight (kg.)	FLOAT AND SINK ANALYSIS % Elementary Weight	Elementary Ash	Elementary Sulphur	Cumulative Float Weight	Cumulative Float Ash	Cumulative Float Sulphur	Cumulative Sink Weight	Cumulative Sink Ash	Cumulative Sink Sulphur
	1.40	22.3	80.2	23.5		80.2	23.5		100.0	28.8	
1.40	1.45	21.6	5.8	28.0		86.0	23.8		19.8	50.1	
1.45	1.50	NIL				86.0	23.8		14.0	59.2	
1.50	1.60	2.4	8.6	51.1		94.6	26.3		14.0	59.2	
1.60	1.80	2.4				94.6	26.3		5.4	72.1	
1.80	1.30	1.5	5.4	72.1		100.0	28.8		5.4	72.1	
1.80		1.5				100.0			5.4	72.1	
	TOTAL		100.0	28.8							
	TOTAL		100.0								

Warnock Hersey Professional Services Ltd.
1423-D, 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel 276 - 9138

Sample Identification: B. C. Hydro Hat Creek Bulk Sample W 77 × Size fraction: 4 × ½"

Lab. No. (s): 77 - 8400 × Wt.% of head sample: 46.8

Specific Gravity		FLOAT AND SINK ANALYSIS %					
		Elementary		Cumulative Float		Cumulative Sink	
Sink	Float	Weight	Ash	Weight	Ash	Weight	Ash
	1.40	43.2	15.3	43.2	15.3	100.0	39.2
1.40	1.45	10.3	31.9	53.5	18.5	56.8	57.4
1.45	1.50	9.1	38.4	62.6	21.4	46.5	63.6
1.50	1.60	8.4	51.8	71.0	25.0	37.4	69.1
1.60	1.80	16.0	69.0	87.0	33.1	29.0	74.1
1.80		13.0	80.3	100.0	39.2	13.0	80.3
	TOTAL	100.0	39.2				

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 X
Size fraction: ½" x ¼"
Lab. No. (s): 77 - 8400
Wt % of head sample: 18.3

Specific Gravity Sink	Specific Gravity Float	FLOAT AND SINK ANALYSIS % Elementary Weight	Elementary Ash	Elementary Sulphur	Cumulative Float Weight	Cumulative Float Ash	Cumulative Float Sulphur	Cumulative Sink Weight	Cumulative Sink Ash	Cumulative Sink Sulphur
—	1.40	35.5	14.4		35.5	14.4		100.0	42.4	
1.40	1.45	9.2	29.0		44.7	17.4		64.5	57.8	
1.45	1.50	10.5	36.3		55.2	21.0		55.3	62.6	
1.50	1.60	11.1	50.3		66.3	25.9		44.8	68.8	
1.60	1.80	17.4	69.7		83.7	35.0		33.7	74.8	
1.80	1.80	16.3	80.3		100.0	42.4		16.3	80.3	
	TOTAL	100.0	42.4							

Hat Creek Bulk Sample W-77 X-X

Wet Attrition Test and Analysis

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 ½ mm wedge wire and the attrited coal then subjected to the anlysis 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 X

LAB. NO. – 77 – 8400

RAW COAL SIZE / ASH DISTRIBUTION

Wet Screen Analysis After Wet Attrition

Size	Wt.%	Dry Ash %	Cum. Wt. %	Cum. Ash %	Weight (kg.)
4" x ½"	27.9	26.7	27.9	26.7	11.7
½" x ¼"	16.9	34.1	44.8	29.5	7.1
¼" x 1/8"	15.8	42.5	60.6	32.9	6.65
1/8" x 1/16"	10.6	52.8	71.2	35.8	4.45
1/16" x 28 M	6.3	57.0	77.5	37.6	2.64
28 x 45 M	3.5	57.3	81.0	38.4	0.118 (Sub)
45 x 65 M	4.4	58.2	85.4	39.4	0.150 (Sub)
65 x 100 M	0.7	56.7	86.1	39.6	0.025 (Sub)
100 x 200 M	1.9	61.0	88.0	40.0	0.80
200 M x 0	12.0	77.9	100.0	44.6	5.06
Total	100.0	44.6			

19% – ¼ mm

Warnock Hersey Professional Services Ltd.

