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TANTALUS
PROJECT
TECHNICAL FILE

Atlas Explorations Limited

February 12, 1970

Tom Adamson

Coal Exploration -
Big Salmon Area, Yukon

J. S. Brock

Bostock has emphasized in letters to Aho and Chisholm that the Tantalus Formation in the Big Salmon area of the Yukon should receive top priority in regard to coal exploration in the Yukon.

In 1966, on a consulting basis, Bostock prepared notes and sketch maps outlining the area in the Big Salmon basin that has, in his opinion, the best coal potential.

The area outlined includes about 130 sq. miles on claim sheets 105-E-15 and 105-L-2. An exploration program for this area, briefly summarized by Bostock, would involve a geologist and one or two assistants, with part time helicopter support (fly camp moves). I would think this area could be prospected and mapped in under two months. Bostock has suggested that the above crew spend a few days at the beginning of the season studying the stratigraphic sections at the known coal deposits in the Tantalus Formation around Carmacks. The Big Salmon area work could be co-ordinated quite easily with the Cab and Macundy Programs in regard to supervision and helicopter support.

Brief Summary of Pertinent "Territorial Coal Regulations."

In order to explore for coal in the Yukon it is necessary to obtain from the Dept. of Indian Affairs & Northern Development a "Coal Exploration Licence."

The area of land in respect of which a licence is issued is equal to one quarter of the area shown on a mineral claim staking sheet and the licence shall be described by the geographical position of the quarter of such sheet (i.e. 105-L-2,NW). A coal exploration licence is in force for 3 years. A deposit, to secure exploration expenditures, in the following amounts must be posted prior to each licence year:

.05/acre - first year
.10/acre - second year
20/acre - third year

./2

If the cost of work done is equal to or greater than the above deposits, the deposit is refunded. If the cost of work done is less than the deposit, only that portion of the deposit corresponding to the cost of work done is refunded.

A licence may be cancelled by the licensee at the end of any licence year.

At any time during the term of the Exploration Licence, application may be made for a Coal Lease. Coal leases are for 21 year terms, are renewable, and are granted for a maximum area of 640 acres. Rental for a coal lease is at the rate of $1.00/acre/year payable in advance. In addition to the rental fee, a royalty of $.10/ton of coal mined must be paid to the Crown.

Exploration licences that we would require to cover the Big Salmon Area are as follows:

105-E-15, N.E.	=	44,750 acres
105-E-15, N.W.	=	44,750 acres
105-E-15, S.E.	=	44,750 acres
105-L-2, S.W.	=	44,750 acres
		179,000 acres

Therefore we would be committed, in the first year, to a minimum exploration expenditure of:

179,000 acres @ .05/acre = $8950.00

No research has yet been done by myself on the economic factors affecting the evaluation of a coal deposit in the Yukon or on the market potential of coal in the Yukon. All of the information in our files and in G.S.C. publications on these subjects is very out of date. I would suspect that the most current work in this regard has been done by the W.P. & Y.R.

The attached fiee contains a summary of Bostock's letters, notes, and maps on the Big Salmon area, and all 'current" G.S.C. material on coal in the Yukon.

#1

1960

The Yukon Coal Company Limited—owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited—operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production from 1948 to 1960 inclusive was about 84,500 tons, an average of 6,500 tons a year. In 1960, production was 4,445 tons, most of which was used by United Keno Hill Mines at Calumet.

Most of the following information was kindly supplied by United Keno Hill Mines Limited. The main adit is 350 feet above the river and follows the main coal seam northward for 1,800 feet. The coal is taken from rooms and pillars up to 200 feet above the north end of the adit. The coal seam dips 50 to 55°W and averages 10 feet in thickness, but in places it is as much as 16 feet thick.

The geology of Tantalus Butte, the workings of the mine, and coal analyses are given by Bostock (1936a, p. 59). Tantalus Butte is underlain by conglomerates, sandstones, etc. of the Tantalus formation of Jurassic or Cretaceous age. Cairnes (1910, p. 52) stated that the strata contain three coal seams that outcrop near the top of the Butte and are 8 feet 10 inches, 9 feet 10 inches, and 7 feet thick. The mine workings expose two seams—an upper one about 2 feet thick and a lower one that varies from 7 to 16 feet thick. The main adit follows the lower seam. This seam is cut by several small faults with only a few feet of displacement, but about 1,300 feet from the portal the seam is offset to the right a distance of 90 feet along a northeasterly trending, steeply dipping fault. About 500 feet farther north there is a similar fault, of unknown offset.

CARMACKS AREA

#1 Tantalus Butte Mine (62°08'N, 136°16'W)

References: Bostock (1936a, pp. 59-62); Skinner (1961, p. 30; 1962, p. 30)

1962

The Yukon Coal Company Limited, which is owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited, operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production by Yukon Coal Company Limited from 1948 to 1962 inclusive was 101,711 tons. Annual production during this period has varied from less than 4,000 tons to a maximum of 14,113 tons in 1954. In 1962, production was 7,650 tons, which, with the exception of about 50 tons, was used by United Keno Hill Mines Limited at Elsa and Calumet.

Carmacks

#1 Tantalus Butte Mine NTS 115 I

References: Cairnes (1910, pp. 52-53); Bostock (1936a, pp. 59-62; 1937, pp. 13-16; 1939, p. 17; 1941, pp. 26-27); Skinner (1961, p. 30).

1961

The Yukon Coal Company Limited—owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited—operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production by Yukon Coal Company Limited from 1948 to 1961 inclusive was about 91,000 tons, an average of 6,500 tons a year. In 1961, production was 7,804 tons, most of which was used by United Keno Hill Mines at Elsa and Calumet.

The Yukon Coal Company Limited, which is owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited, operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production by Yukon Coal Company Limited from 1948 to 1963 inclusive was 109,943 tons. Annual production during this period has varied from less than 4,000 tons to a maximum of 14,113 tons in 1954. In 1963, production was 8,232 tons, which, with the exception of about 144 tons, was used by United Keno Hill Mines Limited at Elsa and Calumet. A maximum crew of 10 men is employed.

The main entry, elevation 2,056 feet and about 350 feet above the Yukon River, follows the main coal seam northward for 2,300 feet. The seam dips about 55°W. When visited late in 1963, most of the production was coming from a south-raking block that is bounded by northeast-trending, steep southeasterly dipping faults, which cross the main entry about 1,300 and 1,800 feet from the portal. The seam within this block averages about 11 feet in thickness. It has been developed by six counter entries above the main entry and raises, some of which reach the surface. Mining, using the room and pillar method, was being carried out from a number of counters. Exploration was also being carried out beyond the northern fault.

The coal is of the high-volatile Bituminous Group. It occurs in the Tantalus Formation, which consists (Bostock, 1936a, p. 28) largely of conglomerate, with some sandstone, shale, and a few coal seams. Wheeler (1961, p. 74) considered the Tantalus Formation to be of Upper Jurassic (?) and Lower Cretaceous age.

three counters have been established above the main entry. At the time of the visit all the mine production was being obtained from the development work in the new block.

A channel sample of the coal, taken in No. 1 Room, 50 feet north from No. 18 Raise on No. 2 Counter, where the seam has an apparent thickness of 16 feet, was analysed by the Mines Branch of the Department of Mines and Technical Surveys with the following results:

Laboratory No.		2251-65	2252-65
Proximate Analyses (Dry Basis)			
Ash	%	24.1	15.1
Volatile Mat er	%	31.8	32.2
Fixed Carbon	%	44.1	52.7
Ultimate Analysis (Dry Basis)			
Carbon	%	61.0	69.5
Hydrogen	%	3.9	4.1
Sulphur	%	0.3	0.2
Nitrogen	%	0.8	0.9
Ash	%	24.1	15.1
Oxygen (by difference)	%	9.9	10.2
Equilibrium Moisture	%	2.4	3.1
Calorific Value	Btu/lb	10,580	11,720

The coal is classified as high volatile B bituminous according to the ASTM System of Classification of Coal by Rank. All samples are agglomerating and have a swelling index of 1 (ASTM). Coals of this type would not be expected to yield metallurgical grade coke.

2251-65: 8 foot channel sample from footwall of seam.
2252-65: 8 foot channel sample from hanging-wall of seam.

COAL MINING

WHITEHORSE MINING DISTRICT

NTS 115 I

CARMACKS AREA

#1 Tantalus Butte Mine (62°08'N, 136°16'W)

1963

References: Cairnes (1910, pp. 52-53); Bostock (1936a, pp. 59-62; 1938, p. 13; 1939, p. 17; 1941, pp. 26-27); Wheeler (1961, p. 74); Skinner (1961, p. 30; 1962, p. 30); Green and Godwin (1963, p. 65).

#1 Tantalus Butte Mine (62°08'N, 136°16'W)

References: Cairnes (1910, pp. 52-53); Bostock (1936a, pp. 59-62); Wheeler (1961, p. 74); Skinner (1961, p. 30; 1962, p. 30); Green and Godwin (1963, p. 65; 1964, pp. 83-84).

The Yukon Coal Company Limited, which is owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited, operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production by Yukon Coal Company Limited from 1948 to 1963 inclusive was 109,941 tons. Annual production during this period has varied from less than 4,000 tons to a maximum of 14,113 tons in 1954. In 1964, production was 7,220 tons, which, with the exception of about 120 tons, was used by United Keno Hill Mines Limited at Elsa and Calumet. A maximum crew of 11 men is employed.

The coal is of the high-volatile Bituminous Group. It occurs in the Tantalus Formation, which consists (Bostock, 1936a, p. 28) largely of conglomerate, with some sandstone, shale, and a few coal seams. Wheeler (1961, p. 74) considered the Tantalus Formation to be of Upper Jurassic (?) and Lower Cretaceous age.

