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WATSON COAL PROSPECTS

YUKON

(N.T.S. 105-D/3,6,11)

Report 1

by

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March 1975

This report has been examined; declared acceptable as Representation Work under Section 32 and Schedule B of the Canada Mining Regulations and valued <sup>in part</sup> in the amount of \$ 11,336.18

Chief,

Date: 1 Mar 1976

## FOREWORD

The following report on the Watson Coal Prospects is in the form of an opinion and appraisal - for which the data, on geology, coal seams, and coal analyses Nos. 1 to 5 *are* taken from published sources (see - Selected References): data from open (public) file, and unpublished coal analyses. Nos. 6 and 7 are noted in the text.

# WATSON LAKE COAL PROSPECTS

## CONTENTS

1. Introduction
2. Location
3. Rail Connections
4. Component Prospects
5. Access
6. Coal Titles
7. Geology
8. Coal Seams
9. Coal Quality
10. Mining and Production
11. Mining Conditions
12. Possibilities to Market
13. Land Use
14. Evaluation
15. Information on Previous Exploration
16. Coal Exploration Licences
17. Exploration and Development: First Stage

## FIGURES

- Figure 1. Index Map: Location of Watson Coal Prospects
- Figure 2. Sections across Bonneville, Granger and Bush Prospects
- Figure 3. Granger Prospect: Coal Shows, and Workings, 1906
- Figure 4. Bush Prospect: Diagrammatic Section of the Tantalus Coal Measures

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WATSON COAL PROSPECTS  
YUKON  
(N.T.S. 105-D/3,6,11)

1. INTRODUCTION

The report reviews coal prospects, the Watson prospects, in the area of Whitehorse, N.T.S. 105-D/3,6,11, in the form of an interim evaluation, according to data at hand.

More data on order, February 24/75, is to be examined in a second report. It seems uncertain whether this will introduce changes in the views, conclusions, and advice which are set out here (Report 1).

A review of data has merit and application to evaluate prospects, and to consider decisions thereon. However, it is only part contributory to an evaluation, and no substitute for examining the prospects on the ground.

## 2. LOCATION

Figure 1 illustrates the location of the Watson prospects. They are aligned about parallel, and west of the valley route, the road, and railway from Carcross to Whitehorse: the prospects are within 9 to 17 miles from the road and railway.

## 3. RAIL CONNECTIONS

The White Pass and Yukon Railway connects Whitehorse to tidewater at Skagway, a distance of 110 miles, by narrow gauge across difficult terrain. The capacity of the Railway for large cargo hauls is limited. Its efficiency relative to the projected growth and development of the Yukon has been questioned in several economic studies.

A railroad northward from Dease Lake, to extend the Prince George Dease Lake line now under construction, may allow Whitehorse or Carcross a future connection with the British Columbia Railway.

## 4. COMPONENT PROSPECTS

The Watson prospects include five larger components, here named Bonneville, Granger, Double, Bush, and Carbon: the Carbon prospect is a composite of two outcrops of the Tantalus beds, (see Figure 1). Three other prospects, represented by

Figure 1

INDEX MAP: LOCATION OF WATSON COAL PROSPECTS, WHITEHORSE,  
NTS 105 - D/ 3,6 & 11

- (1) - Bonneville
- (2) - Granger
- (3) - Double
- (4) - Bush
- (5) - Carbon



Outcrop of Tantalus Group  
(from Wheeler 1961)

RF =  $\frac{1}{250,000}$

Scale - approx: one inch = four miles

Figure 1





small outcrops of the Tantalus, in the valleys of Fish, and Two Horse Creeks are presently left unnamed.

5. ACCESS

Components of the Watson prospects are partially accessible by secondary roads and trails: Bonneville, 1 to 2 miles direct distance from trail; Granger 6 to 8 miles; Double 6 to 7 miles; Bush 2 to 3 miles; Carbon 1 to 2 miles; (information varies according to sources, - N.T.S. Maps 105-D, and 105-D/3,5, and 11).

The condition of roads and trails, and suitability for traffic, the need for improvements, and the requirements of additional, new access should be examined on the ground. Improvements and new roads will be needed to explore and develop the prospects. These needs are not readily specified at present: each prospect entails its own access.

Valleys crossing the trend of the Watson prospects offer useful routes for new roads, but ground conditions are not predicted.

