REPORT ON THE
TANTALUS COAL PROJECT

N.T.S. 105 - L - 2
105 - E - 15

Coal Exploration Licences # 6, 7, 8, 9

by

J.F. George

Work done in the period
June 1 - September 30, 1970

ATLAS EXPLORATIONS LIMITED

November, 1970

TANTALUS COAL PROJECT REPORT

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WHITEHORSE 10 MAR 1966

Coal Exploration
Licence # 6

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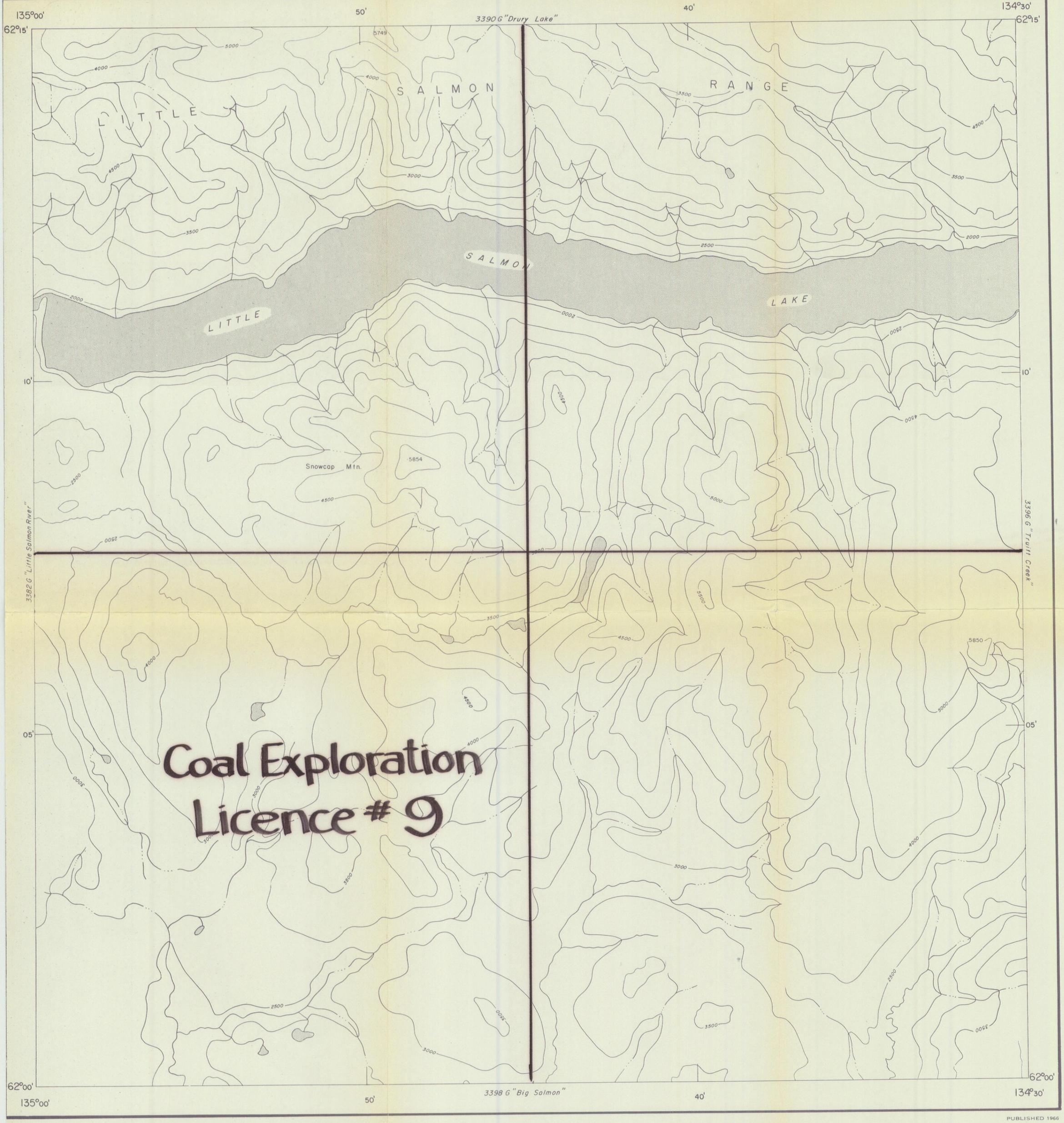
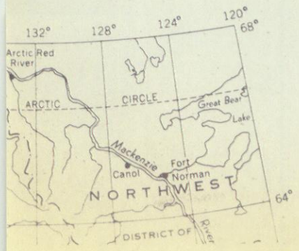
Licence # 7

105E-15





ISOMAGNETIC LINES (total field):

500 gammas . . . . . .
100 gammas . . . . . .
20 gammas . . . . . .
10 gammas . . . . . .

