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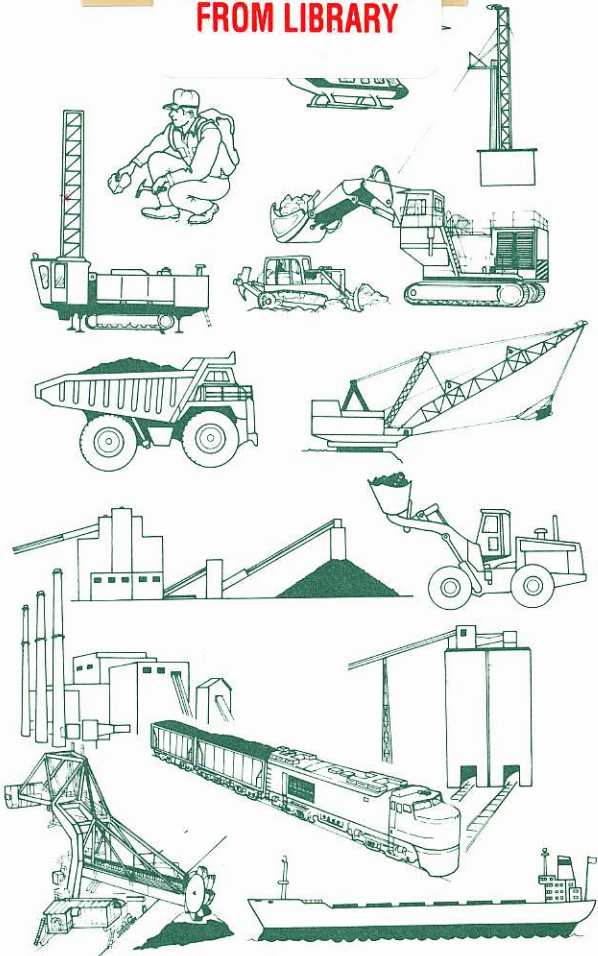
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BRITISH COLUMBIA COAL SPECIFICATIONS

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Province of British Columbia
Ministry of Energy, Mines and
Petroleum Resources

INFORMATION CIRCULAR 1990-5



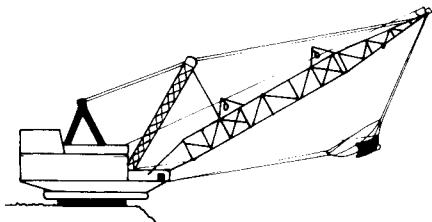
INTRODUCTION

The province of British Columbia is richly endowed with coal resources. These abundant in-place reserves (2.9 billion tonnes) have a wide variation in rank (lignite to anthracite) and a broad geographic distribution. This brochure summarizes the major B.C. coalfields and provides generalized coal specifications for each area. Average quality attributes are generally cited without reference to the range of values. Several information sources have been used which include:

- Exploration assessment reports submitted to the B.C. Ministry of Energy, Mines and Petroleum Resources in compliance with the British Columbia Coal Act.
- Published reports of: the B.C. Ministry of Energy, Mines and Petroleum Resources; CANMET; the Geological Survey of Canada; and various other technical publications.

Some caution is advised in using data contained in this brochure. Quality variations within individual coalfields and/or basins may be pronounced and the values presented may not be representative of the range of coal quality. Where product specifications are listed, these values represent the current range of market demand, rather than the full range of available coal quality.

An impressive infrastructure system is in place within the province, including rail and road transportation routes, power networks, community services, seaports and communication systems. This places British Columbia coal resources among the most competitive in the world. Development potential for these resources is therefore considered excellent.



PRODUCING COMPANIES

BRINCO COAL CORPORATION

1480 - 1055 West Hastings Street
Vancouver, British Columbia
V6E 2E9
Phone: (604) 684-9288
Telex: 04-507546
Fax: (604) 684-3178

CROWS NEST RESOURCES LIMITED

P.O. Box 2699, Station M
525 - 3rd Avenue S.W.
Calgary, Alberta
T2P 3Y9
Phone: (403) 232-2110
Telex: 03-82205
Fax: (403) 232-4494

ESSO RESOURCES CANADA LIMITED

237 - 4th Avenue S.W.
Calgary, Alberta
T2P 0H6
Phone: (403) 237-3737
Telex: 03-821025
Fax: (403) 237-3037

FORDING COAL LIMITED

200, 205 - 9th Avenue S.E.
Calgary, Alberta
T2G 0R4
Phone: (403) 264-1063
Telex: 03-825846
Fax: (403) 264-7339

QUINTETTE COAL LIMITED

650 West Georgia Street
P.O. Box 11575
Vancouver, British Columbia
V6B 4N7
Phone: (604) 669-2226
Telex: 04-51547
Fax: (604) 688-2669