The provision for access will affect costs to exploration: also, limits to costs for access may bear on the design of exploration and its success.

## 6. COAL TITLES

The southeast quarter of N.T.S. 105-D/6 is held by Mr. Bert Savage under Exploration Licence 33, November 26/74.

The northeast quarter of N.T.S. 105-D/6 is under application by Mr. Jack Edgar, January 16/75, - under the Territorial Coal Regulations (copies of documents at hand).

Parts of the Watson prospects were covered by recent coal exploration licences:

- 1) Southeast quarter N.T.S. 105-D/6 by E. Perkins  
- licence expired 1974.
- 2) Northwest quarter N.T.S. 105-D/6 by Luscar Ltd.  
- relinquished October 29/71.
- 3) Northeast quarter N.T.S. 105-D/6 by Luscar Ltd.  
- relinquished October 29/71.

In places mineral claims may impede development of coal prospects - seemingly in the Bush prospect, and perhaps in the Carbon prospect. Their effect should be ascertained, where appropriate, as in a comprehensive evaluation.

## 7. GEOLOGY

In the Whitehorse area, N.T.S. 105-D, coal is reported from the Tantalus group, - sediments of late Upper Jurassic and Lower Cretaceous age (range Portlandian - Neocomian).

The Tantalus Group outcrops in separate segments in a sinuous zone 0.25 to 2.0 miles by about 40 miles, extending from Latitude  $60^{\circ} 40' N$ , (see: Figure 1; Wheeler 1961).

The Tantalus Group overlies the sedimentary complex of the Laberge group of Jurassic age, with unconformity indicated in places. Beds of both groups are folded, deformed and faulted, and in places intruded by granites of Coast Intrusives. Volcanic flows and breccias, and associated sediments of the Hutshi Group overly Laberge beds with unconformity, and are assigned an approximate middle Cretaceous age (Wheeler, 1961). Later intrusions and volcanic flows occurred in the area of the Tantalus outcrops, in Tertiary and Quaternary times. Figure 2 illustrates the geology of the Watson prospects (-interpretations drawn from mapping by Wheeler, 1961).

Tantalus Group: The coal potential of the Watson prospects depends on the coal measures of the Tantalus Group (data at hand).

There are nine outcrops of the Tantalus Group, for which the larger are named as individual prospects. Of these seven are contained by major faults, and the remaining two, and perhaps others in places are



bounded by intrusive contacts with the Coast granites. The prevailing dips of the Tantalus beds range from  $35^{\circ}$  to about vertical. There is no satisfactory record of stratigraphy, and distribution of coal measures and coal seams within the Group.

Estimates of the areas of the named prospects can be listed:

Bonneville	1.3	square miles
Granger	4.8	" "
Double	1.8	" "
Bush	1.0	" "
Carbon	0.6	" "

The unnamed prospects are of smaller area.

The larger areas of the Tantalus crops mostly occupy hill slopes, and terrain of steep relief to elevations of 2,000 feet or more above the valleys. The smaller outcrops lie in the valleys, surrounded by drift and glacial till.

Aeromagnetic maps, 3374G, and 3375G, confirm the distribution of the Tantalus beds.

Laberge Group: Coals are reported from beds of the Laberge Group, north of Latitude  $61^{\circ} 00'$  (Latour, 1972). Seams at the Five Fingers Mine were so referred, but this assignment may be questioned (Campbell, 1967). No record or statement of coal from the Laberge crops, in the area N.T.S. 105-D

has been seen. Possibilities of coal in the Laberge Group, in the exploration licences of interests, and nearby, can be followed up by prospecting.

8. COAL SEAMS

Coal seams are known from two prospects.