The main entry, elevation 2,056 feet and about 350 feet above the Yukon River, follows the main coal seam northward and is about 2,550 feet in length. The seam strikes north and dips about 55°W. During 1964, most of the production came from a south-raking block that is bounded by northeast-trending, steep southeasterly dipping faults, which cross the main entry about 1,300 and 1,800 feet from the portal. The seam within this block averages about 11 feet in thickness. It has been developed by six counters above the main entry and raises, some of which reach the surface. Mining, using the room and pillar method, was being carried out from a number of counters.

When the writer visited the property early in 1965, a seam about 18 feet in width had been picked up beyond the northern fault in the main entry and followed for about 200 feet. This seam lies in about the projected position of the seam south of the fault, but it is not known whether it is the same seam. Where exposed in the main entry, about the location of the planned No. 20 raise, the seam had a true width of about 15 feet with the footwall not exposed. There were no visible partings in the seam as exposed, although a few discontinuous dark siliceous bands appear to be present. As broken, the coal from this face is about 30 per cent lump. Three raises, Nos. 17, 18, and 19 are being driven in the new block and

1965

Chemical and Physical Properties

Laboratory Number		CHANNEL 2596 -65	2597 -65	2598 -65	2599 -65	DUST 2600 -65	MINE RUN 2601 -65
Proximate Analysis							
Moisture	%	1.4	2.1	1.9	2.0	2.3	2.0
Ash	%	9.1	11.1	15.8	17.8	14.1	13.7
Volatile Matter	%	35.8	33.3	32.0	30.6	32.8	33.1
Fixed Carbon	%	53.7	53.5	50.3	49.6	50.8	51.2
Ultimate Analysis (Dry Basis)							
Carbon	%	73.2	73.1	67.9	66.7	69.4	70.7
Hydrogen	%	4.9	4.6	4.3	4.1	4.4	4.4
Sulphur	%	0.3	0.3	0.6	0.5	0.5	0.3
Nitrogen	%	1.0	1.0	0.9	0.9	1.0	0.9
Ash	%	9.2	11.3	16.1	18.2	14.5	14.0
Oxygen	%	11.4	9.7	10.2	9.6	10.2	9.7
Calorific Value (Moist Basis)	Btu/lb.	12,590	12,290	11,210	11,100	11,680	11,850
Grindability		46	46	73	61	61	60
Ash Fusibility							
Initial Deformation Temp.	°F	2070	2030	2070	2050	2120	2100
Softening Temp. Spherical	°F	2130	2120	2150	2140	2240	2210
Softening Temp. Hemispherical	°F	2210	2190	2200	2160	2310	2260
Fluid Temp.	°F	2280	2210	2260	2240	2370	2340
Equilibrium Moisture		2.9	2.8	3.0	2.8	4.3	3.3

2596-65 to 2599 - Channel sample across the face of the main entry
11 June 1965

Hanging-Wall	Thickness in feet Unit	Total from Base
2596-65 - Coal with about 1 inch of "bone at base"	1.7	13.4
2597-65 - uniform coal with small lenses of "siliceous material"	5.4	11.7
2598-65 - soft clay bands and dirty coal	1.9	6.3
2599-65 - uniform coal with small lenses of "siliceous material"	4.4	4.4
Foot Wall		

2600-65 - Sample of dust from the tipple

2601-65 - Run of mine sample, about 200 pounds

"The coal is classified as high volatile B bituminous according to the ASTM System of Classification of Coal by Rank. All samples are agglomerating and have a swelling index of 1 (ASTM). Coals of this type would not be expected to yield metallurgical grade coke.

Float-and-sink tests on the Plus 48 mesh size fraction indicate that the coal would not be difficult to beneficiate with high yields. However cleaning would not be expected to significantly improve the coking properties, as indicated by the swelling indices of the various gravity fractions. The relatively low yield of 1.30 specific gravity material with FSI of 3 would not make such a separation favourable."

COAL MINING AND EXPLORATION

WHITEHORSE MINING DISTRICT

CARMACKS AREA

NTS 115 I

□ #1 Tantalus Butte Mine (62°08'N, 136°16'W)

References: Cairnes (1910a, pp. 52-53); Bostock (1936a, pp. 59-62); Wheeler (1961, p. 74); Skinner (1961, p. 30; 1962, p. 30); Green and Godwin (1963, p. 65; 1964, pp. 83-84); Green (1965, pp. 82-84; 1966, pp. 121-122).

1966

The Tantalus Butte Mine of the Yukon Coal Company Limited - owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited - is the only producing coal mine in Yukon. It is located at Carmacks, about 100 miles north-northwest of Whitehorse. The mine has operated since about 1923, except between 1939 and 1948. Since 1948, annual production has ranged from less than 4,000 tons to a maximum of 14,113 tons (1954) and cummulative production for the period 1948 to 1965 inclusive was 125,967 tons. Production during 1966 was 6,000 tons, virtually all of which was used by United Keno Hill Mines Limited at Elsa and Calumet. A crew of 10 men was employed.

The coal is of the high-volatile Bituminous Group. It occurs in the Tantalus Formation which includes conglomerate with subordinate sandstone and shale and a few coal seams (Bostock, 1936a, p. 28). Wheeler (1961, p. 74) considered the Tantalus Formation to be of Upper Jurassic (?) and Lower Cretaceous age.

The main entry of the mine is at an elevation of 2,056 feet or about 350 feet above Yukon River. It follows the hanging-wall of the main seam in a general north-northwest direction and is about 2,600 feet long. The main coal seam strikes about north-northwest, dips 50-55° SW, and ranges in thickness from 8 to 20 feet. It is cut by northeast-trending, steep southeast-dipping faults which cross the main entry at distances about 1,300 and 1,800 feet from the portal. Mining is done by room and pillar methods, at present the rooms or drives are inclined at 30 degrees to the main entry and spaced 120 feet apart. Most production in 1966 came from the part of the mine north of the second cross-fault but some pillar-mining was done in the area between the two main faults. Analyses of coal samples from the mine are given by Green (1966, p. 123).

#1a Anvil Mining Corporation Limited (about 62°05'N, 136°15'W)
(Coal)

1966

This company holds a total of 8 coal leases adjacent to the Yukon Coal Company Limited Tantalus Butte Mine and to the original Tantalus Mine on the south side of Yukon River, just east of the present bridge. A bulldozer trenching program carried out during 1966 in the latter area located a 30-foot thick coal seam which may be the south extension of the seam worked in the original Tantalus Mine. The coal from the new seam is reportedly similar in character and quality as that being produced from the present Tantalus Butte Mine.

NTS 115 I

#1 Tantalus Butte Mine (62°03'N, 136°16'W)

References: Cairnes (1910a, pp. 52-53); Bostock (1936a, pp. 59-62); Wheeler (1961, p. 74); Skinner (1961, p. 30; 1962, p. 30); Green and Godwin (1963, p. 65; 1964, pp. 83-84); Green (1965, pp. 82-84).

1965

The Yukon Coal Company Limited, which is owned by Territorial Supply Company Limited, a subsidiary of United Keno Hill Mines Limited and Cassiar Asbestos Corporation Limited, operates the Tantalus Butte coal mine under management of United Keno Hill Mines Limited. The mine is at Carmacks, about 100 miles north-northwest of Whitehorse. The Tantalus Butte mine has operated since about 1923, except for the years 1939 to 1948. The Yukon Coal Company was formed in 1947 and the mine reopened in 1948. Production by Yukon Coal Company Limited from 1948 to 1964 inclusive was 117,161 tons. Annual production during this period has varied from less than 4,000 tons to a maximum of 14,113 tons in 1954. In 1965, production was 8,906 tons, which with the exception of about 104 tons was used by United Keno Hill Mines Limited at Elsa and Calumet. A maximum crew of 11 men is employed.

In the Tantalus Formation, which consists (Bostock, 1936a, p. 28) largely of conglomerate, with some sandstone, shale, and a few coal seams. Wheeler (1961, p. 74) considered the Tantalus Formation to be of Upper Jurassic (?) and Lower Cretaceous age.

The main entry, elevation 2,056 feet and about 350 feet above the Yukon River, follows the main coal seam northward and is about 2,530 feet in length. The seam strikes north and dips about 55° W. It is cut by northeast-trending, steep southeasterly dipping faults, which cross the main entry about 1,300 and 1,800 feet from the portal. The seam was located about 80 feet beyond the second fault and production in 1965 was won from this portion.

Samples of the coal, taken by A.D. Oliver, Resident Mining Inspector, were analysed by the Mines Branch of the Department of Mines and Technical Surveys with the following results:

able for lode deposits. These areas include a variety of rocks besides those of the Yukon group, with which placers are generally associated in other districts of Yukon. Thus the best known placers of Carmacks district, those of Nansen and Victoria creeks, are mainly in areas of Tertiary acid intrusives.

When searching for placers it is important also to consider whether the country has been glaciated. This particularly applies in Carmacks district as parts of it have escaped glaciation. Placers formed before the glacial period would in most cases be scoured away by ice movement or buried beneath drift deposits. The features of the last glaciation are still fresh and unmodified by post-glacial erosion, showing that the time since the disappearance of the ice-sheet has been too short for placers to form. For this reason the western limit of the last ice-sheet has been indicated on the map.

It has already been mentioned that parts of the district, in the vicinities of Selkirk and Nansen creek, outside the limit of the last glaciation, were subjected to an earlier glaciation. The importance and extent of the earlier glaciations are not fully known. However, the placers of Nansen and Victoria creeks lie on top of the old boulder clay and have, therefore, been formed since the earlier glaciation. For this reason the areas that were subjected only to the earlier glaciation are not to be regarded as being unfavourable for placer prospecting ground.