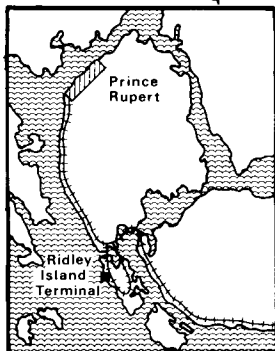
TECK CORPORATION

1199 West Hastings Street
Vancouver, British Columbia
V6E 2K5
Phone: (604) 687-1117
Telex: 04-507709
Fax: (604) 687-6100

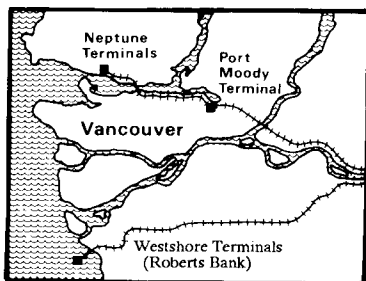
WESTAR MINING LTD.

1176 West Georgia Street
Vancouver, British Columbia
V6E 4B8
Phone: (604) 681-8222
Telex: 04-508723
Fax: (604) 681-9537

PRODUCTION AND MARKETING



All coking coal from N.E. exported to Japan



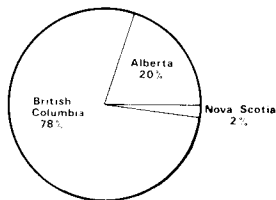
Asia (mainly Japan) 82%

Europe 7%

North America 2%

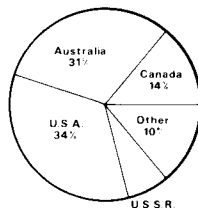
South America 3%

Production of Coking Coal in Canada

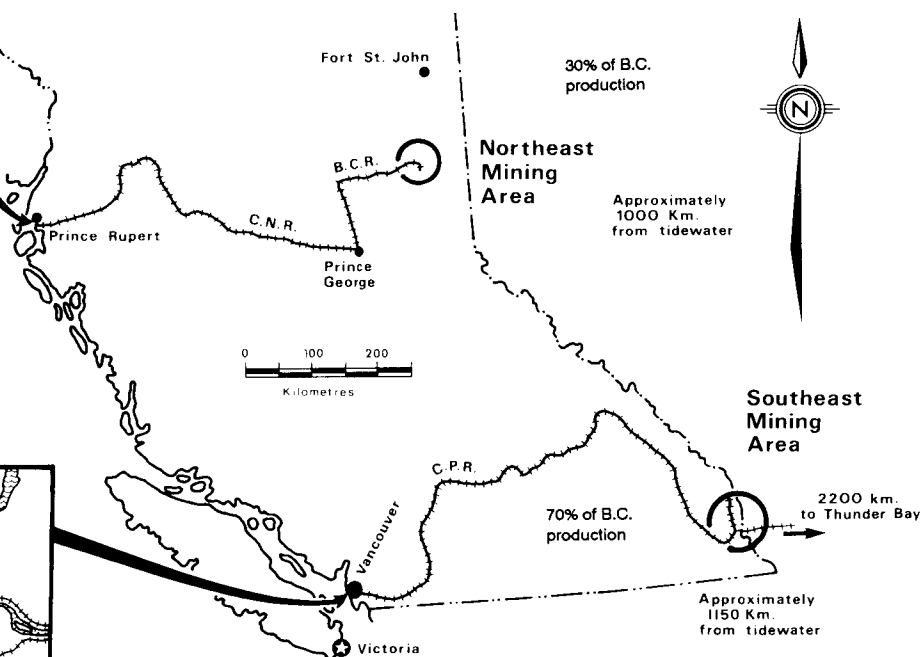
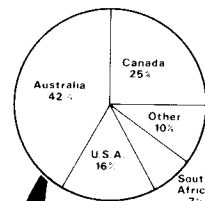