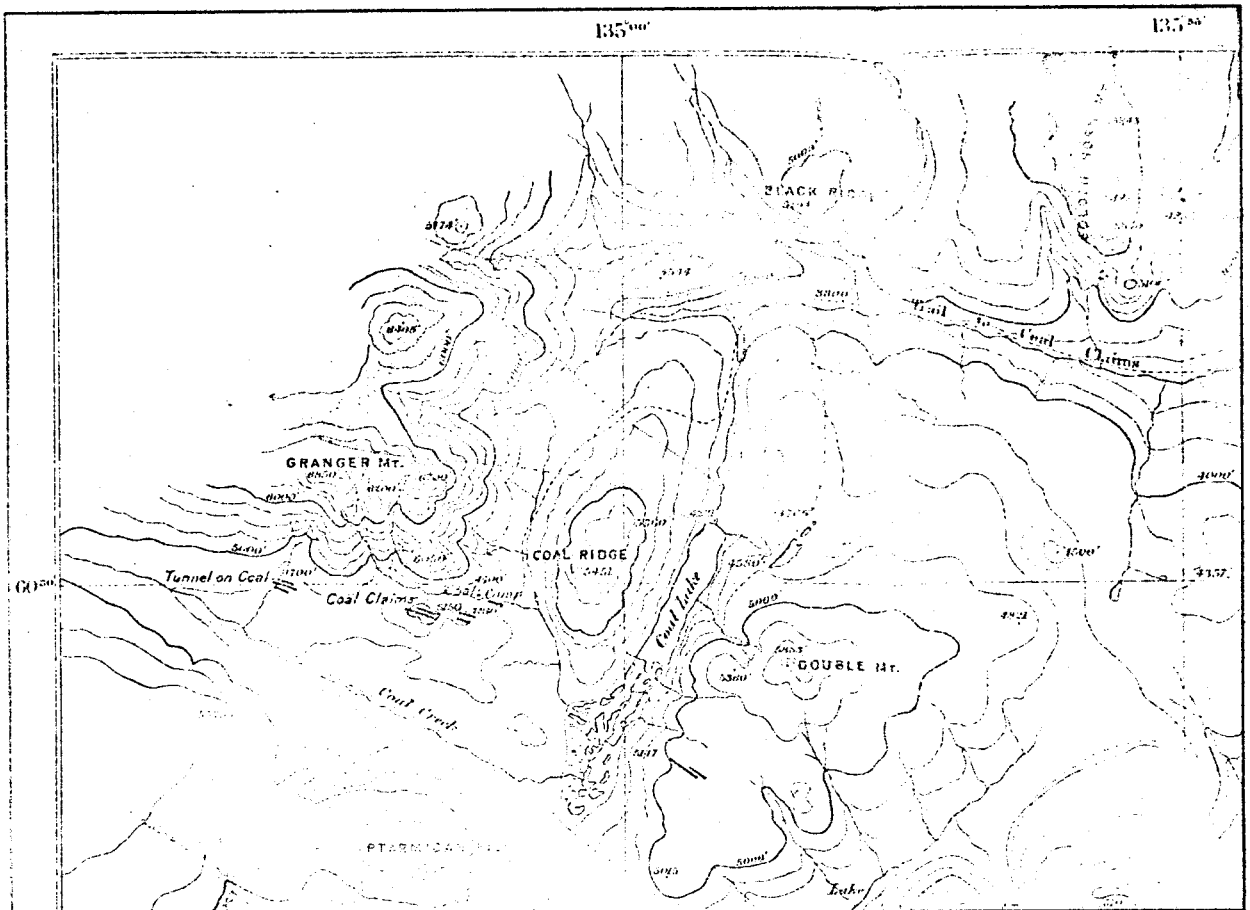
Granger Prospect: Three seams were measured, 9.6, 10.6, and 2.5 feet thick, measured underground in the former Whitehorse coal claims: a fourth seam was found nearby: the seams dip  $42^{\circ}$  to the north-east (Cairnes, 1908). Figure 3 shows the coal crops. See Analyses 1, 2, 3, and 4. Ref. Lat  $60^{\circ} 30'$ , Long.  $135^{\circ} 16'$ .

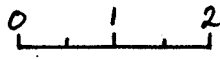
Luscar Ltd. "traced the coal members discontinuously for roughly  $7\frac{1}{4}$  miles: the best seam measured and sampled is slightly greater than 6 feet thick and is a low quality, high ash anthracite", (Coal. Mt. Granger. N.T.S. 105-D/6, 11, Yukon: Min. Res. Branch, Dept. Energy, Mines and Resources).

Bush Prospect: Three seams are known 1.5, more than 6.0, and more than 3.0 feet thick: the seams dip  $60^{\circ}$  to  $80^{\circ}$  westwards (Cairnes, 1912). Figure 4 illustrates the occurrences; the seams ~~was~~<sup>were</sup> contained in 500 feet of strata, intersected by an igneous dyke.