COAL

Coal has been known in the district since the earliest explorations by Dawson, in 1887[1], who noted the presence of thin seams in the Laberge series at a locality that subsequently became the site of the Five-finger coal mine some 5½ miles above Five-finger rapid. Later, coal was found at what became the Tantalus and Tantalus Butte mines on Lewes river above Carmacks. The Tantalus Butte mine continues to produce a few hundred tons each year, most of which is sold in Dawson, but the other two mines are closed.

Tantalus Mine

This mine is on the south side of Lewes river, a mile above Carmacks, and was operated by the Five Fingers Coal Company. It has been abandoned for some years and its workings were not examined by the writer. The Tantalus conglomerates outcrop along the river bank both above and below the mine, and by their attitudes indicate the presence of a minor anticline west of the mine and a minor syncline to the east. The following account is taken from reports by Cairnes.[2]

"The coal outcrop on the river bank is well situated for economical working. . . . Three seams have been opened up, only the lower two of which have been worked to any extent. The seams vary somewhat in thickness, but average about 7 feet 6 inches, 6 feet 6 inches, and 3 feet

[1] Dawson, G. M.: "Report on an Exploration in the Yukon District, N.W.T., and Adjacent Northern Portion of British Columbia, 1887"; Geol. Surv., Canada, Ann. Rept. 1887-88, pt. B, p. 147.

[2] Cairnes, D. D.: Geol. Surv., Canada, Sum. Repts.: 1907, p. 28; 1908, p. 14; 1909, p. 28. "Lewes and Nordenskiöld Rivers Coal District"; Mem. 5, pp. 48-54 and 59-63 (1910). Guide Book No. 10, pp. 82-87 (1913).

of coal in the bottom, middle, and top seams respectively. The lower two seams have, in places, not more than 4 feet of rock between them, and the middle and top seams are generally about 7 feet apart. The coal is worked by the pillar-and-stall system, from two level entries, which have been driven about 2,000 feet. The beds in the mine workings dip to the east at angles varying from 24 degrees to 40 degrees.

"A 500-pound sample from each of these seams taken by the writer in 1908 was treated and analysed by the Mines Branch, the following being part of the results of this work.

	Upper seam		Middle seam		Lower seam	
	Raw	Washed	Raw	Washed	Raw	Washed
	%	%	%	%	%	%
Moisture in sample as received in laboratory	0·9	.....	0·7	.....	0·7	.....
Proximate analysis of coal dried at 105 degrees—						
Fixed carbon	58·0	59·9	54·1	60·3	56·0	59·2
Volatile matter	25·0	26·3	26·7	25·7	27·8	28·1
Ash	17·0	13·8	19·2	14·0	16·2	12·7
Ultimate analysis of dried coal—						
Carbon	6·98	.....	.....	.....	71·1	.....
Hydrogen	4·0	.....	.....	.....	4·3	.....
Sulphur	0·5	0·5	0·5	0·4	0·5	0·5
Nitrogen	0·8	0·8	0·9	0·8	0·7	0·8
Oxygen	7·9	.....	.....	.....	7·2	.....
Ash	17·0	.....	.....	.....	16·2	.....
Calorific value of dried coal in calories per gramme	6·700	7·110	6·310	7·070	6·790	7·210"

The Tantalus mine was operated from 1905 or earlier until 1922. In earlier years from 3,000 to 8,500 tons a year were produced for a period of seven years or more. Much of the coal was used by the river steamers but was not found altogether satisfactory owing largely to the difficulty of distributing it to coaling points up and down the river, and the steamers reverted to the practice of using wood as fuel. Production dropped in 1918 below 1,000 tons and in succeeding years fell to a few hundred tons, until in 1922 the mine was closed.

Tantalus Butte Mine

The presence of coal seams in Tantalus butte, across the river from Tantalus mine and Carmacks, has been known from about the same time as the Tantalus mine started operation. The Five Fingers Coal Company closed the Tantalus mine in 1922 and opened the Tantalus Butte mine in 1923; because compared with the Tantalus mine it is cheaper to operate on a small scale. Since 1923 this mine has produced from 300 to 600 tons a year, most of which is used for domestic heating in Dawson.

Tantalus butte is composed of conglomerates, sandstones, etc., of the Tantalus formation. The strata strike almost due north and dip at an angle of approximately 50 degrees to the west. Cairnes reports[1] the presence of three seams near the top of the butte, 8 feet 10 inches, 9 feet 10 inches, and 7 feet thick, respectively. He gives the following analysis, made by the Mines Branch, Department of Mines, of samples from each seam.

	Average outcrop of 8 feet 10 inches seam	Sample of 9 feet 10 inches seam	Sample of best 6 feet of 7-foot seam
Water	13·64	16·32	12·87
Volatile combustible matter	31·84	31·72	31·72
Fixed carbon	51·84	42·13	49·51
Ash	2·69	9·83	5·90
	100·00	100·00	100·00
Ratio of volatile combustible matter to fixed carbon	1·63	1·33	1·56
Potash reaction	Dark	Brownish	Red
Colour of ash	Pale reddish brown	Pale brownish yellow	Yellowish brown
Kind of fuel	Lignite	Lignite	Lignite

These do not give a coherent coke.

In 1932 when the writer visited the locality the excavations exposing the three seams had caved. The mine workings now expose two seams, an upper one approximately 2 feet thick and a lower one that varies in thickness from 7 to 14 feet. The workings consist of a main entry which crosscuts to the lower seam and follows it to a point 700 feet or more in from the portal. The entry is about 350 feet above the river. An upper entry, 135 feet above the lower, runs in on the upper seams for approximately 100 feet to where a winze reaches the lower seam connecting with the rooms in it and providing ventilation. Most of the coal that has been mined has come from parts of the upper seam that are within 300 feet from the surface measured down the dip of the seam.

In 1933 the writer took a sample across the lower seam close to the inner end of the main entry where it had been exposed for over a year. The sample was a channel sample across the whole seam, which here measured 9 feet 9 inches. The best coal is in the lower third. The central part of the seam breaks up easily and is not so clean. The second best part of the seam is the upper part. The sample was analysed by the Mines Branch, Department of Mines, with the following results.

[1] Cairnes, D. D.: Geol. Surv., Canada, Mem. 5, p. 52. Guide Book No. 10, p. 82.

Condition of sample	As received	Dry basis
Proximate analysis:		
Moisture	6·1	.....
Ash	8·9	9·5
Volatile matter	31·2	33·2
Fixed carbon (by difference)	53·8	57·3
Ultimate analysis:		
Carbon	69·6	74·1
Hydrogen	5·2	4·8
Ash	8·9	9·5
Sulphur	0·4	0·4
Nitrogen	1·0	1·0
Oxygen (by difference)	14·9	10·2
Calorific value:		
Determined in calories per gramme, gross	6,555	6,980
Determined B.T.U. per lb., gross	11,800	12,560
Fuel ratio, fixed carbon, volatile matter	1·70	
Carbon-hydrogen ratio	13·4	15·5
Coking properties	Agglomerate	
Softening temperature of ash	2,330	

In 1934 seven other samples were collected by Mr. Andrew R. Johnstone and analysed by the Mines Branch, Department of Mines. The results follow:

Laboratory No.	13717		13718		13719		13720	
Condition of sample	R	D	R	D	R	D	R	D
Proximate analysis:								
Moisture.....Per cent	5·4	.....	4·5	.....	3·7	.....	5·6	.....
Ash..... "	10·5	11·1	11·5	12·0	9·1	9·5	11·3	12·0
Volatile matter..... "	30·7	32·5	30·9	32·4	32·9	34·2	33·7	35·7
Fixed carbon (by difference).....	53·4	56·4	53·1	55·6	54·3	56·3	49·4	52·3
Ultimate analysis:								
Carbon.....Per cent	.....	.....	.....	.....	.....	.....	.....	.....
Hydrogen..... "	.....	.....	.....	.....	.....	.....	.....	.....
Ash..... "	.....	.....	.....	.....	.....	.....	.....	.....
Sulphur..... "	0·4	0·4	0·3	0·4	0·4	0·4	0·3	0·4
Nitrogen..... "	.....	.....	.....	.....	.....	.....	.....	.....
Oxygen (by difference) "	.....	.....	.....	.....	.....	.....	.....	.....
Calorific value:								
Calories per gramme, gross	6,625	7,005	6,660	6,975	6,935	7,200	6,580	6,970
B.T.U. per pound, gross	11,930	12,610	11,990	12,550	12,490	12,960	11,840	12,550
Fuel ratio, fixed carbon, volatile matter	1·75		1·72		1·65		1·45	
Carbon-hydrogen ratio	.....		.....		.....		.....	
Coking properties	Agglomerate		Agglomerate		Agglomerate		Agglomerate	
Softening temperature of ash	.....		.....		.....		.....	

13717—From 9-foot 4-inch seam, face exposed one year.
13718—From 8-foot 6-inch seam, face exposed 45 days.
13719—From 8-foot seam, face exposed 40 days, face main tunnel.
13720—From 9-foot seam, freshly broken face.