British Columbia: 2.5%
Remainder of Canada: 3.5%

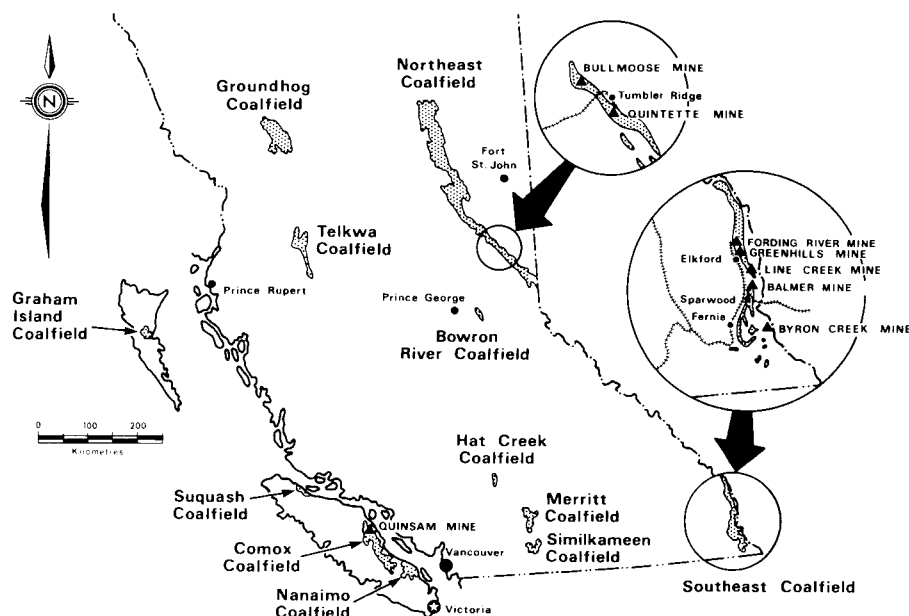
Source Countries for World Coking Coal Imports



Japanese Coking Coal Imports



COALFIELDS AND RESOURCES



MINES

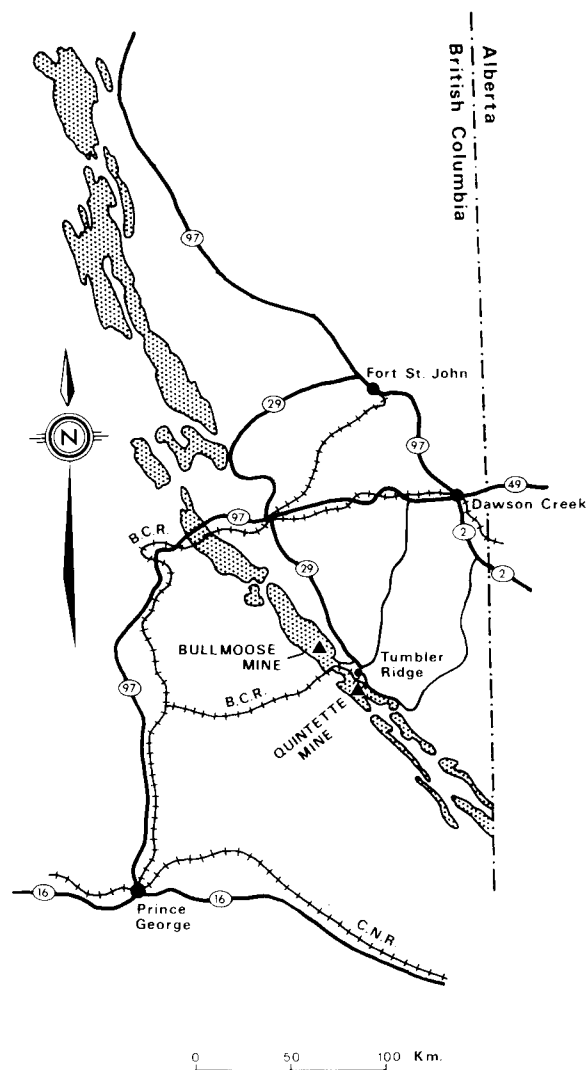
RESOURCES

OPERATOR	MINE	MINING METHOD	1988* CLEAN COAL UTILIZATION PRODUCTION (millions of tonnes)	COALFIELD	COAL RANK	MINING METHOD ADAPTABLE	UTILIZATION	Reserves (millions of tonnes)	Resources (millions of tonnes)	
				Northeast	Low to High Volatile Bituminous	Open Pit and Underground	Metallurgical and Thermal	947 168	7101 1639	
<u>NORTHEAST COALFIELD:</u>										
Teck Corporation	Bullmoose	Open Pit	1.7	Mainly Metallurgical	Northeast	Low to High Volatile Bituminous	Open Pit and Underground	Metallurgical, and Thermal	1050 165	7077 1249
Quintette Coal Limited	Quintette	Open Pit	4.6	Mainly Metallurgical	Groundhog	Low Volatile Bituminous to Anthracite	Open Pit and Underground	Thermal	50	5588
<u>SOUTHEAST COALFIELD:</u>										
Fording Coal Limited	Fording River	Open Pit	5.9	Mainly Metallurgical	Telkwa	High Volatile A Bituminous	Open Pit and Underground	Thermal	35	88
Westar Mining Ltd.	Greenhills	Open Pit	3.1	Metallurgical and Thermal	Hat Creek	Lignite to Subbituminous A	Open Pit	Thermal	440	500
	Balmer	Open Pit	6.4	Mainly Metallurgical	Similkameen	Lignite to High Volatile A Bituminous	Open Pit and Underground	Thermal	15	21
Crows Nest Resources Limited	Line Creek	Open Pit	2.1	Metallurgical and Thermal	Merritt	High Volatile C to A Bituminous	Underground	Thermal		18
Esso Resources Canada Limited	Byron Creek	Open Pit	1.0	Thermal	Comox	High Volatile A Bituminous	Open Pit and Underground	Thermal	30	183
					Nanaimo	High Volatile B Bituminous	Underground	Thermal	3	7
<u>COMOX COALFIELD:</u>										
Brinco Coal Corp.	Quinsam	Open Pit	0.150	Thermal	Suquash	High Volatile C Bituminous		Thermal		
		TOTAL	24.95							
					Bowron River	High Volatile B and C Bituminous	Underground	Thermal		67
							TOTAL		2903	23 757

