

RESEARCH COUNCIL OF ALBERTA

Report 66-6

GUIDE TO COAL DEPOSITS,
YUKON AND MACKENZIE TERRITORIES:
A COMPILATION

by

J. D. Campbell

Research Council of Alberta
Edmonton, Alberta
1967

CONTENTS

	Page
Abstract	1
Introduction	1
Geography	2
Acknowledgments	3
Presentation of data	3
Glossary and explanation of abbreviations	7
Catalogue, coal occurrences, Mackenzie Lowland	9
Catalogue, coal occurrences, Northern Cordillera	13
Summary and comments	25
References cited	27

ILLUSTRATION

Figure 1	Coal occurrences, Yukon and Mackenzie Territories in pocket
----------	---

TABLE

Table 1	Stratigraphic distribution , coal-bearing rock units, Yukon and Mackenzie Territories 6
---------	---

GUIDE TO COAL DEPOSITS,
YUKON AND MACKENZIE TERRITORIES:
A COMPILATION

Abstract

As an aid to those interested in resources of the undeveloped northern regions, an annotated catalogue is presented, listing most reported coal occurrences in the Yukon and Mackenzie Territories (112° - 141° west longitude and 60° - 71° north latitude). A map locates known coal deposits and areas underlain by potentially coal-bearing formations. It is believed that in the north, a land of perennial water-shortage, local supplies of coal will, in many cases, prove to be the preferred sources of energy for electric power, process heat and metallurgy. Primary information contained in the catalogue is derived largely from published reports and maps of the Geological Survey of Canada.

INTRODUCTION

Development of the natural resources, chiefly mineral, of the remote territories lying north of Alberta must raise demands for economical electric power, process heat and steam, and metallurgical coke. Undoubtedly hydro power and, when technological improvement makes possible the necessary medium-size installations, nuclear power will play a part in this development. However, throughout western mid-continental U.S.A. and Canada, all recently-designed major electric power facilities have turned to coal as the most economical source of energy; presumably in Yukon and Mackenzie Territories, similar environmental influences may be expected to promote exploitation of local deposits which, though in many cases of poor quality, are more widespread than is generally realized.

Like mid-continental North America, Yukon and Mackenzie Territories are regions of low or exceptionally low precipitation (Sanderson, 1948) and their major valleys lie at low elevations; thus, although the rivers are large, they offer very few opportunities for economical hydro power.

Water, indeed, in spite of certain widely publicized statements to the contrary, is probably a scarce commodity in the north, and thermal power is, consequently, relatively attractive.

Experience in Alberta (see: Campbell and Almadi, 1964; Campbell, 1964, 1966 in press) has shown that a comprehensive presentation of the distribution-pattern of known coal occurrences is the best introductory guide for anyone wishing to begin prospecting. However, information on coal in the Territories is scattered throughout many reports and maps, and the only compilations (Dowling, 1915; MacKay, 1947) are unobtainable and quite out of date. Accordingly, the Research Council of Alberta has ventured to compile this report, a catalogue and map derived from available geological reports (largely those of the Geological Survey of Canada) showing the known coal occurrences in the Yukon and Mackenzie Territories; a few comments are included relating to those regions and topics in which Council's coal exploration experience in the Plains region of Alberta is believed to be pertinent.

Extensive coal deposits known to exist in the Queen Elizabeth Islands (District of Franklin) are not considered here.

Geography

The total area of the Yukon and Mackenzie Territories together is approximately three times that of the Province of Alberta. Most of the relatively few inhabitants live in very few population centres, so that vast regions remain an empty and little known wilderness of which one third is treeless tundra.

The whole area falls naturally into three roughly equal physiographic provinces, each between 200,000 and 250,000 square miles in area. The eastern third is a low but rugged plateau underlain by igneous and metamorphic rocks of the Canadian Shield; this province does not contain any coal and consequently is not fully shown in the map (Fig. 1) which accompanies this report. The middle third of the total area, the flat Mackenzie River Lowland, is a northern extension of the North American Interior Plains province, and is underlain by flat-lying, undeformed sediments; while it is heavily covered by swamp and muskeg, it may reasonably be expected, where geologic conditions are suitable, to contain considerable resources of coal, much of which may be recoverable by inexpensive strip-mining methods. The western third of the total area, including all the Yukon Territory, is the rugged and mountainous northern extension of the Cordilleran province (see Bostock, 1948a, 1950, 1961); here many of the coal deposits are folded and faulted, commonly pitching steeply under heavy cover, but many others, especially younger deposits and those in the basin-and-plateau region north of the Ogilvie Mountains, may be relatively flat-lying and hence relatively economical to mine.

Productive strata in Yukon and Mackenzie Territories, like those farther south in Alberta and British Columbia, mostly range in age from middle Jurassic to early Tertiary, with one anomalous occurrence of Mississippian coal near the South Nahanni River in southwestern Mackenzie Territory.

Northern coal ranges in rank from lignite to semi-anthracite, with the higher-rank coals generally restricted to the Cordilleran province.

Throughout the Yukon and Mackenzie Territories, small amounts of coal have been won from time to time for limited local use, mostly from outcrops; few proper coal mines have ever been opened, and only one has operated consistently over a period of years — the Tantalus Butte Mine at Carmacks on the Yukon River, which still produces about seven to twelve thousand tons yearly (Green, 1965); but past coal production in the Territories has not been limited by shortage of resources, rather by lack of markets, a situation which very soon may change with the burgeoning economy.

Acknowledgments

This report received its financial support from Calgary Power Limited, Canadian Utilities Limited and the Northern Alberta Development Council, the industrial participants in the Research Council of Alberta Strip Coal Assessment Committee. Their aid and encouragement is gratefully acknowledged.

Data for this report are drawn in large measure from published papers and memoirs of the Geological Survey of Canada.

The author wishes to thank Mr. John Fryer, Coal Analyst, Research Council of Alberta, who helped materially in interpreting and modernizing many of the older analyses, and supplied a number of analyses of northern coals carried out in the Research Council laboratory.

PRESENTATION OF DATA

This report is written chiefly to assemble, into a single handbook, information from scattered references, with some comments based on experience gained in the plains of Alberta. The compiled information is presented by means of a catalogue listing all general areas where coal is known to have been found, and all recorded individual coal occurrences; and a map (Fig. 1) of the Yukon and Mackenzie Territories showing the location of these areas and occurrences.

The map (Fig. 1) on a scale of 1: 3,000,000 or 1 inch to 47.35 miles, is based largely on Geological Survey of Canada map 30-1963 (Geology, Yukon and Northwest Territories, Douglas and MacLean). While it omits some of the eastern part of the Mackenzie Territory underlain by Precambrian crystalline rock, it does indicate all the known coal-bearing rock units.

In many instances, exact distribution of coal within large rock units is unknown; consequently the map shows areas of "in part or possibly coal-bearing" rocks and, within these, areas which are "coal-bearing". The former are underlain by thick or extensive sequences, commonly dominantly marine. The latter, are smaller areas commonly underlain by known coal-bearing continental sediments.

There is a considerable body of private information on the Peel and North Yukon Plateaus, and on the drainage basin of the Pelly River, but little has yet been published; there is very little information of any kind on the Great Bear Plain because the tundra-woodland vegetation with its heavy muskeg effectively mantles the flat-lying bedrock.

The following notes apply to information presented in the catalogue, which is divided into two parts: coal occurrences of the Mackenzie Lowland; and coal occurrences of the Northern Cordillera.

(1) Order: Coal occurrences are grouped together into general areas unified in geographic and stratigraphic distribution. These are listed in order of geographical location, generally from east to west and from south to north.

(2) Latitude and longitude are used to refer to and locate both general areas and specific coal occurrences. Locations have been determined as nearly as possible from the literature and from published large-scale maps.

(3) Specific coal occurrences, 64 in all, are identified by number, and the reference numbers also appear on figure 1.

(4) Glacial and topographic details are noted. Further information on the large unglaciated region in west-central Yukon Territory is given by Bostock (1948a, 1966) and Wilson *et al.* (1958).

(5) In the north, many rock units, especially continental coal-bearing units, remain unnamed and largely undescribed. In many cases their ages are known only in a general way, so that frequently it is impossible to know whether a specific occurrence should be assigned to the beginning of one era or to the end of the preceding. In the catalogue and map, coal occurrences on the Jurassic-Cretaceous boundary are assigned to the Cretaceous, and those on the Cretaceous-Tertiary boundary, to the Tertiary. Stratigraphic relationships of coal-bearing rock units are shown in table 1.

(6) Previous summaries of Northern Canada coal resources (Dowling, 1915; MacKay, 1947) attempted to estimate tonnage reserves. However, no such attempt is made in this report since it is believed that information is still quite inadequate; for most areas, not even reliable seam-thicknesses are available. It is probably unreasonable to go further than to suggest that recoverable tonnages (especially strippable tonnages) may be greater in the Mackenzie Lowland than in the Cordilleran province.

(7) Seam logs and stratigraphic sections, many of them sketchy or antiquated, have been taken from the original references with little or no change; they are presented in descending order or stratigraphic succession.

(8) "Proximate analyses", if they have been published, are included with the description of specific coal occurrences, on a "capacity moisture" basis whenever possible, otherwise on an "as received" or "dry" basis.

(9) Gross calorific value (G.BTU) is lacking from most of the older reports; since this is doubtless the most useful parameter for judging the value of a coal as fuel, it has, whenever possible, been approximated from the volatile matter figure using Seyler's coal classification diagram (see Lowry, 1963, p.30) and reported on a "dry, ash-free" basis only.

