

DEC 21 1970

93 G

Property Submission (coal)

93 G/16

David Betts. Northern Coal

Prince Property. Prince George BC

Dec 17 1970

821950

J.H.S.
 P.M.K.
 G.M.H.
 R.D.S.
 B.C.B.
 I.D.B.
 M.D.R.
 J.H.F.
 E.C.J.

To P.M. Kavanagh

Subject Northern Coal Prince George

ember 17, 1970.

I have reviewed your letter of December 17, 1970.

The basis of your interest appears to lie in the possibility of shipping this coal to Ontario Hydro. The understanding would be that Ontario Hydro would pay \$7.00 per long ton f.o.b. the mine.

Since I do not consider myself qualified to do so, and because I have not got that far into the study, I have no way of knowing the validity of the capital cost mentioned by D.W. Betts in his November 3, 1970 summary. Betts mentions estimated capital structure to be - equity \$10 million and debt \$60 million. He indicates that production costs would be between \$5.00 and \$6.00 per ton. Assuming the higher cost to prevail, the ^{operating} profit per ton of coal sold would be \$1.00 and it would therefore take 12 years to amortize the capital cost without considering interest costs, @ 5,000,000 tons per year.

It is a little hard for me to appreciate that Ontario Hydro would find it feasible to purchase coal in that province which is most remote from Ontario when there are other closer sources of supply.

None of the information I have provides any indication as to what geological problems might be encountered in the mining process. These problems result from fault patterns which disrupt the continuity of the coal measures and from dilution by shaley or sandy members in the coal seams.

It does seem apparent that despite the amount of money spent on northern coal mines thus far, there is not sufficient data to indicate whether this coal is marketable anywhere. Certainly it does not appear to be a coking hole despite statements made by Garraway. It may of course be possible that with sufficient work, a marketable product will ultimately be attained.

Northern Coal Mines as such has been around for a long time and I am sure has been scrutinized by many people who are much more knowledgeable about coal than we are. Under these circumstances this does not look like a situation which we should entertain for any length of time.

Should you wish any of the data returned, please let me know.

Bill

W.M. Sirola.

WMS/jm

DEC 21 1970

93 G.

KERR ADDISON MINES LIMITED

(FOR INTER-OFFICE USE ONLY)

821950

✓	J.H.S.	✓
✓	P.M.K.	✓
✓	G.M.H.	✓
	R.D.S.	
	B.C.B.	
	I.D.B.	
	M.D.R.	
	J.H.F.	

To P.M. Kavanagh

From W.M. Sirola

Subject Northern Coal Mines
Prince George Area, B.C.

Date December 17, 1970.

I have reviewed the data you sent to me via Glen Hogg.

The basis of your interest appears to lie in the possibility of shipping this coal to Ontario Hydro. The understanding would be that Ontario Hydro would pay \$7.00 per long ton f.o.b. the mine.

Since I do not consider myself qualified to do so, and because I have not got that far into the study, I have no way of knowing the validity of the capital cost mentioned by D.W. Betts in his November 3, 1970 summary. Betts mentions estimated capital structure to be - equity \$10 million and debt \$60 million. He indicates that production costs would be between \$5.00 and \$6.00 per ton. Assuming the higher cost to prevail, the ^{operating} profit per ton of coal sold would be \$1.00 and it would therefore take 12 years to amortize the capital cost without considering interest costs, @ 5,000,000 tons per year.

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W.M. Sirola.

WMS/jm

E.C.J.

REFERENCE MEMORANDUM

DATE Dec. 23 1970

THE ATTACHED PAPERS ARE REFERRED

TO Mr. J. H. Stovel

BY PMK

PLEASE REPLY DIRECT PLEASE HANDLE

PLEASE SEE ME RE THIS YOUR COMMENTS

FOR YOUR INFORMATION FOR APPROVAL

PLEASE RETAIN PLEASE RETURN

I agree entirely with Bill Sivola's attached negative opinion - The best that Betts can hope for is \$1.00/per ton operating profit, not including amortization of a \$70 million capital expenditure.

Paul

P.M.K.

Scanner

~~VHS~~
back

VBMH ✓

(J)

STATE BILGIN

STATE BILGIN

LOK JONG BANGSAHON

LOK BANGSAHON

WONG SEE WE SE LING

LOK BANGSAHON

STATE BILGIN

STATE BILGIN

TO

TO

THE ATTACHED BOOKS ARE RETURNED

DATE

Dec 23 1974

BEREBENCE WEROVANDPW

Dec 14/70

On the phone, David Betts suggested that, from his talks with Ontario Hydro, a current selling price of \$1.00/long ton ($\6.25 /short ton) at the mine would be competitive.

He said that Bill C. Whitaker in Calgary is a reputable coal consultant. 403-244-5261

DAVID W. BETTS

WISENER AND PARTNERS
COMPANY LIMITED

To Dr Paul Kavanagh Date Dec 4/70

Re: Northern Coal Mines

Attached are two
summaries of my dis-
cussions with Hydro.

Please call me if you
wish the notes expanded.

David Betts



THE CANADIAN ANALYST LIMITED
GRAPHIC PRODUCTION SERVICES

STOCK MARKET CHARTS
FINANCIAL PRINTING
TELEPHONE: 363-4431

RE: NORTHERN COAL MINES

Summary of discussion with J. L. Cooke, purchasing agent for Ontario Hydro.

November 26, 1970

Volume

Ontario Hydro will use approximately 9.5 million net tons of coal in 1970.

They expect to use 12.0 million tons next year.

Type Required

Hydro prefers to use a high volatile content coal, approximately 13,000 BTU, less than 8% ash, low sulphur (the coal now being used has 2 1/2-2 3/4% sulphur content which can easily be improved upon by Northern Coal), volatile content not less than 28%.

It, therefore, appears that coal from Northern Coal Mines ideally suits their needs.

Proposal

The following was suggested to Mr. Cooke:

- 1) We will arrange for a coal sample to be sent to him for testing.
- 2) We will further negotiations with a mining company to develop this mine for heating coal in the prospect that the coal can be sold to Ontario Hydro.
- 3) As an alternative to (2), we might interest a mining company and Ontario Hydro in furthering the exploration jointly. Normally, Hydro have a "hands off" policy, but if this ideally meets their requirements, they might be interested.

Timing

They must know in 3 to 4 months whether this mine can produce coal economically. The workings are far enough advanced that I feel any mining company could meet this date.

Hydro would want to take delivery in 18 months, say 1972. Other proposals being considered will probably not deliver coal until 1973. We, therefore, have a big advantage. Secondly, the other proposals are for much lower BTU coal and my impressions are that they are much less desirable types.

DWB/clb
November 26, 1970

David W. Betts

J.H.S.
P.M.K.
G.M.H.
R.D.S.
B.C.B.
I.D.B.
M.D.R.
I.H.F.

E.C.J.

RE: NORTHERN COAL MINES

Second discussion with J. L. Cooke, purchasing agent for Ontario Hydro.

November 27, 1970

Coal Middlings

Middlings, being a by-product of the cleaning operation for metallurgical coal, are not an ensured supply.

Ash content, at say 18%, is too high.

Volatitle matter content is too low. As mentioned in a previous discussion, they have established 28% as a minimum objective (with existing equipment). Below this volatile content, they might have to add oil or gas to sustain ignition and, therefore, the middlings would not be economical.

Price

Hydro contracts are f.o.b. the mine. They assume all transportation costs. Shipments from the mine would be uniform throughout the year. They would arrange for bulk storage at the lakehead during the winter season when Great Lakes shipping is not operating.

If a price at the pithead of \$7 to \$8 per short ton (\$7.84 to \$8.96 per long ton) were to be assumed, we would be hard pressed by the competition. Although, he could not give me the bids now under consideration, it would appear that the higher cost to them of \$7 at the pithead, plus the longer transportation distance would more than offset the higher calorific content of the coal from Northern Coal Mines.

DWB/clb

David W. Betts.

November 30, 1970

RE: NORTHERN COAL MINES

Discussion with Takoshi Kobayashi, General Manager,
C. Itoh & Co. (America) Inc., Vancouver, B.C.

November 27, 1970

Sources of High Volatile Coal

At present the Japanese steel industry relies on Australia (and small quantities from South Africa) for their imports of high volatile coking coal.

Quality of Northern's Coal

The coal as tested so far is not good coking coal. However, it improves as the workings advance, and he, therefore, feels it is necessary to continue development work before making a definite ruling on the coking quality.

The Japanese want a coal with an F.S.I. (or C.B.I.) in the 4-6 range. He also feels that large tonnages must be proven.

Price

Canadian contracts are long term at fixed prices. Most U.S. contracts are renegotiable every year.

He expects higher prices under existing contracts with McIntyre Porcupine and Kaiser--say in the \$17 to \$18 range for high quality coal.

Heating Coal

Japanese heating coal has high sulphur content. There are two factors involved here: 1) the politicians want the Japanese mines to provide their heating coal in order to maintain employment 2) others want to import low sulphur fuel to lower pollution levels.

They might buy Northern coal for heating, but this depends on the political factors and when they will be resolved.

Japanese Mission

Kobayashi has requested that the Japanese send a team of engineers to the mine. They might be here in the spring.

DWB/clb

David W. Betts.

November 30, 1970

INFORMATION PACKAGE

Northern Coal Mines

This information package relating to Northern Coal Mines contains the following:

① Summary - Wisener and Partners, Nov. 24, 1970.

Description of the Mine

② 1) Description of the mine, Nov. 12, 1969.

Geologic Report

③ 1) ~~Summary~~ of Mr. Robert B. Bonar's report, Feb. 2, 1970.

Marketing

④ 1) Exerpt from letter from Department of Energy, Mines and Resources, Ottawa, Nov. 19, 1970.

⑤ 2) Two letters from Aumas, Fergusson Wild dated Oct. 5 and Oct. 21, 1970.

⑥ 3) Letter from Mr. Garraway, Oct. 21, 1970, summarizing discussions with Mr. Takashi Kobayashi, General Manager of C. Itoh & Co., Vancouver.

4) See letters from Nissho (Canada) Ltd. under "Chemical Analysis."

Chemical Analysis

⑦ 1) Letters from Nissho (Canada) Ltd., Warnock Hersey, Crest Laboratories, and General Testing Laboratories.

⑧ 2) Summary of samples taken by Northern Coal Mines personnel.

Economic Feasibility

⑨ 1) Summary of cost and revenue estimates--Wisener and Partners, Nov. 3, 1970. *Kaiser, Wheeltype, Northern Coal*

Financing Proposal

⑩ 1) Summary of proposal accepted by directors of Northern Coal Mines, Oct. 13, 1970.

⑪ 2) Supplementary notes to above, Oct. 21, 1970.

Shares Outstanding and Committed

⑫ 1) Summary of approximate number of shares outstanding -Wisener and Partners, Oct. 30, 1970.

NORTHERN COAL MINES

①

SUMMARY

Current Status

Approximately one million dollars has been expended on this mine. Working capital is zero, and the company needs funds to further the exploration program. Approximately \$100,000 is required for a drilling program to determine the attitude of the seam and to obtain core samples for tests. Tests to date have been in oxidized and partially oxidized coal, and results are therefore not considered to be representative of the virgin coal.

Objective

The objective is to bring the mine into production, assuming the above program proves the geology to be as inferred. The senior mining partner would hold not less than 60% of the outstanding shares when the final financing has been completed.