* From the Coal Association of Canada, 1989 directory

NORTHEAST

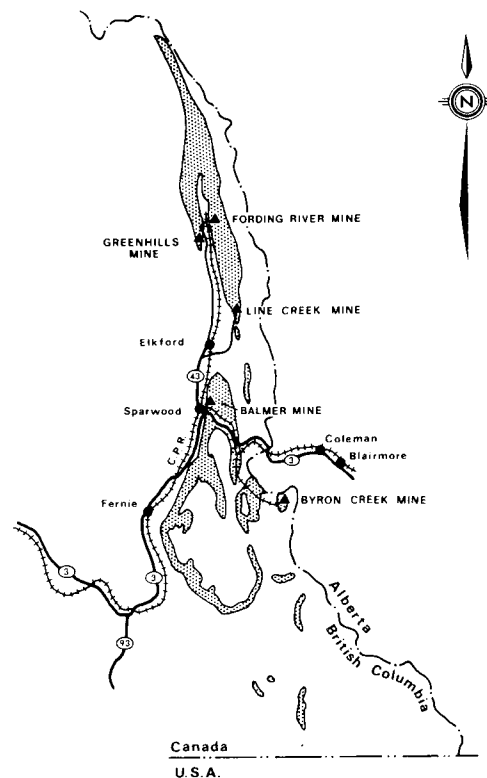
	'Run-of-Mine' Coal	Metallurgical Products*	Thermal Products*
AGE	Early Cretaceous		
RESOURCES			
metallurgical	7101 million tonnes		
thermal	1639 million tonnes		
RESERVES			
metallurgical	947 million tonnes		
thermal	168 million tonnes		
PROXIMATE ANALYSIS, % (as received)			
Moisture	5.0	air dried 1.0-2.0	air dried 2.0-2.5
Ash	15.0 (4.5-21.5)	9.5	10.0
Volatile Matter	22.5	20-26	21-23
Fixed Carbon	<u>57.5</u>	63-69	60.0-66.5
	100.0		
SULPHUR, %	0.5	0.5	0.5
HEATING VALUE			
BTU/lb	12 500	13 000	12 600-13 500
kJ/kg	29 075	30 238	29 308-31 401
RANK	Medium to Low Volatile Bituminous		
ULTIMATE ANALYSIS, % (dry, ash-free basis)			
Carbon	88.0		
Hydrogen	5.0		
Oxygen	5.4		
Nitrogen	1.4		
Sulphur	<u>0.2</u>		
	100.0		
HARDGROVE GRINDABILITY INDEX	72-82		
ASH CHEMISTRY, %			
Na ₂ O	<2.3		
K ₂ O	<2.7		
P ₂ O ₅	<1.6	0.03 Phosphorous	
Other	95.9-99.8		
INITIAL DEFORMATION TEMPERATURE, °C	1200-1500, oxidizing		
FREE SWELLING INDEX, Crucible Swelling No.	1-7	5-7	
R ₀ max	1.2 (0.8-1.7)		
FLUIDITY, d.d.p.m.		90	
SIZE, mm		38 x 0, 50 x 0	
SULPHUR FORMS, %			
Pyritic	<0.2		
Sulphate	0.0		
Organic	<u><0.4</u>		
	<0.5		