Laboratory No.		13721		13722		13723	
Condition of sample		R	D	R	D	R	D
Proximate analysis:							
Moisture	Per cent	4·2	.....	4·4	.....	4·4	.....
Ash	"	10·0	10·5	11·5	12·0	10·0	10·5
Volatile matter	"	32·8	34·2	32·9	34·4	33·4	34·9
Fixed carbon (by difference)	"	53·0	55·3	51·2	53·6	52·2	54·6
Ultimate analysis:							
Carbon		.....	.....	69·5	72·8	.....	.....
Hydrogen		.....	.....	4·7	4·4	.....	.....
Ash		.....	.....	11·5	12·0	.....	.....
Sulphur		0·3	0·4	0·4	0·4	0·4	0·4
Nitrogen		.....	.....	1·0	1·0	.....	.....
Oxygen (by difference)		.....	.....	12·9	9·4	.....	.....
Calorific value:							
Calories, per gramme, gross		6,805	7,110	6,670	6,975	6,810	7,120
B.T.U. per pound, gross		12,250	12,800	12,000	12,560	12,260	12,820
Fuel ratio, fixed carbon, volatile matter		1·60		1·55		1·55	
Carbon-hydrogen ratio		.....		14·8	16·5	.....	
Coking properties		Agglomerate		Agglomerate		Agglomerate	
Softening temperature of ash, °F		2290		2280		2295	

13721—Run of 5 tons of hand-screened slack coal.
13722—From last 5 tons mined in year 1934.
13723—From last 5 tons mined in this season, 1934.

Five-finger Mine

The Five-finger mine is on the east bank of Lewes river, 15 miles below Carmacks by river, or 8 miles in a direct line. The mine is abandoned and its workings filled with water. The information here given with regard to it is summarized from reports by Cairnes[1] who visited it in 1907. "Some years ago a slope was sunk about 350 feet and rooms driven off it on the best seam so far found in these measures, and which dips at 16 degrees to the east; the seam in the lower rooms being 3½ to 4 feet thick. A considerable amount of coal was mined and sold, chiefly in Dawson, but the workings have now been closed for several years.

"As the top of this old slope is subject to mud slides—being situated in the steep clay and sand bank of the river—when work was re-commenced in 1906, under new management, it was on safer ground—some distance south. Here a new slope was sunk 783 feet on a seam higher in the measures than the seam in the old workings, and which also dips at 16 degrees to the east. This seam—which in places in the slope is not more than 6 inches thick—at the bottom contains 22 inches of good clean coal, and 24 inches of coal and shale.

"During 1907 and 1908 very little work was done on this property. In the former year a 25-foot winze was sunk at 450 feet down the new slope to a seam of coal 4½ feet thick, which is apparently the same seam as that in the old slope. Since 1908 the mine has been closed.

"The following samples were taken by the writer: sample A is an average of the 22 inches of good coal in the bottom of the 783-foot slope;

1 Cairnes, D. D.: Geol. Surv., Canada, Sum. Rept. 1907, p. 30. "Lewes and Nordenskiöld Rivers Coal District"; Mem. 5, p. 53.

and B is an average of the bottom of the 26-foot winze. Assayed by the Mines Branch, Department of Mines, at Ottawa, these samples gave the following results:

Sample	A	B
Water	5·95	5·29
Volatile combustible matter	40·46	36·14
Fixed carbon	45·16	40·12
Ash	8·43	18·45
	100·00	100·00
Coke per cent	53·59	58·57
Character of coke	Firm Coherent	....
Ratio of volatile combustible to fixed carbon	1 to 1·11	1 to 1·11
Colour of ash	Reddish	Reddish
Kind of fuel	Coal	Coal "

Other Localities

Coal has been reported from two other localities. One of these on the west bank of Lewes river, 5 miles above Selkirk, was reported by Cairnes[1] to display bituminous coal of good quality. This locality was examined by the writer in 1933. The workings formerly consisted of a shaft now filled with water, probably 20 to 30 feet deep, and an adit, now caved in, at the water's edge. Both dumps are small and composed of black shale in which a few pieces of coaly shale or poor coal occur. On the bank is an outcrop of conglomerate containing plant fragments. The shale and conglomerate strongly resemble those of the upper part of the Laberge series and may very well belong to the Laberge coal horizon. The coal-bearing beds probably extend beneath the Selkirk volcanics which outcrop 50 yards to the west but only for a comparatively short distance, as intrusives believed to be younger than the Laberge series outcrop within a mile on almost all sides.

It has been known from the beginning of the century that coal float occurs in the gravels of Mica creek, and McConnell[2] mentions that "a shaft sunk on an easterly branch of Mica creek, about 8 miles from the Pelly, is reported to have passed through several small seams of lignite." The easterly branch mentioned by McConnell is Ptarmigan creek. This locality was visited by the writer in 1934. At the forks of Ptarmigan creek the ruins of two old cabins with the stone chimneys and fire-places characteristic of the first years of the century were found. The creeks follow a canyon-like valley 200 to 300 feet deep in which no outcrops were observed, the walls appearing to be composed entirely of glacial drift. A few hundred yards up the branch coming from the southwest side of Ptarmigan mountain, old piles of logs apparently cut for mine timber were discovered. The workings were probably located on the south

[1] Cairnes, D. D.: Geol. Surv., Canada, Guide Book No. 10, p. 91 (1913).
[2] McConnell, R. G.: Geol. Surv., Canada, Sum. Rept. 1902, pt. A, p. 33.

side of the valley where a small slide has occurred. This branch of Ptarmigan creek contains a quantity of fragments of black and carbonaceous shales and some coal float. A piece of a fossilized tree trunk was also noted. No sign of a dump from the workings was found. The shales in the creek bed are believed to come from the Laberge series, but although no outcrops were found close to this locality the bedrock is believed to be of the Yukon group which outcrops within a few miles on all sides. It is thought that the coal and the Laberge rocks occur only as fragments in the glacial drift. If they do occur in place, the area of coal measures must be very small and the strata must form a small downfaulted block.

The chief reserves of coal in the district occur in the areas of the Tantalus formation and the upper part of the Laberge series in the vicinity of Carmacks and the old Five-finger mine. These areas are probably the most accessible areas of good coal in Yukon. The measures occur at the surface over an area of approximately 25 square miles, all of which is within 5 miles of Lewes river. The number of coal seams in these coal measures is not known, but at least six seams of workable size and quality are present. An additional area in which coal is likely to occur is that of the Tantalus formation on the southwest side of Lewes river south of Minto. This area could best be explored by drilling.

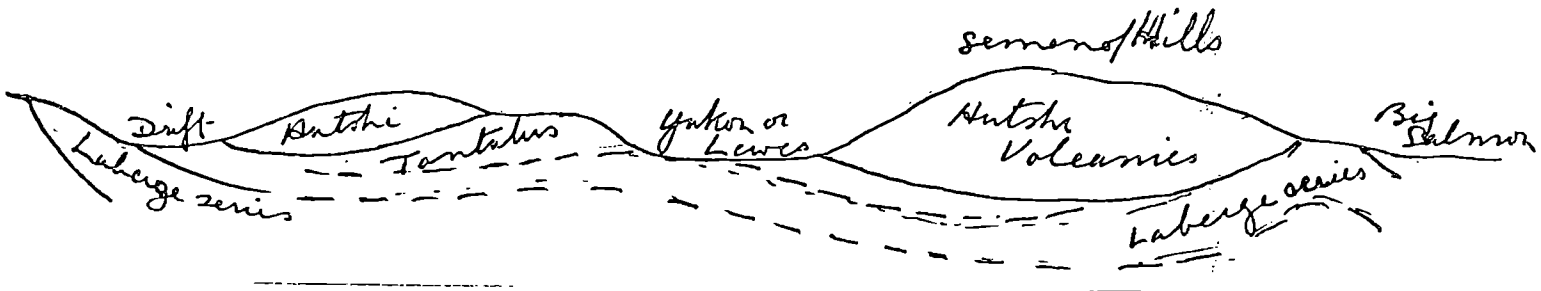
c o p y

Further Notes on the Possibilities of the Tantulus and Laberge Coal Horizons. Hugh S. Bostock. Jan.27,1966.

1. The stratigraphic position of the Hutshi volcanics is of major importance. I believe that the bulk of these rocks overlie the Tantulus in the Carmacks and Laberge map areas but that some volcanics older than the Tantulus have been mapped with them.

   I have never seen an exposed contact between the Hutshi and the Tantulus but their distribution in the Carmacks area seemed to back up the conclusion of D. D. Cairnes (Mem. 5 p.41), Lees (Mem. 217 p.18) and Wheeler (Mem.312) that the Hutshi overlies the Tantulus and Laberge. Wheeler, however, has volcanics mixed with his underlying Triassic as well. On the other hand Campbell (Map 25-1960) without having seen the relationships of these formations places the volcanics that seem to be the extension of the Hutshi in the Big Salmon area of the Laberge map-area in the Carboniferous, well under the Tantulus, because limestones some of which have upper Palaeozoic fossils were found in places among them. My conclusion is given above. This allows the extension of the Tantulus coal measures out under the Hutshi.

2. Lees believed (Mem. 217 p.17) the Hutshi in the Miners Range and Semenof Hills to lie in irregular synclinal structures. A cross section of the Semenof Hills in his view as I remember would be like this: Diagrammetre Sketch



These two points make the possibilities of finding economic quantities of coal in the Tantulus areas south of Cassiar Bar and along the Teslin River much greater than the exploratory

mapping suggests.

If the coal is a real matter of interest the Big Salmon area and those of Cassiar Bar and the Teslin should be well explored.

(signed) Hugh S. Bostock.

nclosed: 3 pages of notes
1 Laberge geol. 105E
1 Glenlyon geol.105L
1 Big Salmon 105E15 E&W.

C O P Y

Box 110, R. R. No. 1,
Hull, P. Q.
January 23rd, 1966.

Dr. E. O. Chisholm,
Atlas Exploration Ltd.,
Capital Hotel,
WHITEHORSE, Y. T.

Dear Ted:

I got your telegram Thursday am and your letter Friday pm. Thank you.