(10) The few opinions that have been published on coking properties of Northern coals are included in simplified form with the analytical data.

(11) It should be noted that all analyses reported here except those representing the three or four true coal mines, have been done on samples from moderately or highly weathered outcrop, in some cases even from outcrop that is actively burning; hence it is likely that the true quality of much northern coal is significantly better than the analyses imply.

(12) Coal rank (the classification of coal into lignite, sub-bituminous, bituminous and anthracite according to maturity) being notoriously imprecise, is not included with analysis. However, since many potentially important coal deposits are not represented by analyses, estimates of rank are often cited directly from the original references as a very rough indication of coal quality. Extreme caution must be used since such estimates have usually been made by visual inspection of poor outcrops by observers untrained in coal evaluation. In particular, the over-use of the word "lignite" should be noted. Properly speaking, coal with a moist, mineral matter-free calorific value of less than 8,300 G.BTU per pound is "lignite". Doubtless many outcrops so designated in the literature are truly lignite but a number of them, especially in the Cordilleran province have proved, on analysis, to be relatively high-rank sub-bituminous coal or even low-rank bituminous coal. Coal rank may be a factor in the fact that a surprising number of northern coal occurrences are burning; the cliffs along nearly ninety miles of Arctic coastline in Franklin Bay are known as the Smoking Hills from the coal fires that burn along their full length, and Tertiary coal at Fort Norman has been burning continuously since Mackenzie saw it in 1789. Probably the coals that burn are relatively low in rank, though it is conceivable that extreme climatic conditions and permafrost, with its attendant extensive collapse-fracturing, contribute somehow to perpetuation of the fires.

	FORT LIARD (Stott, 1960; Harker, 1963)	WATSON LAKE BASIN	WHITEHORSE TROUGH (Bostock, 1936; Bostock and Lees, 1938; Wheeler, 1961)	ST. ELIAS BELT (Bostock, 1952; Kindle, 1953; Muller, 1958)	NORTHWEST TINTINA TRENCH (Green and Roddick, 1962)	BONNET PLUME BASIN	NORTH RICHARDSON MOUNTAINS (Jeletzky, 1958; 1960; 1961)	FORT NORMAN BASIN (Hume, 1954)	GREAT BEAR PLAINS	EAST MACKENZIE ARCTIC PLAINS	ALBERTA SYNCLINE
TERTIARY		██████ ?		(Paleocene coal)	(Paleocene coal)	██████ ?		(Paleocene coal)			(Foothills coal) /(Ardley coal)
CRETACEOUS	Wapiti Gp.		Tantalus Fm.	Dezadeash Gp.			██████	Little Bear Fm.	██████ ?	██████ ?	Edmonton Fm.
JURASSIC			Laberge Gp.				██████				Blairmore Gp.
JURASSIC							██████				Kootenay Fm.
TRIASSIC											
PERMO-PENN.											
MISSISSIPPIAN	Mattson Fm.										

Table 1. Stratigraphic Distribution, Coal-Bearing Rock Units, Yukon and Mackenzie Territories.

GLOSSARY AND EXPLANATION OF ABBREVIATIONS

- A. - ash; the non-combustible portion of a coal, expressed as percentage of total weight.
- anal. - analysis; analyses.
- a/r - "as received" by the analysing laboratory; analysis reported as percentages of total weight with moisture unequilibrated; less reliable as a guide to coal quality than analysis "at capacity moisture" (c/m).
- b/r - bedrock.
- c. - approximately.
- capacity moisture - the moisture content of a coal after equilibration of coal in an atmosphere at 100 percent relative humidity. (Capacity moisture does not include free surface moisture due, for example, to retention of rain or snow.)
- c/m - "at capacity moisture"; analysis reported as percentages of total weight after equilibration to capacity moisture.
- CMB. - analysis done in laboratory of Canada, Department of Mines and Technical Surveys, Mines Branch, Ottawa (or predecessor).
- Coke - nature of coke; a tentative assessment of coking properties usually based on visual examination of the residue left from the volatile matter test; in this catalogue, 0 = non coking, 1 = weakly coking, 2 = strongly coking.
- congl. - conglomerate.
- Cret. - Cretaceous.
- d. - "dry"; analysis reported as percentages of total weight excluding all moisture.
- daf. - "dry, ash-free"; analysis reported as percentages of total weight excluding all moisture and all ash.
- F.C. - fixed carbon; the non-volatile but combustible portion of a coal expressed as percentage of total weight.
- Fm. - Formation.
- G.BTU - gross calorific value; the heat content of a coal (including the latent heat of condensation of the water produced by combustion) expressed in British Thermal Units per pound of coal.

Gp.	-	Group.
GSC.	-	Geological Survey of Canada.
H ₂ O	-	moisture content of a coal expressed as percentage of total weight.
Jur.	-	Jurassic.
L.	-	Lower.
M.	-	Middle.
m.	-	mile.
Mbr.	-	Member.
o/c	-	outcrop, outcropping.
p/f	-	producing formation; rock unit bearing coal.
prob.	-	probable, probably.
<p>Proximate analysis - a system of coal analysis, including determinations of moisture, ash, volatile matter and fixed carbon, all of which are empirical evaluations not representing actual specific constituents of the coal. Proximate analysis does, however, give a valid measure of the quality of a coal.</p>		
RCA.	-	analysis done in laboratory of Research Council of Alberta, Edmonton.
rel.	-	relatively.
sed.	-	sediment, sedimentary.
ss	-	sandstone.
strat.	-	stratigraphic.
Tert.	-	Tertiary.
U.	-	Upper.
refs.	-	references.
u/g	-	underground mine.
V.M.	-	volatile matter; that portion of a coal, other than moisture, which is lost from the coal on heating to 950°C. (1742°F.) in the absence of air, expressed as percentage of total weight.

CATALOGUE, COAL OCCURRENCES,
MACKENZIE LOWLAND

- 123° - 124°W x 60° - 60°15'N
 - Fort Liard, Mackenzie Territory;
 - (see Cordilleran catalogue).

- 118°40' - 126°W x 63° - 67°40'N
 - Great Bear Plain, Mackenzie Territory;
 - low, flat plain over 33,000 sq. m. area, heavily covered by drift and muskeg;
 - b/r mostly undisturbed Cret. sed., prob. mostly marine L. Cret.; prob. very thin in E, thicker in W;
 - continental sed., with thick coal seams known to underlie one of a number of uplands;
 - consequently other uplands (some of which are indicated in figure 1) may be worth prospecting (see comment (iv) p. 25).
 - refs.: Craig *et al.*, 1960; Douglas and MacLean, 1963; GSC. map 1055A; Lord, 1951; MacKay, 1947; Norris, 1965; Stott, 1960.
- (1) 121°35'W x 66°06'N
 - Etacho Point, Great Bear Lake;
 - lake-cliff o/c, foot of Scented Grass Hills which rise 1600 ft. above lake;
 - several seams in 1.5 m. along shore; thickest is 12 ft. to 17 ft.; dip 25° - 50° WSW (possibly distorted by glacial ice-push);
 - anal. (RCA. a/r): H₂O 48; A. 4.6; V.M. 22.6; F.C. 24.8; G.BTU 5,410; (daf.) 11,410.
- (2) 121°45'W x 66°10'N
 - o/c at Boulder Point, 15 m. W of Etacho Point; N side of Scented Grass Hills;
 - anal. (RCA. a/r): H₂O 35.8; A. 4.1; V.M. 29.2; F.C. 30.8; G.BTU 7,170; (daf.) 11,930.

- 128°40' - 136°W x 65°20' - 67°N
 - Peel Plateau, Yukon and Mackenzie Territories;
 - (see Cordilleran catalogue).

- 122°30' - 134°35'W x 68°18' - 70°30'N
 - East Mackenzie Arctic Plain, Mackenzie Territory;
 - low, flat glaciated plain, over 16,000 sq. m. area; covered by drift, swamp and (along Eskimo Lakes and Liverpool Bay) late Tertiary-Quaternary alluvium;
 - b/r poorly exposed, prob. thin and flat-lying, mostly marine; L. and U. Cret. on Darnley Bay (Jeletzky, 1961); Cret. on W shore of Franklin Bay (Mackay, 1958b); U. Cret. at Inuvik (Bamber *et al.*, 1963); scattered areas of Cret. shown (Douglas and MacLean, 1963) S of region to Mackenzie River near Fort Good Hope, prob. all thin marine;
 - coal occurrences widely spread, usually obscure, apparently all related to areas of gentle upland (indicated in figure 1); Smoking Hills and Melville Hills form 170-m. upland-arc from Cape Bathurst to Cape Lyon, mostly coal-bearing, prob. strongly ice-deformed (Mackay, 1958b); underground fires are taken to indicate presence of coal (prob. low-rank) in b/r;
 - refs.: Bamber *et al.*, 1963; Craig *et al.*, 1960; Douglas and MacLean, 1963; Dowling, 1915; Jeletzky, 1961; Lord, 1951; MacKay, 1947; Mackay, 1958a,b, 1963.
- (3) 126°W x 68°18'N
 - Upper Anderson River;
 - "McFarlane (1890-91, p.46) observed coal on the upper Anderson River..." (Mackay, 1958b);
 - this may represent a Cret. outlier in terrain dominated by Paleozoic limestones.
- (4) 124°20'W x 68°50'N
 - "Numerous fragments of lignite blackening the ground near Fallaize Lake probably indicate the presence of lignite beneath (by) frost heaving ..." (Mackay, 1958b).
- (5) 125°25'W x 68°55'N
 - thin beds of coal o/c along Horton River and its affluents (one of which is called Coal Creek) S of Langton Bay (Mackay, 1958b).
- (6) c. 126°30'W x 69°10'N
 - V. Stefansson (see Dowling, 1915) reported exposures of sands and clays with coal seams along 8 m. of Horton River SW of Franklin Bay; single seams to 4 ft. thickness, several seams to 10 ft. total.
- (7) 128°25'W x 69°10' - 69°31'N
 - in valley walls of Anderson River "there is a formation in which spontaneous combustion has taken place...burnt areas extend from near river level to over 300 ft. above the river and grade laterally into unburnt sections of laminated shale with much carbonaceous material" (Mackay, 1958a,b, 1963) - (NB. see addendum p. 12).