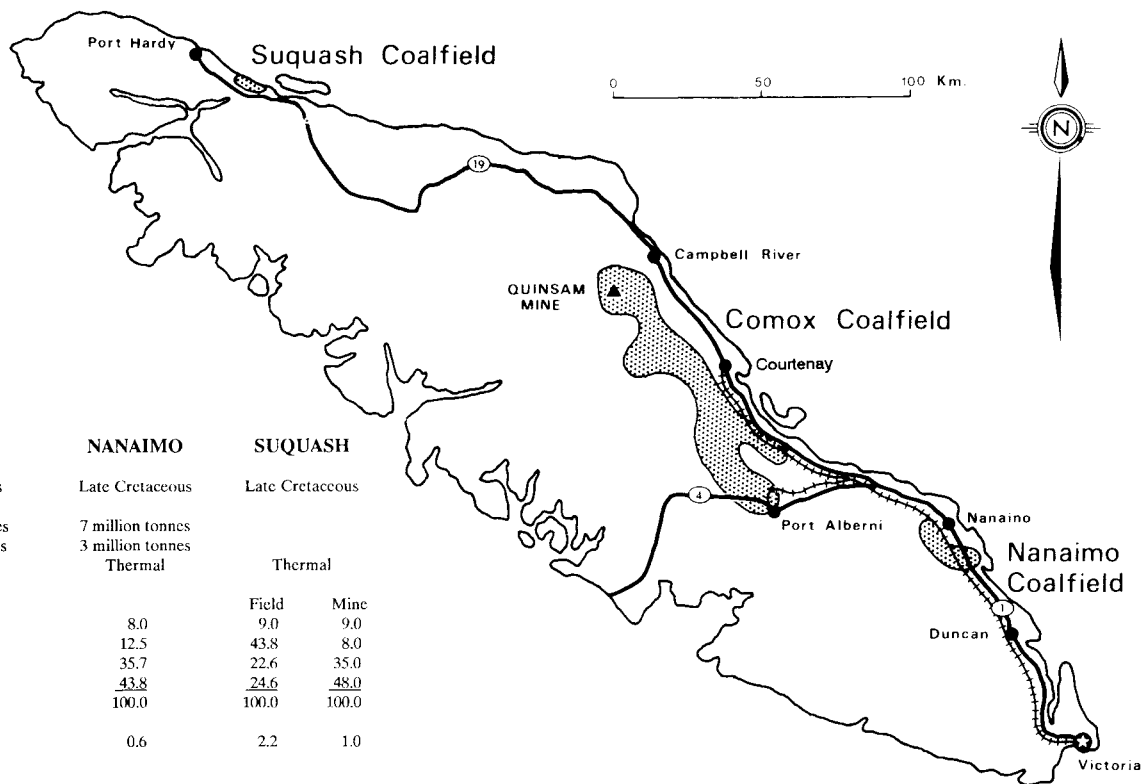
*Ranges derived from TEX report. These ranges represent current contract specifications with Japanese importers - they do not represent the limits of quality specifications of northeast B.C. coals.

SOUTHEAST

	'RUN-OF-MINE' COAL	METALLURGICAL PRODUCTS*	THERMAL PRODUCTS*	SEMI-COKING PRODUCTS*
AGE	Late Jurassic- Early Cretaceous			
RESOURCES				
metallurgical	7077 million tonnes			
thermal	1249 million tonnes			
RESERVES				
metallurgical	1050 million tonnes			
thermal	165 million tonnes			
PROXIMATE ANALYSIS, % (air-dried basis)				
Moisture	2.0	1.0-1.5	1.0-1.5	
Ash	17.0	6.5-9.5	9-15	8.5-10.5
Volatile Matter	23.0	19-33	19.5-31	21-28
Fixed Carbon	<u>58.0</u>	59-69	60-66	
	100.0			
SULPHUR, %	0.4	0.4-0.5 max	0.3-0.6	0.3-0.6
HEATING VALUE				
BTU/lb	12 250	13 680-14 040	11 520-13 320	
kJ/kg	28 494	31 320-32 657	26 796-30 982	
RANK	Low to High Volatile Bituminous			
ULTIMATE ANALYSIS, % (dry, ash-free basis)				
Carbon	87.5			
Hydrogen	5.0			
Oxygen	5.5			
Nitrogen	1.6			
Sulphur	<u>0.4</u>			
	100.0			
HARDGROVE GRINDABILITY INDEX	84 (65->100)			
ASH CHEMISTRY, %				
Na ₂ O	0.1			
K ₂ O	1.0			
P ₂ O ₅	1.3			
Other	<u>27.6</u>			
	100.0			
INITIAL DEFORMATION TEMPERATURE, °C	1450 (1250-1482+), oxidizing			
FREE SWELLING INDEX, Crucible Swelling No.	4.0 (2-7.5)	6-8	1-5.5	3-6
R ₀ max	0.9-1.4			
FLUIDITY, d.d.p.m.	< 100			
SIZE, mm		38 x 0		
SULPHUR FORMS, %				
Pyritic	0.1			
Sulphate	0.0			
Organic	<u>0.3</u>			
	0.4			