I enclose notes and maps of my thoughts on the Tantulus coal areas, particularly that just northeast of Big Salmon on the Yukon River. I can't help thinking that before any decision is made on other coal areas the Big Salmon area should be explored. Whether or not there is a worthwhile coal-field there may have a bearing on the route followed by the railway and I imagine it would be very important to have the shorter transmission line if a thermal power plant is planned.

Thank you for your offer for next summer. As I said when you were here I think, I would only be able to get away for three or four weeks but I will write more of this later. My prime purpose at the moment is to get these maps and notes on the coal off to you tomorrow, Monday, in case they are of use to you for staking the coal.

I am delighted to hear of the progress in the development of the Vangorda area. I would like to know just how Atlas Explor. is linked up with Anvil Mining and Dynasty Explor. as your letter seems to suggest a connection. Also, I would like to know who else is in Atlas Explor. as I had not heard of it until recently.

I have spent the best part of three days on going into town to get these maps, going over them and writing out the notes. I hope they will be some use.

Looking forward to hearing from you. Don't get frozen up - I hope I can get to town tomorrow with this snow that has been coming down all day.

Best luck.

Yours sincerely,

(signed) Hugh S. Bostock.

Notes from the appraisal of the coal basins in the Laberge Map-Area (105-E) and adjacent areas

By: Hugh S. Bostock
January 23, 1966.

SUMMARY

Exploratory mapping suggests that the largest area of Tantalus (Lower Cretaceous) coal measures in Yukon lies northeast of the lower Big Salmon River - i.e. "The Big Salmon Area".

Float on Walsh Creek and on Big Salmon River shows that coal is there but its quality is not known. No prospecting for coal in this area has been heard of.

The area lies along the shortest railway route, Skagway-Carcross-McClintoch River-Teslin River- Yukon River- Big Salmon - Little Salmon Lake, to the Vangorda area. The big Salmon area is some 40 to 45 miles nearer the Vangorda area than the Carmacks coal area.

The Big Salmon area, as I see it, is outlined on the accompanying maps. The major faults on the east of the Tantalus area are marked. Assuming my deductions are correct the area could be as long as 23 miles and as much as 4 miles wide. This area may, however, be divided into two sections by the area of volcanics north of Walsh Creek. The picture given here is simple but it is certain the areas of Tantalus is cut up to some extent by faults.

On the west flank of the mountain between Illusion and Walsh Creeks, as I remember, the Tantalus dips gently easterly so that at least 1000 ft. of beds are there. Neither the top nor bottom of the Tantalus section was recognized. North of Walsh Creek Tantalus beds were exposed crossing a tributary creek (see map) striking northeasterly and dipping 30° or more but I cannot remember whether they dipped southeast or northwest.

I saw the coal in the slide material on the creek bank and there was float coal all down the creek. Coal float was reported in the lower part of the course of Big Salmon River. I did not traverse the river myself and I do not remember who it was reported it.

The actual size of the Big Salmon area remains uncertain. The volcanics mapped in the Laberge map were believed, they were seen to do so in placed, to overlie the Tantalus beds. These beds may then continue under the volcanics as a continuous structure up to 23 miles long and go some distance westward under the volcanics. On the other hand, R. B. Campbell mapping the Glenlyon map to the north thought the volcanics adjacent to the Big Salmon

area these were older (Mississippian) and so to underlie the Tantalus beds. This suggests the Big Salmon area as outlined on the map is divided into at least two areas by the outcrops of volcanics north of Walsh Creek. It is most likely that two groups of volcanics, one older and one younger than the Tantalus have been mapped in both map areas as a single unit.

Notes on other areas of Tantalus coal measures

On Claire Creek, E. J. Lees, 1930, saw Unit 9, volcanics, overlying the Tantalus which dips northeast into the hill and he says it is reported to contain coal seams. I believe, I remember that he told me he was told that a short tunnel had been put into one of the coal seams some years earlier but he could not find it

No coal was seen in the areas of Tantalus south of Cassier Bar, east of Hootalinqua or around Mason's Landing. The Mason's Landing areas shown on the map could be much larger and evidently extend under the drift as E. T. Tozer, G.S.C. 1956+ looking for Triassic fossils found an area of Tantalus some miles southeast of Mason's Landing which was missed in the mapping.

The Kynocks coal area (G.S.C. Me. 5 p.49) was not seen by me and everything I know of the Carmacks coal is given in G.S.C. Mem. 189, p.58 and Fig. 1 in pocket. This gives my guess at the general structure which is probably much more complicated than shown. One should not assume in prospecting for the coal that it is cut off where the measures go under the Tertiary volcanics though necks, pipes and dykes of these volcanics may cut through the Tantalus measures.

There is a small area of conglomerates, typical of the Tantalus southwest of Yukon River opposite Minto. No coal was seen here in place or in drift. It could be there and on account of the large dirft areas there could be a lot more Tantalus than the map suggests (Carmacks Sheet, 115-I).

Cairnes, D.D., G.S.C. Guide Book No. 10 p. 82, (Many typographical mistakes in this guide book) Cairnes gives "Several seams" in Tantalus Butte and 3 - 7'-9'10" in thickness. I could only find 2 seams. However, he was there when prospecting was at its height and there could be seams east of the Butte. Only drilling would check this.

Cairnes - same p.91 see Mem. 189, p.63 for this and Mica Creek Coal.

C O P Y

Box 110, R. R. No. 1,
Hull, P. Q.
January 27th, 1966.

Dr. E. O. Chisholm,
Atlas Explorations Ltd.,
Capitol Hotel,
WHITEHORSE, Y. T.

Dear Ted:

I have been thinking over the coal possibilities and enclose a sheet giving some further thoughts that may be of value in the hunt for it. Though I mention only the areas around the Big Salmon and along the Teslin the relation of the Hutshi to the Tantulus has a decided bearing at Carmacks too.

The arrangements of pay and expenses for the trip to the Yukon next summer are satisfactory to me. For me as far as I can tell mid July to the first week or so of August seems at the moment to be the most suitable time. I think that in that time you would have got most of the value I can be. You understand that I am not up to active field work and my greatest value I believe will be in what I can remember in talking over properties, localities, areas, etc.

I plan to drive to Nelson, B.C., and then to Monte Creek (near Kamloops) and leave my wife there with my sister. She has been taking 3 toffranil pills/day. I believe they are very like the Jertoprane. She is quite herself now. I will then go down to Vancouver and fly to Whitehorse. The return journey in August would be the same in reverse. I understand you would pay me from Kamloops and back except for one or two days I might take off in Yukon to visit. For instance the Arctic Institute Research camp at Kluane Lake if we have not already had reason to call there. You may have to give me a few tips on what I shall need - bedroll, etc., I suppose.

Any news of the developments in the Yukon will be most welcome when you write.

Trust you are having it a bit warmer now.

With best wishes.

Yours sincerely,

(signed) Hugh S. Bostock.

REPORT BY HUGH S. BOSTOCK

February 16, 1966

If anyone knows of coal outcrops in Big Salmon or neighbouring areas, it will be A.R.(Bill) Hayes, for many years telegraph operator at Big Salmon, or possibly some of the Indians of Big Salmon village. Hayes was a thoroughly capable, shrewd, hard-boiled man but one that people went to with their troubles. He was a 'Father Xmas' to the Indians. He fell into disrepute when later telegraph operator and Mining Recorder at Carmacks during the Brown McDade strike. He took advantage of the information that came to him to get claims himself but he had already told the Controller of Yukon Territory, Mr. G.A. Leehall, that he would do just that if he was made Mining Recorder. People who abused him for this were among the first to run to him with their troubles. One of the Taylors of Taylor and Drury might be able to help you find him.

Further Notes on Big Salmon Coal Basin - Aug. 4, 1966
By: Hugh L. Bostock

To my knowledge no good section of the Tantalus formation has ever been found and the relative positions of the members exposed in the different areas are not known. Some guesses about them are as follows.

The section is conceived by me as follows:

Tertiary Carmacks Volcanis, brown andesites and basalts

Structural unconformity

Lower, Lower Cretaceous Tantalus Form.	Thin beds of shale, kaolinite, little coal lenses and silt beds	Jumpont beds apparently the top of the Tantalus
	Massive conglomerate, sandstone, shale, coal (4 workable seams - 2 in Tantalus Butte and 2 south of the river in old Tantalus mine). Massive sandstones, grits and conglomerate E. of Tantalus Butte.	Exposed at Tantalus Butte and on south side of Yukon above bridge. Similar rocks found in the Big Salmon area but no coal seams yet seen in them.
Jurassic Laberge Form.	Shales and coal seam of Five Fingers Coal mine placed in Laberge formation but could be part of Cretaceous. Massive conglomerates of many rock types. No good continuous section showing relation to Tantalus. Volcanics intermingled with the Laberge in the White-horse area. Marine shales in lower part	Cairnes' lower coal horizon placed in the Laberge formation by him.
Triassic Lewes River Series	Mainly limestones with abundant fossils.	No fossils have been found in the limestone NE of Big Salmon Tantalus and though shown as Triassic in the Laberge Sheet they are probably carboniferous.
Carboniferous	Limestone few fossils. Green and purple andesites and breccias called Mt. Nansen Group may include volcanics above or below the Tantalus.	

Suggested plan for initial exploration - Big Salmon Coal Area

A. 1. Suggest geologist start by looking over section at Carmacks on both sides of Yukon River. Also at Five Fingers Coal Mine (1) on Carmacks Sheet, Map 340A in G.S.C. Mem. 189) and slide material on east side of the Yuion River in the bend below and on opposite bank from Murray Creek. Here, as I remember, a lot of material much like that seen on Jumpont Creek is sliding into the river from under the Tertiary, Carmacks Volcanics. This was assumed to be Tertiary sediments but after thought and now seeing the exposure on Jumpont Creek both suggest the slide is the upper part of the Tantalus formation (see Fig. 1 in pocket of Mem. 189 in this file). This would be done by getting a boat at Carmacks as the Five Fingers Coal Mine and this slide are readily accessible from the river. However, it also could be done by car and walking down from the road some miles. Trip to Carmacks: two days there - one for Butte and south side and one with boat on river.