Type of Coal

Unwashed, oxidized, and partially oxidized coal corresponds to a high volatile, Type "C" bituminous. However, at the present stage of development, classification of the coal is very difficult to project. The quality of the coal for metallurgical purposes has improved as the seam workings were advanced. It is therefore felt that it is necessary to complete a proper exploration and development program to prove the type of coal, its washability, and its suitability for coking.

Mining Costs

From the geology, Mr. Bonar, the consulting geologist, has inferred that the mine should have a solid roof and floor. Consequently, mining costs should be low compared to McIntyre Porcupine (for example). Therefore, lower costs should offset the lower price that would be expected for this coal.

Transportation

The mine is close to the proposed port at Prince Rupert. Lower transportation costs will also offset the probable lower price.

Since Prince Rupert is one day closer in shipping time to Japan than Vancouver, Northern Coal Mines, therefore, has an additional cost advantage to the Japanese.

Heating Coal

This coal has possibilities for steam coal purposes. Again, the development program is necessary to prove the type of coal. Following are the approximate specifications:

BTU - 13,000
Ash - 5 to 8%
Sulphur - 0.50 to 0.75%

Reserves

The Geologic Survey of Canada in its 1966 report estimated that 10 square miles of the area was underlain with coal and indicated reserves of 339,000,000 short tons. Mr. Bonar, now estimates that 32 square miles may be underlain with coal and reserves may therefore be in the order of one billion tons.

Potential

Assuming the lower reserve figure, the area has a potential for at least two mines, each producing three million long tons per year.

DWB/clb

D. W. Betts

November 24, 1970



MINE: PRINCE GEORGE RADIO
"GARRAWAY MINES"

MINE OFFICE:
3 - 1330 THIRD AVENUE
PRINCE GEORGE, B. C.
PHONE: 564-5816

Northern Coal Mines Ltd.

②

A.J. Garraway,
725 Suffolk St.,
Victoria, B.C.
382-8666.

GARRAWAY MINE

LOW ASH COKING COAL

RESINS

GERMANIUM & URANIUM

November 12, 1969

LOCATION:

35 miles southeast of Prince George, B. C.
25 miles from the C.N. Railroad
6 miles from Highway 16
500 miles from Vancouver
500 miles from Prince Rupert

Bulk loading facilities in the Prince Rupert area would mean a substantial reduction in the ocean distance to Japan.

PROPERTY:

The coal field resembles a basin approximately 13 miles long and 3 to 4 miles wide, with the seams pitching steeply on the margin but lying comparatively flat under the greater part of the valley. Covered by 35 Coal Licences and 365 Mineral Claims.

MAIN SLOPE: 10' X 14'

Put down on a gradient of -12 degrees and on a bearing of due West, and intersects the 11 foot coal seam at 520 ft. Entry was driven in the 11 ft. coal seam for 80 feet.

Coal slope - slant - put down in 11 ft. coal seam on a gradient of -12 degrees for 400 feet to the south-east. Passed through the zone of oxidation at 325 ft. on the Coal Slope, or 170 ft. vertically below surface. Coal slope should be extended downwards a further 300 - 400 feet to increase distance below zone of oxidation. Both Main and Coal Slopes suitable for the installation of belt conveyors.

VENTILATION SLOPE: 10° X 14°

Located 3000 feet southeast of Main Slope. Put down on a gradient of -19 degrees for 250 ft. 200 ft. of cross-cut to coal seams. Then a Coal Slope - slant - driven down in the 11 ft. coal seam on a gradient of -12 degrees for 425 feet to the northwest.

DRILLING:

42 diamond drill holes put down over an area two miles along the strike and half a mile to the northeast indicated two coal seams - 11 ft. and 8 ft. - on the margin, with three seams - 10 ft., 11 ft., and 8 ft. - lying comparatively flat under the greater part of the valley.

The strike of the seams is NW and SE with the dip to the NE.

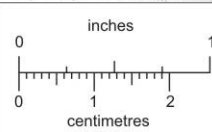
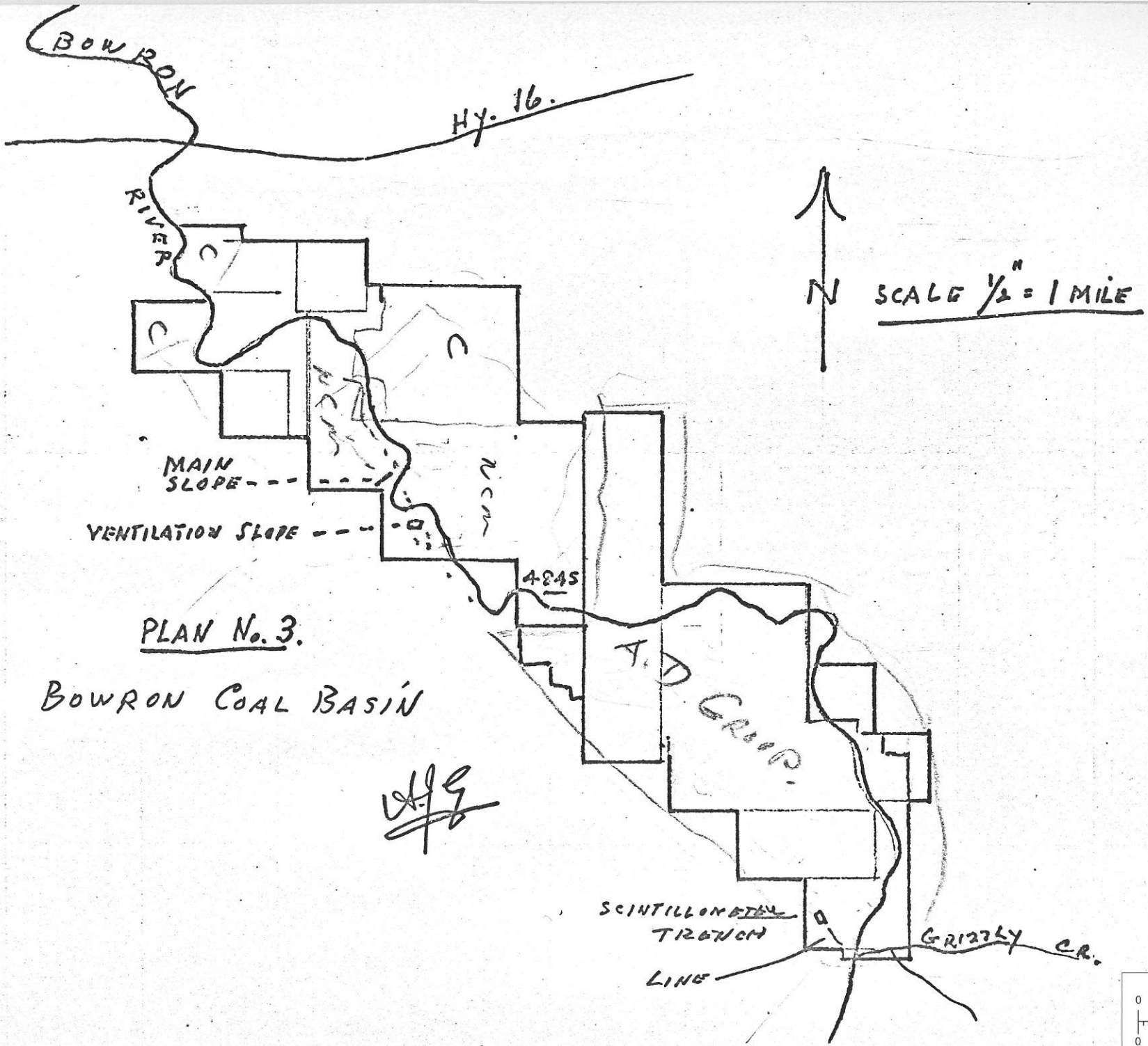
TONNAGE:

25 Million tons of coal has been proven by our diamond drilling program.

Five to ten additional drill holes could prove atleast another 50 million tons and confirm that the attitude of the seams is comparatively flat under the valley.

Based on the calculations of previous geologists, and the knowledge gained by diamond drilling, the coal field may contain over a Billion tons of Coking Coal.

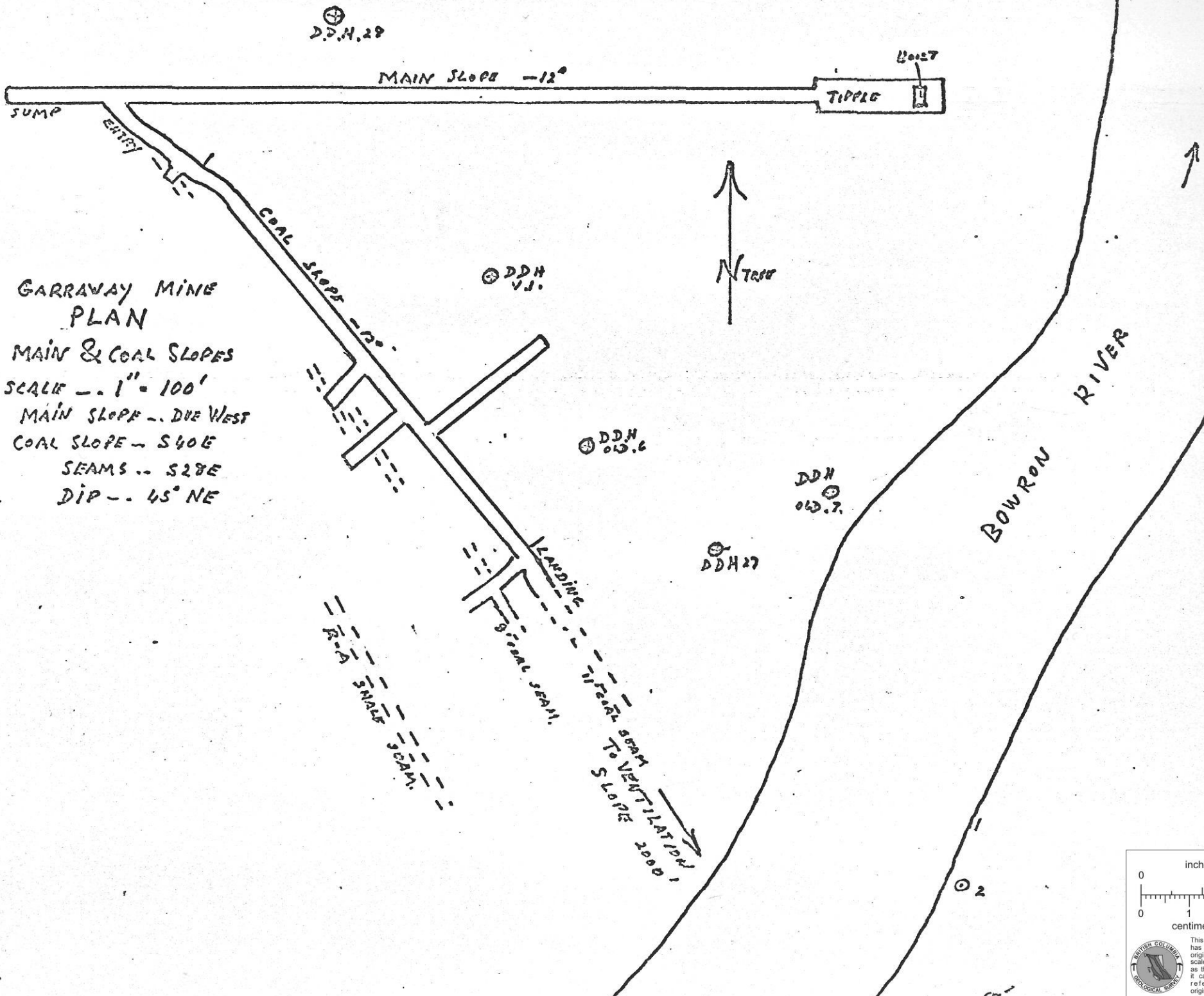
This large potential tonnage would indicate the possibility of two large mines with a combined annual production in excess of six million tons.