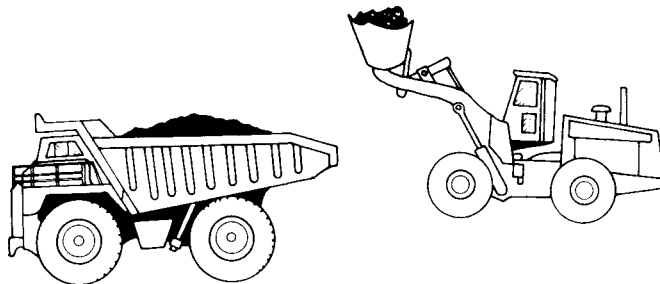


*Ranges derived from TEX report. These ranges represent current contract specifications with Japanese importers - they do not represent the limits of quality specifications of southeast B.C. coals.



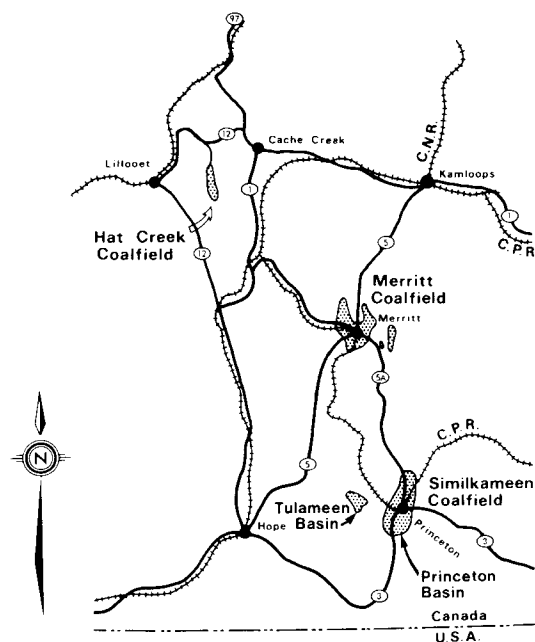
	COMOX	NANAIMO	SUQUASH	
AGE	Late Cretaceous	Late Cretaceous	Late Cretaceous	
RESOURCES	183 million tonnes	7 million tonnes		
RESERVES	30 million tonnes	3 million tonnes		
UTILIZATION	Thermal	Thermal	Thermal	
PROXIMATE ANALYSIS, % (as received basis)			Field	Mine
Moisture	3.0	8.0	9.0	9.0
Ash	15.7	12.5	43.8	8.0
Volatile Matter	36.1	35.7	22.6	35.0
Fixed Carbon	<u>45.2</u>	<u>43.8</u>	<u>24.6</u>	<u>48.0</u>
	100.0	100.0	100.0	100.0
SULPHUR, %	1.9	0.6	2.2	1.0
HEATING VALUE (as received)				
BTU/lb	11 500	11 600	5 800	11 000
kJ/kg	26 749	26 982	13 491	25 586
RANK	High Volatile A Bituminous	High Volatile B Bituminous	High Volatile C Bituminous	
ULTIMATE ANALYSIS, % (dry, ash-free basis)				
Carbon	78.3	82.0		
Hydrogen	5.0	6.1		
Oxygen	12.7	9.6		
Nitrogen	0.8	1.6		
Sulphur	<u>3.1</u>	<u>0.7</u>		
	100.0	100.0		
HARDGROVE GRINDABILITY INDEX	-50	53-85	43	
ASH CHEMISTRY, %				
Na ₂ O	<1.0	0.5		
K ₂ O	<1.0	0.9		
P ₂ O ₅	0.5	0.4		
Other	<u>≥97.5</u>	<u>98.2</u>		
	100.0	100.0		
INITIAL DEFORMATION TEMPERATURE, °C oxidizing atm.	1340	1280		
FREE SWELLING INDEX 1.5 to 2.5		up to 4.5	1.5	
SULPHUR FORMS, %				
Sulphate	Trace	0.0		
Pyritic	1.3	0.1		
Organic	<u>0.1</u>	<u>0.5</u>		
	1.4	0.6		