2. Note airphotos covering the area are listed on carbon copy of letter ordering them from Ottawa in this file. Those covering the Laberge Sheet part can be borrowed from the G.S.C. here in Whitehorse.

3. Judging by the Carmacks exposures the coal seams will probably be found among the massive conglomerate beds rather than the shale and this should be considered in drilling for it.

B. 1. Party: geologist and two men to help
camp equipment including picks and shovels
supplies one week plus + gas for helicopter

2. Beaver puts helper and supplies at mouth of Big Salmon. (Probably some Indians catching salmon there).

3. Helicopter takes geologist in with helper:

(a) Reconnaissance and choose camp somewhere on Walsh Creek near the mouth of Jumpont Creek. Airphotos suggest landing place here.

(b) Helicopter brings 3rd man and camp etc. in from Big Salmon.

October 24, 1966.

Dr. Hugh S. Bostock,
R. R. No. 1,
Box 110,
HULL, Quebec.

Dear Hugh:

Things have been in a rush around here and I haven't had time to reply to your letter of October 3. Thank you very much for your assessment of the coal samples in the Ross River area. I will look into it further and let you know.

Regarding the Big Salmon coal area, this is still under consideration and as yet I have not made plans for the coming season, but likely enough we will need a man to assess it properly for a full season. Your suggestions in this regard would be appreciated.

Yours very truly,

EOC:dh

E. O. Chisholm.

Box 1 RR No 1
Hull, P.Q.
October 3rd 1966

Dr. E O. Chisholm
Atlas Explorations Ltd.
Box 3050, Whitehorse, Y.T.

Dear Ted

I believe I answered your letter of Sept 6 from Vancouver but I cant find my copy of my answer. I trust you received it. Unfortunately I did not get back here until Sept 10th so I am very sorry to say I missed Aaro

I received the cheque squaring up everything in my account. Thank you.

I have tried to get something done about gathering the information on the flow of the ice NE of the Pelly River but it appears that the information is so scanty and scattered that nothing has been done with it to plot ~~on a map~~ it at a scale usable by prospectors.

In case you did not get my last letter - Thank you for sending the Quarterly Report of Progress to Shareholders. I am very glad to get it and to see what it says

With regard to the Ross River Coal I phoned up Alec Ignatieff and find he agrees with me that the analyses show it is a good coal for heating purposes. Actually my sample proved better than I expected as I made a rough channel sample with my pick down the face of the pit it was exposed in and there was every chance that the moisture content and ash would be a good deal higher than what one would expect when the coal was fresh from an underground working. I think if people will get the right stoves etc around Ross River it will be well worth taking up and

mining. It is so close and handy to the road. However, those Tertiary coals have never turned out to be coking coals in western Canada as far as I know and Ignatieff said too that you could not expect to find a coking coal there. He did say that so far no sample sent in from either Tantalus Butte Mine or the old Tantalus Mine on the Carmacks side of the river ~~coal~~ was a coking coal though they did approach coking coal They are Cretaceous coal and there are some coking seams among the Cretaceous coals in the Crowsnest area

I think these samples of the Ross River coal are surprisingly good. Over 65% fixed carbon for my sample 'As Rec'd' is very good and the B.T.U. value is close to the better Carmacks coal as far as I remember. The hardest part will be persuading enough people to use it but it may burn well in a wood stove and then perhaps it won't be so hard. The sulphur content in Al Kulan's sample is considerable but mine is astonishingly low. Well here's luck with the coal mining

Ignatieff says that if you care to let the Mines Branch use the coal analyses as he suggested to you in his letter he will give Atlas Expl. #42 co credit.

I assume that you did not get anyone on to go over the Big Salmon coal area as you do not mention it.

With best wishes

Yours sincerely

Hugh S. Bostock

B 110, R R No 1
Hull, P.Q.
October 29th 1966

Dr E. O. Chisholm
Atlas Explorations Ltd.
355 Burrard St.
Vancouver 1, B.C.

Dear Ted

Thank you for your letter of October 24th.

With regard to the Big Salmon coal, I wrote out a program suggesting what should be done and put it in the file at Whitehorse.

The main points as I remember were:

1. The Big Salmon basin is the largest area of Tantalus formation with which the Mesozoic coal occurs, in the southern Yukon.

2. Judging by the discoveries in areas (at Carmacks etc) to the west it should have commercial coal seams in it but it is possible that the coal is only in the western areas of Tantalus as no commercial seams have been found in the areas east of Claire Creek. However, no prospecting for coal has been done in the eastern areas at Big Salmon or to the south along Yukon and Teslin Rivers. There are some coal seams in practically every well exposed area of Tantalus elsewhere while more areas prospected

3. A study of the Big Salmon basin should be made next summer. It would give Atlas an immediate advantage should the need for coal become pressing

4. The geologist, I suggest, should start by having a good look over the areas of Tantalus formation around Carmacks. This should include the area ~~on~~ on the west of the area of Carmacks Volcanics ~~and~~ about 4 miles N.W. of Tantalus Butte and east of Yukon River. No outcrop of Tantalus is known here as

the maps but after seeing the material on Sumpoint Creek I am convinced that the material sliding from under the Carmacks Volcanics is probably the upper horizons of the Tantalus formation not as I thought in 1932 Tertiary sediments under the volcanics.

5. The geologist should start by an examination of the Tantalus formation around Walsh Creek as the best exposures of the Tantalus formation of the Big Salmon Basin are in this area. I thought I saw a good place to land a copter for setting up a camp on the north side of Walsh Creek about ½ or 1 mile below the mouth of Sumpoint Creek. If he has the file left in the Whitehorse office he will know more than I do in two or three days work.

There may be some more details in the file but I think this covers the main points

Yours sincerely

Harry M. S. Bostock

November 17, 1966.

Dr. Hugh S. Bostock,
Box 110,
R. R. No. 1,
HULL, Quebec.

Dear Hugh:

Thank you for your letter of November 14. The geochemical picture has turned out very well and I do believe we may be on the track of something large up there.

Regarding the coal, I am somewhat on the spot as we have not protected the area yet as we have applied for a concession due to its size. This, of course, requires enabling legislation that is being considered by the Mines Branch. I would appreciate it if you would keep the information confidential for a few days at least until I find out what progress has been made with this application. I will let you know further on this when Dr. Aho returns from the Yukon next week.

Kindest regards to you and Mrs. Bostock.

Yours sincerely,

EOC:dh

Ted Chisholm.

Box 10, RR No 1
Hull, P.Q.

Dr. E. O. Chisholm
Atlas Explorations Ltd.
355 Burrard St, Vancouver 1

November 14th 1966

Dear Ted

Thank you for your letter and for giving me the set up for Atlas. It was as I thought.

I look forward to hearing some good news of some discovery by Atlas. I dont see how your set-ups of the Geochem lab at Ross River can help but pay off.

I have been approached by another company to do some work for them here this winter in Ottawa which will involve in a sense giving them my ideas of the large size of the Tantalus formation area at Big Salmon and the positions of other areas along the Teslin River. However, they are not ~~primarily~~ professedly interested in coal but, even if I soft pedal on the coal aspect, there might be some one among them get an idea about it from what I write and I do not want you to think I am double crossing Atlas. I have made no arrangement as yet.

With kindest regard to yourself, Beth and all Atlas.

Yours sincerely

Hugh S. Bostock

Box 110 RR No 1
Hull, P.Q.

November 21st 1966

Dr. E. O. Chisholm
Atlas Explorations Ltd
355 Burrard St Vancouver 1.

Dear Ted

Thank you for yours of November 17th.

I will not answer the offer of a project for work that I mentioned to you until next week. However, I can tell you that I will not start work on this project till after Christmas and my report is to be sent to Toronto before April 1st 1967 so this should give you all the time you need to get the coal area protected and my prospective employers are not professedly interested in coal.

I trust you will be able to answer promptly as this job is much to my liking and interest and I want to get it settled.

With kindest regards.

Yours sincerely

Hugh S. Bostock

November 28, 1966.

Dr. Hugh S. Bostock,
Box 110,
R. R. No. 1,
HULL, P. Q.

Dear Hugh:

Thank you for your letter of November 17th. I do not want to hold you up on your project and will leave it up to you to protect our interests as you see fit.

I am going to the Yukon tomorrow for a week, hence the hasty reply.

Yours very truly,

ATLAS EXPLORATIONS LIMITED,

EOC:dh

E. O. Chisholm,
Exploration Manager.

TELEPHONE 685-4331

Copy for EOC

ATLAS EXPLORATIONS LIMITED
(N.P.L.)
330 MARINE BUILDING
355 BURRARD STREET
VANCOUVER 1, B.C.

November 24, 1966

Dr. H.S. Bostock,
Box 110, R.R. No. 1,
HULL, P.Q.

Dear Hugh:

Thank you belatedly for your letter of September 22 which was forwarded to me while I was in Chile. I have since returned and been to Los Angeles, and to Mayo as well.

While in Whitehorse, I spoke briefly to Ted Jordan, and he informed us that they are considering enabling legislation which would make it possibly more attractive for us to conduct the proper scale of exploration on the Big Salmon coal area. We are definitely planning to proceed with this project and will keep you fully informed of any further developments.

I understand from TedChisholm that you mentioned that someone else was interested, and we would therefore appreciate it if you would keep our plans in confidence, and also try not to make any commitments yourself.