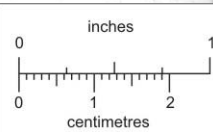
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BRITISH COLUMBIA GEOLOGICAL SURVEY

①



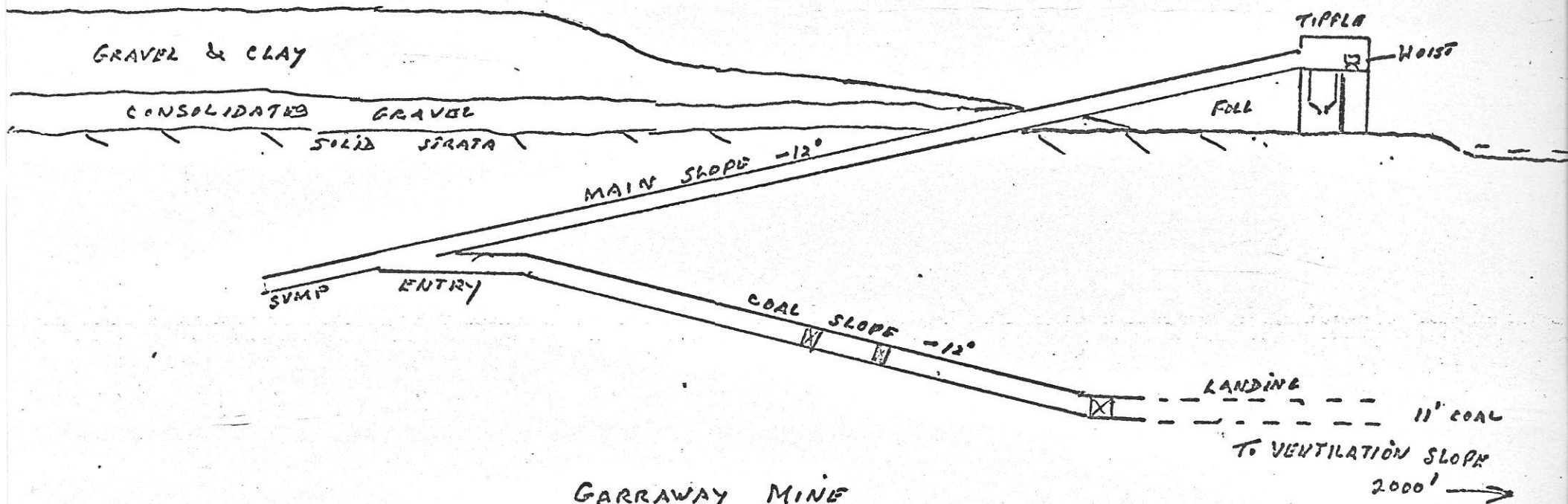
GARRAWAY MINE
 PLAN
 MAIN & COAL SLOPES
 SCALE -- 1" = 100'
 MAIN SLOPE -- DUE WEST
 COAL SLOPE -- S 40 E
 SEAMS -- S 28 E
 DIP -- 45° NE



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.



(2)



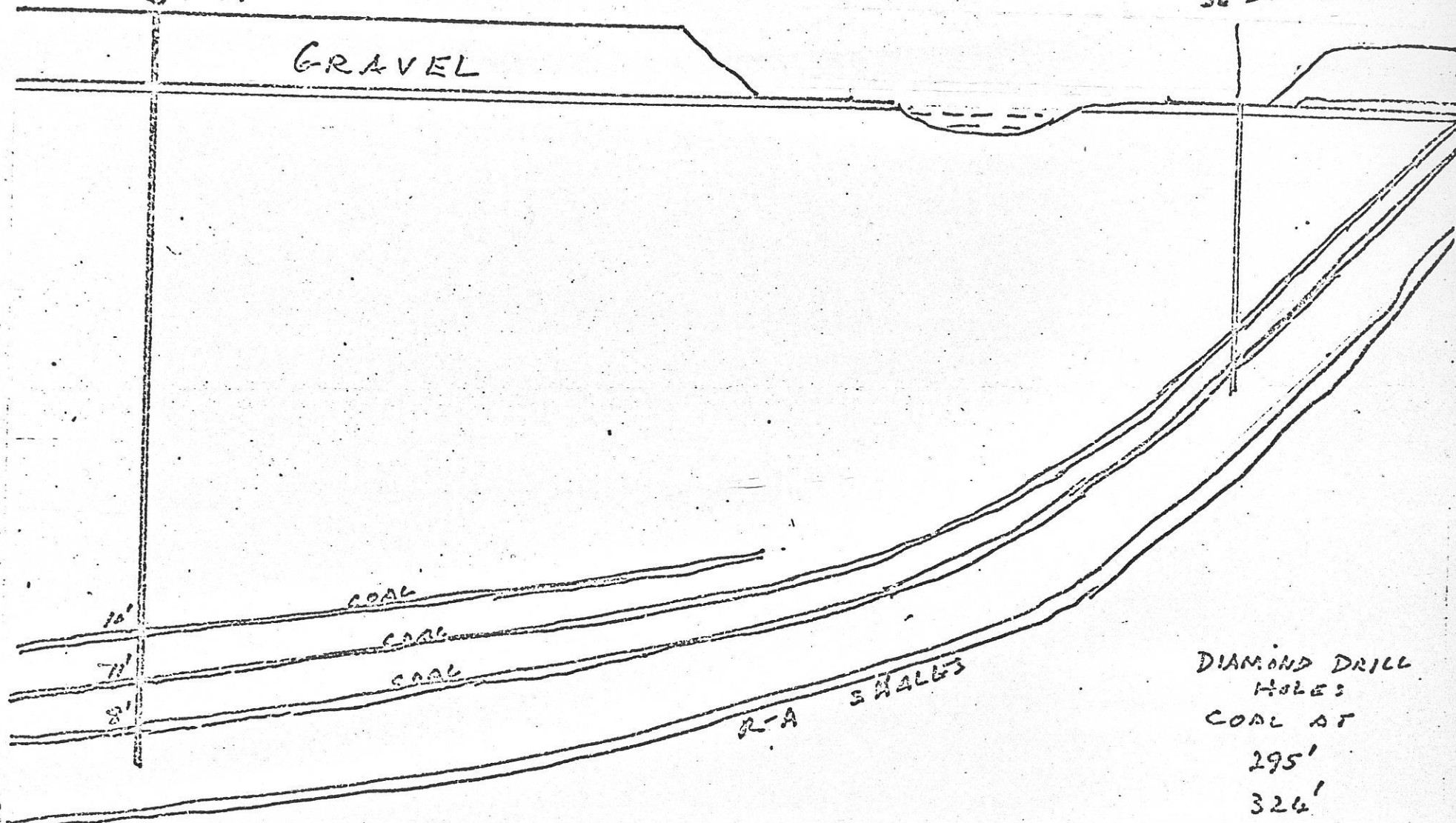
GARRAWAY MINE
 SECTION
 LOOKING NORTHEAST
 SCALE 1" = 100'
 MAIN SLOPE -- DUE WEST
 COAL SLOPE -- S 40 E
 SEAMS -- S 28 E
 DIP -- 45° NE.

0 1
 inches
 0 1 2
 centimetres

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③ W.L. D.D. HOLES &
2, 3, 4, 5, 6
17 & 9 W.L. D.D. HOLES

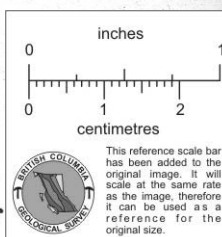
1 DD HOLE
To
32 DD HOLE

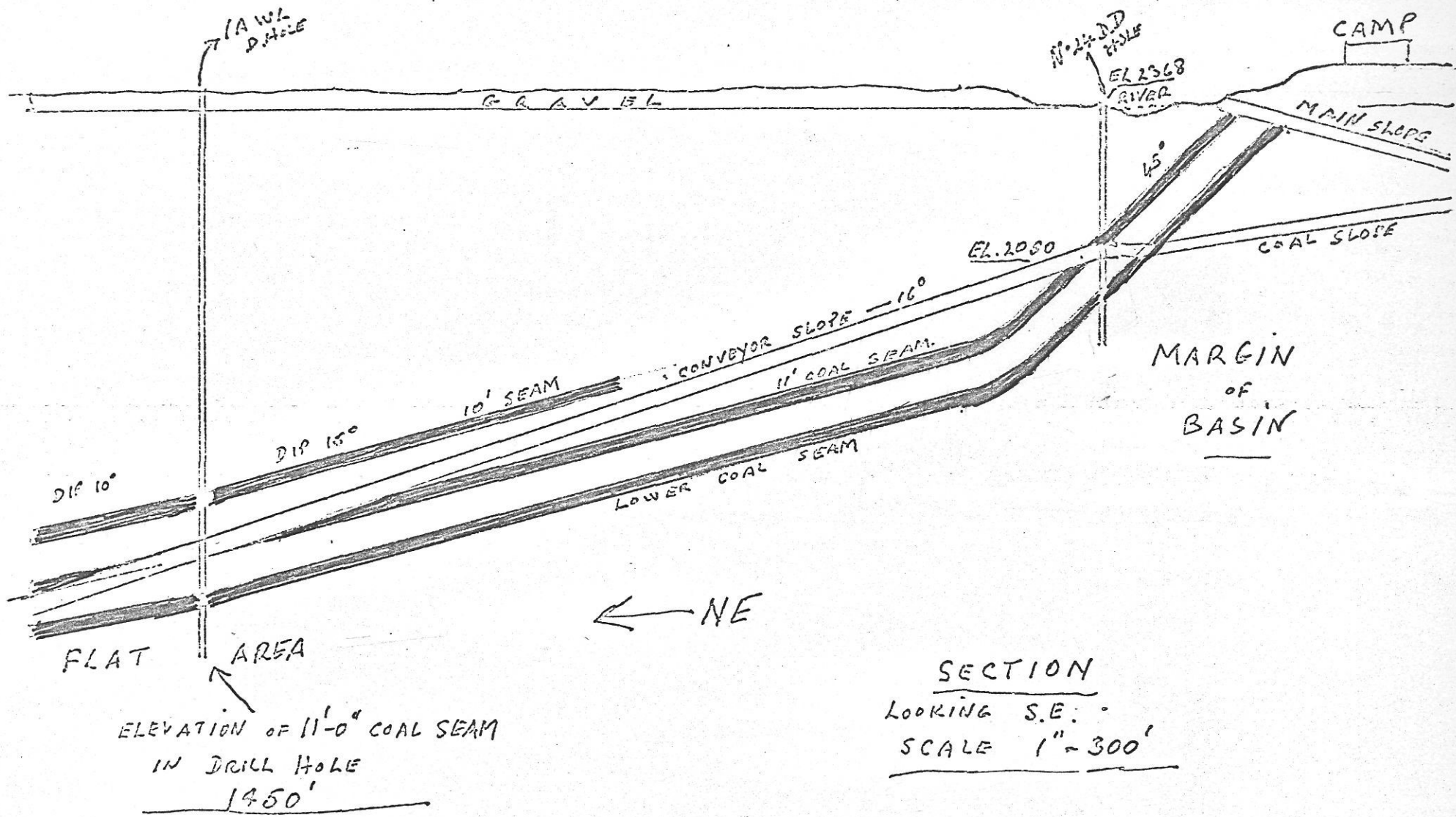


WIRE LINE DRILL HOLES
COAL AT
850', 900' & 950'