VANCOUVER ISLAND



SOUTH CENTRAL

	HAT CREEK**	MERRITT	SIMILKAMEEN		
		Tertiary Eocene	Tertiary Eocene	Tertiary Eocene	Princeton Basin*
RESOURCES	4700 million tonnes	18 million tonnes		21 million tonnes	
RESERVES	566 million tonnes			15 million tonnes	
UTILIZATION	Thermal	Thermal		Thermal	
PROXIMATE ANALYSIS, % (as received)					
Moisture	23.5	5.0	5.5	16.2	
Ash	26.6	9.0	8.8	7.0	
Volatile Matter	24.8	34.0	29.0	30.8	
Fixed Carbon	<u>25.1</u>	<u>52.0</u>	<u>56.7</u>	<u>46.2</u>	
	100.00	100.0	100.0	100.2	
SULPHUR, %	0.4	0.6	0.6	0.45	
HEATING VALUE (as received)					
BTU/lb	5 804	12 500	11 700	10 100	
KJ/kg	13 500	29 075	27 214	23 493	
RANK	Lignite to Subbituminous A	High Volatile C to A Bituminous	High Volatile C to High Volatile A	Lignite to Subbituminous B	
ULTIMATE ANALYSIS, % (dry, ash-free basis)					
Carbon	72.9				
Hydrogen	4.8				
Oxygen	20.3				
Nitrogen	1.5				
Sulphur	0.5				
Chlorine	<u>>0.02</u>				
	100.0				
HARDGROVE GRINDABILITY INDEX		57	51		
ASH CHEMISTRY, %					
Na ₂ O	1		0.67		
K ₂ O	0.5		0.64		
P ₂ O ₅	0.2		0.17		
Other	<u>98.3</u>		<u>98.52</u>		
	100.0		100.00		
INITIAL DEFORMATION TEMPERATURE, °C	1400-1500 ash fusion, oxidizing atm.	1550, softening 1400, oxidizing atm.			
MISCELLANEOUS			R _{0max} = 0.62-0.86		