PUBLISHED 1966

MAP 3389G

SNOWCAP MOUNTAIN

YUKON TERRITORY

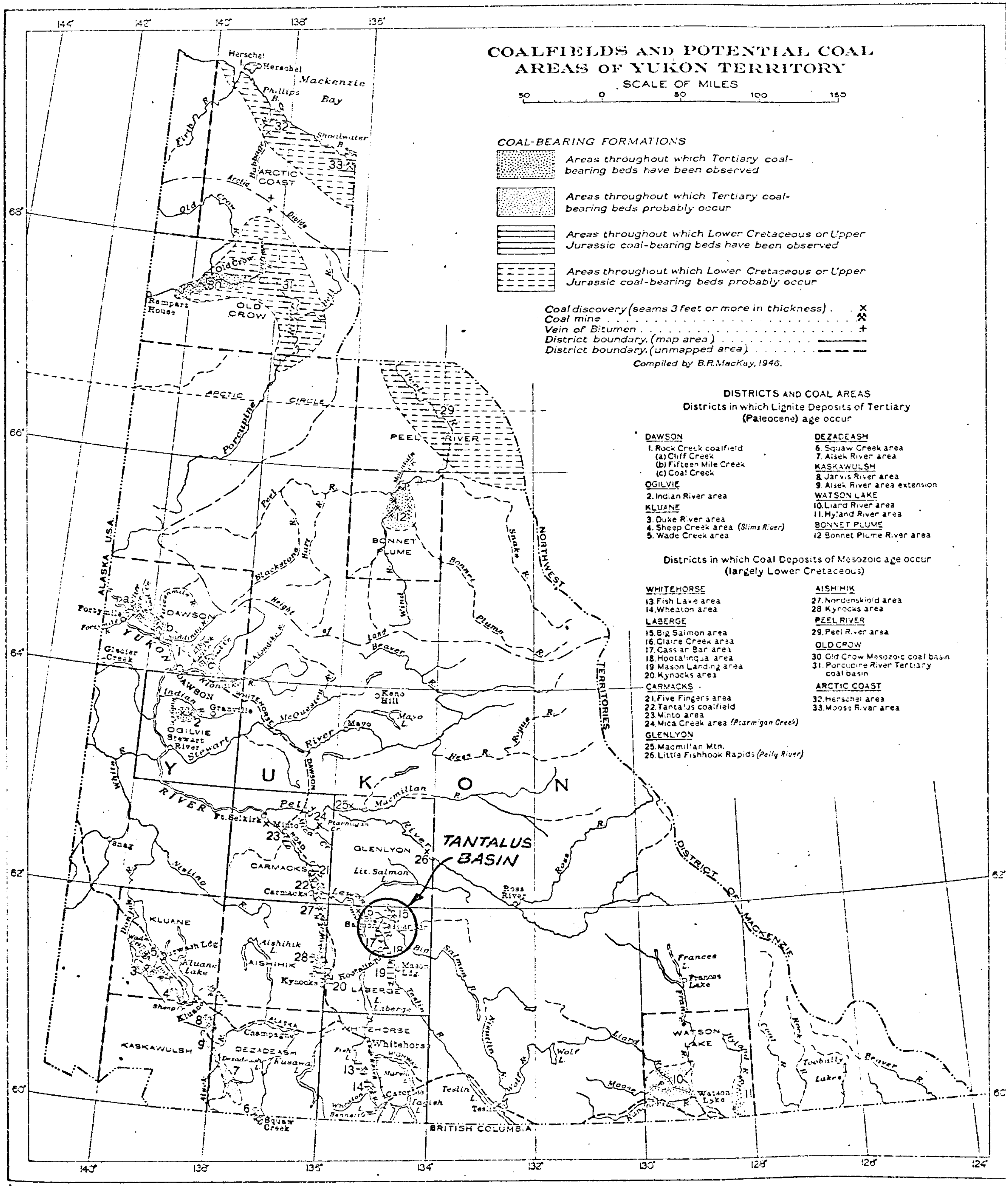
Scale: One Inch to One Mile — 1

Airborne Magnetic Survey, June 1964 to February 1966, by Canadian Aero Service Limited, Ottawa.

No correction has been made for regional variation

The planimetry for this map was obtained from

The magnetic data on this map were compiled from information recorded along the flight lines shown. The anomalies expressed by the magnetic contours are dependent on the variable magnetic intensities of the underlying rocks, and may be due to conditions near, or at unknown depths below the surface. High magnetic anomalies normally indicate the presence of basic rocks, such as diabase, gabbro, or serpentine, which have a relatively high iron content, but in special instances may be due, or partly due, to concentrations of magnetic ore minerals. By means of the magnetic anomalies, various rock bodies or structural features, such



COALFIELDS AND POTENTIAL COAL AREAS OF YUKON TERRITORY
SCALE OF MILES
50 0 50 100 150
COAL-BEARING FORMATIONS
Areas throughout which Tertiary coal-bearing beds have been observed
Areas throughout which Tertiary coal-bearing beds probably occur
Areas throughout which Lower Cretaceous or Upper Jurassic coal-bearing beds have been observed
Areas throughout which Lower Cretaceous or Upper Jurassic coal-bearing beds probably occur
Coal discovery (seams 3 feet or more in thickness)
Coal mine
Vein of Bitumen
District boundary, (map area)
District boundary, (unmapped area)
Compiled by B.R.MacKay, 1946.
DISTRICTS AND COAL AREAS
Districts in which Lignite Deposits of Tertiary (Paleocene) age occur
DAWSON
1. Rock Creek coalfield
(a) Cliff Creek
(b) Fifteen Mile Creek
(c) Coal Creek
OGILVIE
2. Indian River area
KLUANE
3. Duke River area
4. Sheep Creek area (Slims River)
5. Wade Creek area
DEZADEASH
6. Squaw Creek area
7. Alsek River area
KASKAWULSH
8. Jarvis River area
9. Alsek River area extension
WATSON LAKE
10. Liard River area
11. Hyland River area
BONNET PLUME
12 Bonnet Plume River area
Districts in which Coal Deposits of Mesozoic age occur (largely Lower Cretaceous)
WHITEHORSE
13. Fish Lake area
14. Wheaton area
LABERGE
15. Big Salmon area
16. Claire Creek area
17. Cassiar Bar area
18. Hootalinqua area
19. Mason Landing area
20. Kynocks area
CARMACKS
21. Five Fingers area
22. Tantalus coalfield
23. Minto area
24. Mica Creek area (Ptarmigan Creek)
GLENLYON
25. Macmillan Mtn.
26. Little Fishhook Rapids (Pelly River)
AISHIHIK
27. Nordenskiold area
28 Kynocks area
PEEL RIVER
29. Peel River area
OLD CROW
30. Old Crow Mesozoic coal basin
31. Porcupine River Tertiary coal basin
ARCTIC COAST
32. Herschel area
33. Moose River area
TANTALUS BASIN
YUKON
ALASKA U.S.A.
NORTHWEST TERRITORIES
DISTRICT OF MACKENZIE
BRITISH COLUMBIA
Mackenzie Bay
ARCTIC CIRCLE
DAWSON
OGILVIE
KLUANE
AISHIHIK
CARMACKS
GLENLYON
LABERGE
WHITEHORSE
DEZADEASH
KASKAWULSH
WATSON LAKE
BONNET PLUME
PEEL RIVER
OLD CROW
ARCTIC COAST
Whitehorse
Carmacks
Dawson
Mayo
Keno Hill
Ross River
Rampart House
Fortymile
Herschel

SUMMARY

Frank George and Kevin Williams spent two and one-half months in the Tantalus Basin Area mapping expanses of Tantalus strata and attempting to outline the area underlain by coal. An area bisected by Jumpont Creek was decided to be the most favourable for further work.