CLIENT - B. C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. 77 - 8400

RAW COAL FRACTIONS - ANALYSIS % After Wet Attrition

Size	4" x 0	4" x ½"	½" x ¼"	¼" x 28 M	¼" x 0
Weight (kg)	-	11.7	7.1	-	-
Wt. % Head	99.6	27.9	16.9	32.7	81.2
Moisture (As Run)	10.9	17.6	16.5	8.3	5.9
Ash	40.5	22.0	28.5	44.6	53.2
Sulphur	1.17	1.23	1.27	1.16	1.05
Btu / lb.	5,481	7,340	6,416	5,240	4,384
DRY BASIS					
Ash	44.4	26.7	34.1	48.6	56.5
Sulphur	1.31	1.49	1.52	1.26	1.12
Btu / lb.	6,156	8,907	7,682	10,200	4,660
DRY, ASH FREE BASIS					
Btu / lb.	11,300	12,154	11,657	11,126	10,716

Warnock Hersey Professional Services Ltd.

CLIENT – B. C. Hydro

Sample Identification – Hat Creek Bulk Sample W77 X

LAB. NO. 77 – 8400

RAW COAL FRACTIONS – ANALYSIS % – After Wet Attrition

Size	¼" x 1/8"	1/8" x 1/16"	1/16" x 28M	28M x 45M	45 x 65M
Weight (kg.)	6.7	4.5	2.6	0.1	0.2
Wt. % Head	15.8	10.6	6.3	3.5	4.4
Moisture (As Run)	10.7	8.1	2.8	4.3	3.9
Ash	37.9	48.6	55.4	54.8	56.0
Sulphur	1.38	0.99	0.96	1.06	1.10
Btu / lb.	5,854	4,807	4,396	4,479	4,215
DRY BASIS					
Ash	42.5	52.9	56.9	57.3	58.2
Sulphur	1.55	1.08	0.99	1.11	1.14
Btu / lb.	6,556	5,228	4,186	5,254	4,386
DRY, ASH FREE BASIS					
Btu / lb.	11,398	11,089	10,507	10,959	10,500

Warnock Hersey Professional Services Ltd.

CLIENT – B. C. Hydro

Sample Identification – Hat Creek Bulk Sample W 77 X

LAB. NO. – 77 – 8400

RAW COAL FRACTIONS – ANALYSIS % – After Wet Attrition

Size	65 x 100M	100 x 200 M	200M x 0	28 x 100M
Weight (kg.)	0.03	0.8	5.1	–
Wt. % Head	0.7	1.9	12.0	8.6
Moisture (As Run)	3.3	2.6	1.3	4.0
Ash	54.8	59.4	76.9	53.4
Sulphur	1.05	1.25	0.62	1.05
Btu / lb.	4,555	3,877	–	4,372
DRY BASIS				
Ash	56.7	61.0	77.9	55.7
Sulphur	1.09	1.28	0.63	1.09
Btu / lb.	4,708	3,979	–	4,555
DRY, ASH FREE BASIS				
Btu / lb.	10,866	10,197	–	10,276

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. 77 - 8400 After Wet Attrition