- (8) 123°25'W x 69°12'N
 - lignite o/c in valley walls for several m. along Hornaday River and in walls of Rummy and George Creeks, near their common junction;
 - the "old mine" for Paulatuk mission (u/g and strip) 1936-41; (Craig *et al.*, 1960; Mackay, 1958b).
- (9) 123°30'W x 69°25'N
 - lignite o/c along sea-cliffs at NE side of Hornaday River delta;
 - the "new mine" for Paulatuk mission (u/g and strip) 1941-55; 10 tons/yr., (Mackay, 1958b).
- (10) 124°25'W x 69°25'N
 - thin beds of coal o/c at SW corner Darnley Bay (Mackay, 1958b).
- (11) 125°35'W x 69°20'N
 - hills near Langton Bay;
 - thin beds of coal o/c, and fire in b/r (Mackay, 1958b);
 - float coal (MacKay, 1947).
- (12) 122°50'W x 69°30'N
 - scattered lignite exposures E and NE of Brock River delta;
 - "One (exposure) on the north side of Lesard Creek has a seam almost 3 feet thick, overlain by 2 feet of rock and underlain by clay" (Mackay, 1958b);
 - dips 10° - 15° NNE; some lignite highly sulphurous (Craig *et al.*, 1960; Mackay, 1958b).
- (13) 122°20'W x 69°45'N
 - lignite reported few m. S of House Point;
 - must be an outlier on Shield (Mackay, 1958b).
- (14) 122°50'W x 69°45'N
 - lignite exposure few m. S of Pearce Point (Craig *et al.*, 1960; Mackay, 1958b).
 - occasionally mined by natives.
- (15) 126°45'W x 69°50'N
 - fire in b/r S of Horton River mouth (Mackay, 1958b).
- (16) 127°W x 70°06'N
 - 15 m. NW of Horton River (Smoking Hills), (MacKay, 1947).
 - Cret. lignite seam 4 ft. thick.

- (17) 127°08'W x 70°12'N
 - Smoking Hills 32 m. SE of Cape Bathurst (Mackay, 1958b);
 - sea-cliffs 150 ft. - 200 ft., undercut by waves, burning along several m. of coast;
 - dark grey shale with 10-ft. bed of limestone in top 50 ft. of cliff, burning beds near base of cliff, covered;
 - vegetation killed for several hundred yards; slopes covered with multi-colored ash.
- (18) 127°12'W x 70°12'N
 - N bank abandoned Horton River channel;
 - burnt rock, due W of previous occurrence (Mackay, 1958b).
- (19) 133°50'W x 68°20' - 69°N
 - W slopes of Caribou Hills, N of Inuvik;
 - hills (to 850 ft. height) appear "to consist of unconsolidated or poorly consolidated sands, silts and gravels with a few seams of lignite" (Mackay, 1963);
 - age believed to be late Cret. (Bamber *et al.*, 1963); apparently no mineable seams have been found.

Addendum regarding coal occurrence no. 7. Recently, Russell (1967)* has described an Upper Cretaceous section from Windy and Husky Bends of the Anderson River. The rocks that Mackay (1958a) reports supporting spontaneous combustion, Russell describes as "highly bituminous ... (with) thin (1/2 in.) layers of coal ... locally"; however he presents indisputable proof (marine vertebrate fossils) that the observed strata at this locality originated in a near-shore marine environment.

* Russell, Dale A. (1967): Cretaceous vertebrates from the Anderson River N.W.T.; Can. Jour. Earth Sci., Vol. 4, p. 21-38.

CATALOGUE, COAL OCCURRENCES,
NORTHERN CORDILLERA

- 123° - 124° W x 60° - 60°15' N
 - Fort Liard, Mackenzie Territory;
 - syncline-basin in foothills of Mackenzie Mts., c. 200 sq. m.; rolling hills, glaciated, drift-covered;
 - p/f: Wapiti Fm., U. Cret. continental ss & shale;
 - o/c rare; coal to 20 in. thick; stratigraphic equivalent of coal-rich strata of central Alberta;
 - refs.: Douglas and Norris, 1959; Hage, 1945; Stott, 1960.

- (20) 123°42' W x 60°09' N (Hage, 1945, p. 23)
 - Wapiti Fm. capping Pretty Hill on Liard River;
 - log: covered interval; coal 1.2 ft.; buff-weathering ss 25 ft.; prob. a coal seam c. 1.7 ft. (covered); covered interval, 400 ft. to river level;
 - anal. (CMB. a/r): H₂O 16.9; A. 3.7; V.M. 30.9; F.C. 48.5; G.BTU 10,020; Coke 0; G.BTU (daf.) 12,610.

- 123°30' - 126° W x 60° - 61°30' N
 - Southern Mackenzie Mts., Carboniferous, Yukon and Mackenzie Territories.
 - area of strongly thrust-faulted mountains to 5,000 ft.; glaciated;
 - p/f: Mattson Fm. - Mississippian to Permian; mostly lagoonal ss & shale to 4,000 ft. thick;
 - 1 or 2 seams of coal 850 ft. - 1,050 ft. above base in NE corner of o/c area only;
 - refs.: Hacquebard and Barss, 1957; Harker, 1963; Patton, 1958.

- (21) 123°55' W x 61°06' N (Harker's #1 Section)
 - 2 seams in canyon wall, W limit of Jackfish Creek Anticline;
 - Mattson Fm.; dip ESE;
 - log: ss & shale of Mattson Fm. over 2,300 ft.; coal 6 ft.; ss with *Lepidodendron* fossils 85 ft.; dirty coal 3 ft.; ss & shale of Mattson Fm. 849 ft.;
 - anal. (RCA. a/r): H₂O 3.3; A. 3.6; V.M. 34.9; F.C. 58.2; G.BTU 12,560; (daf.) 13,490.

- (22) 124°20' W x 61°10' N (Harker's #3 Section)
 - 2 seams in N facing scarp o/c; Ram Creek;
 - Mattson Fm.; dip W;
 - log: ss & shale of Mattson Fm. 500 ft.; coal 5 ft.; ss with concealed strata about 50 ft.; coal, thin; ss & shale of Mattson Fm. 966 ft.

- 128°10' - 129°55'W x 60° - 60°35'N
 - Watson Lake Tertiary Basin, Yukon Territory;
 - flat lowlands along Liard, Rancheria, Frances and Hyland Rivers adjacent to Alaska Highway; heavily drift-covered, scarcely explored;
 - possibly largely underlain by continental (prob. Tert.) soft white to grey clays, shales and coarse ss;
 - Dawson (1898) observed lignite seams to 3 ft. along Liard River from 4 m. below present Alaska Highway crossing, upstream to mouth of Frances River;
 - dips to 15°; sed. capped in places by basalt flows;
 - coal is impure, laminated;
 - refs.: Bostock, 1948a, 1950; Dawson, 1898; GSC. map 1048A; Lord, 1944; MacKay, 1947.
-
- 132°(&135°)W x 60°N - 137°17'W x 62°45'N
 - Whitehorse Trough, Yukon Territory;
 - extends 200 m. SE from Fort Selkirk into NW British Columbia; rolling to rugged plateau, glaciated; heavily drift-covered;
 - contains late Triassic to early Cret. sed. and volcanics;
 - 2 widespread coal zones in uppermost of these sed. (i) Upper part of Laberge Gp., U. Jur.; 1,000 ft. thick; (ii) Tantalus Fm., U. Jur. - L. Cret., 700 ft. - 1,800 ft. thick; (Bostock, 1936; Wheeler, 1961);
 - subsequently folded, faulted, intruded by granitic rocks, overlain by lava; present coal occurrences quite irregular;
 - several poorly explored "islands" of U. Laberge & Tantalus strata NW and NE of Lake Laberge worth further investigation;
 - contains most accessible and prob. highest-rank coal in Yukon and Mackenzie Territories; may contain acceptable coking coal; includes the only operating mine;
 - refs.: Bostock, 1936, 1950; Bostock and Lees, 1938; Cairnes, 1906, 1908a,b, 1909, 1910a,b, 1916; Douglas and MacLean, 1963; Green, 1965, 1966; MacKay, 1947; McConnell, 1903; Tozer, 1958; Wheeler, 1961.
- (23) 135°04'W x 60°19'N
- coal o/c near summit Bush Mt., c. 3 m. NW of bend of Wheaton River;
 - p/f: Tantalus Fm., much disturbed (cut off by fault 2,000 ft. W of o/c); 3 seams: 1.5 ft., 6 ft., 3 ft.; dips 60° - 80° W;
 - anal., prob. contaminated o/c (CMB. a/r): H₂O 4.8; A. 30.1; V.M. 8.6; F.C. 56.5; G.BTU (daf.) c. 15,600 - 16,000.

