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OPEN FILE

REPORT ON THE BEAR RIVER COAL AREAS PURCHASED

BY A.E.HEPBURN ESQ., VANCOUVER,B.C.

To

A.E.Hepburn, Esq.,

317 Finch Building,

Vancouver, B.C.

Dear Sir:-

In accordance with your instructions, I have visited the coal areas referred to in the heading of this report, situated on Bear River, Cariboo District. I have also laid out a certain amount of exploration and development work which has been completed and the result of which has fully borne out my original anticipation, and is more particularly described in the body of this Report.

DESCRIPTION OF PROPERTY

The property consists of 14 full sections, approximately 9,100 acres. It is shewn on Plan No. 1 attached hereto. It is situated on Bear River in the Cariboo District of British Columbia, the River intersecting it from South to North. It is within 8 miles of the proposed route of the Grand Trunk Pacific Railway which is now being constructed. It is about 65 miles from Barkerville, the old head-quarters of the Mining industry of the Cariboo District. It is 125 miles distent from Quesnel, which is at present the most active and rising city in that District. It is about 40 miles as the crow flies, and 75 miles by water from Fort George, which is destined to

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become an important railway centre at the junction of the Fraser and Nechaco Rivers, and it is approximately 120 miles from Tete Jaune Cache, which will be the most important City of the Northern Section of the Canadian Northern Railway about to be built from the Yellow Head Pass down the North Thompson River to the Coast, forming the third great Transcontinental railway.

From this description it will be seen that your property is in the centre of a new district which will be developed by two new Transcontinental Railway Syetems, and by them ultimately connected with a third, the Canadian Pacific Railway, at Kamloops and Ashcroft. In addition to this, it has now been demonstrated that the Fraser is navigable for steam craft from Fort George to Tete Jaune Cache, and south from Fort George to Soda Creek. It is believed that the lower reaches of the Fraser, as far South as Lillooet, can also be rendered navigable. This important water communication will give an easy and cheap transportation to the surrounding country, and enable a large local trade to be developed independent of the railways. When the latter are in operation, the transportation facilities will be unique.

The surface of the property is very regular and is free from evidence of any geological disturbance. It is covered with timber of a moderate size, suitable for mining purposes, and the general conditions are favorable for establishing a mining plant and conducting surface work all the year round.

T I T L E

The whole of the coal areas referred to are held by you under Licenses from the Provincial Government of

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British Columbia. The title is indefeasible and can be renewed from year to year by the payment of $100 per section, on making a declaration that an amount of development work equal to $100 per section has been done on the property during each year.

The Licenses can, however, at any time, be merged into a Crown Grant on payment of $5.00 per acre.

This is the best title that it is possible to hold to Coal lands.

GEOLOGICAL REPORT

The coal deposits are in the Cretaceous formation, occupying an area of about 5 miles North and South and an indeterminate distance East and West, but judging from the geological evidence, I would assign it a total area of not less than 50 square miles.

Your areas are located in the Western portion of this Basin near the out-crop. The one extension stretches out towards the Fraser River and remains to be definitely located. Plan No.2., attached, shows the Geological features of the surrounding country. The Basin is defined on every side by volcanic rock, which I carefully examined and outlined on the map. The main coal out-crop is at the extreme South West of the property on the Section marked "A" on plan No.1. I took accurate measurements of this exposure and have prepared a detailed section which is submitted herewith and numbered "3". From this you will see that the exposure is a very important one containing a

number of seams of coal of workable thickness. The coals, except where otherwise described, are clean and free from shale or bone. Grouped together, you have three excellent working seams, one 8 feet, another 6 feet, and the third developed by recent operations 18 feet, in thickness. The seams have a dip ranging from 15 to 50%, but it is not likely that this dip is continued for any great distance, because at the opposite side of the Basin where the second exposure is made on the North the measures are comparatively level showing that they come up again.

I have appended a hypothetical Section, No. 4, which gives the probable depth of the coal measures on a sectional line from E. to F. across your property. This sectional line is shewn on Plan No.1.

I have also appended a plan on a smaller scale, No.5, which shows the geographical position of the property with respect to the important points in the Cariboo District. The Second exposure of coal is on Section "B", 5 miles North of the original exposure. It is on the North Bank of the River and is interstratified with sand-stone and conglomerate.

I took samples of the coal and rocks and am satisfied that the two exposures relate to coals of the same horizon. A reference to the analysis given below will show that they are similar in quality to those discovered on the South side of the property and already described.

ANALYSIS OF COAL

I took a considerable number of samples of coal from the seams on the South side of the property and one from the Northern exposure last referred to. These samples were

halved, one portion being retained for future reference and the other portion entrusted to Mr. J. O'Sullivan, F.C.S., of Vancouver, for analysis. A copy of Mr. O'Sullivan's report is attached. It determines that the whole of the samples represent a good grade of bituminous coal of coking quality, very valuable for metallurgical as well as steaming and domestic purposes.

Nothing more need be said as to the quality of the coal except that it is uniform and easily one of the best grades yet discovered in British Columbia.

ESTIMATED TONNAGE

I have been greatly assisted in estimating the tonnage of coal under your property by the exploratory work so satisfactorily conducted during the present season, which has fully borne out my expectations and added one seam of coal to the original estimate, which is equal in thickness to the two first discovered.

On the basis of the hypothetical section hereinbefore referred to, and assuming that the seams are within workable distance of the surface, of which there is no reasonable doubt, I estimate that this property contains 378,000,000 tons of coal, being at the rate of 42,000 tons per acre; making a very liberal deduction of 50% for ribs, pillars and faults, the extracted tonnage would be 21,000 per acre. This would give a net production for the whole of the property of 189,000,000 tons, which is equal to the present out-put of the Crow's Nest Pass Coal Company for more than 200 years.

VALUE OF PROPERTY

Now that there has been a second opportunity of carefully studying the geology of this section and also of doing a full season's development work, it is possible to speak with confidence ofthe value of the property. In arriving at that value, the main considerations are - the remarkable quality of the coal, its ascertained extent, its facility of access for minkng purposes, and its favorable location for marketing. Taking these considerations into account, I think that a very conservative estimate of the present value is $100.00 per acre, or a total of $900,000.00. For the very moderate expenditure outlined in another paragraph of this Report, the value of this property would be raised several million dollars, as I do not consider there is the slightest doubt about its character now that satisfactory exploration work has been done.