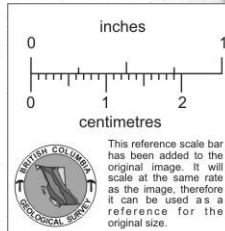
SCALE
1" = 200'

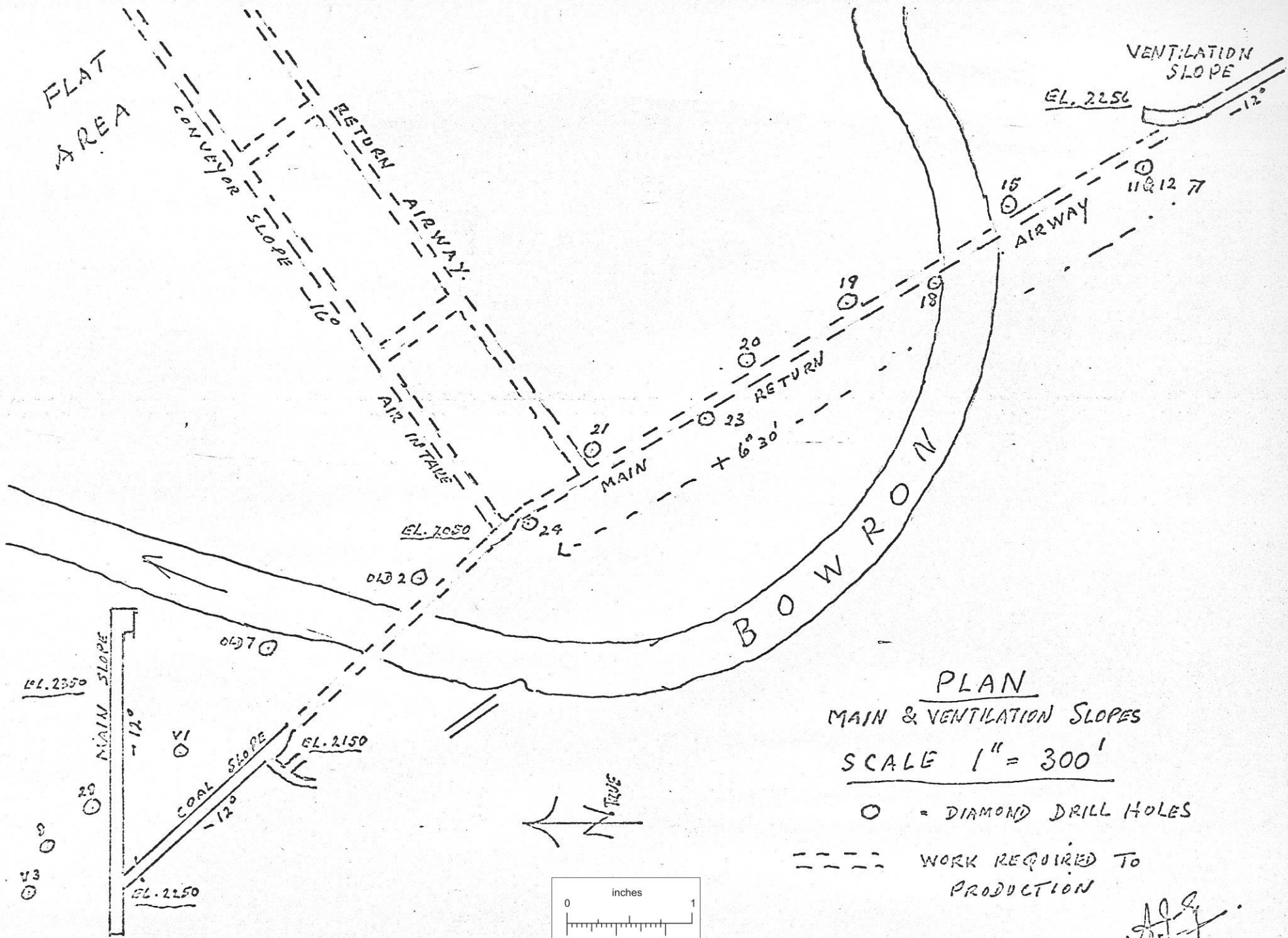
DIAMOND DRILL
HOLES
COAL AT
295'
324'
DIP TO NE





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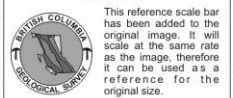
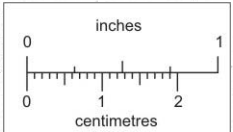




PLAN
 MAIN & VENTILATION SLOPES
 SCALE 1" = 300'

○ = DIAMOND DRILL HOLES

--- WORK REQUIRED TO PRODUCTION



Handwritten signature or initials.

COAL:

High Volatile Bituminous Class B, Coking.

	<u>At the surface and Top of Coal Slope</u>	<u>200 ft. vertically below sur- face. Bottom of Coal Slope</u>
Moisture	5.7 percent	Average 3 percent
Ash	7 percent	Average 4 percent
Vol. M.	40 percent	34.8 percent
Sulphur	0.8-1.2 percent	Average 0.80 percent

Hydrocyclones will clean sulphur below 0.80 percent

Average B.T.U.'s - 13,000

Coke Button

<u>At the surface and Top of Coal Slope</u>	<u>Bottom of Coal Slope</u>
1 & 1½	2½

Small coke button probably caused by extremely low ash. Small channel samples - 12 inches - taken from certain horizons in the seam have given Coke Buttons of 5 and 6.

Coal extremely easy to clean.

From the Entry to the bottom of the Coal Slope, particularly below the zone of oxidation, there has been a constant reduction in the percentage of Volatile Matter.

With the extension of the Coal Slope for a further 300 to 400 feet we would expect the Volatile Matter to be reduced to 30 percent or lower.

No Methane has been detected to date.

GRAVEL

SOLID MEASURES

NORTHERN COAL MINES LTD.

Vertical Backs & Distances Down
Pitch in Coal Seam and in Coal
Slope off Main Slope $AT -12^\circ$

SCALE 1" 40'

The limit of the Effects of Surface
Percolating Water is Expected to be
Between 200 and 400 Ft. down the
Coal Slope.

325' in COAL SLOPE
170' VERTICALLY
230' DOWN PITCH of SEAM

COKE BUTTON INDEX

Above Entry	1 and 1 1/2
Entry- Main Slope	1 1/2 & 2
38' down Coal Slope	2 & 2 1/2
70' down Coal Slope	2 & 3 1/2
200' " " "	2 & 4
300' " " "	2 & 5
400' " " "	2 1/2 & 5-6

Distance Down
Pitch in Coal Seam

Coke Button Index

Coal in Vent Slope 1 & 1 1/2

Coal In Entry - Main Slope 1 1/2 - 2

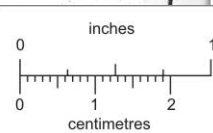
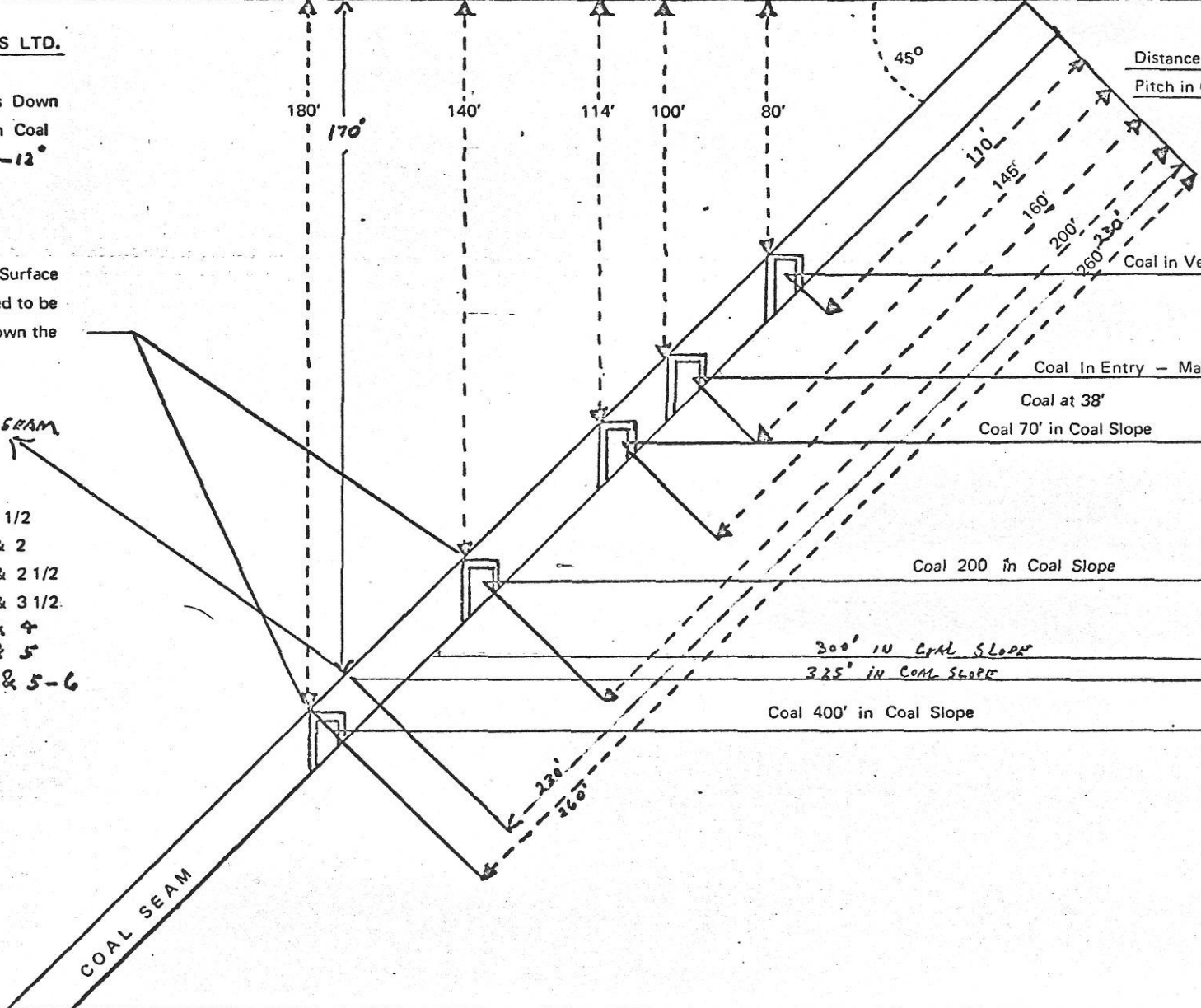
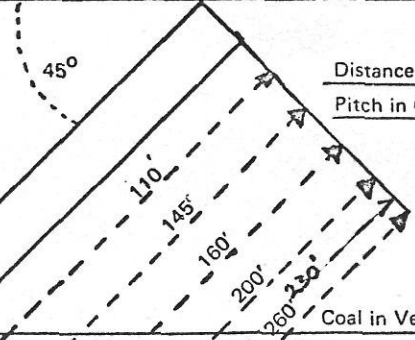
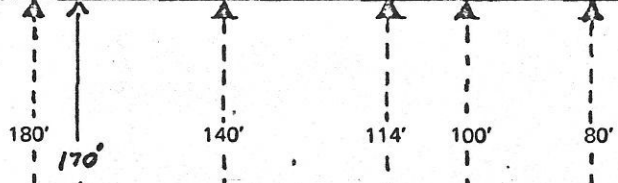
Coal at 38' 2 - 2 1/2

Coal 70' in Coal Slope 2 - 3 1/2

Coal 200' in Coal Slope 2 - 4

300' in Coal Slope 2 & 5

Coal 400' in Coal Slope 2 1/2 & 5-6



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.