ANALYSIS OF CLEAN COAL ½" x ¼" Size Fraction

Cum. Float	1.40	1.45	1.50	1.60	1.80
Wt. % (Cum.)	40.2	47.4	59.6	75.0	88.6
Wt. (kg.)	0.5	0.5	0.7	0.9	1.0
As Run					
Moisture	5.0	4.5	5.5	5.4	4.8
Ash	10.1	12.4	16.0	20.9	26.7
Sulphur	1.19	0.96	0.93	1.21	1.19
Btu / lb.	10,274	9,904	9,271	8,584	7,772
Dry Basis					
Ash	10.6	13.0	16.9	22.1	28.0
Sulphur	1.25	1.01	0.98	1.27	1.25
Btu / lb.	10,812	10,368	9,813	9,070	8,167
Dry, Ash Free Basis					
Btu / lb.	12,094	11,918	11,812	11,647	11,349
Cum. Sink					
As Run					
Wt. (kg.)	0.7	0.6	0.5	0.3	0.10
Wt. %	59.8	52.6	40.4	25.0	11.4
Moisture	4.4	4.4	3.2	3.5	3.93
Ash	44.8	48.7	53.4	61.8	66.45
Sulphur	1.38	1.57	1.86	1.75	2.10
Btu / lb.	5,701	5,137	4,583	–	–
Dry Basis					
Ash	46.9	50.9	55.2	64.0	69.19
Sulphur	1.44	1.64	1.92	1.81	2.19
Btu / lb.	5,960	5,373	4,734	–	–

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. - 77 - 8400 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.)	15.5	25.4	27.4	37.6	57.1
Wt. (kg.)	0.4	0.6	0.7	1.0	1.6
As Run					
Moisture	4.3	5.1	4.3	5.5	7.9
Ash	8.7	11.5	12.9	18.6	25.2
Sulphur	1.01	1.11	1.11	1.12	1.10
Btu / lb.	10,436	9,890	9,712	8,716	7,550
Dry Basis					
Ash	9.1	12.1	13.5	19.7	27.4
Sulphur	1.06	1.17	1.16	1.18	1.19
Btu / lb.	10,909	10,417	10,145	9,221	8,201
Dry, Ash Free Basis					
Btu / lb.	12,006	11,847	11,728	11,476	11,294
Cum. Sink					
As Run					
Wt. (kg.)	2.3	1.8	1.9	1.7	1.2
Wt. %	84.5	74.6	72.6	62.4	42.9
Moisture	9.3	6.4	7.5	6.5	5.8
Ash	49.2	55.4	55.6	59.8	71.3
Sulphur	1.12	1.14	1.11	1.08	1.08
Btu / lb.	4,468	4,090	- -	- -	- -
Dry Basis					
Ash	54.2	59.2	60.0	63.9	75.7
Sulphur	1.24	1.22	1.20	1.16	1.15
Btu / lb.	4,925	4,371	- -	- -	- -

Warnock Hersey Professional Services Ltd.

CLIENT - B.C. Hydro

Sample Identification - Hat Creek Bulk Sample W 77 X

LAB. NO. - 77 - 8400 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.)	4.4	7.6	12.0	18.7	33.2
Wt. (kg.)	0.02	0.04	0.06	0.1	0.2
As Run					
Moisture	4.5	4.4	2.7	2.8	2.8
Ash	8.8	11.3	15.7	21.7	29.5
Sulphur	0.96	0.87	1.09	0.96	0.88
Btu / lb.	10,607	10,153	9,650	8,827	7,670
Dry Basis					
Ash	9.2	11.8	16.1	22.3	30.3
Sulphur	1.01	0.91	1.12	0.99	0.91
Btu / lb.	11,108	10,620	9,917	9,081	7,889
Dry, Ash Free Basis					
Btu / lb.	12,230	12,042	11,820	11,684	11,328
Cum. Sink					
As Run					
Wt. (kg.)	0.6	0.5	0.5	0.5	0.4
Wt. %	95.6	92.4	88.0	81.3	66.8
Moisture	6.8	3.9	5.7	5.6	7.5
Ash	55.5	58.8	59.2	61.5	64.9
Sulphur	0.81	0.8	0.89	0.90	0.82
Btu / lb.	-	-	-	-	-
Dry Basis					
Ash	59.6	61.2	62.8	65.2	70.2
Sulphur	0.87	0.92	0.94	0.95	0.89
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 X
Size fraction: ½" × ¼"
Lab. No.(s): W77 – 84 00 After Wet Attrition
Wt % of head sample: 16.9