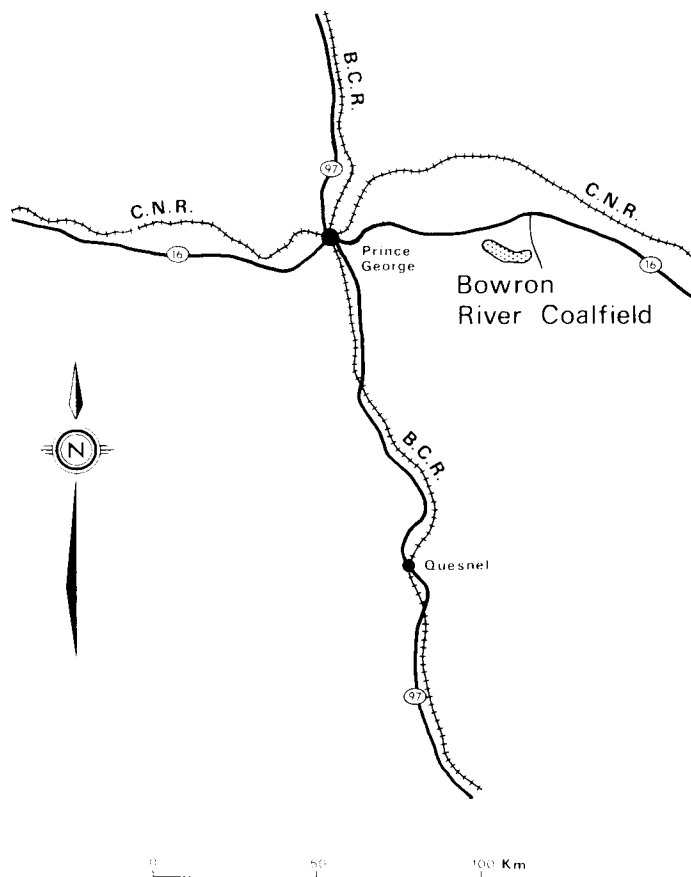


**Princeton* seam only. Mine data.

**Derived from the B.C. Hydro Hat Creek coal liquifaction project prefeasibility study - mining (March 1981).

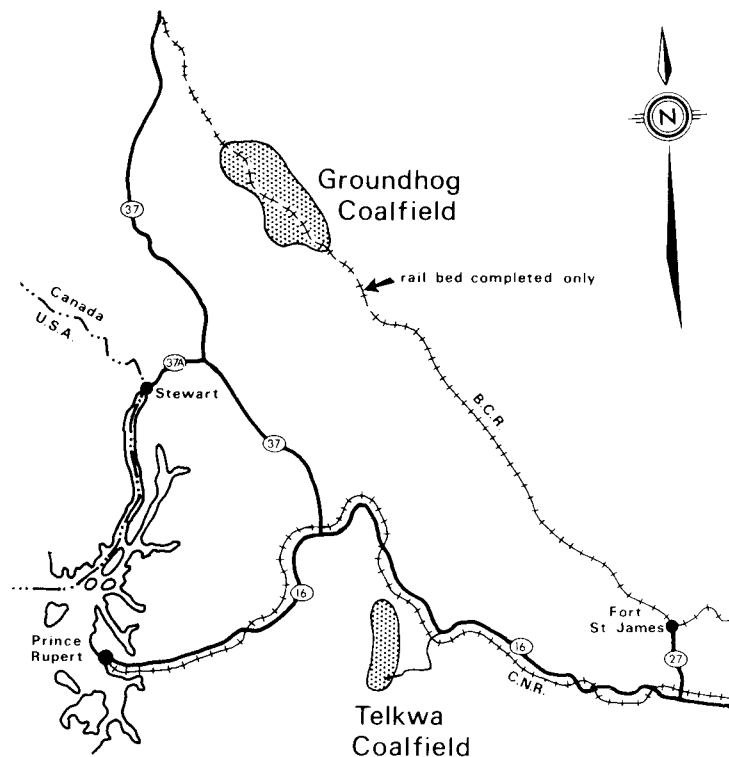
CENTRAL

AGE	Tertiary
RESOURCES	67 million tonnes
UTILIZATION	Thermal
PROXIMATE ANALYSIS, % (as received basis)	
Moisture	4.0
Ash	35.7
Volatile Matter	26.4
Fixed Carbon	<u>33.9</u>
	100.0
SULPHUR, %	1.25
HEATING VALUE (as received)	
BTU/lb	8 000
kJ/kg	18 608
RANK	High Volatile C and B Bituminous
ULTIMATE ANALYSIS, % (dry, ash-free basis)	
Carbon	75.8
Hydrogen	5.8
Oxygen	15.2
Nitrogen	1.6
Sulphur	<u>1.6</u>
	100.0
HARDGROVE GRINDABILITY INDEX	53
MISCELLANEOUS	$R_{0max} = 0.65$ 0-2% Resinite

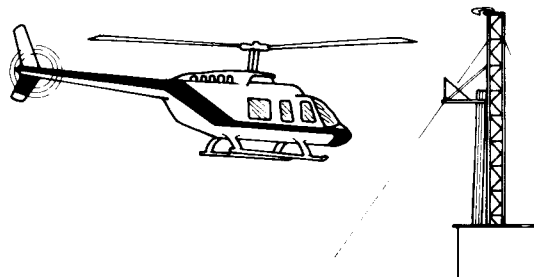


NORTHWEST

	TELKWA	GROUNDHOG	
AGE	Early Cretaceous	Late Jurassic to Early Cretaceous	
UTILIZATION	Thermal	Thermal	
RESOURCES	88 million tonnes	5588 million tonnes	
RESERVES	35 million tonnes	50 million tonnes	
PROXIMATE ANALYSIS, % (as received)		Beneficiated	
Moisture	4.0	2.0	1.0
Ash	21.0	36.0	6.0
Volatile Matter	25.5	8.0	6.5
Fixed Carbon	<u>49.5</u>	<u>54.0</u>	<u>86.5</u>
	100.0	100.0	100.0
SULPHUR, %	1.8	0.5	0.5
HEATING VALUE, r.o.m.			
BTU/lb	10 950	8 800	13 950
kJ/kg	25 470	20 469	32 448
RANK	High Volatile A Bituminous	Low Volatile Bituminous to Anthracite	
ULTIMATE ANALYSIS, % (dry, ash-free basis)			
Carbon	80.0	90.2	
Hydrogen	5.0	3.0	
Oxygen	13.0	5.0	
Nitrogen	0.8	1.0	
Sulphur	<u>1.2</u>	<u>0.8</u>	
	100.0	100.0	
HARDGROVE GRINDABILITY INDEX	60	48	
ASH CHEMISTRY, %			
Na ₂ O	0.8	1.0	
K ₂ O	0.3	1.0	
P ₂ O ₅	0.6	1.0	
Other	<u>98.3</u>	<u>97.0</u>	
	100.0	100.0	
INITIAL DEFORMATION TEMPERATURE, °C	1450	1250	
FREE SWELLING INDEX	Up to 5.5		



0 50 100 Km



COAL DATA SOURCES

Coal production and quality
data is generally available from
some or all of these sources:

**PROVINCE OF BRITISH COLUMBIA
MINISTRY OF ENERGY, MINES AND
PETROLEUM RESOURCES
COAL RESOURCES SUBSECTION**

122-525 Superior Street
Victoria, B.C., V8V 1X4

CONTACT: DAVID GRIEVE
Telephone: (604) 356-8268
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(ENERGY, MINES AND RESOURCES CANADA)
ONE OIL PATCH DRIVE
DEVON, ALBERTA T0C 1E0**

**THE INSTITUTE OF SEDIMENTARY AND PETROLEUM
GEOLOGY
(GEOLOGICAL SURVEY OF CANADA)
3303 - 33RD STREET N.W.
CALGARY, ALBERTA T2L 2A7**

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502, 205 - 9TH AVENUE S.E.
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