In a two-week period near the end of the field season other occurrences in the Carmacks area were examined.

CONCLUSIONS

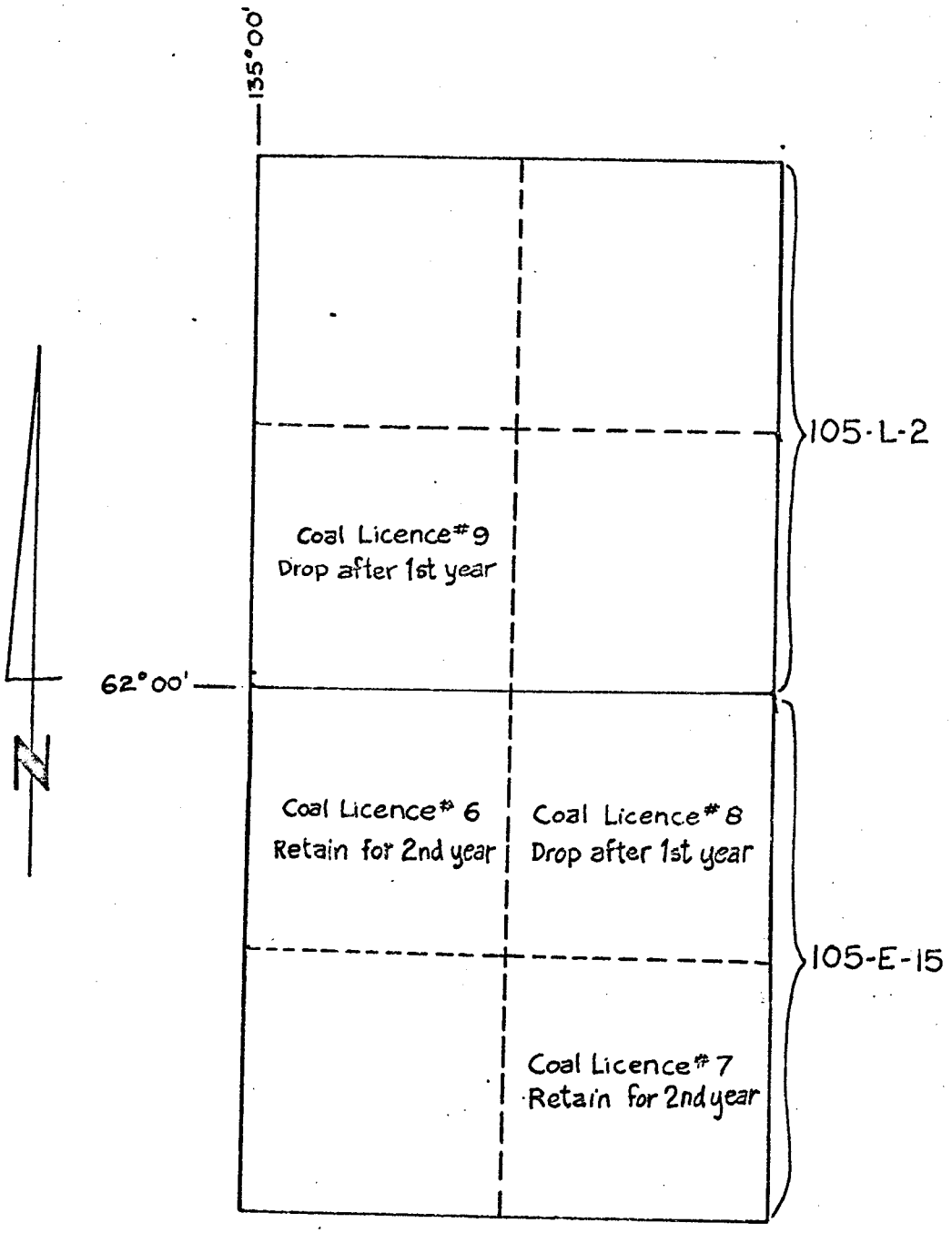
Coal in the Jumpont Creek area is probably of similar rank to the coal at Tantalus Butte. The extent of the coal measures cannot be properly assessed from surface for two reasons; overburden cover is a problem and position of the Jumpont Coal in the stratigraphic section is not clear.

RECOMMENDATIONS

One diamond drill hole with a tentative depth of 400 feet is recommended in the Jumpont Creek Area. This hole would give a more accurate assessment of the coal measures and could be used to direct any further work.

SCOPE OF STUDY

A crew consisting of a geologist and one assistant mapped the area by pace and compass with 1 inch to $\frac{1}{2}$ mile air photos. Where possible, stratigraphic sections were measured. Fly camp moves were completed by helicopter from Magundy and later by Jet Ranger from Whitehorse. A few days were spent in



Coal Exploration Licences

6, 7, 8 & 9

Yukon Territory

Carmacks to examine known coal deposits and geologic environment. Property examination in the Carmacks area was undertaken for a week after mapping the Tantalus Basin for evaluating properties and for possible correlative value.

In conjunction with the geologic mapping a regional silt sampling survey was undertaken.

LOCATION AND ACCESS

The Tantalus Basin is located a few miles east of the junction of the Yukon and Big Salmon Rivers (the abandoned site of Big Salmon). The basin extends NNW from Illusion Creek to a few miles north of 62° latitude. The coal leases covering the area are the:

SW quarter of mineral claim staking sheet No. 105-L-2, and NW, SE and NE quarters of mineral claim staking sheet No. 105-E-15

Access to the area is by helicopter

TOPOGRAPHY

The Tantalus basin is dominated and bounded on the eastern edge by a NW to SE trending ridge of limestone rocks which reach elevations up to 4,000 feet. The area is dissected by Walsh Creek which runs west into Yukon River. South of Walsh Creek deadfall and/or thick brush cover the slope. Large slide and slump areas of water-saturated clay (and containing coal float) occur along this stream.

HISTORY OF PREVIOUS WORK

The area was mapped in 1931 by E.J. Lees of the G.S.C. (Bostock and Lees 1938). In 1966 H.S. Bostock, acting

as a consultant, visited the area for one day and prepared notes and sketch maps for the area of greatest potential.