Figure 3

GRANGER PROSPECT: COAL SHOWS, AND WORKINGS, 1906



Scale, approx: one inch = two miles 

Note - Correction  
for Longitude 135°00' read 135°20'

for Longitude 135°55' read 135°05'

From Cairnes (1908)

BUSH PROSPECT: DIAGRAMMATIC SECTION OF THE TANTALUS COAL MEASURES

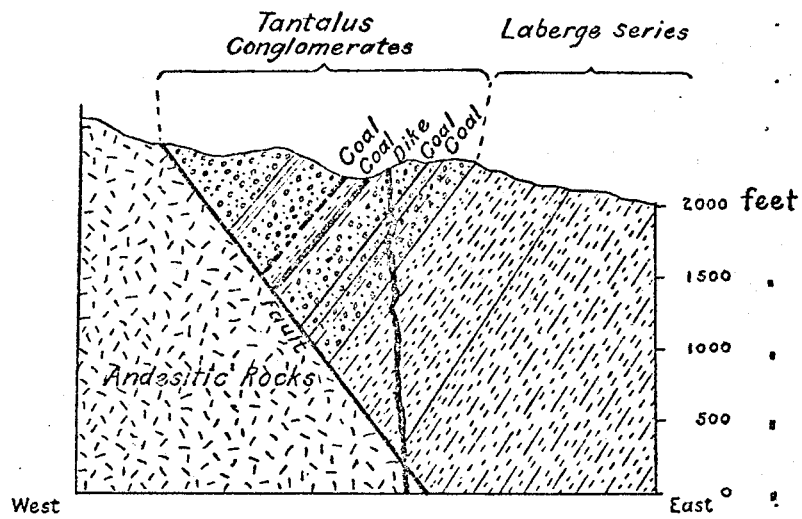


Fig. 10. Diagrammatic east and west section through the coal measures.

From Cairnes (1912, p.146).

See Analysis 5 for the seam, 6.0 feet thick.

Ref. Lat.  $60^{\circ} 19'$ , Long.  $135^{\circ} 04'$ .

9. COAL QUALITY

There are 7 analyses of coals from the Watson prospects (data at hand). Analyses Nos. 1 to 5 are from Cairnes (1908, 1912): Nos. 6 and 7 are on splits of one sample (presumed from Tantalus coal(?), and reported from near Bush Mt: submitted by Mr. McCune, December 27/74).

ANALYSES OF TANTALUS COALS

PROSPECT	GRANGER				BUSH
Analyses No.	1	2	3	4	5
(Proximate)	%	%	%	%	%
Water	2.15	3.78	3.76	2.35	4.78
Volatiles	6.10	10.06	8.34	6.65	8.62
Fixed Carbon	69.86	38.38	62.50	42.27	56.50
Ash	21.98	47.48	25.40	48.73	30.10

GRANGER PROSPECT: ANALYSES -

Nos. 1, 2, 3, and 4 (See Cairnes 1908, Wheeler 1901).

Nos. 1, 2, and 3 on coal sampled in underground working (tunnel) on the former Whitehorse coal claims, Granger prospect.

No. 1, from seam 9 feet 8 inches.

No. 2, from seam 2 feet 6 inches.

No. 3, from seam 10 feet 8 inches.

No. 4, from seam nearby, in creek below the workings (thickness not reported).

BUSH PROSPECT: ANALYSIS -

No. 5, (See Cairnes 1912, Wheeler 1961).

No. 5 from seam, thickness 6 feet or more, stripped at surface, "west of summit of Mount Bush".

ANALYSES OF RECORD, 1974 & 1975

Analyses No.	6	7
(Proximate)	%	%
Moisture (AR)	1.72	2.65
Volatiles	32.22	31.94
Fixed Carbon	52.52	49.26
Ash	13.54	16.15
Sulphur	0.36	0.32
Btu/lb	10,924	10,084
CBI	powder	powder

Analyses 6 and 7 reported to be on splits of one sample, taken from "the coal deposit near Bush Mountain":  
Submitter, - Mr. McCune.

Proximate analyses, as received:

No.6, by Chemical Industries Services, Detroit, Michigan/  
Ref. 1274-57

No.7, by Detroit Testing Laboratory Inc., Detroit, Michigan/  
Ref. 4122 54-A.