- (24) 135°15'W x 60°30'N
 - "Whitehorse coal" o/c on side Mt. Granger, 12 m. W of White Pass & Yukon Rlwy.;
 - p/f: Tantalus Fm.; o/c in band c. 1 m. x 9 m., axis WNW;
 - 3 seams measured: 9.7 ft.; 10.3 ft.; 2.5 ft.; dip 42° NE;
 - prospecting and tunnelling 1900-06;
 - anal. tunnel sample (CMB. a/r): H₂O 2.2; A. 22; V.M. 6.1; F.C. 69.9; G.BTU (daf.) c. 15,500 - 15,800.
- (25) 136°05'W x 61°20'N
 - Kynocks; small gully o/c of coal on side of ridge 6.5 m. NW of old Kynocks road-house;
 - several seams .5 ft. to 8 ft.; in top of Laberge Gp. (Jur.); dip steep WSW; drift cover;
 - anal. o/c sample (CMB. a/r): H₂O 12; A. 11.1; V.M. 34.3; F.C. 42.6; G.BTU (daf.) c. 12,600 - 14,400;
 - another o/c U. Laberge coal 6 m. NNW on ridge W of Nordenskiöld River;
 - both o/c are in one of two synclinal structures in U. Laberge & Tantalus strata; others possible in area c. 6 m. square.
- (26) 134°47'W x 61°57'N
 - Big Salmon;
 - float coal in tributary of Walsh Creek and o/c Tantalus Fm. upstream; o/c Tantalus Fm. 4 m. - 8 m. SE; and float coal in Big Salmon River 5 m. SSW; all in single topographic basin;
 - Bostock and Lees (1938) suggest this is single coal basin; Tantalus Fm. over 1,000 ft.; basin may be 25 m. x 3 m.;
 - MacKay (1947) assumes 2 seams, total 11 ft. thick;
 - topography in basin is relatively flat; a drilling program might be warranted here.
- (27) 135°24'W x 61°58'N
 - small inlier on Claire Creek of Tantalus Fm. c. 4 m. x .5 m.;
 - coal reported (Bostock and Lees, 1938);
 - seam assumed 3 ft. thick (MacKay, 1947).
- (28) 136°07'W x 61°54'N
 - coal o/c on E wall of Nordenskiöld River valley; heavy drift cover;
 - several seams to 1.4 ft.; Tantalus Fm.; distorted by syenite-porphry intrusive;
 - some prospecting prior to 1908;
 - anal. (CMB. a/r): H₂O 4.7; A. 7.8; V.M. 15.6; F. C. 72.3; G.BTU (daf.) c. 15,700 - 16,000.

- (29) 136°16'W x 62°06'N
- Tantalus Mine; S bank of Yukon River c. 1 m. E of Carmacks (on Whitehorse-Mayo Highway);
 - 3 seams, in Tantalus Fm.; dip 24° - 40°E;
 - u/g mine, Five Fingers Coal Co.; 1905-22; production 1,000 - 8,500 tons per year;
 - strat. section (Cairnes, 1910b): coal 3 ft.; rock c. 7 ft.; coal 6.5 ft.; rock c. 4 ft.; coal 7.5 ft.;
 - anal. (RCA. c/m): H₂O 2.1; A. 28; V.M. 21.6; F.C. 48.3; G.BTU 10,110; (daf.) 14,460; Coke (CMB.) 2;
 - over 12 sq. m. may be underlain by coal measures; more may lie under volcanic rock capping; (Bostock, 1936; Cairnes, 1906, 1910b).
- (30) 136°15'W x 62°08'N
- Tantalus Butte Mine; N bank Yukon River; 2 m. NE of Carmacks (on Whitehorse-Mayo Highway);
 - 3 seams in Tantalus Fm.; dip 50°W;
 - u/g mine, 1923 to present time; operated by Yukon Coal Co., an affiliate of United Keno Hill Mines; 1965 production 8,806 tons (Green, 1966); strat. section (after Cairnes, 1910): cover, shale & ss; coal 8.8 ft.; congl., shale & ss, c. 90 ft.; coal 9.8 ft.; shale & ss, c. 140 ft.; coal 7 ft.; floor, congl.; strat. section (after Green, 1966): hanging wall; coal with c. 1 in. of "bone at base", 1.7 ft.; uniform coal with small lenses of "siliceous material", 5.4 ft.; soft clay bands and dirty coal, 1.9 ft.; uniform coal with small lenses of "siliceous material", 4.4 ft.; foot wall;
 - in 1965 found 18-ft. seam (Green, 1965);
 - anal. (RCA. a/r): H₂O 5; A. 9.9; V.M. 43.6; F.C. 51.5; G.BTU 11,850; (daf.) 13,920; Coke (CMB.) 1; anal. (CMB. a/r, after Green, 1966): H₂O 2; A. 13.7; V.M. 33.1; F.C. 51.2; G.BTU 11,850; Coke 1; initial ash deformation temperature 2100° F;
 - note: Bostock (1936) found 2 seams exposed: upper seam 2 ft.; lower seam 7 ft. - 14 ft.; 2 sq. m. may be underlain by coal measures.
- (31) 136°20'W x 62°12'N
- Five Fingers Mine; SE bank Yukon River; 6 m. upstream from Five Fingers Rapids;
 - 2 seams in upper part, Laberge Gp. (U. Jur.): upper seam (.5 ft. to 3.8 ft. coal & shale) and lower seam (3.5 ft. to 4 ft.); both dip 16°E;
 - mine operated prob. from 1900 - 08;
 - anal. upper seam (CMB. a/r): H₂O 5.95; A. 8.43; F. C. 45.16; V.M. 40.46; G.BTU (daf.) c. 12,100 - 13,600; Coke 2.
- (32) 136°55'W x 62°33'N
- few o/c Tantalus Fm., SW wall of Yukon River Valley; 4 m. S of Minto (Bostock, 1936);
 - may represent a considerable area of coal-bearing strata buried under drift (no coal seen).

- (33) 137°17'W x 62°45'N
 - 5 m. above (SE of) Fort Selkirk, W bank Yukon River;
 - river-edge coal o/c now obscured;
 - possibly Laberge Gp. (U. Jur.);
 - reported good-quality bituminous coal;
 - possibly mined u/g before 1910.
-
- 136°30'W x 60°10'N - 141°W x 61°55'N
 - St. Elias Belt, Yukon Territory;
 - 2 larger Mesozoic sed. basins and a belt of smaller detached Tert. sed. basins "follow an irregular, valley-like feature, the Duke Depression, parallel with and behind the main front ranges of the St. Elias Mountains" (Bostock, 1950);
 - terrain mountainous, though dwarfed by immense St. Elias peaks behind; glaciated; lower slopes heavily drift-covered;
 - Mesozoic "Dezadeash" basin contains over 10,000 ft. of tightly folded seds. of "Dezadeash Gp.", youngest Jur. or oldest Cret. age; thin coal seams in basal congl. (which may belong to underlying Jur. unit) at two locations; elsewhere obscured; whole unit intruded by granites (Kindle, 1947, 1949, 1953);
 - Tert. (Paleocene) basins contain up to 2,500 ft. of seds.; coal seams to 14 ft. scattered throughout; strata almost flat-lying, except tilted and faulted on SW side of basins against St. Elias Mt. (Bostock, 1952; Muller, 1954, 1958);
 - refs.: Bostock, 1950, 1952; Cairnes, 1915; Kindle, 1947, 1949, 1953; McConnell, 1906c,d; Muller, 1954, 1958; Wheeler, 1963.
- (34) 137°51'W x 60°42'N
 - mountain creek o/c, 2 m. N of Alsek River;
 - congl. 500 ft. thick overlain by 150 ft. of carbonaceous slates & argillites, with an abundance of thin coal seams (mostly c. 2 in. thick); strata strongly disturbed; U. Jur. - L. Cret. (Kindle, 1949).
- (35) 138°W x 60°48'N
 - mountain creek o/c N side of Kimberly Creek;
 - thin seams of coal in congl. and in overlying slates and argillites (U. Jur. - L. Cret.);
 - "Although the seams ... are of no value, this zone might be worth exploring farther south" (Kindle, 1949).
- (36) 138°42'W x 61°03'N
 - creek o/c on Sheep Creek; 6 m. upstream from Kluane Lake;
 - several coal seams to 6 ft. thickness, in faulted basin c. 4 sq. m. in area; Paleocene; dips to 85°;
 - exploited by placer miners working Sheep Creek as early as 1904 (McConnell, 1906c);
 - anal. (CMB. a/r): H₂O 10.9; A. 9.6; V.M. 41; F.C. 38.5; G.BTU (daf.) c. 11,500 - 13,000.