A tabulation of areas currently under exploration permit for coal exploration together with a sketch showing locations is given in Appendix XIII.

GENERAL GEOLOGY

Bedrock in the Tantalus Basin area ranges in age from Precambiran to Cenozoic.

Units mapped as Precambrian and Paleozoic are of sedimentary origin.

Rocks mapped as Mesozoic include Volcanic flows and high-energy sedimentary rocks with irregular content of volcanic derived pebbles and cobbles. These formations include the Laberge and Tantalus Groups which are the coal-bearing sequences in the region.

Light-coloured volcanic flow rocks which overlie the Tantalus Group in the area have been mapped as Tertiary.

Bedrock exposures in the Tantalus Basin area are not common. Only fragmented stratigraphic sections are available for measurement; these are found along stream-beds as on hillsides at several places in the area. Bedrock exposure is less than $\frac{1}{2}\%$ with most of the low-lying areas obscured by a thick blanket of glacial and stream-deposits.

TABLE OF FORMATIONS

Pleistocene or Recent		glacial deposits stream and glacial lake deposits bog and volcanic ash
unconformity		unconformity
UPPER JURASSIC ? or Cretaceous?	Hutshi Group	dark coloured volcanics andesite
unconformity		unconformity
UPPER JURASSIC or Lower Cretaceous	Tantalus Fm	conglomerate sandstone shale coal
disconformity		disconformity
Jurassic	Laberge Gp	conglomerate, greywacke, arkose, sandstone, argillite
unconformity		unconformity
TRIASSIC? or Mississippian?	Lewes River series?	limestone, chert and chert-limestone breccia
great unconformity		great unconformity
Precambrian	Yukon Group	quartz biotite schist

YUKON GROUP

Only one outcrop of rock regarded to be of Proterozoic age was seen in the map area. It is an outcrop of strongly foliated, biotite-quartz schist and is located in the eastern part of the area near a large ridge of Lewes River limestone.

LEWES RIVER GROUP

The Lewes River Group (Bostock 1938) is comprised largely of chert and chert-limestone breccia of Triassic (?) age. This unit is highly resistant to weathering and forms a prominent ridge in the eastern parts of the map area.

LABERGE GROUP

The Laberge Group is a sequence of clastic sedimentary rocks of Jurassic (?) age with an estimated thickness in the Lake Laberge area of 4500-8800 feet (Bostock and Lees 1938). Bostock divides the Laberge into three units:

(i) a basal unit of sandstone and argillite

(ii) a middle member of conglomerate

(iii) upper member; of sandstone and argillite.

The conglomerate consists of boulders and cobbles of porphyritic volcanic rocks in a volcanic-wacke matrix. Overlying the conglomerate are white to light cream coloured arenites and massive greywackes. The coal seams or "lower coal horizon" occur in this upper member.

In the Carmacks area Bostock maps white tuffaceous sediments as overlying the beds of sandstone, conglomerate and shale containing the coal seams of Five Fingers mine. The uppermost beds of the Laberge Group are coarse conglomerates of

volcanic or granitic rocks.

TANTALUS GROUP

The Tantalus Formation of Upper Jurassic to Lower Cretaceous age is composed of conglomerate, sandstone, shale and a few coal seams. It is estimated, by Bostock and Lees, to be more than one thousand feet thick in the Tantalus Basin. The typical lithology of the formation is light coloured, relatively well sorted conglomerate of rounded pebbles ($\frac{1}{2}$ to 2 inches in diameter) of white quartz, light coloured quartzites, dark grey to black chert and cherty argillite and some light green chert in a sand-size matrix of the same composition. The conglomerate has lenses and interbeds of light grey sandstone. Shale and coal make up a small part of the sequence.

Along Jumpont Creek conglomerate contains pebbles of quartz, chert and volcanic rock in a sandstone matrix. In some parts the conglomerate is totally comprised of light coloured volcanic fragments cemented in an iron-oxide rich clay matrix. Outcrops of light grey sandstone with quartz, white feldspar and chert grains are found intercolated with the conglomerates. Tuffaceous (?) sediments containing clasts of feldspar, fragments of clayey volcanic rock and large pieces of carbonaceous plant remains were seen at two localities.

Campbell (1967) mapped two small outcrop areas in the Glenlyon map area as Tantalus. One outcrop, of chert and quartz pebble conglomerate interbedded with sandstone was very similar to Tantalus Butte conglomerate. The other outcrop was sandstone consisting of grains of quartz, feldspar and volcanic rock fragments in an argillaceous clay matrix.

South of Walsh Creek is a large cliff exposing five hundred feet of massive poorly sorted conglomerate with very few sandstone lenses.

The conglomerate was composed of large cobbles and pebbles of light cream to tan coloured volcanic material but also some quartz, quartzite, chert, cherty argillite and igneous rock.

Farther south the dominant rock-types were interbedded chert and quartz pebble conglomerate and sandstone. The sandstone graded to argillaceous silty sandstone with abundant plant fragment molds.

On the southern end of the ridge between Walsh and Illusion Creeks a different lithology is exposed. Conglomerate of light grey chert pebbles in a cherty cemented sandstone matrix, interbedded with sandstone was overlain by white cherty siltstone. Also exposed was medium bedded buff to white clayey sandstone with clay ironstone concretions.

HUTSHI GROUP

A unit of dark coloured fine-grained porphyritic volcanics, andesitic in composition, underlies much of the area to the west of Tantalus Basin. Bostock and Lies (1938) map this unit as part of the Hutshi Group, which they believe overlie the Tantalus Fm. Campbell, on the other hand, contends that this unit is Upper Triassic and underlies both Laberge and Tantalus. Although the relationship is in doubt and there is conflicting evidence, I believe this unit overlies the Tantalus formation. In one location the unit is in close geographic proximity to the light coloured volcanics which directly overlie the Tantalus. In another location, however, it is found below an outcrop of Tantalus.

The Tantalus dips away from the volcanics indicating that volcanics underlie the Tantalus.