PREPARATION PLANT

: Our coal has two very important features.

Not only is it a low ash coal, but all tests indicate that it is comparatively easily cleaned.

This would mean an Inexpensive Preparation Plant, and lower cleaning costs per ton of coal.

Cleaning tests of both coal core and bulk samples show a very high recovery of low ash coal.

CLEANING

Reducing the coal to $\frac{1}{2}$ " in order to recover the resins produces the ideal size for cleaning either by Cyclones or Air Cleaning.

Hydrocyclones require little floor space and operate on a closed circuit water system but require de-watering screens and/or efficient dryers.

Air Cleaning requires no medium or solution, nor water or settling ponds and eliminates or reduces the drying problem. There is no loss of B.T.U.'s to moisture and no pollution of streams or atmosphere. Air Cleaning effectively reduces sulphur.

Air Cleaning is excellent in areas where the winters are severe.

Hydrocyclones and Air Cleaning are superior to the Sink & Float method in reducing high ash and high sulphur impurities from $\frac{3}{4}$ " x 0 coal.

At this time all indications are that our coal could be effectively Air Cleaned and would mean a very substantial saving in the final cost per ton.

BLENDING

Based only on numerous Proximate Analyses, our coking coal would be most valuable in Blending, particularly with other coals containing 25% or less of Volatile Matter and more than 8% Ash.

11

RESINS:

High Temperature Hydrocarbon Fossil Resins.

The coal contains two types of resin:

Refined Resin & Amber Resin

Bulk sampling, under the supervision of Dr. J. Black, whilst driving the Coal Slope down in the 11 ft. coal seam in the Ventilation Slope returned an average of 3.66% of the Refined Resin. A few samples returned 8.86 percent.

The coal appeared to contain atleast the same quantity of the Amber Resin.

Research has been carried out by Dr. J. Visman, Head, Regional Research Laboratories, Edmonton, and by the Battelle Memorial Institute, Columbus, Ohio.

The results were very encouraging but for various reasons the research has not been completed.

REFINED RESIN:

A dark coloured material obtained by an extraction process. Not visible in the coal seam. It is completely soluble in pyridine and soluble in varying extents in a number of other solvents.

Softens at ~200C.

Similar to Congo Resin.

AMBER RESIN:

Visible in the coal seam and can be picked out of the coal.

Completely insoluble in chloroform, benzene, or pyridine.

Does not soften even at 400C and does not melt until ~450C.

Systematic testing has proved that when our coal is crushed to minus $\frac{1}{2}$ " and then passed over a $\frac{1}{4}$ " screen between 80 and 90 percent of both resins pass through the $\frac{1}{4}$ " screen with the fines.

RADIOACTIVE SHALES:

At the surface exposure in the river bank, the 15 ft. shale seam where Dr. Hacquebard obtained his highest readings, lies approximately 120 ft. horizontally southwest of the lower 8 ft. coal seam. A crosscut from the bottom of the Coal Slope has been advanced some 30 ft. horizontally southwest from the lower coal seam. This crosscut is 200 ft. vertically below surface. A scintillometer survey underground indicated that the 10 ft. of shales immediately below the lower coal seam carried readings equal to the highest readings obtained by Dr. Hacquebard on surface. This crosscut has to be extended 80 to 100 ft. to prove both the Uranium and Germanium in the 15 ft. shale seam.

GERMANIUM:

Six samples taken from the surface exposure and based on the value of Germanium at 29 cents per gram, returned the following:

\$0.72 - \$0.92 - \$3.60 - \$5.45 - \$9.10 and \$54.00 per ton for an average of \$12.38 per ton.

SURFACE:

In an area ten miles southeast along the assumed line of strike from the exposure in the river bank, a scintillometer survey was carried out over a distance of 4,500 feet. The radioactive shales and sandstones are lying under 25 to 30 feet of gravel overburden but readings of 2 to 3½ times background were indicated.

This survey line was carried Northwest over a 50 ft. gravel bench and we believe a D8 would expose these seams and the coal seams which should lie some 120 feet horizontally to the northeast.

HEAVY WATER:

The Bowron River has a very high Deuterium content and at the mine location has an abundant water supply and other features necessary for the production of low cost Heavy Water.

Canadian General Electric were favourably impressed with the possibility of a Plant at our mine but political policy insisted that the Plant be established in a designated area.

EXAMINED BY
DR. HACHECARD
R-A EXPOSURE

RIVER EL. 2350

HIGHEST
READINGS

OLD ADIT

11'-0" COAL

LOWER 8'-0" COAL

15'-0" RADIO-ACTIVE SHALE

SECTION

LOOKING S.E. FROM
LANDING AT BOTTOM OF COAL SLOPE

SCALE 1" = 4'-0"

ZONE OF

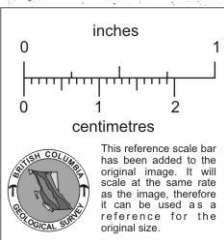
OXIDATION.

10'-0"
R-A SHALES
DOUBLE
SURFACE
READINGS

EL. 2150

LANDING
AT SLOPE
BOTTOM

CROSS-CUT



13

I understand that the Canadian National Railway has recently completed a Feasibility Study covering the transportation of our coal to Prince Rupert area for shipping to Japan.

This study was probably carried out on the basis of the proven 25 millions tons of coal and without considering the extremely high potential tonnage for the coal field.

Comparatively speaking, it will take very little diamond drilling to prove hundreds of millions of tons of coal. It is my firm belief that the first mine on our property should be planned for the production of 3 million tons annually for not less than 40 years.

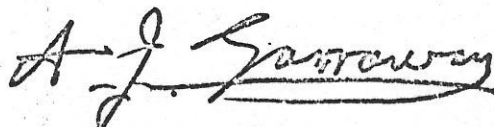
With due regard to the time interval, the mine should be designed for the simultaneous extraction of coal from the three seams.

Production of our coal, with loading facilities in the Prince Rupert area, would be of great value to other deposits which may be developed in this area of B.C. and certain areas of Alberta.

Northern Coal Mines Ltd. has expended approximately one million dollars on the property and at today's values the work carried out would cost between $1\frac{1}{2}$ and two million dollars.

It is estimated that for the final phases approximately \$400,000 will be required to extend the coal slope a further 300 - 400 feet, extend the cross-cut and bulk sample the 15 feet radioactive shale seam, carry out sufficient diamond drilling to prove an additional 50 - 60 millions tons of coal and complete a feasibility study on the property.

The work for the final phases was planned by Mr. R. B. Bonar, Mr. Tak Kobayashi and myself.



A. J. GARRAWAY
President & Mine Manager

14
4465 Dolores Place,
Victoria, B.C.
February 2, 1970.

3

To the President and Directors of Northern Coal Mines Ltd.

Dear Sirs:

At the request of your Managing Director I respectfully submit a resume of my interest and opinions regarding your property situated in the Bowron River Coal Field.

My first visit to the Bowron River Coal Field was in 1949 when the area near the Old Adit was being prospected by Mr. F. Wells of Prince George, however, since the acquisition of the coal licenses by Mr. A. J. Garroway I have visited the property several times and have been in close touch with all phases of the development to date due to the periodic visits of Mr. A. J. Garroway to my office at the Parliament Buildings.

COAL RESERVES

The area of the Bowron River coal basin is estimated at 10 square miles (Geological Survey of Canada, 1946) and is underlain by three coal seams of 10 feet, 11 feet, and 8 feet in thickness as indicated in D.D. hole No. 1A. These figures give possible reserves of coal of about 339,000,000 short tons of high volatile 'C' bituminous coal.

At your property the western outcrop of the field has been thoroughly drilled for approximately 12,000 feet and, with one D.D. hole No. 1A some 1,600 to 2,000 feet east of the outcrop it is my opinion that about 30,000,000 tons have been proven. The 12,000 feet of definitely proven outcrop is too strong an indication for the coal not to continue eastward for some considerable distance.

It is the recommendation of the writer that at least four drill holes be put down eastward of the western outcrop. No. 1 about 1,600 feet due east of D.D. No. 1A, and, if the coal seams are intersected as anticipated, then No. 2 should be drilled due east of No. 1 about 2,000 feet distant. Two further holes should be drilled, one 2,000 feet due south of No. 1 and the other 2,000 feet due south of No. 2. If these holes proved successful the estimation of tonnage proved would, in my estimation, be increased a further 50,000,000 tons.

SEAM GEOLOGY

The seams at the outcrop dip sharply eastward, varying from 40 to 45 degrees.

It was the opinion of the writer, after studying the topography of the basin and noting the somewhat broken nature of the immediate roof underground where the main slope of the present workings first intersected the seams that the structure had been turned up sharply below the outcrop and that the seams would flatten out as the workings proceeded eastward. This trend has been indicated by D.D. hole No. 1A. Further drill holes to the east, as recommended under "Coal Reserves," should, in the writer's opinion, prove the existence of a large flat area underlying the basin. This condition is a necessity if large scale economical mining is to be considered.

To date, only one fault has been indicated by the drill holes and the workings. This fault was intersected in the rock slope of older workings to the south and the trend of the fault was north-east. The drilling of the four holes, recommended in the paragraph "Coal Reserves" should indicate whether this fault continues north-east or turns eastward.

COAL

It is stated in the "Coal Reserves of Canada, 1946" that the Bowron Coal Basin is underlaid by three coal seams. This fact is also indicated by the results of D.D. hole No. 1A which intersected three coal seams of 10 feet, 11 feet, and 8 feet thickness.

In the present mine only the middle and lower seams have been contacted and worked. These two seams have been assayed with the following results:

Middle Seam, 11 feet thick

	<u>Top of Slope</u>	<u>400 Feet Down Slope (Face)</u>
Inherent M.	5.5	4.92
Ash	2.8	2.77
V.M.	39.7	36.5
F.C.	52.0	55.8
S.	1.2	0.85
S. Index	1	2.5
B.T.U.	not given	12,550

Lower Seam, 8 feet thick (at point of contact of rock slope and seam)

Moisture	14.1
Ash	2.6
V.M.	28.6
F.C.	54.7
S.	1.5
B.T.U.	12,470
S. Index	2.5

The coal in place is extremely hard and weathers exceedingly well. The ash content in both seams is remarkably low and the sulphur content appears to be decreasing as the workings penetrate into virgin coal below the oxidized zone.

The B.T.U. content indicates that the seams are on the border-line between high volatile 'B' and high volatile 'C' bituminous coals.