MARKET

It is becoming a trite saying that the market for British Columbia coal is unlimited, but it is nevertheless a fact because the demand for domestic and export purposes is far in excess of the supply. However, in estimating the commercial prospects of a property one has to take into account the area which it would actually control against all competitors and then the area in which it would have a chance with other competing companies. As to the former, the nearest properties are those of the Telqua on the North-west, and of the Brazeau River in Alberta on the East, the former being 250 miles distant, and the latter 300. It is only fair also to consider the undeveloped coal areas of the North Thompson River, for although these are an unknown quantity, they are favorably thought of by mining

experts, and may become a factor in the near future. There are no other known deposits within 300 miles of Bear River. This would give a market for domestic purposes to a district approximately 250 miles square. The district will be opened up rapidly as the Grand Trunk Pacific and Canadian Northern Railways are built. Experience in similar districts shows that the greater population causes an increased demand for coal as fast as it can be produced. In addition to the domestic demands, the railways would naturally purchase fuel on the shortest haul, and the Bear River property is situated so as to monopolise at least 250 to 300 miles on the Grand Trunk Pacific and 100 miles on the Canadian Northern. It would also monopolise an additional 200 miles on the Grand Trunk Pacific when the projected branch is built from Fort George to Ashcroft, or some other point on the main line of the Canadian Pacific Railway. These two markets alone would undoubtedly require the coal that could be produced on Bear River up to a minimum tonnage of 2,000 tons a day, and as it would take from two to three years to develop the property sufficiently to produce this tonnage, you will see that by that time the railways referred to will be in operation and the demand for that amount assured. In the competitive markets further East and West you will come into competition with the Telqua and Brazau River coals. Just how much of that market you will be able to acquire is a matter of speculation. It would depend entirely upon the cost of production, and having regard to the great thickness of your seams and the strong measures in which they lie, there is no reason why the coal should not be produced at a low cost.

PROBABLE PROFITS

I estimate that the cost of mining coal at Bear River when railway transportation is afforded will not exceed $1.50 a ton. The selling price of Vancouver Island coal is $4.50 at the pit's mouth, and it is probable that in the earlier stages of Bear River coal it will realise a similar figure, but ultimatley it will have to be sold at a lower price, especially for steam purposes. I therefore suggest that in order to make a fair estimate of profits, the average selling shall be set at $3,50, and a further fifty cents be deducted for contingencies, which would leave a clear profit of $1.50 a ton. This I regard as exceedingly conservative.

COST OF PLANT

Although it is not possible to give a detailed estimate of the cost of suitable plant until the property has been prospected, you may like to have some general idea on the subject, and I would therefore say that an up-to-date plant, suitable for producing 1,000 tons a day and including 100 coke ovens (Bee-hive), would cost in the neighbourhood of $500,000. To this will have to be added the cost of a branch railway from the Fraser to the property; this would pass through a valley with a low elevation round the base of Siwash Mt., and would cost $20,000 a mile. The total distance is approximately fifteen miles.

SUMMARY

After the most careful examination of your property and a thorough study of the geological conditions revealed,

and after a full Season's development work which has more than justified the original anticipations, I am able to state positively that in the Bear River coal areas you have a valuable proposition, with the assurance of a sufficient area of good bituminous coal to make a number of mines. The only limit to the number of mines which you can open up on such an extensive property is that imposed by the requirements of the market, and if the anticipations of Premier McBride, as announced in his New Year Manifesto are even measurably correct, then there is going to be such extensive settlement of the Northern portions of British Columbia as will insure an unlimited market for coal. There is no other property so favorably situated for supplying that prospective demand in the section of country where it is certain to arise in the near future because Fort George is already a place of note and an attractive centre which must continually increase in importance. Indeed, I consider that the chief value of your property lies in the fact that it is in the very centre of the new and extensive district about to be opened up by two trans-continental railways, and you are extremely fortunate in having been able to acquire such valuable coal holdings in that locality.

(Sgd.) Wm. Blakemore, M.E.
Member Canadian Min. Inst.
Greenwell Medalist, North of
England Inst. Min. Engineers.

Victoria,
Jan. 7th, 1911.

NO.A. ANALYSIS OF SAMPLE OF COAL RECEIVED FROM MR. A.E.HEPBURN,M.E., MARKED No. "A".

Moisture	3.5%
Volatile combustible matter	37.5%
Fixed carbon	54.0%
Ash	4.0%
Sulphur	1.0%

This coal is bituminous, of good coking quality, yielding 58.5 per cent, hard and firm coke. It is therefore very valuable for metallurgical, as well as steaming and domestic purposes.

(Signed) J.O'Sullivan, F.C.S.

Nov. 15th, 1909.

NO.B. ANALYSIS OF COAL RECEIVED FROM MR.A.E.HEPBURN, M.E., marked No. "B".

Moisture	3.5%
Volatile combustible matter	40.8%
Fixed carbon	48.3%
Ash	6.0%
Sulphur	1.4%

Coke - 55.5 per cent.

Character of coke - Hard and firm

This coal is bituminous, of good coking quality and consequently very valuable for metallurgical, as well as steaming and domestic purposes.

(Signed) J.O'Sullivan, F.C.S.

 Nov. 15th, 1909

NO. 1. ANALYSIS OF SAMPLE OF COAL RECEIVED FROM MR. A.E.HEPBURN,M.E., marked "No. 1"

Moisture	6.0%
Volatile combustible matter	37.3%
Fixed carbon	54.3%
Ash	1.0%
Sulphur	1.4%

Coke - 56 per cent.

Character of coke - Hard and firm.

This is bituminous coal of coking quality and consequently very valuable for Metallurgical, as well as steaming and domestic purposes.

(Signed) J.O'Sullivan, F.C.S.

Nov. 15th, 1909.

NO. 2. ANALYSIS OF SAMPLE OF COAL RECEIVED FROM MR. A.E.HEPBURN, M.E., marked "No. 2"

Moisture	4.0%
Volatile combustible matter	44.4%
Fixed carbon	46.9%
Ash	3.5%
Sulphur	1.2%

Coke - 51 per cent.

Character of coke - hard and firm

This coal is bituminous, of good cooking quality and consequently very valuable for metallurgical, as well as steaming and domestic purposes.

(Signed) J.O'Sullivan, F.C.S.

Nov. 15th, 1909.

NO.3. ANALYSIS OF SAMPLE OF COAL RECEIVED FROM MR.A.E.HEPBURN, M.E., marked "No.3"

Moisture	4.0%
Volatile combustible matter	41.8%
Fixed carbon	50.3%
Ash	2.5%
Sulphur	1.4%

Coke - 53.8%

Character of coke, hard and firm.

This coal is bituminous, of good coking quality, and consequently very valuable for Metallurgical, as well as steaming and domestic purposes.

(Signed) J.O'Sullivan, F.C.S.

Nov. 15th, 1909.

NO.4. ANALYSIS OF SAMPLE OF COAL RECEIVED FROM MR.A.E.HEPBURN, M.E., marked "No.4"

Moisture	4.50%
Volatile combustible matter	38.85%
Fixed carbon	49.35%
Ash	6.0%
Sulphur	1.30%

Coke - 56 per cent.

Character of coke - Hard and firm.

This coal is bituminous, of good coking quality and consequently very valuable for Metallurgical, as well as steaming and domestic purposes.

(Signed) J.O'Sullivan, F.C.S.