Analyses 1 to 5, from the Granger and Bush prospects indicate semianthracites. They are noteworthy for high ash content in the range 21 to 49%. There is a question whether the high ash is due to sampling procedures, or to the nature of the seams or coals.

The sample of analyses 6 and 7 can be referred to high volatile bituminous and (?) subbituminous coal: the sample was perhaps weathered - a tendency to non-equilibrium in the calorific value may indicate this.\* The sample shows relatively high volatiles, moderate ash, and low sulphur.

The two sets of analyses are in contrast.

Cairnes noted the absence of coking coals in the Granger and Bush areas. The sample of analyses Nos 6 and 7 is non-coking.

There seems little doubt that Tantalus coals were altered and metamorphosed by igneous intrusions, - the Coast granites, and later intrusives, volcanics, and dykes. The rank of the coals may well vary from place to place. The degree of variations can affect specifications to sales and contracts.

\* The analyses of this sample is curious, perhaps anomalous - cf analyses 1 to 5.

#### 10. MINING AND PRODUCTION

No records of mining and production have been seen.

Development work is noted only for one property - the former Whitehorse coal claims in the Granger prospect:- one 'tunnel' or slope, for 60 feet, and trenching. It seems unlikely that the property attained production of consequence.

#### 11. MINING CONDITIONS

Data at hand indicates coal production from the Watson prospects will depend largely on underground mining. Relief and structures may allow surface mining at some localities, but this possibility cannot be assessed or encouraged at present view.

Seemingly underground mining will content with steep and near vertical seams, and possibilities and probabilities of disturbed, broken and faulted seams. Entries can be made by adits.

These are only general views and implications. Mining conditions may vary from place to place, and can only be assessed by trial and experience.

Structures, distributions, and thickness of seams, which determine mining methods, recovery, and production are not well known. For the Watson

prospects, there are indications and cautions: dependence on underground mining, steep seams, difficult ground, need for special and adaptive methods, limitations to mechanical mining, and mining recovery about 50%. The sum of these conditions may indicate production at high cost, and a capacity of less than 150,000 tons annually for one mine.

## 12. POSSIBILITIES TO MARKET

The Watson coals allow use as -

Utility coals, for thermo-electric generation: possible users in the Yukon being local and territorial utilities, mining, and industrial plants. The high volatile coals may suit gasification, but this market seems remote.

Special coals, the semianthracites, for use as special fuels and sources of carbon: specifications to market call for low ash content in the final product.

The Watson prospects are within range of export markets.

The local and territorial markets are not large, and a demand for utility coals will be subject to policies, and commitments to other sources of energy.

Coal and lignite deposits north of Latitude 61° 00' are competitive in local and utility markets in the Yukon.

Markets represent a continuing field for search and development. They relate to determinative factors of coal quality, specifications, rates of production, costs, and transport, etc.

13. LAND USE

Exploration, development, and mining come under the approval of the Yukon Territorial Land Use Committee. Consideration to policies may bear on the long range future of the Watson prospects. Some aspects which may affect policies are, the development of metal mining in the Whitehorse area, the suitability and amenity of the area of the Watson coal prospects to recreational and tourist use, and as habitat for wildlife, and the real value of the coal prospects themselves. The balance of views and conflicts in land use are rarely foreseeable, but it is significant to investment.

14. EVALUATION

The following are major factors in considering the Watson prospects according to data at hand.

- 1) The area of the coal crops is small:  
this itself is not a deterrent, but it sets limits to discovery and potential.
- 2) Coal seams are present in workable thickness.
- 3) The rank, and quality of the coals are likely variable: the variability can affect contracts and sales.
- 4) The high ash content in analyses of the semi-anthracites - there remain questions whether the sampling is representative, or whether the semianthracites are saleable?
- 5) Views of mining conditions represent interpretations for which changes and revisions should be allowed.
- 6) For underground working costs of production will tend to be high, and output low: this may well exclude a market in utility coals.
- 7) There are no positive indications to favour surface mining.

Many unknown factors obscure assessment, and they can be resolved by future work on: coal seams, stratigraphy, distribution, and continuity: coal quality and rank, and their variations: mining methods, costs, and output: and markets. Chemistry of the coals also deserve investigation, and this

seems appropriate in view of the regional and local mineralization.