- (37) 139°07'W x 61°16'N
 - coal o/c in headwaters of Ptarmigan Creek;
 - rel. undisturbed Paleocene basin; c. 12 sq. m. (including central area capped by lava); dips to 15° (Muller, 1958).
- (38) 139°22'W x 61°18'N
 - badlands o/c, headwaters Granite Creek;
 - several seams to 6 ft. thickness (unconfirmed report of 14-ft. seam); rel. undisturbed Paleocene basin, 19 sq. m. (includes central area capped by lava); dips to 35°; seds. to 1,500 ft. thickness (Bostock, 1952; Cairnes, 1915; Muller, 1958);
 - some coal packed on horses to Burwash Landing in 1920's;
 - log (southern side of field where thickest seams reported): loose sand and gravel; coal (occasional thin partings) 5 ft.; shale 5 ft.; coal (few thin partings) 4 ft.; clay .7 ft; coal & coaly shale 3 ft.; clay and shale floor; (Bostock, 1952);
 - anal. (CMB. a/r): H₂O 22.6; A. 10.1; V.M. 35.9; F.C. 31.4; G.BTU 8,065; (daf.) 14,930; (Bostock, 1952).
- (39) 139°46'W x 61°22'N
 - coal in river-cliff o/c, W bank of Donjek River;
 - folded and faulted Paleocene basin, c. 5 sq. m.; dips to 60°; (Muller, 1958).
-
- 130°40' - 136°20'W x 61°45' - 62°50'N
 - Pelly River drainage, Yukon Territory;
 - miscellaneous reports of scattered small coal occurrences and small basins of potentially coal-bearing rocks; rolling plateau, glaciated; mostly heavily drift-covered;
 - area cut diagonally by Tintina Trench (Bostock, 1948a); trench prob. major fault zone with a right-lateral movement of 240 - 260 m. (Roddick, 1965);
 - b/r largely metamorphosed, mineralized; considerable hardrock prospecting activity, some success; few published refs.; Douglas and MacLean, 1963, show few small (prob. unmetamorphosed) Tert. deposits, possibly related to few published reports of coal;
 - refs.: Bostock, 1936, 1948a, 1950; Campbell, 1954; Douglas and MacLean, 1963; GSC. map 1048A; Keele, 1910; Kindle, 1946; Johnston, 1936; MacKay, 1947; McConnell, 1906a; Roddick, 1965.
- (40) c. 131°W x 61°42'N
 - Campbell Creek;
 - Keele (1910) reports "quantities of drift lignite ... along the lower part of Campbell Creek but the seams ... not found".

- (41) 132°36'W x 61°58'N
 - Lower Lapie River;
 - Kindle (1946) reports few seams of coal a few inches thick in c. 500 ft. of Paleocene congl., ss & shale;
 - downstream from Canol bridge over Lapie River, in Tintina Trench.
- (42) 134°10'W x 62°29'N
 - Fish Hook Rapids, in Tintina Trench;
 - coal mapped here (Bostock, 1950; MacKay, 1947); no data given;
 - small deposits of congl. and other unmetamorphosed clastics here, believed U. Jur. - U. Cret. in age (Campbell, 1954); other deposits of congl. in trench believed Cret. - Tert. in age (Johnston, 1936).
- (43) c. 136°16'W x 62°43'N
 - Mica Creek;
 - McConnell (1906a) and Bostock (1936) report coal float in creek; no b/r seen;
 - coal possibly mined about 1900.
- (44) 136°12'W x 62°50'N
 - Granite Canyon;
 - McConnell (1906a) reported "lignite" from clastic rocks; Bostock (1936) could not find the coal but determined age as Tert.
- (45) c. 135°40'W x 62°55'N
 - MacMillan Mts.;
 - coal mapped here (Bostock, 1950; MacKay, 1947) without comment;
 - Campbell (1954) reports b/r here metamorphosed and schistose.
-
- 138°55' - 140°W x 63°30' - 63°55'N
 - Indian River Tert. Basins, Yukon Territory;
 - 2 deposits on S boundary of Klondike District, total area c. 150 sq. m.; 500 ft. of (prob. Paleocene) congl.; thin associated shales and thin coal; volcanic lava capping (Bostock, 1942);
 - the western basin may extend westward into valley of Sixtymile River (Cockfield, 1921);
 - refs.: Bostock, 1942; Cockfield, 1921; McConnell, 1903, 1906b.
- (46) 139°15'W x 63°43'N
 - "A small seam outcropping on Ruby Creek, a tributary of Indian River, was worked ... (in) 1902 ...but...the tunnel had fallen in" (McConnell, 1906b).
-

- 137°35'W x 63°40'N - 141°W x 64°43'N
 - NW Tintina Trench, Yukon Territory;
 - rolling hills of coarse clastic seds., filling a major geotectonic feature; adjacent to Dawson City (Roddick, 1965);
 - unglaciated NW of Klondike River but everywhere heavily covered by glacial outwash;
 - b/r oldest Paleocene or youngest Cret. congl., ss, shale and coal (Green and Roddick, 1962); mostly unconsolidated, friable, poorly exposed, badly slumped; only moderate tectonic disturbance; occasional faults and dips to 75°; no known marker beds; stratigraphy and thickness unknown;
 - coal seams in zones to 40 ft., single seams to 11 ft., prob. lensy;
 - 350 sq. m. known underlain by coal-bearing rocks; further 300 sq. m. to SE prob.; total tonnages may be large (Bostock, 1950); a drilling program might be warranted here;
 - refs.: Bostock, 1942, 1948a,b, 1950, 1964; Green and Roddick, 1962; MacKay, 1947; McConnell, 1903, 1906b; McConnell and Tyrrell, 1901; Roddick, 1965.
- (47) 138°58'W x 64°14'N
 - Coal Creek Mine on Rock Creek;
 - coal o/c on face of low hill cut by creek; dip 3° - 10° NE;
 - u/g mine opened by Alaska Exploration Co., 1899; operated c. 4 yrs.;
 - log: clay roof; hard lignite 3 ft.; clay parting 1 ft.; hard lignite 2 ft. - 3 ft.; clay floor;
 - anal. (RCA. a/r): H₂O 30.7; A. 9.6; V.M. 28.1; F.C. 31.6; G.BTU 7,540; (daf.) 12,630.
- (48) 139°53'W x 64°25'N
 - coal is reported on Fifteenmile River (McConnell, 1903; MacKay, 1947).
- (49) 140°07'W x 64°28'N
 - Coal Creek (Yukon River) Mine;
 - coal seam o/c at foot of steep creek-cut; dip 45° SE for a distance of 210 ft., then dip SW (McConnell, 1906b);
 - u/g mine opened by Coal Creek Mining Co. with 11.5 m. narrow-gauge rlwy. to Yukon River;
 - log: hard ss 12 ft.; clay .2 ft.; coal 4 ft. - 11 ft.; clay 6 ft.; ss 16 ft.
- (50) 140°29'W x 64°35'N
 - Cliff Creek Mine;
 - 1.8 m. N of Yukon River; coal seams dip 0.0 - 75° S;
 - u/g mine opened by North American Trading & Transportation Co. in 1899, with narrow-gauge rlwy. to Yukon River;

- logs (upstream tunnel): lignite 1.5 ft.; thin parting; lignite .4 ft.; black shale .2 ft.; lignite .5 ft.; thin parting; lignite 2 ft.; clay 1.2 ft.; lignite 1.2 ft.; clay 3 ft.; lignite 1 ft.; (downstream tunnel, 2,800 ft. away): lignite (one thin parting) 9 ft.; shale & clay 18 ft.; black shale 3 ft.; lignite 3 ft.; black shale 6 ft.;
- anal. (CMB. a/r): H₂O 8.5; A. 3.62; V.M. 42.04; F.C. 45.77; G.BTU (daf.) c. 12,000 - 13,600.

-
- 124°20' - 128°40' W × 63°40' - 66°12' N
 - Fort Norman Basin, Mackenzie Territory;
 - flat to rolling foothills of Mackenzie Mts.; c. 7,000 sq. m.;
 - glaciated; b/r obscured by drift, gravel, muskeg;
 - over 6,000 ft. L. and U. Cret. sed. in axis of syncline; mostly marine c. 4,500 ft. above base, U. Cret. Little Bear Fm. (3rd. of 4 components, 600 ft. - 800 ft. thick) is partly continental and contains a few thin coal seams in o/c on Little Bear and Redstone Rivers; seams folded, faulted, inclined steeply;
 - up to 1,600 ft. L. Eocene (or Paleocene?) b/r overlying Cret.; poorly consolidated congl., ss, shale, lignite; seams prob. lensy, folded to 50° incline;
 - refs.: Douglas and MacLean, 1963; Hume, 1954; Hume and Link, 1945; Lord, 1951; MacKay, 1947.
 - (51) 124°40' W × 64°10' N
 - o/c on Redstone River of 560 ft. Cret. strata with coal in 90-ft. shale & ss unit; c. 140 ft. above visible base.
 - (52) 125°45' W × 64°35' N
 - East Fork Little Bear River; for 18 m. on high hills; both sides of valley, soft Tert. sed. over 1,200 ft. thick with lignite seams to 8 ft. or 10 ft.; dips to 50°NE.
 - (53) 125°W × 64°40' N
 - river o/c, Tert. sed.; at Old Fort Point on Mackenzie River;
 - 125 ft. of soft ss; shale; lignite; some lignite burnt; dip SW.
 - (54) 126°20' W × 64°40' N
 - o/c of Little Bear Fm. (U. Cret.) on Little Bear River in large syncline;
 - p/f: 100 - 350 ft. of congl., ss, shale, ironstone, near top of Little Bear Fm. contain coal seams from few inches to several ft. thick.