Nov. 15th, 1909.

Vancouver, B.C.,

November 26th,1910.

Analysis of sample of Coal received from Arthur E.Hepburn, M.E., of Vancouver, British Columbia, marked "BEAR RIVER, Fort George, No. 3, 18 foot seam."

Hygroscopic water	3.5%
Volatile Combustible matter	41.5%
Fixed carbon	50.0%
Ash	4.0%
Sulphur	1.0%

Coke -- 54.6 per cent -- Character of Coke, hard and firm. British Thermal units ---- 12,517.2 Pounds of water evaporated by one pound of the Coal ----12.96.

This coal is bituminous of good coking quality. It is therefore very valuable for Metallurgical as well as Steaming and Domestic purposes. It should also prove valuable for Gas-making.

(Signed) J.O'Sullivan, F.C.S.

C O P Y

Vancouver, B.C.,

November 26th,1910.

Analysis of sample of Coal received from Arthur E. Hepburn, M.E., of Vancouver, British Columbia, marked "BEAR RIVER, Fort George No.2, 6 foot seam."

Hygroscopic water	3.5%
Volatile Combustible matter	39.0%
Fixed carbon	48.5%
Ash	8.0%
Sulphur	1.0%

Coke --- 57.0 per cent -- Character of Coke, hard and firm. British Thermal Units 11,970 Pounds of water evaporated by one pound of the Coal --- 12.4.

This coal is bituminous of good coking quality. It is therefore very valuable for Metallurgical as well as Steaming and Domestic purposes.

It should also prove valuable for gas-making.

(Signed) J.O'Sullivan, F.C.S.

COPY of ORIGINAL LETTER.

J.O'Sullivan, F.C.S.etc.

(London) England.

A S S A Y E R

Analytical Chemist and Metallurgist

Vancouver, B.C. November 15th, 1909.

A. E. Hepburn, Esq., M.E.,

CITY.

Dear Sir:—

I enclose herewith certificates of analysis of the six samples of coal taken from the outcroppings of your Bear River properties.

I must congratulate you on the excellent quality of these samples, as they compare most favourably with the best samples I have put through from Vancouver Island, and the Nicola District, There is every reason to believe that a very superior quality of coal will be encountered when cover is obtained.

Yours faithfully,

(Signed) J.O'Sullivan, F.C.S.

Vancouver, B.C.,

November 26th, 1910.

Analysis of sample of Coal received from Mr. Arthur E. Hepburn, M.E., of Vancouver, British Columbia, marked "Bear River, Fort George, No.1., 8 foot seam"

Hygroscopic water	3.0%
Volatile Combustible matter	40.5%
Fixed carbon.	48.5%
Ash	7.0%
Sulphur	1.0%

Coke --- 56 per cent, Character of Coke, Hard and firm. British Thermal Units 12,312.

Pounds of water evaporated by one pound of the Coal --- 12.75.

The coal is bituminous of good coking quality. It is therefore very valuable for Metallurgical as well as Steaming and Domestic purposes. It should also prove valuable for Gas-making.

(Signed) J.O'Sullivan, F.C.S.

REPORT ON BEAR RIVER COAL PROPERTY.

held by A. E. Hepburn, Esq., Vancouver, B.C.

by C.F.J.Calloway, B.Sc.

Vancouver, B.C.

March 12th, 1912.

A.E.Hepburn, Esq.,

Vancouver, B.C.

Dear Sir:-

Following your instructions I visited your coal property on Bear River, Cariboo, last fall, leaving Vancouver on September 17th and returning on November 29th, accompanied by your brother, Mr. H. McI. Hepburn.

During this period we spent six weeks on the ground.

We took advantage of the fact that you were having the ground surveyed at the same time by Messrs. Gore and McGregor, Government Surveyors, of Victoria, B.C., to accompany their party, which we joined at Lesser Bear Lake, twenty miles from Bakerville, where they were building flat bottomed boats, in which we travelled down Bear River to the property, a distance of 65 to 70 miles.

Owing to the shallowness and rapidity of the water in many places, and the numerous boulders in the stream, this method of travelling is very precarious at any time of the year, and impossible during certain seasons. Photographs 23 to 28 will give an idea of this, the two last being taken on the homeward trip in November.

During the six weeks we were on the ground we

shifted camp twice, which enabled me to visit the different parts of the property without the necessity of making excessively long trips.

The lines cut by the surveyors greatly facilitated travelling, and I was able to make a careful examination of the area.

On November 8th we started to travel down the river in our boats, intending to pass down to the Fraser River and thus to Fort George, but the zero weather, which had already lasted for some time, had frozen up the river to such an extent that after a day and a half, in which we made a little over six miles, we abandoned the boats, cached the tents, surveying instruments, supplies, etc., and packed across country by compass bearing until we reached the Willow River trail, which we followed in to Fort George, arriving there on the fourth day from Bear River, crossing the Fraser on foot.

On this account I had to leave behind all the samples which I took on the ground. These were to have been fetched out by Messrs. Gore and McGregor, with their instruments, on dog sleighs during the winter, but this has not yet been done, and I am therefore unable to give analyses from my own samples.

LOCATION

The property is situated in Cariboo District, British Columbia, about 45 miles due east from Fort George. (See Plans 1 and 2). The Bear River flows through it in a northwesterly direction in its course from Lesser Bear Lake to the Fraser.

The names Bear River and Bear Lake are very common in British Columbia, and it is important that this one should not be confused with Bear River, Portland Canal, or other rivers of the same name.

AREA AND DESCRIPTION:

Your holding consists of fourteen sections of one square mile each, all held under Coal and Petroleum Prospecting License from the Provincial Government. Twelve of these are in one block, and have been surveyed. The other two were not surveyed, owing to the fact that the descriptions in the licenses do not agree with the actual positions of the location posts.

Surveyed and leases obtained

Surveyed late 1912.

If surveyed as described, they would lie outside the coal basin, so that before they can be surveyed it must be ascertained whether the Government will allow the description to be read in an elastic manner, so as to represent the ground actually staked.

The following is a list of the sections:

Lot No.	Name		Date of License	Has been renewed.
4866	A.E.Hepburn,	No. 1	10th Nov. 1911	Once.
4864	"	No. 2	"	"
4863	"	No. 3	"	"
4867	"	No. 4	"	"
4846	"	No. 5	"	"
4868	"	No. 6	"	"
4870	Jas.Thompson		23rd Nov. 1911	twice
4869	Roy Thompson		"	"
4845	Thos. Blair		"	"
4844	A. Harper		"	"
4871	J. Rowan		1st March, 1912	"
4865	Mrs.F.H.Hepburn		"	"
-	Mrs. J. Rowan		"	"
-	W. H. Price		"	"

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The first six licenses may be renewed for a further period of one year from November 10th, 1912, but the others, having already been renewed twice, cannot be further renewed, and it will be necessary to obtain leases on these before their expiration. Before this can be done on the two last they must be surveyed. The legal requirements for obtaining leases on the other twelve have already been fulfilled.