I do not have the assay of the top seam (10 feet) which was intersected by drill hole No. 1A.

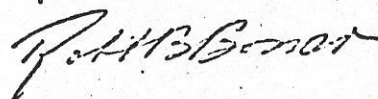
RECOMMENDATIONS

In addition to the four drill holes recommended under "Coal Reserves" I would further advise that the present workings be kept pumped out so that interested persons may inspect the workings especially the coal faces where dry samples could be taken.

If the mine is allowed to fill with water the workings would deteriorate to a larger extent. To pump out the water and repair the roadways would take considerable time not to mention expense thus delaying any inspection of the workings that an interested company would insist on.

As it appears that the coke button indices are improving as the workings advance into virgin coal below the oxidized zone I would recommend, if it is at all possible, that the face of the slope be advanced further into virgin coal where a coke button index more representative of the field could be obtained.

Respectively submitted,



Robert B. Bonar, P. Eng.

4

RE: NORTHERN COAL

The following note is an excerpt from a letter from Mr. L. P. Christmas, Department of Energy, Mines and Resources, Ottawa, dated November 19, 1970.

"In respect to markets for high volatile bituminous, I understand the Japanese are now interested in obtaining this type of coal to blend with the large quantities of low volatile that they have contracted for."



AUMAS, FERGUSON WILD, LTD.

SUITE 1650 GUINNESS TOWER, 1055 WEST HASTINGS STREET,
VANCOUVER 1, B.C., CANADA TELEPHONE (604) 683-2258
TELEX: 04-50244 CABLES: TRANSCOAST, VANCOUVER

October 5, 1970

(5)

Wisener & Partners Co. Ltd.,
220 Bay Street,
Toronto 1, Ontario

Attention: Mr. David W. Betts.

Dear Mr. Betts:

RE: NORTHERN COAL LTD.

This will confirm the writer's telephone conversation of today on the above subject.

We are working very closely with Northern Coal and feel that with some immediate funds to do the drilling, followed by a feasibility, that this will be a viable situation.

We can guarantee sale of the coal, subject only to clarification of analysis.

Enclosed is a card for future reference. You can count on our assistance in aiding Northern Coal towards ultimate production.

Yours truly,

AUMAS, FERGUSON WILD, LTD.

DAVID D. MARTIN
General Manager

DDM/am
Encl.



AUMAS, FERGUSON WILD, LTD.

SUITE 1650 GUINNESS TOWER, 1055 WEST HASTINGS STREET,
VANCOUVER 1, B.C., CANADA TELEPHONE (604) 683-2258
TELEX: 04-50244 CABLES: TRANSCOAST, VANCOUVER

October 21, 1970

Wisener and Partners Company Limited,
220 Bay Street,
Toronto 1, Ontario

Attention: Mr. David W. Betts

Dear Mr. Betts: RE: NORTHERN COAL LTD.

Our very sincere thanks for your kind letter of October 15th.

Before we could make any written proposal as to a general pricing structure for coal, you realize that the pricing depends, not only on the type of coal, but the chemical analysis.

We are very happy to learn that you have clients that are giving active consideration to financing Northern Coal on their next phase. We are also delighted to give you permission to forward to them, a copy of our letter of October the 5th.

Frankly Mr. Betts, we feel it is much too early to reduce to writing, even a guess estimate of pricing. When further underground work has been taken care of, adequate bulk sampling done, together with additional drilling, we then have true and indicative coal samples to assess the values based on analysis.

In the interim, we can assure you that as a Company, we feel we are more knowledgeable in the marketing of coal than anyone else in the coal marketing field. We have established connections, and subject only to analysis, we do know we can sell the Northern coal, and we are looking forward to the opportunity of representing them on their marketing program as their exclusive agents.

Continued



.....2

AUMAS, FERGUSSON WILD, LTD.

Add to our marketing knowledge, the expertise of our associates, the Gibson Transportation Company on transportation generally, and I am sure you realize we have a complete package deal for Northern Coal and their partners.

Shall keep in close touch, when the writer visits Toronto, and we look forward to having the opportunity of meeting with you, either there or on one of your early trips to Vancouver.

We want to be helpful, we would appreciate being kept informed, and you may count on our continuing support at all times.

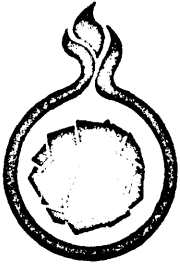
With kindest regards.

Yours very truly,

AUMAS, FERGUSSON WILD, LTD.

DAVID D. MARTIN
General Manager

DDM/am



MINE: PRINCE GEORGE RADIO
"GARRAWAY MINES"

MINE OFFICE:
3 - 1330 THIRD AVENUE
PRINCE GEORGE, B. C.
PHONE: 564 - 5818

Northern Coal Mines Ltd.

725 Suffolk Street,
Victoria, B. C.,
October 21, 1970.

⑥

Mr. David W. Betts,
Wisener Partners Company Limited,
220 Bay Street,
Toronto, Ontario.

Dear Mr. Betts:

Re: Meeting with Mr. Tak Kobayashi

Unlike all our previous discussions Mr. Kobayashi stated that high volatiles was no longer a problem. This was especially true in our case where our coking coal was so low in ash.

He suggested that the fusibility of the ash and carbon, the time and temperature of the coking process and the fluidity of the coke were the important factors. This, he said, would require very large samples in order for blending and testing to be carried out under commercial conditions. These large samples should come from the area where it is planned to mine the coal for export.

Discussing the possible increase in the price of coal, Mr. Kobayashi stated that the price for present contracts was from \$13.00 to \$14.50 per ton but that McIntyre had requested an increase to \$18.00 per ton F.O.B. Vancouver in 1971. Presently, coal being loaded from Hampton Road, Virginia, was \$18.58 per ton but is expected to be increased to \$20.00 per ton in 1971. Mr. Kobayashi anticipated Western Canadian coal would be \$20.00 per ton F.O.B. Vancouver by 1972.

Sincerely,

A. J. Garraway

AJG/LA

Nissho (Canada) Ltd.

SUITE 1112, UNITED KINGDOM BUILDING
409 GRANVILLE STREET
VANCOUVER 2, B.C., CANADA

CABLES: NISSHOCONY
VANCOUVER

TELEPHONE: 684-8351

TELEX: 04-5491

April 17, 1968.

MM-364

200 ft down Coal Slant

⑦

Mr. A. J. Garraway, President,
Northern Coal Mines Ltd.,
725 Suffolk Street,
VICTORIA, B.C.

Dear Sir:

Re: Assay Results of Coal Samples

Upon receipt of a coal sample from your Bowron River property, we forwarded same to Tokyo to get the assay, low ash grade being of special interest to us.

Now we have received the result of assay by telex this morning as follows:

Moisture: 5.2%
Ash: 4.8%
Volatile Matter: 39.3%
Fixed Carbon: 50.7%
Sulphur: 0.73%
Coke Button Index: 1

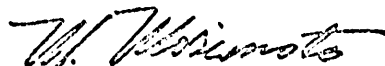
We trust that the above information will be of some help to you.

We would like to remind you that we seriously desire a sample representative of your coal at Bowron River.

We look forward to hearing from you with respect to the above matter at your earliest convenience.

Yours very truly,

NISSHO (CANADA) LTD.



M. Morimoto.



MM/sb

c.c. Mr. A. David Ross,
1232 Chartwell Cresc., West Vancouver

Tokyo Coal I

Nissho (Canada) Ltd.

SUITE 1112, UNITED KINGDOM BUILDING
409 GRANVILLE STREET
VANCOUVER 2, B.C., CANADA

CABLES: NISSHOCONY
VANCOUVER

TELEPHONE: 604-6351

TELEX: 04-5491

May 27, 1968.

MM-394

260 ft down Coal Slant

Mr. A. J. Garraway, President,
Northern Coal Mines Ltd.,
725 Suffolk Street,
Victoria, British Columbia.

Dear Sir:

Re: Assay Results of Bottled Coal Sample

We forwarded a bottled coal sample to Tokyo as soon as it was presented by you for assay.

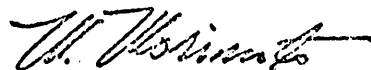
Now we have received the results of assay, as follows:

Moisture	4.6%
Ash	13.2%
Volatile Matter	36.9%
Fixed Carbon	45.3%
Sulphur	1.84%
Coke Button Index	1.5%

Our Tokyo branch is doing further assay on the material, after they wash same. We will advise you of the assay results of washed sample upon receipt of information from Tokyo.

Yours very truly,

NISSHO (CANADA) LTD.



M. Morimoto.



MM/sb

c.c. Mr. A. David Ross
1282 Chartwell Cresc., West Vancouver

Nissho, Tokyo, Coal-1
Nissho, New York - K. Miura, Gen. Comm. Sect.

CREST LABORATORIES LTD.

B.C. REGISTERED ASSAYERS
INDUSTRIAL and RESEARCH CHEMISTS

7911 ARGYLL ROAD
EDMONTON, ALBERTA
August 30, 1968.

(18)

Mr. A.D. Ross,
1232 Chartwell Crescent,
West Vancouver, B.C.

Lab No.: 517

Sample No.: 315 91

+ 1 inch

300 ft down Coal Slope

Dear Sir:

The results of the analysis on the above sample are as follows:

	<u>As Received</u>	<u>Dry Basis</u>
Moisture	7.4	
Ash	3.2	3.4
Volatile Matter	<u>36.0</u>	33.9
Free Carbon	53.4	57.7
B.T.U.'S	12,077	13,060
Sulphur	1.0	1.0
Free Swelling Index - 1		

Yours very truly,

CREST LABORATORIES LTD.


R. Sawyer,
Chemist.

c.c. Northern Coal Mines Ltd. - Prince George, B.C.

RS/and

CREST LABORATORIES LTD.

B.C. REGISTERED ASSAYERS
INDUSTRIAL and RESEARCH CHEMISTS

7911 ARGYLL ROAD
EDMONTON, ALBERTA
August 30, 1968.

19

Mr. A.D. Ross,
1282 Chertwell Crescent,
West Vancouver, B.C.

Lab No.: 513

Sample Marked: 515 02

$\frac{1}{2}'' \times \frac{1}{4}''$

300 ft down Coal Slope

Dear Sir:

The results of the analysis on the above sample are as follows:

	<u>As Received</u>	<u>Dry Basis</u>
Moisture	7.6	
Ash	1.2	1.2
Volatile Matter	<u>24.3</u>	37.7
Free Carbon	96.4	61.1
B.T.U.'s	12,404	13,436
Sulphur	0.8	0.8
Free Swelling Index - 1		

Yours very truly,

CREST LABORATORIES LTD.

R. Sawyer
R. Sawyer,
Chemist.

c.c. Northern Coal Mines Ltd., - Prince George, B.C.

RS/led

CREST LABORATORIES LTD.

B.C. REGISTERED ASSAYERS
INDUSTRIAL and RESEARCH CHEMISTS

7911 ARGYLL ROAD
EDMONTON ALBERTA

20

Post marked mailed on
Sept 25/68 to NCM

Mr. A.D. Ross,
1282 Chartwell Crescent,
West Vancouver, B.C.

Lab No. 525

Sample Unpacked (Northern Coal Mines Ltd.)

