BRITISH COLUMBIA
COAL
SPECIFICATIONS

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:

- 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

Fort St. John
30% of B.C. production

Northeast Mining Area
Approximately 1000 Km from tidewater

Southeast Mining Area
Approximately 1150 Km from tidewater

British Columbia: 2.5%
Remainder of Canada: 3.5%

Source Countries for World Coking Coal Imports

Production of Coking Coal in Canada

Japanese Coking Coal Imports
## MINES

<table>
<thead>
<tr>
<th>OPERATOR</th>
<th>MINE</th>
<th>1988* OPERATOR MINE</th>
<th>MINING METHOD</th>
<th>CLEAN COAL UTILIZATION (millions of tonnes)</th>
<th>COALFIELD</th>
<th>COAL RANK</th>
<th>MINING METHOD</th>
<th>UTILIZATION</th>
<th>RESERVES</th>
<th>RESOURCES</th>
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<tbody>
<tr>
<td>Teck Corporation</td>
<td>Bullmoose</td>
<td>Open Pit</td>
<td>1.7</td>
<td>Metallurgical</td>
<td>Northeast</td>
<td>Low to High Volatile Bituminous</td>
<td>Open Pit and Underground</td>
<td>Metallurgical and Thermal</td>
<td>947</td>
<td>7101</td>
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<td>Quintette Coal Limited</td>
<td>Quintette</td>
<td>Open Pit</td>
<td>4.6</td>
<td>Metallurgical</td>
<td>Southeast</td>
<td>Low to High Volatile Bituminous</td>
<td>Open Pit and Underground</td>
<td>Metallurgical and Thermal</td>
<td>1050</td>
<td>7077</td>
</tr>
<tr>
<td>Fording Coal Limited</td>
<td>Fording River</td>
<td>Open Pit</td>
<td>5.9</td>
<td>Metallurgical</td>
<td>Groundhog</td>
<td>Low Volatile Bituminous to Anthracite</td>
<td>Open Pit and Underground</td>
<td>Thermal</td>
<td>50</td>
<td>5588</td>
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<td>Westar Mining Ltd.</td>
<td>Greenhills</td>
<td>Open Pit</td>
<td>3.1</td>
<td>Metallurgical</td>
<td>Telkwa</td>
<td>High Volatile A Bituminous</td>
<td>Open Pit and Underground</td>
<td>Thermal</td>
<td>35</td>
<td>88</td>
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<td>Crows Nest Resources Ltd.</td>
<td>Balmer</td>
<td>Open Pit</td>
<td>6.4</td>
<td>Metallurgical</td>
<td>Hat Creek</td>
<td>Lignite to Subbituminous A</td>
<td>Open Pit</td>
<td>Thermal</td>
<td>440</td>
<td>500</td>
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<td>Esso Resources Canada Ltd.</td>
<td>Line Creek</td>
<td>Open Pit</td>
<td>2.1</td>
<td>Metallurgical</td>
<td>Similkameen</td>
<td>Lignite to High Volatile A Bituminous</td>
<td>Open Pit and Underground</td>
<td>Thermal</td>
<td>15</td>
<td>21</td>
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<td></td>
<td>Byron Creek</td>
<td>Open Pit</td>
<td>1.0</td>
<td>Metallurgical</td>
<td>Merritt</td>
<td>High Volatile C to A Bituminous</td>
<td>Underground</td>
<td>Thermal</td>
<td>18</td>
<td>18</td>
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<td></td>
<td>Quinsam</td>
<td>Open Pit</td>
<td>0.150</td>
<td>Thermal</td>
<td>Comox</td>
<td>High Volatile A Bituminous</td>
<td>Open Pit and Underground</td>
<td>Thermal</td>
<td>3</td>
<td>7</td>
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<td>Suquash</td>
<td>Open Pit</td>
<td>0.150</td>
<td>Thermal</td>
<td>Nanaimo</td>
<td>High Volatile B Bituminous</td>
<td>Underground</td>
<td>Thermal</td>
<td>67</td>
<td>23757</td>
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<td></td>
<td>Bowron River</td>
<td>Open Pit</td>
<td>0.150</td>
<td>Thermal</td>
<td>TOTAL</td>
<td>24.95</td>
<td>TOTAL</td>
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</table>

* From the Coal Association of Canada, 1989 directory
NORTHEAST

<table>
<thead>
<tr>
<th>'Run-of-Mine' Coal</th>
<th>Metallurgical Products*</th>
<th>Thermal Products*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>Early Cretaceous</td>
<td></td>
</tr>
</tbody>
</table>

**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 1.0-2.0 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: 57.5 63-69 60.0-66.5
- air dried
  - Moisture: 5.0 1.0-2.0 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: 57.5 63-69 60.0-66.5

**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: 0.2
- 100.0

**HARDGROVE GRINDABILITY INDEX**
- 72-82

**ASH CHEMISTRY, %**
- Na₂O: <2.3
- K₂O: <2.7
- P₂O₅: <1.6
- Other: 95.9-99.8

**INITIAL DEFORMATION TEMPERATURE, °C**
- 1200-1500, oxidizing

**FREE SWELLING INDEX, Crucible Swelling No.**
- R₉₀ₐₓ: 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: <0.4
- <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**