Surveyed and Leases obtained

A lease costs 15¢ per acre, or $96 per section of 640 acres per annum, and $100 worth of work must be done each year in development in respect of each section. This work need not be actually done on each section; ten contiguous sections may be grouped together for this purpose, so that work will only have to be done in two places on the block of twelve sections, and at one place on the other two, which are not contiguous with the others.

I understand that you have already applied for leases on the twelve sections.

Surveyed see Lease Schedule

The six which are held under your own name (lots 4846, 4863, 4864, 4866, 4867 and 4868) were located after this area was placed under reserve, so that no surface rights can be obtained with these.

A Crown Grant, giving a permanent inalienable title, may be obtained when the conditions of the lease have been fulfilled. This will cost $15 per acre, or $9600 per section, for these six sections, and $20 per acre, or $12800 per section, for the other eight, in which the grant will include surface as well as coal.

The total cost of obtaining a Crown Grant on this property will therefore be six times $9,600 - eight

times $12,800 or $160,000. It will not be necessary to do this, however, for eight years from the date of the lease, as that is good for five years, and may be renewed for a further three.

All the surface which is required for actual mining purposes may be used on any of the sections, also all timber so required, but for laying out a townsite only those sections can be taken into consideration over which surface rights can be obtained.

Since these last locations were made the Coal-Mines Act has been amended so as to preclude the granting of licenses on reserved land. Unless the reserve is taken off this area, or the amendment repealed, it will therefore be impossible to extend your holdings in this district, except by purchase from those who have already obtained licenses over certain adjacent areas.

As you have, however, undoubtedly the cream of the field within your present holdings, and have an area large enough to last for a very long period, the question of further extending it need not be considered.

SOURCES OF INFORMATION:

This property was visited and reported on by Mr. Wm. Blakemore, M.E. of Victoria, B.C. in November 1909, and after some development work had been done, a further supplementary report was made by Mr. Joseph Wendle, the original locator, in November, 1910.

I have had the advantage of reading both these reports and also of personally discussing the matter with both gentlemen, which has been of great assistance to me, and I take great pleasure in expressing here my obligation to them.

superior hardness of the intrusive rock, which causes it to rise above the general level of the bench land underlain by the coal measures.

The only exposures of the coal measures seen occur in the banks of Bear River at the points shown on the map (Plan 3).

These exposures, except those at D, indicate a general northeasterly dip, the portions seen forming the south-western rim of a basin extending under the flat ground covered by your licences.

probably caused by faulting

Crossing the river between C. and D. (Plan 3) there is an anticlinal roll, the measures showing a reverse dip at the only points seen on the western side. Above the coal exposure at D, (described later) a massive conglomerate occurs, the only rock of this nature seen in the district, although bands of a few feet of conglomerate occur among the shales which form the bulk of the measures seen.

It is probable that this anticline extends to the south-east as indicated on Plan 3, thus accounting for the somewhat irregular and steep dip of the measures at the Hepburn Coal Exposure. The small hill which undoubtedly consists of the intrusive rock seen at E. and G. in the river bank, probably represents a portion of an intrusive ridge which is responsible for the formation of the anticline. The horizontal section (Plan 6) indicates the probable condition of things on this assumption, which, after careful consideration, seems to me the most likely explanation of the situation.

In any case the steepness of the measures at the Hepburn Coal Exposures need cause no anxiety, as the topography of the country indicates an extensive undisturbed

basin in which the measures may be expected to lie almost, if not quite flat, only being disturbed in the neighborhood of the igneous intrustions.

Photographs 4, 6, 7, 8, 9, 16, 17, 20 and 22 will give a good idea of this.

COAL SEAMS:

The principal coal exposures occur at the point marked "Hepburn Coal Exposures" on Plan 3, and which are shown in detail on Plan 4. Photograph 1 is a view from across the river including the ground covered by Plan 4.

Here the measures consist of shale with occasional beds of sandstone and conglomerate and numerous coal seams, dipping at varying angles to the northeast.

The vertical section (Plan 7) shows the actual thickness measured by your brother and myself of all the beds exposed at this point. The measurements were made at right angles to the dip on the sloping beds along the river bank and foreshore, in the crosscut at the end of the tunnel, and in the opencut trench, but are shown reduced to a vertical section for convenience.

Of the coal seams exposed, three are workable, and it is highly probable that some of the other aggregations of thin seams may prove workable under large portions of the area by the thinning out of the intervening shale bands. The three workable seams have the following sections measured by me, with the assistance of your brother:-

BIG SEAM	Feet	Inches
		See plan 7.
Top part not seen		
Coal	3	4
Coaly Sandstone		4
Coal	3	9
Shale		1
Sandstone		3
Coal		9½
Shale		3

	In.
Coal	6
Shale and Coal	1½
Bony Coal	3½
Shale	1
Coal	2½
Shale	½
Coal	3½

Shale Floor

TOTAL SEEN 10 ft. 4 in.

TOTAL COAL SEEN 9 ft. 2 in. See plan 7.

SIX FOOT SEAM

In Crosscut	ft.	in.	In Bank	ft.	in.
Roof not seen			Shale Roof		
Coal		7	Coal ✓		1½
Sandstone, shale & coal		3½	Black shale ✓		1
Coal		7	Coal ✓		8
Clay Seam		1/8	Shale ✓		1
Shale, Coal & Clay		3½	Coal ✓		9
Coal		1½	Sandy shale ✓		4
Clay seam		½	Coal ✓		8
Coal		4	Shale ✓		½
Sandy Shale		1	Coal ✓		8
Coal		6	Coal and shale ✓		2½
Shale		2	Coal ✓		4
Coal	1	10	Shale ✓		½
Shale & Coal		8	Coal		8
			Black Shale		1
			Coal		3¾

Sandstone Floor		Sandy Shale Floor	
TOTAL SEEN	5 ft. 4-7/8 in	Total	5 ft. 0-¾ in.
TOTAL COAL SEEN	3 ft. 11½ in.	TOTAL COAL	4 ft. 2½ in.

The bed of sandstone which appears as the floor of this seam in the section taken in the crosscut, is only from two to three feet thick, and forms the roof of the Eight Foot Seam (See Plan 7).

EIGHT FOOT SEAM.

	Ft.	In.
Sandstone Roof.		
Coal and Sandy Shale		4
Shale		3
COAL (with 3 small Shale streaks)		11
Soft Shale		1¼
COAL		4
Clay Seam		1½
COAL		8
Sandy Shale		1½
COAL		2¼
Shale and Coal		2¾
COAL		8½
Clay Seam		½
Sandstone		3½
COAL	1	5
Sandstone		2½
COAL		9
Coal and Shale		4
COAL		8
Clay Seam		1/8
COAL		11
Sandstone		5
COAL		1
Shale		1
COAL		8
Shale 0 to		6
COAL		3
Shale		1
COAL		4
Coal and Shale		11
Shale Floor		
TOTAL	11 ft.	11-3/8 in.
TOTAL COAL	7 ft.	8 ¾ in.