The Watson prospects have some considerations of merit. Data at hand is not discouraging, but it is limited and the implications only tenuous. It is not known at present if the prospects have been investigated and explored completely (see following section). There is an overall lack of positive features in the data, to affirm a clear recommendation to pursue the prospects. Such view may be altered by subsequent work and exploration. The possibilities for future discoveries should be allowed.

It seems advisable not to undertake commitments to exploration and expenditures until all data is brought in and reviewed.

The following sections concern the acquisition of data, and requirements to progress in exploration.

15. INFORMATION ON PREVIOUS EXPLORATION

It is questioned whether information and reports of work and exploration of previous title holders of the Watson prospects,

Luscar Ltd., northwest, and northeast quarters  
of 105-D/6,

E. Perkins, southeast quarter of 105-D/6, are available for use.

Possible ways to obtain the information:

- (1) Reports filed with Territorial and Federal Governments, which may be released to the public,
- (2) Reports of the title holders, which may be got by negotiation, or by purchase.

A general inquiry for available information has been made to the Department of Indian Affairs and Northern Development, in Whitehorse, and this inquiry should be pursued.

#### 16. COAL EXPLORATION LICENCES

Exploration of interest in the Watson prospects should lead to licences on the following areas:

- (1) northeast quarter of N.T.S. 105-D/6,
  - (2) southwest quarter of N.T.S. 105-D/11,
  - (3) southeast quarter of N.T.S. 105-D/6,
- (order of priority suggested from data at hand).

Area (3), above listing, is held, and, Area (1) is under application.

A virtually complete control of the Tantalus crop is ensured by additional licences on the

northeast quarter of N.T.S. 105-D/3 and the northwest quarter of N.T.S. 105-D/6. They may be left open: control over the areas (1), (2) and (3), listed above tends to discourage competitors, but leaves open ground for nuisance staking. It should be noted that the northwest quarter of N.T.S. 105-D/6 contains the projected extension of the seams found on the old Whitehorse coal claims.

17. EXPLORATION AND DEVELOPMENT: FIRST STAGE

There are several approaches to exploring and developing the Watson prospects. They concern the priority, or decision, - underground work applied at one locality and prospect, - or drilling to determine the coal potential of the prospects overall, - and monetary outlays in relation to opinion of the prospects.

A reconnaissance in advance of exploration and development is advised, to foresee progress, and to define approaches and methods of work.

The following proposals\* are set out to view requirements and costs for the first stage of working the Watson prospects. Sections (A) and (B)

\* The proposals do not imply recommendations of the prospects, or otherwise.

represent the alternative approaches (noted above). Estimates of costs are tentative and subject to revision.

- (1) Advanced Reconnaissance: mapping, prospecting; inspect old workings; examine roads, trails and access; check data; define working methods; review estimates: 5 to 7 days. Allow \$7,000.
- (A) Underground Exploration and Development: rehabilitate the Granger "tunnel" and extend on the seams, or drive new working; sample coal quality, and washability; prospect seams nearby, trench and sample; additionally, search and examine nearby prospects: strength 5 to 7 men, for 60 working days.

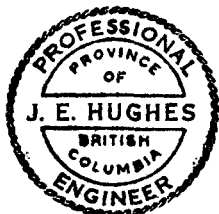
Rehabilitate old working and		
new drivage to 200 feet - Allow		\$32,000
Road making and trenching		30,000
Prospecting		4,000
Analyses and tests		4,000
Transport and supply		7,000
Camp and administrative costs		10,000
Reclamation		6,000
Engineering: planning, super-		
vision, work, reports		12,000
		<hr/>
Total	Allow	\$105,000
		<hr/>

## ALTERNATIVE

- (B) Exploration and Drilling: a programme of drilling and sampling 2 or 3 of the component prospects: footage 3,000 to 4,000 feet: 45 to 60 days.

Drilling	Allow	\$54,000
Roadmaking		30,000
Analyses		1,500
Transport and supply		6,000
Camp and administrative costs		10,000
Reclamation		1,500
Engineering: planning, supervision, work, reports		<u>7,000</u>
Total Allow		<u>\$110,000</u>

Alternatives (A) and (B) are subject to much uncertainty in allowances for access roads.



Signed *J. E. Hughes*

J. E. Hughes

March 12/75

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