Canada's Yukon

Coal

Coal is found in Mississippian, Jurassic, Cretaceous and Tertiary non-marine sequences which underlie as much as 37 000 km^2 of the Yukon. The largest deposits and those with the greatest potential are located within the mid-Cretaceous to Eocene strata of the Bonnet Plume Basin of northeastern Yukon. The basin is a pull-apart feature related to strike-slip faults of the Richardson Fault Array.

Coal also occurs within the Jura-Cretaceous sedimentary rocks in the Whitehorse Trough, which developed as a forearc basin on the eastern side of the Stikine arc. These deposits were formed in fan deltas which separated the emerging arc terrain from flyschoid environments within the trough. Some deposits occur in Cretaceous to Eocene pull-apart basins along the Tintina Fault.

Significant coal occurences also are documented in the southeast Yukon's Rock River Basin, a 50 km by 10 km graben or half-graben filled with Late Cretaceous to Eocene sedimentary rocks.

Yukon Government

Significant efforts to develop the coal resources have taken place in the four areas listed below.

Division Mountain
The Division Mountain coal deposit is located 90 km northwest of Whitehorse, approximately 20 km west of the Klondike Highway and the 138 kV Southern Yukon electrical transmission grid. Cash Resources has identified a deposit of 52.9 million tonnes of coal.

The coal is characterized as high-ash, low-sulphur, high-volatile bituminous B. It occurs in seams of mineable thickness, and there is probable continuity along the strike for at least 15 km. Furthermore, there is considerable potential in the area to discover more coal.

Whitehorse Coal
Whitehorse Coal is located approximately 30 km southwest of Whitehorse, close to transportation routes and domestic markets. Seams of mineable thickness, 0.6 to 13 m, have been identified extending discontinuously for 12 km. The coal is a low-sulphur, moderate to high ash anthracite. Coal near the surface is highly oxidized.

Rock River
Coal is confined to an area approximately 10 by 50 km, and is mostly concealed in a mantle of clay, gravel and sand, locally up to 30 m thick. Based on five drill holes totalling 720 m, there appears to be approximately 60 million tonnes of coal within 80 m of the surface. It is classified lignite A to sub-bituminous C, with a thermal content of 3,720 kCal/kg. The gravity survey outlined anomalous areas indicating a potential for up to 1.5 billion tonnes. The coal is amenable to surface mining at a ratio of approximately 2 to 1, waste to coal by volume.

Bonnet Plume
The Bonnet Plume Basin is located in the northern Yukon approximately 100 km to the east of the

52.9 million tonnes

Typical exposure of the coal-bearing Tanglefoot formation, east of Carmacks. (inset) Discovery outcrop at the Division Mountain coal deposit which occurs in the upper Tanglefoot formation within the Whitehorse Trough.

Dempster Highway. It contains the Yukon's largest reserves of coal, 660 million tonnes of high volatile bituminous C, in seams of mineable thickness. The coal is of low sulphur content and is potentially clean-burning. The coal is potentially suitable for conversion to clean gaseous or liquid fuels.

The following table extracted from the document "Yukon Coal Potential" is a more detailed summary of the coal in the South Bonnet Plume Basin a mid-Cretaceous to Tertiary sedimentary basin which hosts the largest coal resources in Yukon.