(55) 125°20'W x 64°55' N

- burning coal seam in bank of Mackenzie River upstream from Fort Norman;
 - p/f: Tert. up to 600 ft. thick, o/c for several m. along Mackenzie and Great Bear Rivers;
 - anal. (RCA. c/m): H₂O 32.5; A. 5; V.M. 27.2; F.C. 35.3; G.BTU 7,780; (daf.) 12,270.
-

● 140°W x 65°N

- Monster River Syncline, Yukon Territory;
 - thick continental sed., in axis of syncline; area c. 100 sq. m.; very rugged, inaccessible region, scarcely explored; unglaciated;
 - rocks lowermost Tert. (Green and Roddick, 1962) or U. Cret. (Bamber et al., 1963; Douglas and MacLean, 1963); axis WSW; strata dip 15° - 30°;
 - coal not reported but possible;
 - refs.: Bamber et al., 1963; Douglas and MacLean, 1963; Green and Roddick, 1962.
-

● 128°40' - 136°W x 65°20' - 67°N

- Peel Plateau, Yukon and Mackenzie Territories;
- rolling, glaciated, heavily drift-covered; over 12,000 sq. m.;
- considerable oil and gas prospecting activity; few published refs.;
- thick, relatively undisturbed L. & U. Cret. sed., mostly marine, some U. Cret. continental rocks possibly coal-bearing in basins close to Mackenzie Mts. (S boundary of area);
- refs.: Bamber et al., 1963; Camsell, 1906; Douglas and MacLean, 1963; Hume, 1954.

(56) 134°W x 66°28'N

- bank of Peel River 6 m. above mouth of Caribou River; Camsell, 1906, reported "reddened clay shale . . . and immediately below this some lignite float . . ." (seam not seen);
 - mapped (Bamber et al., 1963; Douglas and MacLean, 1963) as L. Cret.
-

● (57) 134°27' - 135°30'W x 65°16' - 65°58'N

- Bonnet Plume Tert. Basin, Yukon Territory;
- rolling, glaciated intermontane basin at junctions of Wind, Peel and Bonnet Plume Rivers, about 700 sq. m., drift and alluvium-covered, difficult of access;

- b/r (gravels, sands and shales) Tert., up to 1,050 ft. thick (Hume, 1954);
- lignite seams 8 ft. to 38 ft. (MacKay, 1947) or 40 ft. (Bostock, 1950), o/c on Peel River 1 m. above delta of Bonnet Plume River (Hume, 1954), and along Wind River; o/c extensively burnt (Bostock, 1950; Camsell, 1906; MacKay, 1947); tonnages may be large (Hume, 1954);
- refs.: Bamber *et al.*, 1963; Bostock, 1950, 1961; Camsell, 1906; Douglas and MacLean, 1963; Hume, 1954; MacKay, 1947.

-
- 136°30' - 141° W x 65°30' N
 - Eagle Plain and NW Ogilvie Mts., Yukon Territory;
 - inaccessible regions, rugged in SW, rolling in E, unglaciated; extensively covered by residual deposits;
 - considerable oil and gas prospecting activity, some success in Eagle Plain; few published refs.;
 - rocks Jur. to U. Cret. (Bamber *et al.*, 1963); prob. mostly marine except for upper part of U. Cret. which contains "lignite seams" (Moorhouse, 1966); strata folded and faulted in SW; less disturbed in E;
 - only one specific coal occurrence reported;
 - refs.: Bamber *et al.*, 1963; Bostock, 1950, 1961; Douglas and MacLean, 1963; Moorhouse, 1966.

- (58) c. 140°30' W x 65°41' N
- headwaters of Kandik River;
 - rugged, almost inaccessible;
 - Bamber *et al.* (1963) and Douglas and MacLean (1963) show basin (syncline?) of U. Cret. (including continental?) rocks with rim of L. Cret. (marine?);
 - Bostock (1950) maps a coal mine here without comment; prob. an enterprise of gold rush days, possibly of pre-Klondike activity at Fortymile, Yukon Territory, or Circle, Alaska.

-
- 135°20' - 139° W x 67° - 69° N
 - North Richardson Mts. and Arctic Plateau, Yukon and Mackenzie Territories;
 - moderately rugged; much folded and faulted; only partly glaciated; extensively covered by drift and residual deposits;
 - coal in Jur., L. Cret., and U. Cret. units; scarcely explored;
 - refs.: Bamber *et al.*, 1963; Bostock, 1950, 1961; Gabrielse, 1957; Jeletzky, 1958, 1960, 1961; MacKay, 1947.

- (59) 137°20' W x 68°N
 - headwaters of Bell River, Yukon Territory;
 - 820 ft. of grey quartzite bearing thin coaly streaks, c. 3,700 ft. above base of 4,000 - ft. section of U. Jur. & L. Cret. strata;
 - L. Cret. (prob. Hauterivian) in age (Jeletzky, 1961);
 - no true seams seen.
- (60) 135°25' W x 68°12' N
 - lower canyon of Donna River, W of Aklavik, Mackenzie Territory;
 - 3 or 4 coal seams, 1 ft. - 5 ft. thick in 240 ft. of shale and ss near bottom of 1,300-ft. deep canyon;
 - L. Cret. (prob. Hauterivian) in age (Jeletzky, 1960);
 - a little coal taken before 1939;
 - anal. (RCA.d.): A. 8.5; V.M. 37.7; F.C. 53.8; G.BTU (d.) 12,240; (daf.) 13,420.
- (61) 137°45' W x 68°17' N
 - "thick lowermost Jurassic or (?) uppermost Triassic coal-bearing beds and conglomerates outcropping in headwaters of Blow River some 7 miles north of Bonny Lake, Yukon Territory", (Jeletzky, 1960).
- (62) 138°37' W x 68°38' N
 - Yukon Territory coal occurrence reported by Gabrielse (1957);
 - on map (Bamber *et al.*, 1963) apparently Jur. in age.
- (63) 136°35' W x 68°45' N
 - Moose Channel Mine, Yukon Territory;
 - o/c and mine along westernmost distributary of Mackenzie River (Bostock, 1950);
 - prob. u/g mine before 1939;
 - seam 8 ft. thick (MacKay, 1947);
 - prob. U. Cret. (Bamber *et al.*, 1963).
- (64) 138°07' W x 68°55' N
 - Babbage River coal o/c, Yukon Territory; (Bostock, 1950; MacKay, 1947);
 - may be L. or U. Cret.
-
- 138°30' - 141° W x 67°20' - 68°25' N
 - Old Crow Plain and Porcupine River at Old Crow, Yukon Territory;
 - c. 2,500 sq. m. believed (Bostock, 1950) to be underlain by coal-bearing Tert. strata; possibly also some Cret. at Old Crow; however, no specific seams reported; both areas unglaciated, flat, swampy and heavily covered with recent alluvium;
 - refs.: Bamber *et al.*, 1963; Bostock, 1950, 1961; Douglas and MacLean, 1963.

SUMMARY and COMMENTS

The following generalizations, based in part on the author's experience in Alberta, may reasonably be drawn.

- (i) Coal-bearing strata in the Yukon and Mackenzie Territories are not well described since, being shaly and recessive, they are usually poorly exposed. Even in the northwestern part of the Tintina Trench, adjacent to the well-known Klondike region, structure, stratigraphy and thickness of the coal-bearing sediments are unknown.
- (ii) Considerable tonnages of cheap strippable coal for power production are most likely to be found in flat-lying deposits of the Mackenzie Lowland, (in the Great Bear Plain and the East Mackenzie Arctic Plain) similar to deposits in the prairies of Alberta.
- (iii) Ample tonnages of cheap power coal may also lie recoverable in intermontane basins of the Northern Cordillera, especially in the relatively flat-lying Tertiary basin deposits.
- (iv) In the Mackenzie Lowland (and possibly also in the Peel Plateau and in intermontane Tertiary basins), inspection of topography may be a most useful preliminary guide to coal occurrence. It appears that the Great Bear Plain may be considered to have a synclinal structure analogous to that of the Alberta Syncline, with a very thin, broad, undisturbed east-northeastern limb, and an axis coinciding roughly with the west boundary of the Mackenzie Lowlands (see Douglas and Norris, 1963). Bedrock is everywhere obscured, but apparently, in the east, very thin, dominantly marine Cretaceous sediments overlie Paleozoic carbonate rocks, while slightly thicker, possibly in part continental Cretaceous sediments occupy the axis. The relatively small upland (indicated in figure 1) along the axis southeast of Fort Norman could thus be analogous to, though not necessarily contemporaneous with the middle and upper parts of the Edmonton Formation and the Paskapoo Formation in central Alberta; here a search might reveal coal as lenses or zones in shaly facies below (and protected by) ridges of scarp-forming sandstone analogous to the Ardley coal zone in central Alberta which lies below the "basal Paskapoo sandstone". On the east-northeastern limb, the Horn Plateau and possibly also the Cartridge Hills are counterparts of the Birch or Caribou Mountains in northern Alberta, marine shale and sandstone ridges barren of coal, adjacent to the Paleozoic-Mesozoic unconformity; but the Scented Grass Hills beside Great Bear Lake (containing the only reported coal in the region)

are certainly counterparts of the Clear Hills and Pelican Mountain of north central Alberta, prominent protrusions of coal-bearing continental sediments into regions of marine Cretaceous bedrock some distance away from the Paleozoic-Mesozoic unconformity. Possibly other prominent uplands surrounded by marine bedrock (some of which are indicated in figure 1) may similarly contain coal. Possibly also, there exist deposits of another type found in central Alberta, protrusions of continental sediments surrounded by marine bedrock forming smooth low hills insignificant from the ground, but, with experience, easily discernible in air photographs; at Sheerness, Forestburg and Dodds, deposits of this type contain impressive quantities of strippable coal.