All the thin seams of clay will undoubtedly disappear when the seams are followed away from the surface, and no doubt also many of those described as shale, which are really hardened clay due to surface seepage, so that the seams may confidently be expected to show a much cleaner section in their normal condition.

The above measurements differ from those given by Mr. Wendle and Mr. Blakemore, the difference in the case of the two smaller seams being undoubtedly due to the great variability in the individual benches of coal and

shale, the latter occurring in more or less lenticular masses, so that a section measured at one point materially differs from one measured a few feet away, although the general aggregate is about the same.

For comparison I am adding Mr. Wendle's sections at the end of this report (Appendix 1). The variation in the seams is shown by the great difference between the two sections of the "Six Foot Seam" measured by myself at points about thirty feet apart, in which the individual benches cannot be correlated, and the character of the floor is different, being a slightly shaly sandstone in the tunnel and a sandy shale in the bank outside.

The variability is also characteristic of the Vancouver Island coalfields, and in fact, forms one reason for the belief that this coalfield, like those, is of Cretaceous age.

In the case of the larger seam, however, the difference between my measurement and that of Mr. Wendle (Mr. Blakemore did not see this seam; it was only discovered after his visit) is more than can be accounted for in this way.

The opencut trench in which this seam was exposed by Mr. Wendle was filled in with gravel and mud during the high water in the spring, and was again dug out by us (Photo. 3).

Owing to its low elevation above the level of the river it was impossible for us to expose its northern extremity, where the upper portion of the seam occurs, as the mud flowed back into it as fast as it was removed.

My section therefore does not include the whole of the seam exposed by Mr. Wendle.

The part which we did see, we measured very carefully, measuring each bench at right angles to its dip. I understand that Mr. Wendle measured the whole horizontally and then reduced the measurements in accordance with the average dip.

As the dip is variable, and the opencut is not in a straight line, this method is not so satisfactory as the one employed by us, and the measurements given in my section may be taken as fairly accurate as far as they go, but they take no account of the three or four feet at the top of the seam, which is shown by Mr. Wendle as clean coal (see Appendix 1).

This seam as will be seen from Mr. Wendle's Section (Appendix 1) has an excellent roof.

While I have not the slightest reason to doubt that this is the case, I am only showing what I have actually measured.

Below the "Eight Foot Seam" there are numerous benches of coal of similar quality. Where seen, these are all too much interbedded with shale and sandstone to be workable, but, considering the lenticular and variable character of the shale bands observed, it is highly probable that over part of the area some of the shale bands will thin out, causing the coal benches to come together, forming workable seams. It is similarly possible that the three seams described, which are workable where exposed, may in places become too much split up to be economically worked, but it is in my opinion fair to offset against this the probability of other seams assuming a

workable character, and to take the observed thickness as a fair estimate of the workable coal which may be expected to underlie the whole of the area covered by the coal measures in the seam s already proved.

If the measures between the two lower seams do not either thin out so that they can be worked together, or thicken so that they can be worked independently, it is possible that you will only be able to work one of them, or, at any rate, that a portion of the coal contained in one will have to be abandoned.

It is very probable, however, that the intervening measures will either thin out or thicken, showing similar variations to those among the Vancouver Island coal measures.

As will be seen from Plan 6, a small seam occurs some little distance above the main coal exposure. At a somewhat higher horizon in the measures several thin seams are seen in the right bank of the river at the point marked C, (Plan 3). The thickest of these is about two feet.

Passing over to the other side of the anticline, rather higher in the measures, several thin benches of coal were exposed by Mr. Wendle last October in an open-cut immediately underneath the massive conglomerate at D, (Plan 3, see Photo 21).

The following section was kindly furnished by him:

	feet	inches
Conglomerate, about	150	0
Grey Shale	2	0
Conglomerate	1	0
Shale		3
Sandstone	1	6
Dark Brown Shale		6
Light " "	1	0
Sandstone		10
Dark Brown Shale		10
COAL		6
BONY COAL		2

	feet	inches
Brown Shale		8
COAL		3
Shale		1
COAL		6
Shale		2
BONY COAL		4
Shale		4
COAL		8
Brown Shale		2
COAL		1
Shale		6
COAL		3
Brown Shale		1
COAL	1	3
Brown Shale		2
COAL	1	4
Brown Shale		5
COAL		5
Dark Brown Shale	1	0
COAL		6
Dark Brown Shale		5
COAL		9
Dark Brown Shale and Coal	1	0
Conglomerate	5	0

Strike about N. W. and S.E. Dip about 45° to the Southwest.

While nothing found so far in this neighbourhood is of a workable thickness, the presence of these coal seams proves that the measures contain coal on several horizons, and, while the vertical extent of the measures between these horizons is not known, it is quite possible that other workable seams may occur in the unseen portion, and also in that portion below the main seams.

For this reason, and also to prove the depth and extent of, and variations in, the known seams, at various points in the area, it will be highly desirable to thoroughly prospect the property by drilling, as described later.

QUALITY OF COAL:

As already mentioned, I was obliged to leave all my samples behind, hoping that they would be brought out in time to have their analyses included in this report, but as this has not been done, I append a list of the previous analyses

given in Mr. Blakemore's report. The coal is very clean and bright in appearance. On account of the shale bands it will have to be washed before shipment, but this will present no difficulty.

A quantity of coal which had been dumped on the foreshore outside the tunnel mouth was washed by the action of the river during the high water, separating the shale from the coal, which was left in a remarkably clean condition.

These must be selected samples.

ANALYSES OF BEAR RIVER COAL.

Sample	Hygr. Water.	Vol. Com. Matter.	Fixed Carbon	Ash	Sulphur	Calorific value B.T.U.
A	3.5	37.5	54.0	4.0	1.0	
B	3.5	40.8	48.3	6.0	1.4	
No. 1	6.0	37.3	54.3	1.0	1.4	
No. 2	4.0	44.4	46.9	3.5	1.2	
No. 3	4.0	41.8	50.3	2.5	1.4	
No. 4	4.5	38.85	49.35	6.0	1.3	
8' Seam	3.0	40.5	48.5	7.0	1.0	12,312
6' Seam	3.5	39.0	48.5	8.0	1.0	11,970
Big Seam	3.5	41.5	50.0	4.0	1.0	12,517

These analyses were all made by Mr. J. O'Sullivan of this city, who describes the coke as hard and firm. He also mentions that these samples compare most favorably with the best that he has put through from Vancouver Island and the Nicola district.