South Bonnet Plume Basin coal

Location	Seam name	Average seam thickness (m)	Type (rank) of coal	Moisture content (%)	Ash content (%)	Volatile content (%)	Fixed carbon (%)	Sulphur content (%)	Calorific value (BTU/lb)	Calorific value (MJ/kg)	Resource-measured (million tonnes)*	Resource-indicated (million tonnes)*	Resource-inferred (million tonnes)*	Resource-total (million tonnes)*
Illtyd Creek	#1	6.85	HVB C	5.2	19.8	32.8	42.2	0.35	9067	21.09	121	29	33	183
	#2	3.66		5.5	13.8	34.2	46.5	0.33	9910	23.05				
	#3	2.40		5.1	20.1	32.3	42.2	0.35	9041	21.03				
West Illtyd Creek	#3		HVB C										48	48
	#4													
	#5													
Wernecke	#1	5.65	HVB C	3.9	12.9	36.1	47.3		10547	24.53		105	29	134
	#2	9.51		5.0	10.3	36.0	48.9		10810	24.14				
	#3	3.43		6.7	16.2	32.2	45.1	0.33	9622	22.38				
	#4	2.92		7.3	9.6	33.9	49.3	0.33	10592	24.64				
	#5	2.72		6.5	16.5	29.5	48.5	0.27	9723	22.62				
Airstrip (Marathon)	#3	5.50	HVB C	4.4	18.6	32.2	44.8	0.39	9380	21.82			18	18
	#4	4.89		5.2	18.8	30.3	45.8	0.34	9499	22.09				
Wind River (Deslaurier)	#3	8.00	HVB C	4.4	18.1	31.0	45.6	0.40	9743	22.66		60	43	103
	#4	4.75		4.7	14.3	32.6	48.3	0.40	10167	23.65				
	#5	9.19		4.5	11.6	31.9	51.9	0.47	10556	24.55				
Spaceship	#1	6.42	HVB C	4.5	14.9	34.4	46.2	0.32	10052	23.38			158	158
	#2	8.49		5.2	12.4	34.5	48.2	0.31	10316	24.00				
	#3	7.12		4.7	13.3	33.3	48.7	0.3	10223	23.78				
	#4	5.45		4.7	12.6	32.8	49.6	0.24	10452	24.31				
	#5	1.93		4.9	11.8	30.5	52.8	0.28	10506	24.44				
Garlic Ring	#1	2.60	HVB C									9	6	15
	#2	3.40												
Total														**659**

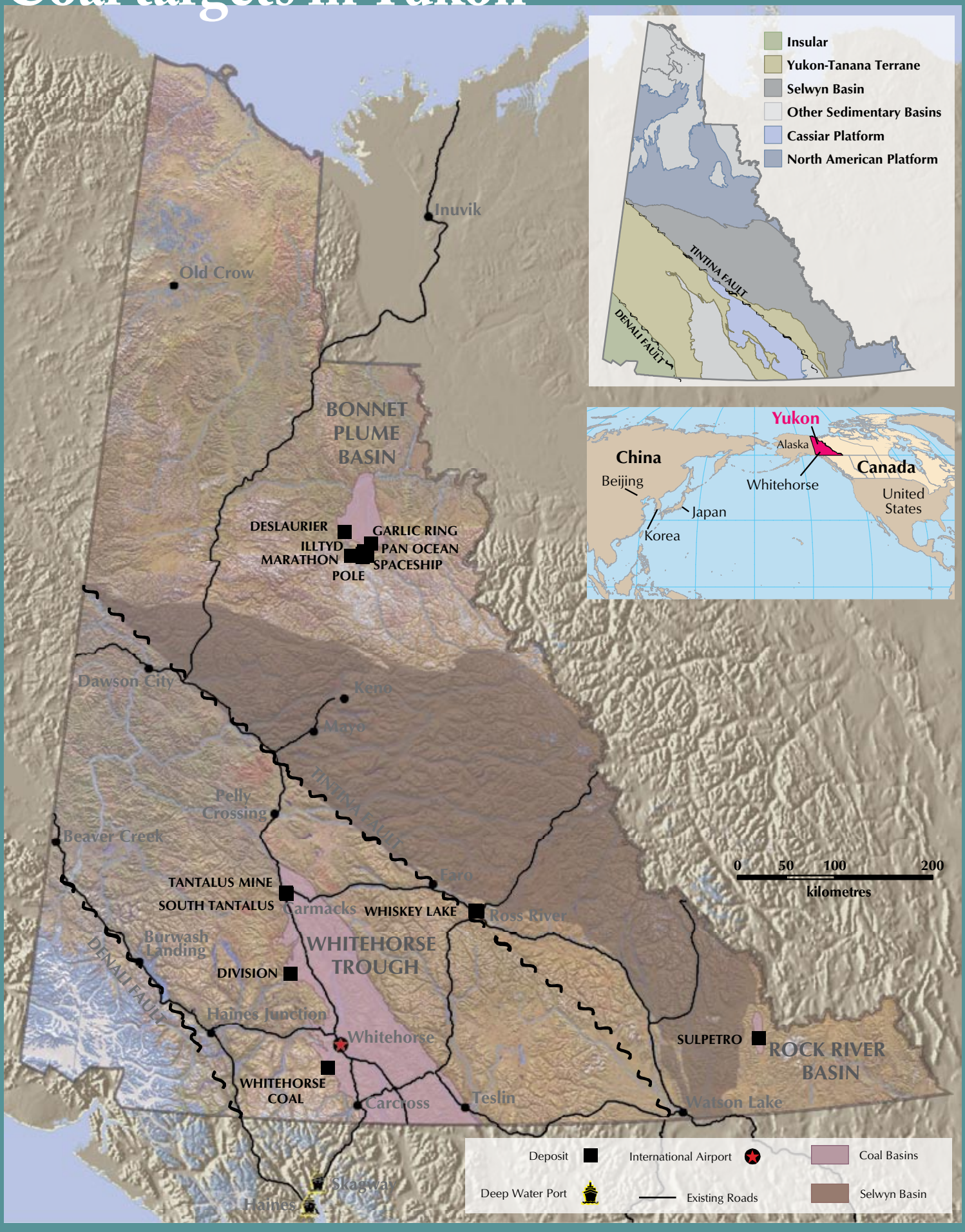
Analyses are for clean coal – produced by washing the +28 mesh fraction at 1.90 specific gravity.
*Resources were calculated in the 1980s and may not conform to guidelines currently in use (NI43-101).
The above information is summarized from the following references:

Hunt, J.A., 1994. Yukon Coal Inventory 1994. Prepared for Energy and Mines Branch, Economic Development, Yukon government, 168 p.

Long, D.G.F., 1985. Coal in Yukon. *In:* Mineral Deposits of the Northern Cordillera, J.A. Morin (ed.), Canadian Institute of Mining and Metallurgy, Special Volume 37, p. 311-318.

Wright, J.L. and Miller, D.C., 1986. Rock River coal basin: geology, gravity survey and interpretion. *In: In:* Mineral Deposits of the Northern Cordillera, J.A. Morin (ed.), Canadian Institute of Mining and Metallurgy, Special Volume 37, p. 362-371.

Coal targets in Yukon



YUKON COAL DEPOSITS

Deposit Owner/optioned to/contact	**Zone(s)** Year resource-reserve was calculated/Reference	Mineral resource-reserve category‡/ Tonnage@ grade/commodity	Yukon MINFILE no. (MINFILE is a computerized mineral inventory providing a detailed description documenting the exploration history and geology of Yukon mineral occurrences.)
Rock River Basin			
Sulpetro (50/50 partnership) Almaden Minerals Ltd. 1103-750 Pender Street W Vancouver, British Columbia Canada V6C 2T8 Telephone: 604-689-7644 Santoy Resources Ltd. 611-675 West Hastings Street Vancouver, British Columbia Canada V6B 1N2 Telephone: 604-669-4799	**Sulpetro** 1982 Assessment report #062134	Historical calculation 67 Mt lignite A to sub-bituminous C coal (CV = 15 456 kJ/kg)	095D 026
Bonnet Plume Basin			
Marathon Anderson Mining Company 3151 Third Avenue Whitehorse, Yukon Canada Y1A 1G1 Telephone: 867-667-2270	**Marathon** 1980 Assessment report #062055	Inferred 18.4 Mt high volatile bituminous C coal (CV = 23 297 kJ/kg)	106E 013
Pole Anderson Mining Company 3151 Third Avenue Whitehorse, Yukon Canada Y1A 1G1 Telephone: 867-667-2270	**Pole** 1980 Assessment report #062055	Inferred 28.93 Mt Indicated 104.65 Mt High volatile bituminous C coal (CV = 23 297 kJ/kg)	106E 021
Garlic Ring Anderson Mining Company 3151 Third Avenue Whitehorse, Yukon Canada Y1A 1G1 Telephone: 867-667-2270	**Garlic Ring** 1980 Assessment report #062055	Inferred 5.55 Mt Indicated 8.6 Mt High volatile bituminous C coal (CV = 23 297 kJ/kg)	106E 032
Illtyd Anderson Mining Company 3151 Third Avenue Whitehorse, Yukon Canada Y1A 1G1 Telephone: 867-667-2270	**Illtyd** 1980 Assessment report #062055	Inferred 33.5 Mt Indicated 29.21 Mt Measured 120.93 Mt High volatile bituminous C coal (CV = 22 097 kJ/kg)	106E 035
Pan Ocean Anderson Mining Company 3151 Third Avenue Whitehorse, Yukon Canada Y1A 1G1 Telephone: 867-667-2270	**West Illtyd** 1980 Assessment report #062055	Inferred 47.56 Mt High volatile bituminous C coal (CV = 23 297 kJ/kg)	106E 036
Deslaurier Philip Wheelton, President Promithian Inc. 209-2995 Princess Crescent Coquitlam, British Columbia Canada V3B 7N1 Telephone: 604-715-2274	**Deslaurier** 1980 Assessment report #062055	Inferred 43.8 Mt Indicated 60.83 Mt High volatile bituminous C coal (CV = 24 888 kJ/kg)	106E 037
Spaceship Anderson Mining Company 3151 Third Avenue Whitehorse, Yukon Canada Y1A 1G1 Telephone: 867-667-2270	**Spaceship** 1980 Assessment report #062055	Inferred 157.95 Mt High volatile bituminous C coal (CV = 23 297 kJ/kg)	106E 038