I trust that all is well with you, Violet, and the family. We certainly did appreciate your trip to the north and your general inspiration and ideas on field programs. I am only sorry that I did not have the opportunity to see you personally in our travels.

Best personal regards,

Yours very truly,

ATLAS EXPLORATIONS LIMITED (NPL)

A.E. Aho,
President.

AEA/pd

Box 110 RR No 1
Hull, P.Q.
September 22nd 1966

Dr. Aaro Aho
Atlas Explorations Ltd
328 Marine Bldg
355 Burrard St Vancouver 1

Dear Aaro

Hewett told me that you had rung up a few days before Violet and I got back from the West. I am so sorry to have missed you. He said that you made some mention of the Big Salmon coal and I wonder if that means that you have a favourable report on it from the man from U.B.C. who was going in to examine it. I am naturally very anxious to hear. However that is not the main point of this letter.

First I want to tell you that I had a grand trip to the Yukon which has meant a tremendous lot to me. It was wonderful to see so much of the areas I was so familiar with over again and to see many of the people I have known for so long.

Second I want to thank you for this trip which could not have been without your support of the idea.

The Big Salmon basin is certainly the largest structure of the Tantalus coal measures and there are a number of other smaller areas along the Teslin and Yukon Rivers valley. However, these have never been prospected and no coal exposure of any thickness has been reported in them. So much of the areas are drift covered that only drilling will prove whether the coal measures on this eastern side of the Mesozoic syncline carry coal in them as well as on the western side from Kynocks to Carmacks. I shall be most interested to hear what is done about this.

I am exceedingly interested to hear that it is planned to drill the Fyre lake prospect next month.

The trip outwest did Violet a tremendous amount of good and she is enjoying being back home.

She joins me in sending our very best wishes to you and Sylvia.

Thank you for a wonderful trip to the Yukon which will be dearly remembered always.

Yours sincerely

Hugh S. Bostock

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 105 L

LEGEND

CENOZOIC

QUARTERNARY
RECENT
29 Stream deposits; sand, gravel, and silt

PLEISTOCENE AND RECENT
28 Glacial sand, gravel, silt, clay and till; volcanic ash, bog deposits, and soil

TERTIARY
27 27a, basaltic flows; minor shale and conglomerate; 27b, trachytic and basaltic flows; may be younger than 27a

26 26a, granite (quartz-feldspar) porphyry; 26b, rhyolite (quartz) porphyry

MESOZOIC

JURASSIC AND/OR CRETACEOUS AND (?) EARLIER
25 25a, biotite granodiorite and quartz monzonite; minor leuco-quartz monzonite and biotite-hornblende quartz diorite; 25b, biotite-hornblende granodiorite, quartz monzonite, and quartz diorite; 25c, augite-hornblende monzonite and syenite; minor diorite and mafic rocks; 25d, gneissose granitic rocks

UPPER JURASSIC (?) AND LOWER CRETACEOUS (?)
TANTALUS GROUP (?)
24 Chert pebble and cobble conglomerate, and sandstone

JURASSIC
LOWER JURASSIC AND LATER
LABERGE GROUP
23 Arkose and conglomerate; sandstone, siltstone, and argillite

TRIASSIC
UPPER TRIASSIC
LEWES RIVER GROUP
22 Grey limestone

21 Basaltic and andesitic volcanic rocks, conglomerate, and greywacke

MISSISSIPPIAN OR LATER
20 Conglomerate, shale, and sandstone

19 Andesitic and basaltic flows, breccia, and tuff; diorite; slate, phyllite, slaty limestone, chert, and carbonaceous shale

18 Andesitic and basaltic flows, breccia, and tuff; minor rhyolite breccia and argillite

17 Grey crystalline limestone and limestone breccia and conglomerate (in part interbedded with 18; may represent several limestone units)

16 Serpentinite

MISSISSIPPIAN AND (?) LATER
15 Thin-bedded chert, argillite, and quartzite; minor limestone

MISSISSIPPIAN
LOWER MISSISSIPPIAN
14 Dark grey and black crystalline limestone; minor argillite and chert

MISSISSIPPIAN AND/OR EARLIER
13 13a, metamorphosed volcanic rocks; greenstone and greenschist (hornblende-albite-epidote-quartz rocks); quartz-chlorite schist, argillite, and limestone; 13b, 13a with many small bodies of serpentinite

12 12a, metamorphosed greywacke (quartz-hornblende-epidote-albite-biotite-chlorite schist), grey sericitic and chloritic quartzite, white sericitic quartzite, greenstone, limestone, and lime-silicate rocks (uncertain stratigraphic relationships to 12b and 13a); 12b, feldspathic, sericitic quartzite, limy quartzite, shale, argillite, varicoloured slate, greenstone, and limestone; 12c, 12b in a complex with altered and sheared granitic rocks

11 Grey crystalline limestone, locally crinoidal (interbedded with 12 and 13; probably represents several limestone units)

10 Chert pebble and cobble conglomerate, slate, sandstone, and greenstone

9 Grey and brown chert pebble and cobble conglomerate and breccia; minor quartzite, slate, and bedded chert

8 Dark, bedded chert, varicoloured slate, sandstone, quartzite, limestone, and conglomerate

PALAEOZOIC

SILURIAN (?) AND DEVONIAN (?)
7 White and grey quartzite, dolomitic quartzite, slate and argillite

6 Grey and buff dolomite, siliceous dolomite, and grey slaty limestone (interbedded with 7; may represent two carbonate units)

CAMBRIAN (?) AND/OR ORDOVICIAN (?)
MIDDLE AND UPPER CAMBRIAN (?) AND/OR ORDOVICIAN (?)
5 Thin-bedded shale, argillite, and siliceous limestone; rhyolitic tuff and flows; greenstone and minor hornfels (may, in part, be equivalent to 4)

4 Slate, phyllite, spotted slate, and hornfels

CAMBRIAN (?)
LOWER AND/OR MIDDLE CAMBRIAN (?)
3 Thin-bedded, grey and buff, crystalline limestone, phyllitic limestone, lime-silicate gneiss, and skarn

PROTEROZOIC AND/OR PALAEOZOIC

CAMBRIAN (?) AND/OR EARLIER (?)
LOWER CAMBRIAN (?) AND/OR EARLIER (?)
2 Limestone, lime-silicate gneiss, amphibolite, and skarn; minor quartzose rocks (beds and lenses within 1 and inclusions within 25a)

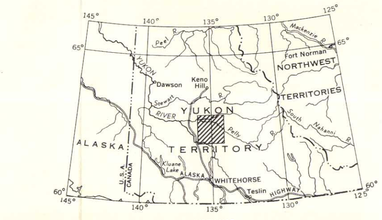
1 Micaceous quartzite and quartz-mica schist; minor limy rocks

R Metamorphic rocks

Geological boundary (defined, approximate)
Bedding (inclined, vertical, tops not indicated)
Bedding (overturned)
Schistosity (inclined, vertical)
Fault (defined, approximate, assumed)
Anticline, approximate
Syncline, approximate
Fossil locality (F)
Mineral occurrence (lead Pb, zinc Zn) × Pb, Zn

Geology by R.B. Campbell, 1949 to 1954 and J.O. Wheeler, 1956.
Descriptive notes by R.B. Campbell

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured



INDEX MAP

PUBLISHED, 1960
COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

PRINTED BY THE SURVEYS AND MAPPING BRANCH

Adjoins Map 890A, "Mayo"
Adjoins Map 340A, "Carmacks"
Adjoins Map 372A, "Laberge"

MAP 25-1960
GEOLOGY
GLENLYON
YUKON TERRITORY

Scale: One Inch to Four Miles = 1/253,440
Miles
4 2 0 4 8 12

Approximate magnetic declination, 33° 04' East

inches 0 1
centimetres 0 1 2
This reference scale bar has been added to the original image. It will change in proportion as the image. therefore it can be used as a reference for the original size.

Red ink shows my interpretation of structure & contacts. - R.B.B.

LEGEND
Trail
Cabin
Telephone line
Intermittent stream
Marsh
Sand or gravel
Contours (interval 1000 feet) 5000
Height in feet above mean sea-level 1995

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

DESCRIPTIVE NOTES

Pelly and Macmillan Rivers provide easy access to the map-area; both are navigable with small craft at all stages of water. Pack-horses may be used throughout the area in summer.

Tintina Valley is the locus of a major geological discontinuity across which the sedimentary sections are very different, though they may be, in part, of the same age. The map-units on either side of this break are shown in the legend in a continuous column; but it should not be construed from this that the relative ages of the units from one side of the valley to the other are known. The legend should be regarded as a combination of two legends which can be related only in a general way. This problem arises mainly from the fact that only one unit, the Lower Mississippian limestone (14), yielded fossils from which a definite age could be determined.

The sequence of quartzose rocks (1) overlain by limy rocks (3) followed by argillaceous rocks (4) in Glenlyon Range reflects the general succession of the Proterozoic and Cambro-Ordovician strata in Pelly and Cassiar Mountains to the southeast. There is no direct stratigraphic relationship between unit 5 and any of the other strata, but the lithological character of this unit suggests that it should be correlated with Cambro-Ordovician rocks to the southeast.

The rocks of units 6 and 7 are characterized by dolomite and pure quartzite and are correlated with lithologically similar Siluro-Devonian rocks in Pelly Mountains.

The Palaeozoic rocks northeast of Tintina Valley (units 8, 9, 14, and 15) have no known counterparts southwest of the valley but they may be related to Upper Devonian and Mississippian rocks in northern Yukon and Alaska. Perhaps the most noteworthy feature of this section is the 4,000 to 5,000 feet of chert-pebble conglomerate (9) which underlies the Lower Mississippian limestone (14).