Although the proportion of volatile matter to fixed carbon is considerably higher than is found suitable for coking in Carboniferous coals, it has been demonstrated that the proportions which apply to those coals do not

hold good for the Cretaceous and Tertiary coals of the West, and it is likely that this will prove an excellent coking coal in practice. The fairly high sulphur content is the most unfavourable feature in this respect.

ESTIMATED QUANTITY:

As already mentioned the coal measures are only exposed at certain points along the river. While they undoubtedly underlie the wide bench land which is covered by alluvial deposits, their limits can only be roughly estimated as being defined by the surrounding hills of igneous rock.

The outlines shown on the map (Plan 3) are therefore purely hypothetical, but may reasonably be taken as indicating the probable area underlain by coal measures.

While it is just possible that the coal seams may attain too great a depth to be worked under a portion of this area, there is, as has already been explained, no reason to expect this, the probable construction of the basin being something like that shown in the hypotehtical section (Plan 6).

At the point F (Plan 3) the shale is considerably disturbed by the igneous intrusion, standing nearly vertically, and showing reversed dips in places. This point is well outside of your ground, but in my estimate I have made ample allowance for any extension of the disturbed zone under your area.

In view of the foregoing, the area which I estimate as being underlain by workable coal in the seams described within your holdings is ten and a half square miles, or 6720 acres, which, taking a thickness of 21 feet of coal, and allowing 1200 tons# per foot per acre (which is sufficient

#Long tons of 2240 lbs. are referred to throughout.

to allow for faulty ground, losses in working, etc., this gives a total quantity of 169,344,000 tons.

In view of the numerous bands of shale and sandstone in the two smaller seams, and in the lower part of the big one, it will be inevitable that, in spite of careful hand picking and washing, a certain amount of coal will be lost, and, as already mentioned, if the small thickness of measures between the two lower seams proves to be the normal condition, it will probably not be found possible to work them both.

For this reason, therefore, in my estimate I consider it advisable to leave out the Six Foot Seam, taking only the two larger ones into consideration.

Against this deduction, however, must be offset the extra thickness of coal at the top of the Big seam, which has not been taken into account at all, and it would not be fair to throw out the Six Foot Seam without making some allowance for this.

Under these circumstances an estimate of 150 million tons of workable coal seems to be fully justified.

There is good reason to hope that other workable seams may be discovered upon further exploration of the measures, and it is quite possible that the measures between the two lower seams may either thicken sufficiently to enable them to be worked separately, or else thin out enough to enable them to be worked together.

WORK DONE

During the summer of 1910 the tunnel (Photo 2) shown on Plan 4 was driven for you by Mr. Wendle for a distance of 34 feet. A crosscut was then driven about ten feet to the left and fourteen feet to the right,

proving the two smaller seams as shown in Section 2, Plan 7.

The top of the Six Foot Seam was not reached in the right hand crosscut, a hole drilled in the face penetrating into the surface wash, so that it could not be driven any further. This hole was plugged up, but Mr.Wendle reports a further 12 inches of coal as being proved by it. (See Appendix I).

This is the only permanent mining work which has been done on the property; the rest of the work done consisting of the opencut referred to, and other exploratory work, and the construction of a substantial log cabin (Photo 5) twelve by fourteen feet, and a trail between the cabin and the tunnel.

See Appendix, Building, trails and work done since.

The survey of the property covers all assessment work required until a lease is obtained, except for the two outlying unsurveyed sections.

TIMBER:

There is ample timber for mining purposes over the whole area. Along the river there is a thick growth of spruce, with black pine, cottonwood (Photo 12) and birch in places, except in some of the low-lying stretches, which are covered by cottonwood, poplar, alder and willow.

On the benches the timber is chiefly black pine up to twelve or fourteen inches in diameter, particularly suitable for mining purposes (Photo. 13). On the higher ground there is spruce, black pine, cedar and occasional fir, the trees being larger than on the bench land, but seldom exceeding two feet to two feet six inches in diameter.(Photo.14)

Plan 5. shows the notes on the timber made by the survey party.

WATER:

An ample supply at all seasons of the year can be obtained from Bear River. This will have to be either carried in a flume or pipeline from a point above the works, or pumped from the nearest point.

TRANSPORTATION:

The present means of access to the property down Bear River from Lesser Bear Lake would be quite out of the question as a regular route of transportation, as only small flat bottomed boats (Photos. 23, 24, 26, 27, 28) can be taken, and then only at certain seasons of the year, and with a certain amount of risk. There is a trail from Bakerville to a point eighteen miles below Lesser Bear Lake, which, I understand, will probably be extended about fourteen miles, to a point below the canyon, this summer. From this point navigation is fairly easy, but at the best this route will only serve for taking in light articles.

For permanent transportation four routes come into consideration.

1. From Fort George there is a wagon road for six miles, and a trail for the remaining twenty miles to Willow River, crossing the latter and ascending its right bank. From this point to Bear River it is about fourteen miles, and to the Hepburn Coal Exposures about twenty miles.

In order to reach the property by this route it would therefore be necessary to make about twenty miles of wagon road over the existing trail and a further twenty miles through the forest. There would be no difficulty in doing this, the principal objections to this

route being its length and the fact that both the Willow and Bear rivers would have to be corssed.

As a number of pre-emptions have been taken up on each river, it is probable that a government subsidy could be obtained for the construction of this road.

2. If the Grand Trunk Pacific Railway follows the route shown on Plan 2, crossing Bear River above the lower canyon, a road or railway about eighteen miles long would connect the property with it. I have, however, not been able to ascertain whether this is the route which is to be adopted or not, and as I have not been over the ground, cannot say what difficulties there might be.

3. From a point on the line of the Grand Trunk Pacific Railway in the valley of the Fraser, above the canyon, a road or railway could be constructed through Seymour Pass to the coal, the distance, being estimated by Mr. Gunn, a G.T.P. surveyor, who has been over the route, at about fourteen miles (See Plan 2.)

The Pass is low, not more than 300 feet above the level of the coal exposures, and is occupied by a broad meadow (Plan 3, and Photos. 7 and 15). This meadow is swampy in summer time, so that the line would have to skirt along the bases of the hills, but there would be no rock work or heavy grades.

Such a railway should be constructed for $15,000 per mile.

A railway or wagon road over this route would place the property in communication with the outside irrespective of the completion of the Grand Trunk Pacific

Railway, as steamers will be running this summer from the railway at Tete Jaune Cache down the Fraser to Fort George.

4. The Cariboo, Barkerville and Willow River Railway has a charter to build a line from Eagle Lake on the line of the Grand Trunk Pacific, up the Willow River to Barkerville, (Plan 2). A subsidy of $6,400 per mile has been granted by the Dominion Government, and a Bridge allowance of $95,000. The Provincial Government will no doubt also grant a subsidy for the construction of this line.

A considerable portion of the line has been definitely located, and preliminary surveys have been run over the whole length. The owners of this railway propose to build a branch line in to the coal as soon as they reach a point on the Willow River opposite it. The distance will probably be less than as shown on Plan 2, as I understand that the railway is likely to lie further to the east than shown at that point.