Yukon coal deposits, *continued*

Deposit Owner/optioned to/contact	**Zone(s)** Year resource-reserve was calculated/Reference	Mineral resource-reserve category‡/ Tonnage@ grade/commodity	Yukon MINFILE no. (MINFILE is a computerized mineral inventory providing a detailed description documenting the exploration history and geology of Yukon mineral occurrences.)
Whitehorse Trough & Tintina Trench			
Division Cash Minerals Limited 1016-510 Hastings Street W Vancouver, British Columbia Canada V6B 1L8 Telephone: 604-688-2568	**Division Mountain** 1998 Assessment report #093824	Indicated 52.9 Mt High volatile bituminous B coal (CV = 31 401 kJ/kg)	115H 013
Whiskey Lake Cash Minerals Limited 1016-510 Hastings Street W Vancouver, British Columbia Canada V6B 1L8 Telephone: 604-688-2568	**Ross River block**	Inferred 370 000 t (0-50 m of cover) 740 000 t (0-100 m of cover) 1 100 000 t (0-150 m of cover)	105F 048
Tantalus Mine Cash Minerals Limited 1016-510 Hastings Street W Vancouver, British Columbia Canada V6B 1L8 Telephone: 604-688-2568	**Tantalus mine**	n/a	115I 002
South Tantalus Cash Minerals Limited 1016-510 Hastings Street W Vancouver, British Columbia Canada V6B 1L8 Telephone: 604-688-2568	**Carmacks South**	Inferred 780 633 t High-volatile bituminous B to meta-anthracite coal (CV = 22 500 kJ/kg)	115I 001
Whitehorse Coal Cash Minerals Limited 1016-510 Hastings Street W Vancouver, British Columbia Canada V6B 1L8 Telephone: 604-688-2568	**Underground** 1969 Assessment report #060580 **Open pit** 1985 Assessment report #092012	Historical calculation 2 381 384 t Meta-anthracite coal (CV = 13 355 kJ/kg) Historical calculation 182 198 t Meta-anthracite coal (CV= 25 198 kJ/kg)	105D 042

‡Mineral resource-reserve category: resource and reserve figures have been compiled from a variety of historical data sources that in most cases predate the implementation of National Instrument 43-101. Therefore, only those figures indicated by an asterisk (*) comply with National Instrument 43-101.

Chert-pebble conglomerate, typical of the coal-bearing Jura-Cretaceous Tantalus Formation. Coal was mined from this formation at the Tantalus mine in Carmacks for use in mineral production at the Anvil zinc-lead mine.

Coal mining in 1992 by Nadahinni Mining on the Whiskey Lake deposit near Ross River. This coal was being mined from Cretaceous to Eocene conglomerates along the Tintina Fault. It was used in milling at the Anvil mine.

Coal

Canada's Yukon

The Whiskey Lake open-pit coal mine in operation in the early 1990s (top) and later view of the upper coal seam (bottom).

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