<table>
<thead>
<tr>
<th>‘RUN-OF-MINE’ COAL</th>
<th>METALLURGICAL PRODUCTS*</th>
<th>THERMAL PRODUCTS*</th>
<th>SEMI-COKING PRODUCTS*</th>
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<tbody>
<tr>
<td>AGE</td>
<td>Late Jurassic-Early Cretaceous</td>
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<tr>
<td>RESOURCES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>metallurgical</td>
<td>7077 million tonnes</td>
<td></td>
<td></td>
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<tr>
<td>thermal</td>
<td>1249 million tonnes</td>
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<tr>
<td>RESERVES</td>
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<tr>
<td>metallurgical</td>
<td>1050 million tonnes</td>
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<tr>
<td>thermal</td>
<td>165 million tonnes</td>
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<tr>
<td>PROXIMATE ANALYSIS, %</td>
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<td></td>
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<tr>
<td>(air-dried basis)</td>
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<td></td>
<td></td>
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<tr>
<td>Moisture</td>
<td>2.0</td>
<td>1.0-1.5</td>
<td>1.0-1.5</td>
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<tr>
<td>Ash</td>
<td>17.0</td>
<td>6.5-9.5</td>
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<td>19.33</td>
<td>19.5-31</td>
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<tr>
<td>Fixed Carbon</td>
<td>58.0</td>
<td>59-69</td>
<td>60-66</td>
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<tr>
<td>100.0</td>
<td></td>
<td></td>
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<tr>
<td>SULPHUR, %</td>
<td>0.4</td>
<td>0.4-0.5 max</td>
<td>0.3-0.6</td>
</tr>
<tr>
<td>100.0</td>
<td></td>
<td></td>
<td>0.3-0.6</td>
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<tr>
<td>HEATING VALUE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BTU/lb</td>
<td>12 250</td>
<td>13 600-14 040</td>
<td>11 520-13 320</td>
</tr>
<tr>
<td>kJ/kg</td>
<td>28 494</td>
<td>31 320-32 657</td>
<td>26 790-30 982</td>
</tr>
<tr>
<td>RANK</td>
<td>Low to High Volatile Bituminous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ULTIMATE ANALYSIS, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(dry, ash-free basis)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon</td>
<td>87.5</td>
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<tr>
<td>Hydrogen</td>
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</tr>
<tr>
<td>Oxygen</td>
<td>5.5</td>
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<td>Nitrogen</td>
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<tr>
<td>Sulphur</td>
<td>0.4</td>
<td></td>
<td></td>
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<tr>
<td>100.0</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>HARDGROVE GRINDABILITY INDEX</td>
<td>84 (65-&gt;100)</td>
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<td></td>
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<tr>
<td>ASH CHEMISTRY, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Na₂O</td>
<td>0.1</td>
<td></td>
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</tr>
<tr>
<td>K₂O</td>
<td>1.0</td>
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</tr>
<tr>
<td>P₂O₅</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>0.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INITIAL DEFORMATION TEMPERATURE, °C</td>
<td>1450 (1250-1482 +), oxidizing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FREE SWELLING INDEX, Crucible Swelling No.</td>
<td>4.0 (2-7.5)</td>
<td>6-8</td>
<td>1.5-5</td>
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<tr>
<td>Rₚ,max</td>
<td>0.9-1.4</td>
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<tr>
<td>FLUIDITY, d.d.p.m.</td>
<td>&lt; 100</td>
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</tr>
<tr>
<td>SIZE, mm</td>
<td>38 x 0</td>
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<td></td>
</tr>
<tr>
<td>SULPHUR FORMS, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyritic</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulphate</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

*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.*
<table>
<thead>
<tr>
<th></th>
<th>HAT CREEK**</th>
<th>MERRITT</th>
<th>SIMILKAMEEN</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Tertiary</td>
<td>Tertiary</td>
<td>Tertiary</td>
</tr>
<tr>
<td></td>
<td>Eocene</td>
<td>Eocene</td>
<td>Eocene</td>
</tr>
<tr>
<td>RESOURCES</td>
<td>4700 million tonnes</td>
<td>18 million tonnes</td>
<td>21 million tonnes</td>
</tr>
<tr>
<td>RESERVES</td>
<td>566 million tonnes</td>
<td>Thermal</td>
<td>12 million tonnes</td>
</tr>
<tr>
<td>UTILIZATION</td>
<td></td>
<td>Thermal</td>
<td>Thermal</td>
</tr>
<tr>
<td>PROXIMATE ANALYSIS, %</td>
<td>Moisture</td>
<td>Ash</td>
<td>Volatile Matter</td>
</tr>
<tr>
<td>(as received)</td>
<td>23.5</td>
<td>26.6</td>
<td>24.8</td>
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<tr>
<td>SULPHUR, %</td>
<td>0.4</td>
<td>0.6</td>
<td>0.6</td>
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<tr>
<td>HEATING VALUE</td>
<td>BTU/lb</td>
<td>kJ/kg</td>
<td>BTU/lb</td>
</tr>
<tr>
<td>(as received)</td>
<td>5,804</td>
<td>15,500</td>
<td>12,500</td>
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<tr>
<td>RANK</td>
<td>Lignite</td>
<td>High Volatile</td>
<td>High Volatile</td>
</tr>
<tr>
<td></td>
<td>Subbituminous A</td>
<td>C to A</td>
<td>C to High</td>
</tr>
</tbody>
</table>