TERTIARY VOLCANICS

A unit of light coloured volcanics, varying from light grey to tan, trachytic in composition and vessicular in part, is exposed in a number of small scattered outcrops. These volcanics are correlative with Tertiary volcanics in the Glenlyon map area (Campbell, 1967) and in the Laberge map area (Bostock and Lies (1930). This unit is seen to directly overlie the Tantalus conglomerates in one location.

GLACIAL DEPOSITS

The entire area has been glaciated. Overburden in the Walsh Creek area is probably several hundreds of feet thick. In the Jumpont Creek area the cover is much thinner with an average thickness of approximately 20 feet. Much of the overburden is clay-rich and water-saturated. Mud-slides are common in the vicinity of Jumpont Creek.

DISCUSSION OF TANTALUS BASIN GEOLOGY

The most common lithology in the Tantalus Basin is conglomerate of light coloured volcanic rock cobbles with lesser quartz, quartzite, chert and cherty argillite pebbles. This differs from the conglomerate at Tantalus Butte and that described by Bostock and Lies, i.e. conglomerate of relatively well sorted pebbles of black, green and light grey chert, cherty argillites and quartzites regularly interbedded with sandstone. The exposure of a conglomerate interbedded with sandstone similar to the typical Tantalus, indicates a facies change does not occur.

In several locations in the Tantalus Basin, a rock composed of claystone with clasts of white volcanics, feldspar and carbonaceous plant fragments outcrops. This rock can possibly be correlated with tuffaceous sediments in the Laberge Group near the Five Fingers Mine. The conglomerate underlying the tuffs at Five Fingers, composed of pebbles and cobbles of volcanic material as well as quartz, quartzite and certy argillite correlateds with conglomerate in the Tantalus Basin. If these rocks can be correlated, the succession in the Tantalus Basin includes the very upper part of the Laberge Group.

The presence of the Laberge Group on Walsh Creek and the relationship of the dark coloured volcanics are important in defining the extent of the Tantalus formation. The expsoure of Laberge sediments indicates that all the Tantalus has been removed and therefore, even if the volcanics are younger than the Tantalus, it is probable that Tantalus beds are not present to a large extent below the volcanics.

The interbedded conglomerate and sandstone exposed near Cobble Lake probably underlie the massive 500 foot section of conglomerate south of the Walsh Lakes.

On Walsh Creek a large outcrop exposes conglomerate consisting of large blocks of angular to subangular dark brown porphyritic volcanic material in a matrix of volcanic-wacke.

This conglomerate is overlain by massive, poorly sorted green-brown argillaceous sandstone made up largely of volcanic material and feldspars. One outcrop of friable argillaceous greywacke contained limy red weathering concretions.

The poorly sorted volcanic conglomerate and limy concretions in the greywacke would indicate that this outcrop belongs to the Laberge Group.

STRUCTURAL GEOLOGY

The area is structurally deformed as shown by the great variation in attitudes of bedding and the presence of numerous slickensides, fracturing and jointing.

Bedding: The attitudes of most of the Tantalus strata are usually gently dipping with variable stikes. Bedding was difficult to obtain on the massive limestone beds, but generally beds dip steeply to the east and strike northeast-southwest.

Faulting: The main structural component in the area is a NNW-trending fault which brings the Tantalus formation into contact with the limestone unit. Just south of Walsh Creek, on an east-facing slope, Tantalus conglomerate overlies the limestone. This is in disagreement with Bostock's theory of an eastward-dipping thrust fault bringing limestone over Tantalus. A probable explanation is a westward-dipping normal fault or strike-slip fault with a normal component. At the south end of the ridge the structure becomes more complicated with limestone exposed between areas of Tantalus outcrop. The limestone varies to chert in places and also contains blocks of conglomerate as inclusions. Fault gouge and breccia varying from siliceous to iron oxide rich are associated with the fault zones. Attitudes of beds close to the fault zone show drag features which support the normal fault theory.

MINERALIZATION

The only coal found in the Tantalus Basin was along Jumpont Creek. Coal was found in float in the stream gravel, in slides and slumps and in place. The best coal was found in stringers up to two inches thick and was interlaminated with

siltstone. The coal was not analysed but is probably similar in nature to the lignite mined at Tantalus Butte (See Table 1 and Appendix VIII). Exposures in the Jumpont Creek area are poor as a consequence of thick blankets of incompetent water-saturated glacial clays.

To accurately determine the extent of the coal measures on Jumpont Creek it would be necessary to drill at least one diamond drill hole with a depth of approximately 400 feet.

Although this depth would probably be in excess of foreseeable economic limits for mining, the drill hole would yield a more accurate measure of the coal horizons which could be used to direct further exploration efforts.

TABLE 1

SUMMARIZED A.S.T.M. CLASSIFICATION OF COALS BY RANK

Class Group	Fixed Carbon* per cent		Volatile Matter* per cent		Calorific* Value Btu	
	Equal or Greater Than	Less Than	Greater Than	Equal or Less Than	Equal or Greater Than	Less Than
Anthracitic	86			14		
Bituminous						
Low volatile bituminous	78	86	14	22		
Medium volatile bituminous	69	78	22	31		
High volatile bituminous		69	31		10,500	14,000
Subbituminous					8,300	11,500
Lignitic					6,300	8,300

* - Dry, Mineral – Matter Free Basis

TABLE 2

SPECIFIC GRAVITY AND WEIGHT OF COAL OF DIFFERENT RANKS

Rank	Sp. Gr.	Tons per Acre Foot	Tons per sq. Mile Foot
Anthracite	1.47	2,000	1,280,000
Bituminous	1.32	1,800	1,152,000
Subbituminous	1.30	1,770	1,132,000
Lignite	1.29	1,750	1,120,000

(From Averitt, 1969)

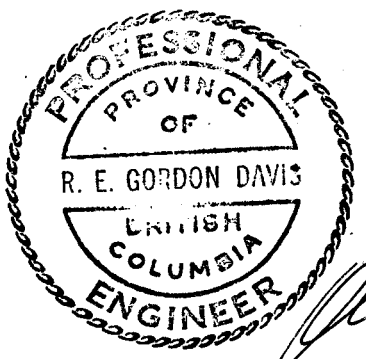
TANTALUS SILT SAMPLING SURVEY

A silt sampling survey was undertaken in conjunction wit the geological mapping project. A total of 152 silt samples were geochemically analysed for Cu, Pb and Zn. Some of the samples were analyzed for Mo. Values were very low. The highest Cu value was 80 ppm at location 122. The highest Pb value was 37 ppm at location 27. The highest Zn value was 100 ppm at locations 122 and 130.