- (v) Coking coal is most likely to be found in the Whitehorse Trough or in the northern Richardson Mountains, but deposits there are probably rarely strippable, and underground mining will have to be practised.
- (vi) South Mackenzie Mountains Paleozoic coal is possibly just a curiosity with little economic value, but it is of good, perhaps even coking quality, and might warrant further prospecting.
- (vii) After preliminary prospecting, only a well-planned drill-program, suitably designed to operate in areas of difficult access, in muskeg or mountain, and including a plan of sampling and analysis, can prove up a field with any degree of certainty (Pearson, 1959; Campbell and Almadi, 1964).

REFERENCES CITED

- Bamber, E.W., Hughes, O.L., Mountjoy, E.W., Norford, B.S., Norris, A.W., Norris, D.K., Price, R.A., Procter, R.M., Taylor G.C. (1963): Geology, northern Yukon Territory and northwestern District of Mackenzie; Geol. Surv. Can. Map 10-1963.
- Bostock, H.S. (1936): Carmacks district, Yukon; Geol. Surv. Can. Mem. 189, 67 pages.
- (1942): Ogilvie, Yukon Territory; Geol. Surv. Can. Map 711A, with marginal notes.
- (1948a): Physiography of the Canadian Cordillera, with special reference to the area north of the fifty-fifth parallel; Geol. Surv. Can. Mem. 247, 106 pages.
- (1948b): McQuesten, Yukon Territory; Geol. Surv. Can. Paper 48-25, 13 pages.
- (1950): Potential mineral resources of Yukon Territory; Geol. Surv. Can. Paper 50-14, 29 pages.
- (1952): Geology of northwest Shakwak Valley, Yukon Territory; Geol. Surv. Can. Mem. 267, 54 pages.
- (1957): Yukon Territory, selected field reports of the Geological Survey of Canada, 1898 to 1933; Geol. Surv. Can. Mem 284, 650 pages.
- (1961): Physiography and resources of the Yukon; Can. Geog. Jour. Vol. 63, p. 163-177.
- (1964): Geology, McQuesten, Yukon Territory; Geol. Surv. Can. Map 1143A with marginal notes.
- (1966): Notes on glaciation in Central Yukon Territory; Geol. Surv. Can. Paper 65-36, 18 pages.
- Bostock, H.S. and Lees, E.J. (1938): Laberge map-area, Yukon; Geol. Surv. Can. Mem. 217, 32 pages.
- Cairnes, D.D. (1906): Explorations in a portion of the Yukon, south of Whitehorse; Geol. Surv. Can. Sum. Rept. for 1906; reprinted in Bostock, 1957, p. 209-217.
- (1908a): Report on portions of the Yukon Territory, chiefly between Whitehorse and Tantalus; Geol. Surv. Can. Sum. Rept. for 1907; reprinted in Bostock, 1957, p. 239-245.

- (1908b): Report on a portion of Conrad and Whitehorse mining districts; Geol. Surv. Can. Pub. No. 982; reprinted in Bostock, 1957, p. 245-275.
- (1909): Preliminary report on a portion of the Yukon Territory, west of Lewes River and between latitudes of Whitehorse and Tantalus; Geol. Surv. Can. Sum. Rept. for 1908; reprinted in Bostock, 1957, p. 276-283.
- (1910a): The Wheaton River district, Yukon Territory; Geol. Surv. Can. Sum. Rept. for 1909, reprinted in Bostock, 1957, p. 327-342.
- (1910b): Lewes and Nordenskiöld Rivers coal district, Yukon Territory; Geol. Surv. Can. Mem. 5, 70 pages.
- (1915): Exploration in southwestern Yukon; Geol. Surv. Can. Sum. Rept. for 1914; reprinted in Bostock, 1957, p. 354-380.
- (1916): Wheaton District, southern Yukon; Geol. Surv. Can. Sum. Rept. for 1915; reprinted in Bostock, 1957, p. 410-425.
- Campbell, J.D. (1964): Catalogue of Coal Mines of the Alberta Plains; Res. Coun. Alberta Prelim. Rept. 64-3, 140 pages.
- (1966, in press): Catalogue of Coal Mines and Coal Leases, Alberta Rocky Mountains and Foothills; Res. Coun. Alberta Rept. 66-5.
- Campbell, J.D. and Almadi, I.S. (1964): Coal occurrences of the Vulcan-Gleichen area, Alberta; Res. Coun. Alberta Prelim. Rept. 64-2, 58 pages.
- Campbell, R.B. (1954): Glenlyon, Yukon (map with marginal notes); Geol. Surv. Can. Paper 54-12.
- Camsell, Charles (1906): The Peel River and Tributaries; Geol. Surv. Can. Ann. Rept. Vol. 16, Pt. CC; reprinted in Bostock, 1957, p. 173-206.
- Cockfield, W.E. (1921): Sixtymile and Ladue Rivers area, Yukon; Geol. Surv. Can. Mem. 123, 60 pages.

- Craig, B.G., Davison W.L., Fraser, J.A., Fulton, R.J., Heywood, W.W., Irvine, T.N. (1960): Geology, north-central District of Mackenzie, Northwest Territories; Geol. Surv. Can. Map 18-1960, with marginal notes.
- Dawson, G.M. (1898): Report on an exploration in the Yukon District, N.W.T., and adjacent northern portion of British Columbia, 1887; Geol. Surv. Can. Pub.No. 629; quoted in Lord, C.S. (1944).
- Douglas, R.J.W. and MacLean, B. (1963): Geology, Yukon Territory and Northwest Territories; Geol. Surv. Can. Map 30-1963.
- Douglas, R.J.W. and Norris, D.K. (1959): Fort Liard and La Biche map-areas, Northwest Territories and Yukon; Geol. Surv. Can. Paper 59-6, 23 pages.
- (1963): Dahadinni and Wrigley map-areas, District of Mackenzie, Northwest Territories; Geol. Surv. Can. Paper 62-33, 34 pages.
- Dowling, D.B. (1915): Coal fields and coal resources of Canada; Geol. Surv. Can. Mem. 59, 174 pages.
- Gabrielse, H. (1957): Geological reconnaissance in the northern Richardson Mountains, Yukon and Northwest Territories; Geol. Surv. Can. Paper 56-6, 11 pages.
- Geological Survey of Canada (1957): Geological map of Yukon Territory; Geol. Surv. Can. Map 1048A.
- Geological Survey of Canada (1958): Geological map of the District of Mackenzie, Northwest Territories; Geol. Surv. Can. Map 1055A.
- Green, L.H. (1965): The mineral industry of Yukon Territory and southwestern District of Mackenzie, 1964; Geol. Surv. Can. Paper 65-19, 94 pages.
- (1966): The mineral industry of Yukon Territory and southwestern District of Mackenzie, 1965; Geol. Surv. Can. Paper 66-31, 137 pages.
- Green, L.H. and Roddick, J.A. (1962): Dawson, Larsen Creek, and Nash Creek map-areas, Yukon Territory; Geol. Surv. Can. Paper 62-7, 20 pages.