The rocks southwest of Tintina Valley, believed to be Mississippian, have correlatives to the south. The clastic rocks of unit 10 are similar to Mississippian strata in the eastern part of Pelly Mountains. The limestone (11), and the metasedimentary and sedimentary rocks (12) together with the volcanic rocks (13), can be correlated with similar rocks that are at least partly of Mississippian age, in the western part of Pelly and the northern part of Cassiar Mountains. The exact thickness and sequence of these rocks is not known because of the poor exposure and complex structure, but there is no doubt that their total thickness is great.

Serpentinite (16 and included in unit 13b) occurs in small bodies known only within the volcanic rocks of unit 13. It may therefore be as old as Mississippian.

The volcanic rocks (18) around Little Salmon River are poorly exposed and their stratigraphic relationships are obscure. Some of the limestone (17) associated with these rocks has been found by others to contain upper Palaeozoic fossils, and similar rocks in another area have been found to underlie the Upper Triassic Lewes River group. The metamorphism in these volcanic rocks is less intense than that in the rocks around Little Salmon Lake (12). The evidence suggests that they are post-Mississippian and pre-Upper Triassic; they might be assigned a Permo-Triassic age.

The volcanic and sedimentary sequence of unit 19 apparently lies unconformably above the Lower Mississippian limestone (14) and related strata (8, 9, and 15). Granitic rocks, which may be as young as Upper Cretaceous, cut the rocks of unit 19. These two factors provide the only limits known at present to the age of unit 19. However, the nature of the component rocks suggests that the age is most probably late Palaeozoic or early Mesozoic. Unit 19 is characterized by the presence of green andesitic volcanic rocks which are usually aphanitic but may be fine-grained diorite in the centres of some thick flows. The unit may include small dioritic intrusions. North of Little Kalzas Lake and on the high ridges of Tay Mountain no volcanic rocks were observed, and the strata in these places may have no equivalents elsewhere. At the mouth of Harvey Creek and at Big Fish Hook Rapid, carbonaceous shale occurs with the rocks of this group.

The conglomerate of unit 20 contains fragments similar to the rocks of units 6 and 7 and is not known to include granitic or volcanic types. It seems probable that these beds are younger than the rocks of unit 19. They may be Cretaceous in age.

The volcanic rocks (21) that are included in the Lewes River group have been mapped differently in adjoining areas. In Glenlyon area they appear to underlie the Upper Triassic limestone (22) but they have lithologic differences to the rocks of unit 18 with which they might otherwise be correlated. Similar rocks, in an area to the south, have been placed within the Lewes River group.

The basal section of the Laberge group (23) is composed mainly of conglomerate and may be more than 4,000 feet thick. The fragments, which reach boulder size in the conglomerate, are composed mainly of volcanic rocks with subordinate granitic and sedimentary types. The upper beds of the group are a large but unknown thickness of grey and brown arkose with minor conglomerate.

Two small outcrops of conglomerate (24) are believed to be part of the Tantalus group. South of the map-area, near these outcrops, similar conglomerate is well exposed and is definitely part of that group.

In a general way the granitic rocks may be divided into two types separated by the assumed fault that passes through Drury Lake valley. In the granitic rocks (25a) northeast of this fault, biotite is, with but minor exceptions, the sole mafic mineral, whereas to the southwest (in unit 25b) hornblende and biotite are in general equally common, although here and there biotite only or hornblende only may be present. The granitic rocks northeast of the fault tend to be more equigranular and more uniform in composition than those to the southwest.

Fine-grained intrusions (26a and 26b) cut Palaeozoic rocks only and cannot be closely dated. But they are similar to siliceous Tertiary intrusions found in many parts of the Yukon.

The basalt of unit 27a is not associated with any apparent volcanic topographic forms and the flows have been, to some extent folded. The trachyte and basalt of unit 27b, on the other hand, is related to a dissected volcanic cone and the flows are not known to be folded.

Glacial deposits vary greatly in type and thickness from place to place. Locally such deposits, including both outwash and till, are 500 feet thick. In the valleys of Macmillan River and Pelly River for some miles above the mouth of Macmillan River there is up to 100 feet of buff and grey clay and silt that may be a lacustrine deposit.

Large through-going faults seem to provide the best explanation for the discontinuous nature of the geology in Glenlyon area. The faults are speculative, but in general they bound blocks in which some features of the geology are not repeated in any of the adjoining blocks and the evidence for their existence seems to be good. So profound is the break in the geology across Tintina Valley that it seems reasonable to assume that the valley represents the locus of a fault upon which there has been major horizontal displacement. The minor faults within Glenlyon Range have an apparent right lateral-displacement, taken in aggregate, of 10 miles or more. From this, it might be inferred that the bounding faults, and particularly that in Tintina Valley, have movements of even greater magnitude.

The trend of folds is N70°W to N80°W in the area northeast of the assumed fault that passes through Drury Lake valley, whereas generally it is more nearly northwest in the area southwest of the fault. Complex, folded recumbent folds may occur in the strata of units 11, 12, and 13, but in all the other stratified rocks the folding appears to be much less complicated.

Other than the lead-zinc deposit at the south end of Glenlyon Range, upon which some work has been done, no important sulphide deposits were observed in the area. Sparse, very short asbestos fibre was seen in some of the serpentinite bodies included in unit 13b. The intensity of glaciation seems to preclude the possibility of the discovery of important placers.

MAP 25-1960
GLENLYON
YUKON TERRITORY
SHEET 105L

PROVISIONAL MAP
105 E/15 W 1:50,000

CANADA

CARTE PROVISOIRE
EDITION 1 105 E/15 W

Compiled, 1960, by the SURVEYS AND MAPPING BRANCH, DEPARTMENT OF MINES AND TECHNICAL SURVEYS, from air photographs taken in 1949. Field surveys 1954 and 1957. Printed 1962.

Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa.

BIG SALMON
YUKON TERRITORY

Compilée en 1960, par la DIRECTION DES LEVÉS ET DE LA CARTOGRAPHIE, MINISTÈRE DES MINES ET DES RELEVÉS TECHNIQUES, d'après les photographies aériennes prises en 1949. Travaux exécutés sur le terrain en 1954 et 1957. Imprimée en 1962.

Ces cartes sont en vente au Bureau de distribution des cartes, ministère des Mines et des Relevés techniques, Ottawa.

Roads:	Routes:
all weather	toute saison
dry weather	période sèche
cart track	de terre
trail or portage	sentier ou portage
Railway, normal gauge, single track	Chemin de fer, voie unique (écartement normal) (siding / voie d'évitement, station / gare)
Power transmission line	Ligne de transport d'énergie
Mine or Open cut	Mine ou fosse à ciel ouvert
Horizontal control point, with elevation	Point géodésique avec cote 454 △
Bench mark, with elevation	Repère de nivellement avec cote BM 157→

SCALE 1:50,000 ÉCHELLE

Miles 1 0 1 2 3 Miles
Metres 1000 500 0 1000 2000 3000 4000 Mètres
Yards 1000 500 0 1000 2000 3000 4000 Verges

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level
North American Datum 1927
Transverse Mercator Projection

ÉQUIDISTANCE DES COURBES: 100 PIEDS
Élévations en pieds au-dessus du niveau moyen de la mer
Réseau géodésique nord-américain unifié (1927)
Projection transverse de Mercator

MAGNETIC DECLINATION 32°52′ EAST
AT CENTRE OF MAP 1962
Annual change (decreasing) 3.8′

DÉCLINAISON MAGNÉTIQUE AU CENTRE
DE LA FEUILLE EN 1962: 32°52′ EST
Variation annuelle (décroissante) 3.8′

The nomenclature on this map has not been submitted to the Canadian Board on Geographical Names and may be subject to revision. Information on names is invited by the Surveys and Mapping Branch.

La nomenclature de la présente carte n'a pas été soumise à la Commission canadienne des noms géographiques et, par conséquent, elle pourrait faire l'objet d'une revision. Tous renseignements sur les noms seront bien accueillis par la Direction des levés et de la cartographie.

Building	Bâtiment	Barn	Grange
School	École	Post Office	Bureau de poste
Church	Église	Cemetery	Cimetière
Lighthouse	Phare		
River with bridge	Rivière avec pont		
Stream, intermittent or dry	Cours d'eau intermittent, ou à sec		
Lake intermittent; indefinite	Lac intermittent, rive imprécise		
Marsh or Swamp	Marais ou marécage		
Depression contours	Courbes de cuvette		

inches
0 1 2
0 1 2 3 4 5
centimetres

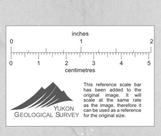
This reference scale bar has been added to the original image. It will scale at the same rate as the image, therefore it can be used as a reference for the original size.

YUKON GEOLOGICAL SURVEY

NATIONAL TOPOGRAPHIC SYSTEM
SYSTÈME DE RÉFÉRENCE CARTOGRAPHIQUE NATIONAL

105 E/15 W

SHEET 105 E-15



SCALE: ½ MILE To 1 INCH

1500 0 1500 3000 4500 6000 7500 9000 10500
FEET

Magnetic North 32° 30' E

105 L-3	105 L-2	105 L-1
105 E-14	105 E-15	105 E-16
105 E-11	105 E-10	105 E-9

WHITEHORSE 10 MAR 1966

135°00' 62°00' 134°30' 62° 00'

3394 2500 3000 3500 2500

Volcanics

Area of Tantalus Basin

Tantalus ?

W a t s h

17,000 acres

R E N I R

Big Salmon

B I G

S A L M O N

Tantalus ?

Tantalus ?

K O N

Y U K

Cassiar Bar

4500 4713 4000 3000 2000 2500

H e a d l e s s C r e e k

TANTALUS BASIN

N. BIG SALMON R.

61°45' 135°00' 134°30' 61°45'

105E-15