Respectfully submitted,

J.F. George
Modified by M.E. (Tim) Coates

November, 1970



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Appendix I

ATLAS EXPLORATIONS LIMITED

Geology Map of Tantalus Basin
West Half

N. T. S.		SCALE: 1" = 1000'
DATE OF SURVEY:		PARTY CHIEF: J.F. GEORGE
DATE DRAFTED: 21-12-70		DRAFTED BY: JAD
DATE REVISED:		REVISED BY:
CHECKED BY:		FIGURE No.:


134°45′
62°00′
40′
35′
LEGEND
1 Schist
2 Limestone Chert & Limestone Chert Breccia
3 Leberge Group
4 Tantalus Formation
5a Tertiary Volcanics (light colored volcanics)
5b Hutshi Group (dark colored volcanics)
3997
3000
3300
2600
3500
B I G
S A L M O N
R A N G E
Walsh
Walsh Lakes
Creek
2500
2300
Pear Lake
Lokken
Rapids
Sink Lake
Scarp Lake
55′
Cobble Lake
Snail Lake
4117
4000
Kettle Lake
3500
Three Puddles
George Lake
2000
50′
Appendix II
ATLAS EXPLORATIONS LIMITED
Geologic Map of Tantalus Basin - East Half
N. T. S.
SCALE 1"=1000'
DATE OF SURVEY
DATE DRAFTED 22-12-70
DATE REVISED
CHECKED BY
PARTY CHIEF J.F. GEORGE
DRAFTED BY JAD
REVISED BY
FIGURE No.

1	Quartz – biotite schist
2	Limestone and chert limestone breccia
3a	Shale
3b	Sandstone, Greywacke
3c	Arkose
4	Tantalus Conglomerate
5a	Light coloured volcanics
5b	Dark coloured volcanics

BEDDING
FOLIATION
JOINTS
LINEATION
VEINS
DYKES
FAULTS: DEFINED APPROX. ASSUMED
CONTACTS:
OUTCROP BOUNDARY
CAMP SITE
TRENCH
D.D.H.
STOCKWORK

ATLAS EXPLORATIONS LIMITED

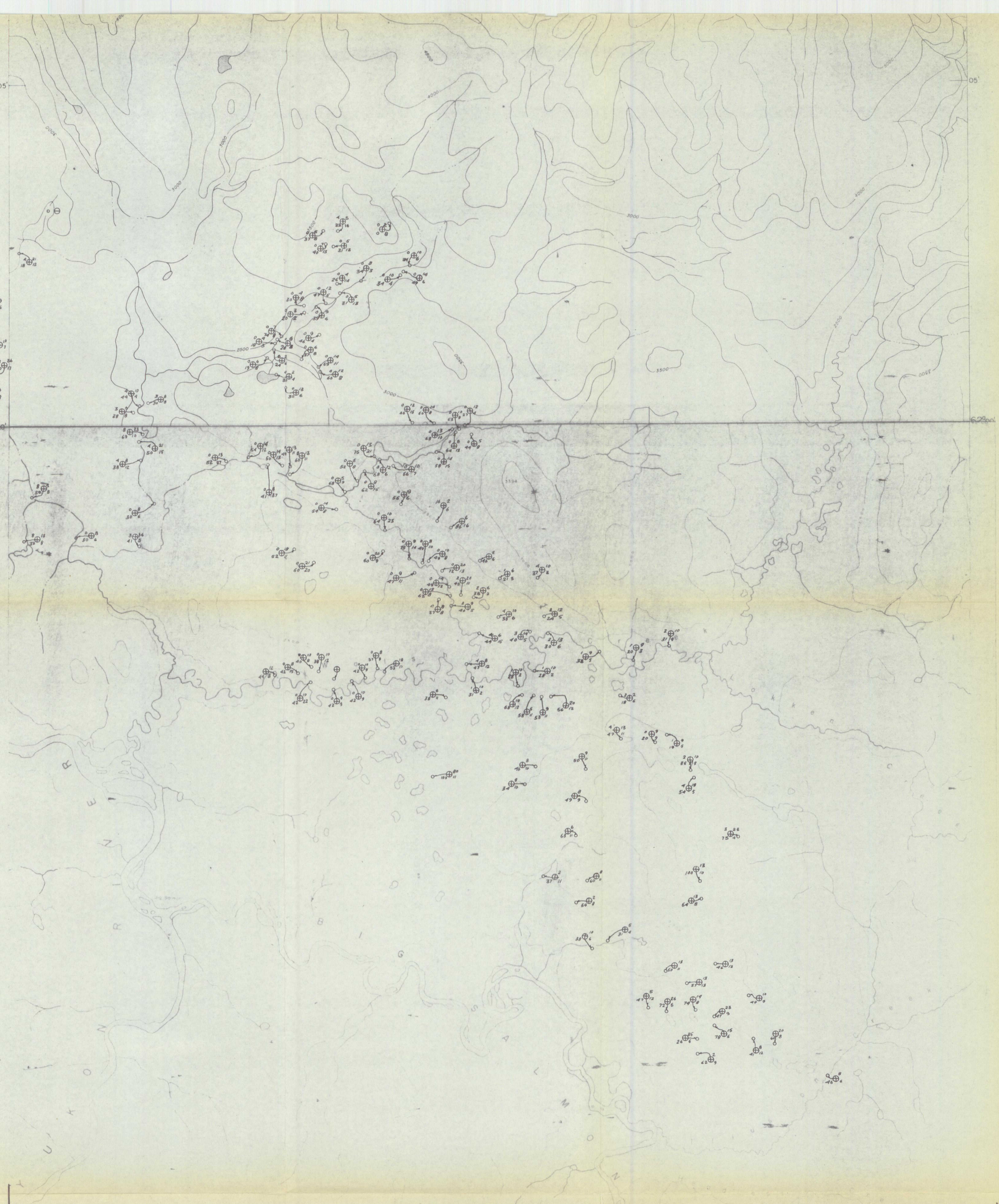
TANTALUS COAL PROJECT

GEOLOGIC MAP of TANTALUS BASIN

YUKON TERRITORY

N. T. S.: 105-L-2 / 105-E-15		SCALE: 1" = 1 mile
DATE OF SURVEY:		PARTY CHIEF:
DATE DRAFTED: JAN. 6, 1971		DRAFTED BY: J.A. DENNISON
DATE REVISED		REVISED BY:
CHECKED BY:		FIGURE No.:

105E-15



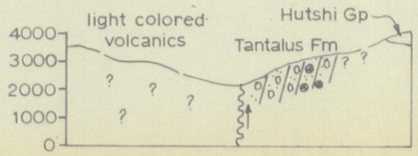
Mo 12 ⊕ 51 Cu.
Zn. 71 30 Pb.
Order of Values

o *Silt Sample Site*

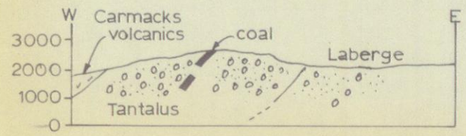
ATLAS EXPLORATIONS LIMITED

Tantalus Project
Geochemical Silt Survey Results (p.p.m.)

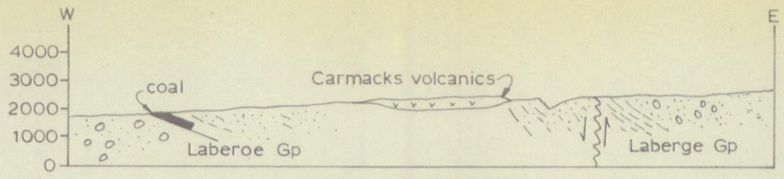
N. T. S.: 105 L 2 / 105 E 15		SCALE: 1" = 1 mile
DATE OF SURVEY:	PARTY CHIEF:	
DATE DRAFTED: DEC. 23, 1970	DRAFTED BY: J.A.D	
DATE REVISED	REVISED BY:	
CHECKED BY:	FIGURE No.:	



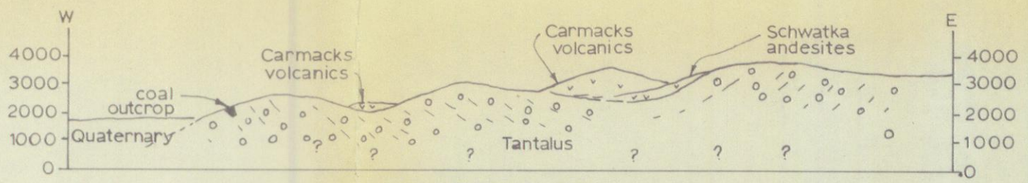
CLAIRE CREEK



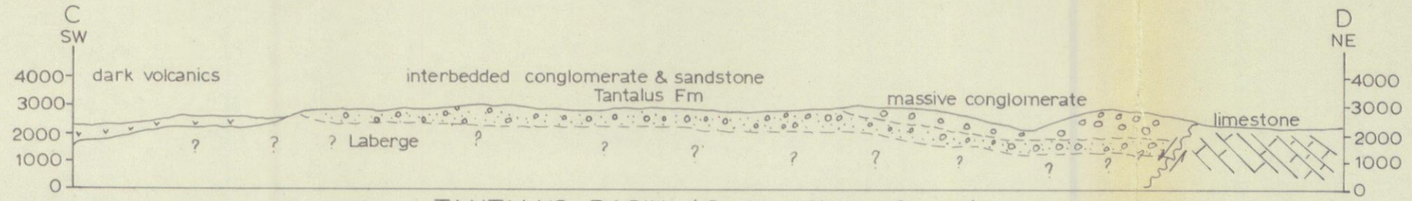
TANTALUS BUTTE



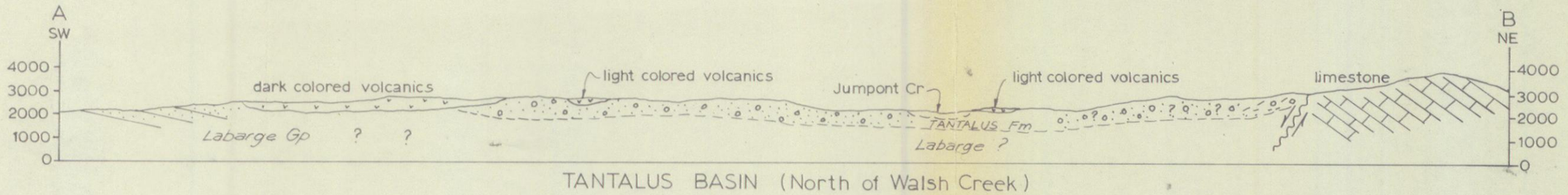
FIVE FINGERS



MILEPOST 90



TANTALUS BASIN (South of Walsh Creek)



TANTALUS BASIN (North of Walsh Creek)