|               | Tertiary    | Tertiary | Tertiary   |
|               | Eocene      | Eocene  | Eocene     |
| RESOURCES     | 21 million tonnes | 25 million tonnes | 10 million tonnes |
| RESERVES      | 21 million tonnes | Thermal | 15 million tonnes |
| UTILIZATION   |             | Thermal | Thermal |
| PROXIMATE ANALYSIS, % | Moisture | Ash | Volatile Matter | Fixed Carbon | Moisture | Ash | Volatile Matter | Fixed Carbon |
| (as received) | 9.0 | 34.0 | 52.0 | 100.0 | 0.6 | 0.6 | 0.6 | 0.6 |
| SULPHUR, %    | 12.5 | 29.0 | 29.0 | 56.7 |
| HEATING VALUE | BTU/lb | kJ/kg | BTU/lb | kJ/kg | BTU/lb | kJ/kg | BTU/lb | kJ/kg |
| (as received) | 11,700 | 27,214 | 10,100 | 23,493 |
| RANK          | Lignite    | High Volatile | High Volatile | Lignite |
|               | Subbituminous A | C to A | C to High | to |

|               | Thermal |
| INITIAL DEFORMATION TEMPERATURE, °C | 1800-1900 | 1550, softening | 1400, oxidizing atm. |
|               | 1550, softening | 1400, oxidizing atm. |

|               | INITIAL DEFORMATION TEMPERATURE, °C |
| MISCANTILEOU S |                |

**"Princeton" seam only. Mine data.**

**Derived from the B.C. Hydro Hat Creek coal liquefaction 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 33.9

SULPHUR, %
1.25

HEATING VALUE
(thermal basis)
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 1.6

HARDGROVE
GRINDABILITY INDEX
53

MISCELLANEOUS
\( R_{O,max} = 0.65 \)
0-2% Resinite
NORTHWEST

**TELKWA**

**AGE**
Early Cretaceous

**UTILIZATION**
Thermal

**RESOURCES**
88 million tonnes

**RESERVES**
35 million tonnes

**PROXIMATE ANALYSIS, %**
(as received)
- Moisture: 4.0
- Ash: 21.0
- Volatile Matter: 25.5
- Fixed Carbon: 49.5

**SULPHUR, %**
1.8

**HEATING VALUE, r.o.m.**
- BTU/lb: 10,950
- kJ/kg: 25,470

**RANK**
High Volatile A

**ULTIMATE ANALYSIS, %**
(dry, ash-free basis)
- Carbon: 80.0
- Hydrogen: 5.0
- Oxygen: 13.0
- Nitrogen: 0.8
- Sulphur: 1.2

**HARDGROVE GRINDABILITY INDEX**
60

**ASH CHEMISTRY, %**
- Na₂O: 0.8
- K₂O: 0.3
- P₂O₅: 0.6
- Other: 98.3

**INITIAL DEFORMATION TEMPERATURE, °C**
1450

**FREE SWELLING INDEX**
Up to 5.5

**GROUNDHOG**

**AGE**
Late Jurassic to Early Cretaceous

**UTILIZATION**
Thermal

**RESOURCES**
5588 million tonnes

**RESERVES**
50 million tonnes

**PROXIMATE ANALYSIS, %**
(as received)
- Beneficiated
  - Moisture: 2.0
  - Ash: 36.0
  - Volatile Matter: 4.0
  - Fixed Carbon: 86.5

**SULPHUR, %**
0.5

**HEATING VALUE, r.o.m.**
- BTU/lb: 8,800
- kJ/kg: 20,469

**RANK**
Low Volatile Bituminous

**ULTIMATE ANALYSIS, %**
(dry, ash-free basis)
- Carbon: 90.2
- Hydrogen: 3.0
- Oxygen: 5.0
- Nitrogen: 1.0
- Sulphur: 0.8

**HARDGROVE GRINDABILITY INDEX**
48

**ASH CHEMISTRY, %**
- Na₂O: 1.0
- K₂O: 1.0
- P₂O₅: 1.0
- Other: 92.0

**INITIAL DEFORMATION TEMPERATURE, °C**
1250

**FREE SWELLING INDEX**
Up to 5.5
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
FAX: (604) 356-8153

CANMET
(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

THE COAL ASSOCIATION OF CANADA
502, 205 - 9TH AVENUE S.E.
CALGARY, ALBERTA T2G 0R3

B.C. RESEARCH
3650 WESBROOK MALL
VANCOUVER, B.C. V6S 2L2