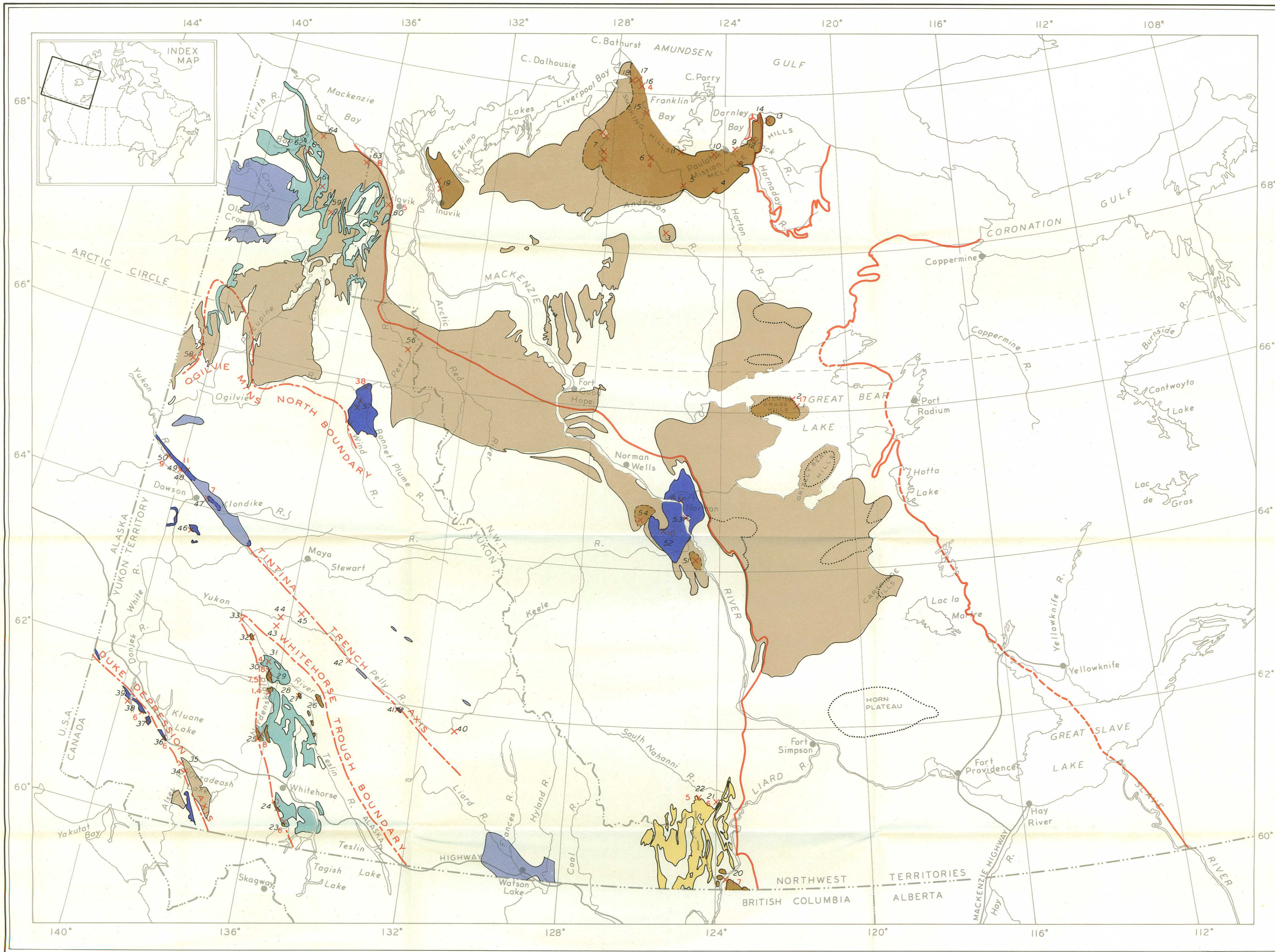
- Hacquebard, P.A. and Barss, M.S. (1957): A Carboniferous spore assemblage in coal from the South Nahanni River area, Northwest Territories; *Geol. Surv. Can. Bull.* 40, 63 pages.
- Hage, C.O. (1945): Geological reconnaissance along lower Liard River, Northwest Territories, Yukon and British Columbia; *Geol. Surv. Can. Paper* 45-22, 33 pages.
- Harker, P. (1963): Carboniferous and Permian rocks, southwestern District of Mackenzie; *Geol. Surv. Can. Bull.* 95, 91 pages.
- Hume, G.S. (1954): The lower Mackenzie River area, Northwest Territories and Yukon; *Geol. Surv. Can. Mem.* 273, 118 pages.
- Hume, G.S. and Link, T.A. (1945): Canol geological investigations in the Mackenzie River area, Northwest Territories and Yukon; *Geol. Surv. Can. Paper* 45-16, 87 pages.
- Jeletzky, J.A. (1958): Uppermost Jurassic and Cretaceous rocks of Aklavik Range, northeastern Richardson Mountains, Northwest Territories; *Geol. Surv. Can. Paper* 58-2, 84 pages.
- (1960): Uppermost Jurassic and Cretaceous rocks, east flank of Richardson Mountains between Stony Creek and lower Donna River, Northwest Territories; *Geol. Surv. Can. Paper* 59-14, 31 pages.
- (1961): Upper Jurassic and Lower Cretaceous rocks, west flank of Richardson Mountains between the headwaters of Blow River and Bell River, Yukon Territory; *Geol. Surv. Can. Paper* 61-9, 42 pages.
- Johnston, J.R. (1936): A reconnaissance of Pelly River between Macmillan River and Hoole Canyon, Yukon; *Geol. Surv. Can. Mem.* 200, 19 pages.
- Keele, Joseph (1910): Reconnaissance across the Mackenzie Mountains on the Pelly, Ross and Gravel Rivers, Yukon and Northwest Territories; *Geol. Surv. Can. Rept. No.* 1097; reprinted in Bostock, 1957, p. 283-314.
- Kindle, E.D. (1946): Geological reconnaissance along the Canol Road, from Teslin River to Macmillan Pass, Yukon; *Geol. Surv. Can. Paper* 45-21, 29 pages.
- (1947): Dezadeash map-area, Yukon; *Geol. Surv. Can. Paper* 47-15, 16 pages.

- (1949): Dezadeash map-area, Yukon; Geol. Surv. Can. Paper 49-24, 34 pages.
- (1953): Dezadeash map-area, Yukon Territory; Geol. Surv. Can. Mem. 268, 68 pages.
- Lord, C.S. (1944): Geological reconnaissance along the Alaska Highway between Watson Lake and Teslin River, Yukon and British Columbia; Geol. Surv. Can. Paper 44-25, 20 pages.
- (1951): Mineral Industry of District of Mackenzie, Northwest Territories; Geol. Surv. Can. Mem. 261, 336 pages.
- Lowry, H.H. (1963): Chemistry of coal utilization; New York, Wiley and sons, 1142 pages.
- MacKay, B.R. (1947): Coal Reserves of Canada; Reprint from Report of the Royal Commission on Coal, 1946, Ottawa, King's Printer, 113 pages.
- Mackay, J.R. (1958a): The valley of the lower Anderson River, Northwest Territories; Geog. Br. Can. Dept. Mines and Tech. Surv. Geog. Bull. 11, p. 36-56.
- (1958b): The Anderson River map-area, N.W.T.; Geog. Br. Can. Dept. Mines and Tech. Surv. Mem. 5, 137 pages.
- (1963): The Mackenzie Delta area, N.W.T.; Geog. Br. Can. Dept. Mines and Tech. Surv. Mem. 8, 202 pages.
- McConnell, R. G. (1903): Exploration of Tintina Valley from the Klondike to Stewart River; Geol. Surv. Can. Sum. Rept. for 1900 (1901) and Ann. Rept. Vol. 13, 1900, Pt. A; reprinted in Bostock, 1957, p. 25-36.
- (1906a): The MacMillan River; Geol. Surv. Can. Sum. Rept. for 1902 (1903) and Ann. Rept. Vol. 15, 1902, Pt. A; reprinted in Bostock, 1957, p. 49-61.
- (1906b): Prospecting in the Ogilvie Range; Geol. Surv. Can. Sum. Rept. for 1903 (1904) and Ann. Rept. Vol. 15, 1903, Pt. A; reprinted in Bostock, 1957, p. 62-64.
- (1906c): The Kluane mining district; Geol. Surv. Can. Sum. Rept. for 1904 (1905) and Ann. Rept. Vol. 16, Pt. A; reprinted in Bostock, 1957, p. 114-126.
- (1906d): Headwaters of White River; Geol. Surv. Can. Sum. Rept. for 1905; reprinted in Bostock, 1957, p. 144-151.

- McConnell, R.G. and Tyrrell, J.B. (1901): Preliminary note on the gold deposits and gold mining in the Klondike region; Geol. Surv. Can. Sum. Rept. for 1898 (1899) and Ann. Rept. Vol. 11, 1898, Pt. A; reprinted in Bostock, 1957, p. 17-23.
- Moorhouse, M.D. (1966): cited in "Why Arctic strikes must be big"; Oilweek, Vol. 17, No. 14, p. 10-14.
- Muller, J.E. (1954): Kluane Lake (west half), Yukon Territory; Geol. Surv. Can. Paper 53-20, 9 pages.
- (1958): Kluane Lake map-area, Yukon Territory; Geol. Surv. Can. Paper 58-9, 9 pages.
- Norris, A.W. (1965): Stratigraphy of Middle Devonian and older Paleozoic rocks of the Great Slave Lake region, Northwest Territories; Geol. Surv. Can. Mem. 322, 180 pages.
- Patton, W.J.H. (1958): Mississippian succession in South Nahanni River area, Northwest Territories; Allan Memorial Volume, Am. Assoc. Petrol. Geol., p. 309-326.
- Pearson, G.R. (1959): Coal reserves for strip-mining, Wabamun Lake district, Alberta; Res. Coun. Alberta Prelim. Rept. 59-1, 55 pages.
- Roddick, J.A. (1965): Right-lateral movement along the Tintina Fault; in Geol. Surv. Can. Paper 65-2 (Report of activities: Part II).
- *
- Sanderson, M. (1948): Drought in the Canadian North-West; Geog. Rev., Vol. 38, p. 289-299.
- Stott, D.F. (1960): Cretaceous rocks in the region of Liard and Mackenzie Rivers, Northwest Territories; Geol. Surv. Can. Bull. 63, 36 pages.
- Tozer, E.T. (1958): Stratigraphy of the Lewes River Group (Triassic), central Laberge area, Yukon Territory; Geol. Surv. Can. Bull. 43, 28 pages.
- Wheeler, J.O. (1961): Whitehorse map-area, Yukon Territory; Geol. Surv. Can. Mem. 312, 156 pages.
- (1963): Geology, Kaskawulsh (Mount St. Elias, east half), Yukon Territory; Geol. Surv. Can. Map 1134A, with marginal notes.

* See addendum p. 12.

Wilson, J. T., Falconer, G., Matthews, W.H. and Prest, V.K. (1958):
Glacial map of Canada; The Geological Association of
Canada, Toronto.



Legend

Distribution of rock units:

Age mostly Tertiary	Coal-bearing	Partly or possibly coal-bearing
Age mostly Cretaceous		
Age mostly Jurassic		
Age mostly Mississippian		

FIGURE 1.

**COAL OCCURRENCES,
YUKON AND MACKENZIE TERRITORIES**

Scale, 1 : 3,000,000

50 0 Miles 50 100

Legend

Individual coal occurrence	X
Thickness, thickest single coal seam (feet)	6
Text-reference number	34
Boundary, physiographic province	
Other specified physiographic feature	
Upland, Gr. Bear, Gr. Slave plains	