300 ft. down Coal Slope

Dear Sir:

The results of the analysis on the above sample are as follows:

	<u>As Received</u>	<u>Dry Basis</u>
Moisture	6.9	
Ash	4.1	4.5
Volatile Matter	<u>35.4</u>	38.0
Free Carbon	53.4	57.3
B.T.U.'s	<u>11,739</u>	12,602
Sulphur	0.8	0.8
Free Swelling Index - 1		

+ / rncH

Yours very truly,
CREST LABORATORIES LTD.

R. Sawyer
R. Sawyer,
Chemist.

c.c. Northern Coal Mines Ltd.,
P.O. Box 2, Prince George, B.C.

RS/lb

Certificate of Analysis

**GENERAL TESTING LABORATORIES DIVISION
SUPERINTENDENCE COMPANY (CANADA) LTD.**

(21)



ANALYTICAL AND CONSULTING CHEMISTS

BULK CARGO SPECIALISTS - SURVEYORS - INSPECTORS - SAMPLERS - WEIGHERS

MEMBER:
AMERICAN SOCIETY FOR TESTING MATERIALS
THE AMERICAN OIL CHEMISTS' SOCIETY
AMERICAN COUNCIL OF INDEPENDENT LABORATORIES, INC.
CANADIAN TESTING ASSOCIATION

1001 EAST PENDER STREET
VANCOUVER 6, B.C.
CANADA

REFEREE AND/OR
OFFICIAL CHEMISTS FOR:
VANCOUVER MERCHANTS EXCHANGE
NATIONAL INSTITUTE OF OILSEED PRODUCTS
THE AMERICAN OIL CHEMISTS' SOCIETY

OFFICIAL WEIGHMASTERS FOR:
VANCOUVER BOARD OF TRADE
VANCOUVER MERCHANTS EXCHANGE

November 19, 1968

Mr. Ross,
1282 Chartwell Crescent
West Vancouver, B.C.

No. 58982

WE HAVE TESTED a submitted sample of coal, received on November 12, 1968 and report as follows:-

400 ft down Coal Slope

ANALYSIS:

Moisture (air dried)	2.02%	1387
The following analysis is on an air dry basis:-		
Moisture	6.92%	3.24
Volatile Matter	36.50%	38.
Ash	2.77%	3, 35
Fixed Carbon	55.81%	52.
Calorific Value (S.D. 8/15)	12,550	
Sulphur	0.85%	71
Free Swelling Index	2 1/2	2 1/2

COPY

GENERAL TESTING LABORATORIES DIVISION
SUPERINTENDENCE COMPANY (CANADA) LTD.,

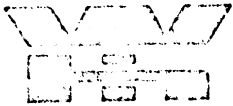
W.B. Sizer

per _____
W.B. Sizer - Chief Chemist

58.04 52.
33.37 38

robo

1	2 1/2	1 1/2	2 1/2
2	2	1 1/2	2
3	4	1 1/2	3 1/2
4	2 1/2	1 1/2	2 1/2



WARNOCK HERSEY
INTERNATIONAL LIMITED

PROFESSIONAL SERVICES DIVISION

125 East 4th Ave., Vancouver 10, B. C. Phone 876-4111 — Telex 04-50353

REPORT OF: Chemical Analysis
AT Vancouver Laboratory
PROJECT: Coal Sample
REPORTED TO: C. Itoh & Co. Ltd.,
409 Granville Street
Vancouver, B.C.

FILE NO: 465 - 11487

DATE May 1, 1970

REPORT NO:

ORDER NO:

SAMPLES CUT BY MR. R.B. BONAR
FACE OF LANDING

We have tested three samples of Coal submitted by you on April 27, 1970 and report as hereunder:

SAMPLE IDENTIFICATION

- Sample No. 1 - Top 30"
- Sample No. 2 - Bottom 58" of seam
- Sample No. 3 - Whole Seam

TEST RESULTS

	<u>Sample No. 1</u>	<u>Sample No. 2</u>	<u>Sample No. 3</u>
Total Moisture (as received)	5.83 %	6.71 %	5.93 %
Surface Moisture (as received)	2.36 %	3.68 %	2.92 %
Inherent Moisture (air dry)	3.55 %	3.15 %	<u>3.10 %</u>
Ash (air dry)	9.70 %	12.15 %	12.40 %
Volatile Matter (air dry)	38.50 %	38.70 %	38.60 %
Fixed Carbon (air dry)	48.25 %	46.00 %	45.90 %
Sulphur (S) (air dry)	0.77 %	1.61 %	1.05 %
Free Swelling Index	1	1	1

WARNOCK HERSEY

T.M. Williams
T.M. Williams
SUPERVISOR, GENERAL LABORATORY



WARNOCK HERSEY
INTERNATIONAL LIMITED

PROFESSIONAL SERVICES DIVISION

125 East 4th Ave., Vancouver 10, B. C. Phone 876-4111 — Telex 04-50353

REPORT OF: **Chemical Analysis**
AT **Vancouver Laboratory**
PROJECT: **Coal Samples**
REPORTED TO: **Northern Coal Company Ltd.,
725 Suffolk Street
Victoria, B.C.**

FILE NO: **465 - 12848**
DATE **October 8, 1970**
REPORT NO:
ORDER NO:

ATTENTION: Mr. Garraway

We have tested the samples of coal submitted by you on September 25, 1970 and report as hereunder:

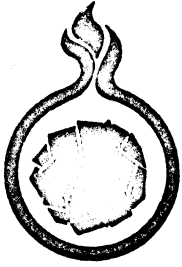
TEST RESULTS

<u>Sample No.</u>	<u>Resin Content (percent by weight)</u>			
1	2.13			
3	2.79			
4	1.95			
5	2.13			
6	0.80			
7	1.47			
8	0.16			
	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 5</u>	<u>Sample 7</u>
Surface Moisture	3.30 %	3.34 %	2.54 %	2.44 %
Inherent Moisture	3.77 %	3.50 %	3.79 %	3.78 %
Ash	10.5 %	11.5 %	9.9 %	9.8 %
Volatile Matter	36.97 %	38.07 %	36.86 %	37.07 %
Fixed Carbon	48.76 %	46.93 %	49.45 %	49.35 %
Sulfur	0.92 %	0.92 %	0.92 %	0.94 %
B.T.U.'s per lb.	11,901	11,901	12,026	12,101
Free Swelling Index	1	1	1	1

All results reported on the air dry basis except surface moisture which is reported on the as received basis.

WARNOCK HERSEY

J.A.J. Thompson
J.A.J. Thompson, Ph.D.
MANAGER, CHEMICAL DEPARTMENT



MINE: PRINCE GEORGE RADIO
"GARRAWAY MINE6"

MINE OFFICE:
3 - 1330 THIRD AVENUE
PRINCE GEORGE, B. C.
PHONE: 564-5816

Northern Coal Mines Ltd.

8

CHANNEL SAMPLES

FACE OF LANDING

Sample	Surface Moisture	Inherent Moisture	Volatiles	Fixed Carbon	Ash	Sulphur	F.S.I.	BTU's	Soluble Resin	Amber Resin
1	3.30	3.77	36.97	48.97	10.5	0.92	1	11,901	2.13	2.13
2	3.34	3.50	38.07	46.55	11.5	0.92	1	11,901		
3								Fines below $\frac{1}{4}$ "	2.79	
4								Fines below 10 mesh screen	1.95	
5	2.54	3.79	36.86	49.45	9.9	0.92	1	12,026	2.13	
6								Fines below 20 mesh screen	0.80	
7	2.44	3.78	37.07	49.35	9.8	0.94	1	12,101	1.47	
8								Fines below 28 mesh screen	0.16	

Each sample (Nos. 1, 2, 5, and 7) was crushed to pass through the 1/2 inch screen, thoroughly mixed and quartered down to 10 pounds.

NO. 1 SAMPLE:

Weight of sample	10 lbs.
Above $\frac{1}{4}$ " screen	6 lbs.
Below $\frac{1}{4}$ " screen	4 lbs.

NO. 2 SAMPLE:

Weight of sample	10 lbs.
Above $\frac{1}{4}$ " screen	6 lbs.
$-\frac{1}{4}$ " x 10 mesh	$2\frac{1}{2}$ lbs.
Below 10 mesh	$1\frac{1}{2}$ lbs.

NO. 5 SAMPLE:

Weight of sample	10 lbs.
Below $\frac{1}{4}$ " screen	4 lbs.
Above 20 mesh	3 lbs.
Below 20 mesh	1 lb.

NO. 7 SAMPLE:

Weight of sample	10 lbs.
Below $\frac{1}{4}$ " screen	4 lbs.
Fines above 20 mesh	3 lbs.
Fines 20 x 28 mesh	$\frac{3}{4}$ lb.
Fines below 28 mesh	$\frac{1}{4}$ lb.

LOCATION OF SAMPLING

The samples were cut from the face of the landing at the bottom of the Coal Slant in the 11 ft. coal seam. The face had not been worked for some two months and the percolating waters in the zone of oxidation had gradually seeped down into the coal through minute cracks caused by blasting. The face is immediately below the zone of oxidation and has therefore been subjected to a certain degree of oxidation from the moisture which, at this point, can be expected to carry a high percentage of sulphur.

The face is 200 feet vertically below surface and 280 feet down the full pitch of the seam from surface.

The samples were taken on the same day that Mr. Bonar cut samples received by Warnock Hersey dated April 27, 1970.

DESCRIPTION OF SAMPLES

NO. 1 SAMPLE:

Channel sample cut across the seam.

NO. 2 SAMPLE:

Channel sample across the seam crushed to pass through $\frac{1}{2}$ " screen and then coal passed over a $\frac{1}{4}$ " screen. All coal passing through the $\frac{1}{4}$ " screen was then passed over a Tyler 10 mesh screen. Fines going through 10 mesh were discarded. All coal above 10 mesh in sample.

NO. 3 SAMPLE:

Fines below $\frac{1}{4}$ " screen tested for refined (soluble) resin.

NO. 4 SAMPLE:

Fines from No. 2 sample passing through the 10 mesh screen tested for refined resin.

NO. 5 SAMPLE:

Sample cut across seam. Crushed to pass through $\frac{1}{2}$ " screen. Fines below $\frac{1}{4}$ " screen were pulverized to pass through a Tyler 10 mesh screen. These fines were then passed over a Tyler 20 mesh screen. All coal above 20 mesh screen in the sample.

NO. 6 SAMPLE:

Fines from No. 5 sample passing through the 20 mesh Tyler screen tested for refined (soluble) resin.

NO. 7 SAMPLE:

Sample cut across face and crushed to pass through $\frac{1}{2}$ " screen and then over a $\frac{1}{4}$ " screen. Fines passing through $\frac{1}{4}$ " screen crushed to pass through 10 mesh screen. Fines then passed over a 20 mesh screen. Fines passing through 20 mesh screen were then passed over a 28 mesh screen. All coal above 28 mesh screen in sample.

NO. 8 SAMPLE:

Fines from No. 7 sample that passed through the 28 mesh screen were tested for refined resin. The average resin (Refined or Soluble) content in the 11 ft. coal seam determined by bulk sampling is about 4 percent. Visual inspection has convinced us that there is at least the same percentage of Amber resin in the coal.

Therefore, we must assume that in the No. 1 sample there is the same percentage of Amber resin as there is of the Soluble resin.

Research carried out by Dr. J. Visman of Edmonton indicated that when the coal is crushed to pass through a $\frac{1}{2}$ " screen and then passed over a $\frac{1}{4}$ " screen that the fines below $\frac{1}{4}$ " contained a very high percentage of the resins.