A very easy pass, which has been traversed several times, by their engineer, communicates with the valley of Bear River at the mouth of Willow Creek.

If this line is built in the near future, as it is likely to be, it will be unnecessary to construct a private line to connect your property with the outside.

No shaft sinking or diamond drilling can, however, be commenced until there is a road or railway to the property, so that, if it appears likely that there will be much delay in the construction of this line, it will pay you to build your own, or at least a good wagon road.

TOWNSITE.

There is a splendid site for a townsite on the flat ground in the neighbourhood of the proposed mine, or indeed anywhere on that bench land, but unfortunately, as already mentioned, this area was located after the ground was placed under reserve, and no surface rights can therefore be acquired beyond these needed for actual mining operations.

See Lease Schedule.

As it will be desirable to lay out a townsite in connection with the mine, the next best site is on the higher ground on the opposite side of the river, above the Hepburn Coal Exposures. The small creeks running through this ground would not be sufficient for the water supply, and water would have to be pumped from the river, but this would have to be done wherever the townsite is located, as the smaller creeks freeze up during the wimter.

CLAY DEPOSIT.

At the point marked N, (Plan 3) there is a deposit of what has the appearance of a high grade fireclay in the bank of the river (Photo.11). There is about twenty feet of depth visible, with 5 to 10 feet of overburden, the bottom of the clay not being seen.

where?

As I had to leave behind my samples of this with those of the coal, I am unable to say whether it is of any commercial value or not, but its texture and colour give grounds for the belief that it will prove valuable. If it should prove a good fireclay it will be of great service for the construction of boiler settings, flues, stacks, coke ovens, etc.

Samples to be received see appendix III.

PROPOSED DEVELOPMENT:

During the coming summer, or until a railway

P/C

or wagon road can be constructed, I would advise you to keep a few men on the property driving a tunnel along the strike of one of the seams at a slightly higher elevation than the existing tunnel.

After about 300 feet a crosscut should be driven to either side, and continued so as to prove as much as possible of the measures. The left hand cross cut will meet the anticline (If my hypothesis is correct), after which it would only cut through the same measures again, and the right hand one will come out to the surface, but a considerable amount of ground will be proved in this way. The main tunnel should be continued to prove the behaviour of the known seams over a considerable distance.

Incidentally a supply of coal will thus be obtained which will be of service in the further development work.

The tunnel should be at a slightly higher elevation than the present one on account of the high water in the river during the spring, but should not be more than five or six feet higher, as it is probable that the measures have been eroded down to about this level, and that only alluvium would be met with above that. A little preliminary surface strip ing will determine the most suitable height.

As soon as machinery can be taken in to the property, I should recommend the thorough prospecting of it by diamond drill holes. A machine at least as large as Type "H" should be used, giving a core not less than two inches diameter, and it should be equipped with a Sullivan patent core barrel, which is the best in the field for coal.

The first hole should be put down at the point where I have marked the proposed shaft (Plan 3), and others at

points such as those indicated on the plan, the actual positions and the order in which they are drilled depending upon local conditions and upon the results obtained.

The two outlying sections should be proved at an early period, but the first holes to be drilled should be those in the neighborhood of the first sinking.

If done by contract, and a minimum of 10,000 feet of drilling is guaranteed, this will cost about $3.50 per foot. You may prefer to purchase an outfit, which will cost about $6000 delivered, exclusive of diamonds. These will come to about $4,500.

As soon as the first hole has proved the depth of the coal you should start to sink a shaft in the position indicated.

You may prefer to do this without any preliminary drilling, in order to avoid delay in reaching the producing stage, and the coal in sight amply warrants you in doing so, the chief object in drilling first being to ascertain the depth of the shaft required.

This shaft should be in three compartments, two for hoisting and one for pumping, travelling, etc., and should be 13 x 26 feet overall, lined with the large timber obtained from the higher ground. It may be expected to be between 400 and 500 feet deep.

The air shaft may be sunk at a point nearer the outcrop where it will be shallower, and may be 13 by 18 feet overall.

If no preliminary drilling is done, I should recommend that this shaft be sunk first.

From these shafts a large area may be worked, but in order to work the whole field economically it will be necessary to open two or three other mines. This will be a

matter for future consideration, as the market demand increases. In any case it will be necessary to sink on the two isolated sections if the coal proves good in the boreholes on these.

COST OF DEVELOPMENT:

The following is an approximate and liberal estimate of the cost of opening up the property:-

Two shafts (500 feet deep each)	$100,000
Machinery for hoisting 2000 tons a day, underground haulage, ventilation, lighting, sawmill, etc.	150,000
Tipple and Washery	50,000
Diamond drill prospecting	35,000
Opening out underground	30,000
Preliminary surface work, roads, etc	15,000
Total	$ 380,000

If you have to build your own railroad to connect with the Grand Trunk Pacific, an additional sum of $225,000 must be allowed.

In the above estimate I have not allowed anything for the erection of coke ovens, as, although the coal is, as far as can be seen from the crucible assay, of an excellent coking character, it is at present too far from any market for coke to warrant the installation of coke ovens.

This will, in the future, however, become an important consideration. The country about to be opened up by the railway to Bella Coola is known to be very rich in iron and copper, and there is no doubt that many rich mineral areas will be developed within the next few years by means

of the railways under construction or planned, and as a natural consequence the smelting industry will become an important one in the northern country, so that it is only a matter of time before there will be a large market for coke.

ESTIMATED PROFITS:

The profits usual in the collieries on Vancouver Island range from $1 to $2 per ton.

Although this coal could be shipped in fully as clean a condition as that actually shipped from there with very little extra labour, it will be desirable to thoroughly pick and wash it so as to place a clean product on the market. It will therefore be best to assume a rather higher cost of production.

Allowing the high figure of $2.00 per ton for cost of production, and reducing the average selling price of $3.50 per ton at the mine (which applies to the whole of B.C., the inland fields as well as those on Vancouver Island), to $3.00, on account of the fact that the percentage of lump coal is liable to be less here than in the case of the Island collieries, and also on account of the long railway haul between the mine and the market (although this applies equally to the Crow's Nest Pass and other inland fields), this leaves a profit of $1 per ton.

It must be remembered that all the railwey rates in this part of the country will be under the control of the Railway Commission, so that no excessive charges are to be feared.

MARKET CONDITIONS.

A glance at Plan 1 will show the exceptionally

favorable situation enjoyed by this field, being the only workable deposit of coal (other than lignite) yet known in the vast region of central British Columbia.