FLOAT AND SINK ANALYSIS %

Specific Gravity Sink	Specific Gravity Float	Elementary Weight	Elementary Ash	Elementary Sulphur	Cumulative Float Weight	Cumulative Float Ash	Cumulative Float Sulphur	Cumulative Sink Weight	Cumulative Sink Ash	Cumulative Sink Sulphur
	1.40	40.2	10.6		40.2	10.6		100.0	32.7	
1.40	1.45	7.2	26.4		47.4	13.0		59.8	47.5	
1.45	1.50	12.2	32.0		59.6	16.9		52.6	50.4	
1.50	1.60	15.4	42.2		75.0	22.1		40.4	56.0	
1.60	1.80	13.6	60.5		88.6	28.0		25.0	64.4	
1.80		11.4	69.1		100.0	32.7		11.4	69.1	
	TOTAL	100.0	32.7							

Warnock Hersey Professional Services Ltd.
1423-D 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel. 276-9138
1423 D 45th Avenue N.E. Calgary Alberta T2E 2P3 Tel. 276-9138

Sample Identification: Hat Creek Bulk Sample W 77 X
Size fraction: ¼" x 28 M
Lab. No.(s): 77 - 8400 After Wet Attrition
Wt % of head sample: 32.7

Specific Gravity Sink	Float	Elementary Weight	Elementary Ash	Elementary Sulphur	Cumulative Float Weight	Cumulative Float Ash	Cumulative Float Sulphur	Cumulative Sink Weight	Cumulative Sink Ash	Cumulative Sink Sulphur
	1.40	15.5	9.1		15.5	9.1		100.0	48.1	
1.40	1.45	9.9	16.8		25.4	12.1		84.5	55.3	
1.45	1.50	2.0	31.3		27.4	13.5		74.6	60.4	
1.50	1.60	10.2	36.0		37.6	19.6		72.6	61.2	
1.60	1.80	19.5	42.4		57.1	27.4		62.4	65.3	
1.80		42.9	75.7		100.0	48.1		42.9	75.7	
TOTAL		100.0	48.1							

FORM 342

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 X

Size fraction: 28 × 100 M

Lab. No.(s): 77 – 8400

Wt.% of head sample: 8.6

FLOAT AND SINK ANALYSIS %

Specific Gravity Sink	Specific Gravity Float	Elementary Weight	Elementary Ash	Elementary Sulphur	Cumulative Float Weight	Cumulative Float Ash (Dry)	Cumulative Float Sulphur	Cumulative Sink Weight	Cumulative Sink Ash	Cumulative Sink Sulphur
	1.40	4.4	9.2		4.4	9.2		100.0	57.0	
1.40	1.45	3.2	15.4		7.6	11.8		95.6	59.2	
1.45	1.50	4.4	23.5		12.0	16.1		92.4	60.7	
1.50	1.60	6.7	33.4		18.7	22.3		88.0	62.6	
1.60	1.80	14.5	40.8		33.2	30.4		81.3	65.0	
1.80		66.8	70.2		100.0	57.0		66.8	70.2	
	TOTAL	100.0	57.0							

FORM 342

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: 28 M x 100 M
Lab. No. (s): 77 - 9015 After Wet Attrtion
Wt % of head sample: 13.1

Specific Gravity		FLOAT AND SINK ANALYSIS %								
		Elementary			Cumulative Float			Cumulative Sink		
Sink	Float	Weight	Ash	Sulphur	Weight	Ash Dry	Sulphur	Weight	Ash	~~Sulphur~~
	1.40	3.7	7.5		3.7	7.5		100.0	61.4	
1.40	1.45	0.9	10.8		4.6	8.1		96.3	63.4	
1.45	1.50	7.1	12.0		11.7	10.5		95.4	63.9	
1.50	1.60	3.4	34.0		15.1	15.8		88.3	68.1	
1.60	1.80	5.5	48.9		20.6	24.6		84.9	69.5	
1.80		79.4	70.9		100.0	61.4		79.4	70.9	
	TOTAL	100.0	61.4							

FORM 342