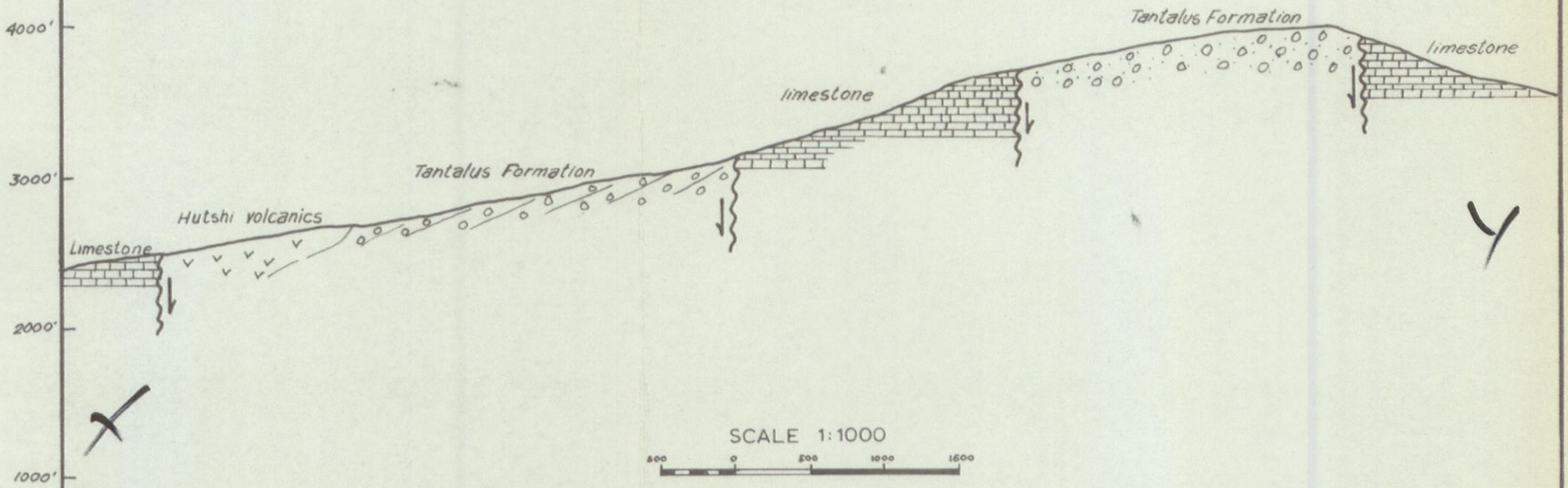
ATLAS EXPLORATIONS LIMITED

STRUCTURAL CROSS SECTIONS

N. T. S. :		SCALE : 1" = ½ mile.....Horizontal 1" = 5,000'.....Vertical
DATE OF SURVEY :		PARTY CHIEF :
DATE DRAFTED : 17 - 12 - 70		DRAFTED BY : J.A.D.
DATE REVISED		REVISED BY :
CHECKED BY :		FIGURE No. : 1

APPENDIX IV

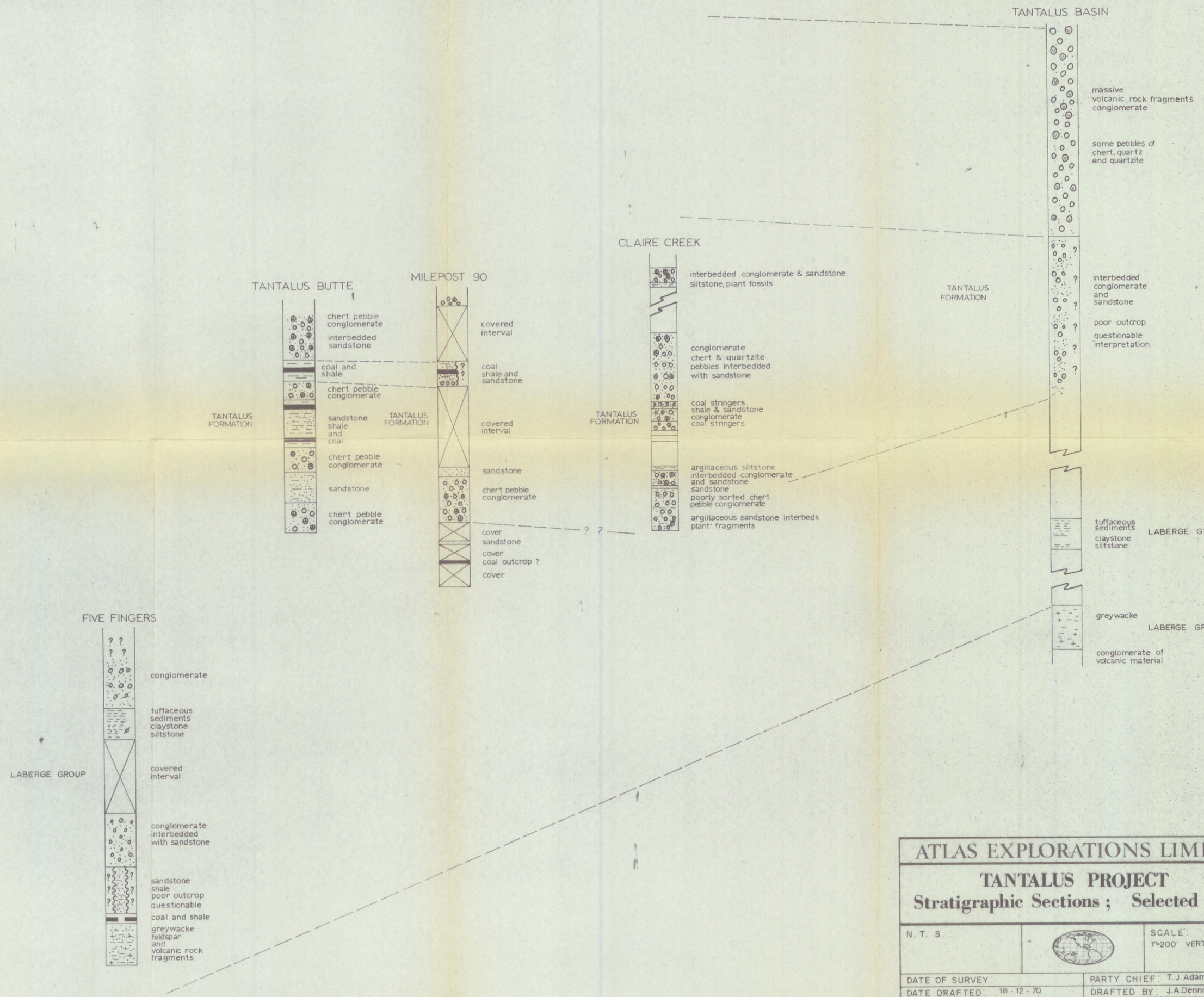
Appendix VI



ATLAS EXPLORATIONS LTD.

TANTALUS PROJECT
STRUCTURAL CROSS SECTION
FIGURE 2

Appendix VI



ATLAS EXPLORATIONS LIMITED

TANTALUS PROJECT
Stratigraphic Sections ; Selected Areas

N. T. S.		SCALE: 1"=200' VERTICAL
DATE OF SURVEY:		PARTY CHIEF: T. J. Adamson
DATE DRAFTED: 18 - 12 - 70		DRAFTED BY: J.A.Dennison
DATE REVISED		REVISED BY:
CHECKED BY:		FIGURE No.: 3

APPENDIX VII