⑨

NORTHERN COAL MINES

The following is a summary of estimates of the coal mining costs of Kaiser, McIntyre Porcupine, and Northern Coal.

Kaiser Resources

Annual Tonnage - 5,000,000 long tons
Recovery rate - 85%
Tons of raw coal mined - 5,882,000
Contract price - \$12.85 U.S. f.o.b. Roberts Bank

Rail Distance (Roberts Bank) - 700 miles

Estimated Capital Structure - Equity - \$70,000,000
- Debt - \$90,000,000

Estimated Construction Costs - \$115,000,000

	<u>Costs/Long Ton</u>	
	<u>Prospectus</u>	<u>Present Estimate</u>
Production	\$ 3.80	\$ 5.25
Port Handling	0.50	0.50
Rail Transportation	3.90	3.90
Depreciation, depletion, deferred charges	1.56	2.00
Interest	.64	1.70
G. & A.	<u>.78</u>	<u>.84</u>
Total Cost/Long Ton	\$11.18	\$14.19

Price increases are anticipated in order to give Kaiser a 'reasonable' return on invested capital.

McIntyre Porcupine Mines

Annual Tonnage - 2,000,000 long tons
Recovery Rate - 80%
Tons of raw coal mined - 2,500,000 long tons
Contract price - \$13.90 U.S. f.o.b.
Neptune Terminals

Rail Distance (Neptune Terminals) - 700 miles

Estimated Capital Structure (for coal operation only)

- equity - nil
- Debt - \$58,000,000

Estimated Construction Costs - \$50,000,000

	<u>Costs/Long Ton</u>	
	<u>Low</u>	<u>High</u>
Production	\$ 6.00	\$ 6.50
Port Handling	0.50	0.50
Rail Transportation	3.51	3.51
Depreciation	1.45	1.62
Interest	1.53	1.88
G. & A.	<u>0.50</u>	<u>0.62</u>
Total Cost/Long Ton	\$13.49	\$14.63

Price increases are anticipated in order to give McIntyre a 'reasonable' return on invested capital.

Northern Coal Mines

Annual Tonnage - 3,000,000 long tons
Recovery rate - 85%
Tons of raw coal mined - 3,529,000
Contract Price - \$18.00 f.o.b. Vancouver or
Prince Rupert (see Note 1)

Rail Distance - Vancouver - 755 miles
- Prince Rupert - 500 miles

Estimated Capital Structure - equity - \$10,000,000
- debt - \$60,000,000

Estimated Construction Costs - \$60,000,000

	<u>Costs/Long Ton</u>	
	<u>Low</u>	<u>High</u>
Production	\$ 5.00	\$ 6.00
Port Handling	0.60	0.60
Rail Transportation (Note 2)	4.25	4.25
Depreciation	1.40	1.45
Interest (Note 3)	1.70	1.70
G. & A.	<u>0.50</u>	<u>0.50</u>
Total Cost/Long Ton	\$13.45	\$14.50

Note 1: Shipping time from Prince Rupert will be one day shorter to Japan than from Vancouver. It is therefore conceivable that the f.o.b. price Prince Rupert would be higher than \$18.00 per long ton.

Note 2: This cost assumes the coal is transported 755 miles to Vancouver. If the coal is transported the 500 miles to Prince Rupert, the cost would be decreased to \$2.80 per Long Ton (improvement of \$1.45 per long ton).

Note 3: Interest cost in first year only. The interest cost will decrease as cash flow is used to repay bank loans. Debt assumed to be at 8½% interest rate.

Summary

At this stage of development, the coal mine of Northern appears to be a feasible project. It is anticipated that mining costs will be lower than those of McIntyre. Geological inferences are that both the roof of the mine and the floor are more suitable for coal mining.

The proposed port at Prince Rupert will give Northern a distinct advantage with respect to rail and ocean shipping costs. The former will significantly reduce their costs. The shorter ocean distance will either induce a better price or improve their market position because of a lower cost to the Japanese to transport the coal.

D.W. Betts
November 3, 1970

SUMMARY

FINANCIAL

Audited financial statements for the year ended September 30th, 1970, are not yet available. Those for the period ended July 31st, 1970, should be available soon.

The company president, A. J. Garroway, estimates the following:

a. Total Assets	\$1,000,000
b. Working Capital	nil
c. Total Liabilities	\$ 12,000

THE MINE

The mine is located approximately 60 miles from Prince George, British Columbia, in an area known as the Bowron Valley. An old geologic survey (Coal Reserve of Canada, 1947) indicated that 10 square miles of the area was underlain with coal. A current estimate indicates that the area is more probably in the order of 32 square miles. Northern Coal Mines Ltd. has coal licenses covering approximately 27 square miles in this region. Intentions are that an additional 7 square miles will be licensed.

COAL RESERVES

At this stage in the drilling program, the extent of the coal deposits have not been clearly defined. The company indicates the following:

Proven reserves	30,000,000 tons
Probable reserves	50,000,000 tons additional
Possible reserves	339,000,000 tons inclusive

The proven reserves are not enough to justify a mine. The drilling program must continue to prove more coal. The company expects the area will produce 6 million tons of coal per year when development is complete.

TYPE OF COAL

At this stage of development, the coal is oxidized and has a fairly low coke button index (C.B.I.) which indicates the coke is quite soft. The specification improves as the workings advance and at present it is probable the run-of-mine-coal will correspond to a medium to high volatile type coal. Ash content is expected to be less than Kootenay coal. Sulphur content will probably be in the range of 1.0%.

In summary, it is probable that the coal will be of at least fair to good coking quality. Its low ash content would make it very desirable for blending with Kootenay, or similar type, coal.

EXPECTED PRICE

The current price for high volatile coal, according to the manager of a large Japanese trading company in Vancouver, is in the range of \$13.00 to \$15.00 per ton. It is felt that \$18.00 would be a reasonable price to expect in 3 years, given the projected world supply/demand relationship. Preliminary cost estimates indicate that the mine would be very profitable at this price (or even at \$16.00/ton).

RAIL TRANSPORTATION

CNR have made a feasibility study of the area and have indicated (verbally) that a 25 mile spur line to the mine site would be very straight forward. It is the company's intention to again open discussions with CNR to determine whether a definite commitment can be made.

The company intends to ship the coal from the deep sea port at Prince Rupert. This part is now under study by the Provincial and Federal Governments. Alternatively, the coal would have to be transported to Vancouver (Neptune Terminal, for example).

DEVELOPMENT PROGRAM

The exploration and development program is planned in three stages:

Stage 1

Two drill holes, including electric logging, to determine if the seam is flat lying and to determine the quality of the coal. Current workings are in coal which is partially oxidized and tests on this coal are not considered to be similar ^urun-of-mine tests.

Concurrently, the seam will be advanced and the landing will be completed. The Stage 1 financing, \$105,000 may be sufficient to drill an additional one or two holes.

Stage 2

Assuming the geology and tests on the coal at Stage 1 ^{are} as expected, Stage 2 will be started. This program will include more drilling to prove more coal reserves and will also advance the seam to the flat-lying part of the seam.

A letter of intent should be obtained from the Japanese towards the end of Stage 1 and start of Stage 2.

The estimated cost of this phase is in the order of \$200,000 to \$300,000.

Stage 3

Final feasibility study. This must be done on run-of-mine coal. Drilling probably will continue to prove more coal reserves. At this stage a contract should be signed and the process should continue to final financing and construction.

The cost of this phase is very indefinite but is currently estimated at between \$1,000,000 and \$1,500,000.

FINANCING

There will be financing in the order of 8,366,000 shares outstanding when all commitments to prevent shareholders have been satisfied. The objective in the financing program is to give the financing and operating partner no less than 60% of all shares outstanding when final financing has been completed.

It has been proposed and agreed to by the company that financing proceed in three stages corresponding to the development program. Each stage is conditional upon the success of the previous phase.

Stage 1

The new partner would purchase 750,000 treasury shares at \$0.15. Proceeds to the company would be \$112,500.

Stage 2

The new partner would purchase 1,500,000 shares at \$0.15. Wisener and Partners would purchase an additional 200,000 shares for market. Proceeds to the company would be \$255,000.

Stage 3.

The new partner would purchase 2,000,000 shares at \$0.50. Wisener and Partners would purchase an additional 500,000 shares for market. Proceeds to the company would be \$1,250,000.

Under the proposed financing, to the end of Stage 3, the distribution of shares would be as follows:

	<u>Shares (%)</u>
Present shareholders	8,366,000 (62.8)
New partner - not including WISCO shares	4,250,000 (31.9)
- including WISCO shares	4,950,000 (37.2)
	<hr/> 13,316,000 (100)

Final financing arrangements must give the new financing partner not less than 60% of the shares then outstanding (assumes the new partner purchases WISCO shares).

D. W. Betts.

October 13, 1970.

NORTHERN COAL MINES

(11)

October 21st, 1970

The following data supplements the notes dated October 13, 1970.

1. The mine is currently not operating due to lack of funds (as noted, there is no working capital). Three men are required to maintain the mine at the present status. This is being financed by the promoters and their friends. The minimum carrying cost is estimated at \$6,000 per month. The mine has been at a standstill (at this cost) for several months.
2. At stage 1 of the exploration and development program, the estimated cost is \$10,000 per month for 8 men. To provide for contingencies, a more realistic budget figure would be in the order of \$12,000 to \$15,000 per month.
3. At stage 2, at which point you will probably have decided to proceed to make a mine, Mr. Garraway estimates the cost at \$30,000 per month. This provides for a two shift operation in order to advance the workings quickly to the flat-lying part of the seam.

In addition, capital costs of an estimated \$35,000 will be required for a new mucking machine and 9 mine cars.

The projected price of \$18 per long ton for the coal now appears to be a very realistic price to expect.

DWB/cem
Oct. 21, 1970

David W. Betts

Northern Coal Mines

Shares Outstanding

(12)

Following is an approximate summary of the shares outstanding. A final list from the trust company will be available soon.

Shares Outstanding
as of October 13, 1970

<u>Company Officers</u>	<u>Shares</u>
Alfred J. Garraway - President	200,000
 <u>Company Directors</u>	
Morris M. Menzies	140,000
Alfred D. McIsaac	391,000
Wesley D. Waines (and family)	500,000
A. D. Group (represented by A. D. McIsaac)	1,100,000
A. David Ross	<u>500,000</u>
	2,631,000
 <u>Other</u>	
Brameda Resources	1,000,000
Menzies Holdings	<u>90,000</u>
	1,090,000
Major shareholder's total	3,921,000
Float	1,799,000
Total	5,720,000

Share Commitments as of Oct. 13, 1970

<u>Shareholder</u>	<u>Amount Advanced</u>	<u>Per Share</u>	<u>No. of Shares</u>
Wesley D. Waines	\$ 50,000	\$0.18	276,000
Alfred J. Garraway			
Alfred D. McIsaac	20,000	0.167	120,000
Wesley D. Waines	33,000	Note 1	
A. D. Group	100,000	0.133	750,000
A. D. Ross	150,000	0.30	500,000
Other (see Note 1)			<u>1,000,000</u>
Total Commitments			2,646,000

Note 1:

One million shares are due to shareholders of Cariboo Collieries for money advanced to Northern. Included in this 1,000,000 shares are the shares committed to Mr. Waines.

Approximate Total Shares Outstanding 8,366,000

D. W. Betts
Oct. 30, 1970