The nearest known workable coal on the East is at Jasper Park, on the Alberta side of the Yellowhead Pass, 200 miles distant; on the West, Copper River, south of Hazelton, about 300 miles, (The Telkwa and Morice River areas are a few miles nearer, but are so broken up that it seems very doubtful whether they can be worked, and the coal in the Bulkley Valley is reported to be too much disturbed to come into consideration at all); on the South the Nicola field is over 400 miles distant, and on the North there is only the undeveloped and little prospected Peace River area, 150 miles away, the coal from which will find its natural market on the prairies.

This coal will therefore have to itself the enormous area of central British Columbia, of which Fort George is the centre.

Although this country is at present very sparsely populated, it will, with the advent of the Grand Trunk Pacific and other railways, within a few years support a large population.

Wood fuel is scarce and expensive in many localities, notably Fort George, and the demand for coal for domestic, and in the near future also for industrial purposes, will be very considerable.

On Map 1. will be seen the railways passing through this country which Premier McBride has announced are to be completed by July 1915, as well as those under construction, which will be completed at a much earlier date,

and others which are contemplated, some of which will undoubtedly be built within a few years.

The line from Fort George to Fort McLeod and the Peace River, and from there to the coast at Bella Coola, is likely to be built very shortly, starting from Fort George to Fort McLeod, and thence via Fort Fraser to Bella Coola. Reconnaissance parties are already in the field.

These railways will all need large quantities of coal, and Bear River is the only source of supply yet known for that portion of them which traverses the central part of the Province.

There are over 1100 miles of navigable waterways in this part of the country, and within a very few years there will be a large fleet of steamers on these.

The development of the resources of this part of the country which will inevitably follow the building of these railways will assure a very large demand for coal, so that, although the output for the first few years may be limited by the demand, it is probable that before long there will be a steady demand for all that can be produced.

I am informed, on the authority of a prominent railway engineer, that by next year(1913) there will be a demand for at least 1000 tons a day for railway purposes alone.

VALUE OF PROPERTY:

The present value of a mineral property depends not so much upon the actual amount of mineral present as upon the time which will elapse before the working of the mineral will redeem the capital invested with reasonable

profit.

This in turn depends upon the profit per ton which can be expected and upon the output which can be maintained under existing market conditions.

At an output of 2000 tons per day, or 600,000 tons per year, the estimated 150 million tons will take 250 years to work out.

As it is impossible to foretell the changes which may take place during such a long period in working costs, sale prices, demand, competition, etc., all calculations must be based upon most conservative figures.

Moreover, although the above estimate of workable coal may be taken as a fair one, the fact remains that workable coal has so far only been <u>proved</u> at one place, so that, until the area has been further proved by drilling, the possibility of the coal attaining an excessive depth, and of unforeseen disturbances occurring, must be allowed for, furnishing an additional reason for extremely conservative estimates.

In view of these considerations I have therefore in the following calculations reduced the figure of profit from the already conservative estimate of $1 per ton to 50¢, and, instead of taking the area as a whole, I have taken it in portions upon which fairly reasonable estimates can be formed.

Taking, then, first one section of 640 acres, this contains according to the estimate about 15 million tons. At an output of 600,000 tons a year this will last for 25 years. For the first few years the output will be less,

starting from nothing, but towards the end of the period it may reasonably be expected to be considerably greater.

This, at a net profit of 50¢ per ton, will yield $300,000 per annum, or $7,500,000 in the 25 years.

Allowing no return for the first year, this sum will be coming in over a period starting one year hence and ending twenty-five years hence. The mean of that period is therefore thirteen years hence, and the sum which, invested for thirteen years at 7% compound interest, will yield $7,500.000 may fairly be taken as the present value of this first section. That sum is $3,112,033.

On a similar basis, the second section of 640 acres will be commenced 25 years hence and exhausted after a further period of 25 years. Its mean time is therefore 37-1/2 years from now, and in the same way that of the third section 62-1/2 and of the fourth 87-1/2 years.

Calculating for these in the same way, and only allowing for a continuation of the output at the same figure their present values are as follows:-

First Section	$3,112,033
Second "	592,884
Third "	109,330
Fourth "	20,134
Total	$3,834,381

This gives a figure of nearly four million dollars as the present value on a conservative basis of the first four sections, neglecting the rest.

Now, if the market conditions are such as to enable an output of double the amount considered to be

maintained, two sections will be worked in the time which has been assumed for one, and the present value of the second section will therefore be equal to that of the first, that of the third and fourth equal to that taken for the second, and so on, giving for the first eight sections a present value of twice the above figure.

Without taking this into account, and allowing for an immediate capital outlay of $500,000 on equipment, and a further sum of $500,000 for the complete equipment of a new mine on every second section, at intervals of fifty years, (this sum is excessive, and is intended to provide against the contingency of very deep shafts being required, and other heavy expenditure) we have a total capital outlay on the first four sections as follows:-

	Sum required	Time	Present value
1st Section	$500,000	now	$500,000
3rd "	500,000	50 years hence	16,973
Fee for Crown Grant	160,000	8 years hence	93,130
			$610,103

Deducting this from the value of the coal, we have:-

Value of Coal	$3,834,381
Capital Expenditure	610,103
	$3,224,278

This sum represents a fair purchase price for the property on the very conservative estimate of a profit

of 50¢ per ton and an output of 2000 tons per day, and taking only four sections, or 2550 acres into consideration.

If, as is likely before many years, the market calls for an output greater than 2000 tons a day, the above value will be increased very considerably.

Thus, if an output of 4000 tons a day is taken as the basis, the present value of the first eight sections worked will be just twice the present value above estimated for the first four. The capital expenditure on equipment may also be taken as twice as great, thus:-

	Sum required	Time	Present Value
1st & 2nd Sections	$500,000	Now	$500,000
3rd & 4th	500,000	"	500,000
5th & 6th	500,000	50 years hence	16,973
7th & 8th	500,000	"	16,973
Fee for Crown Grant	160,000	8 years hence	93,130
		Total	$ 1,127,076

This gives a present purchase price as follows:-

Value of Coal	$ 7,668,762
Capital Expenditure	1,127,076
	$ 6,541,686

From the above it will be seen to what a great extent the present value is dependent upon market conditions. It will be reasonable to assume a figure between these two estimates, but which of them will prove to be nearest to the actual value is a question which only time can answer.

SUMMARY AND CONCLUSION:

From the foregoing it is obvious that, even after making every possible allowance for adverse conditions,

your property is of immense value.

The most noteworthy feature about it is its unique position. A bituminous coalfield situated within fifteen miles of a great navigable waterway, and of the line of a transcontinental railway, which will probably be completed next year; it is the only coal, other than lignite, yet known in an area as large as Scotland, the resources of which are practically unknown, but which promise to be enormous. Several railways are going to be built through this territory during the next few years, and its navigable rivers and lakes will also be used for transportation purposes.

In spite of all that can be said against it, there can be no doubt that Central British Columbia has a great future as an agricultural country, and that this at present almost unknown country will within the next decade support a large population. Its mineral possibilities are also great.

In this area wood fuel is none too abundant, and Bear River is the only source of coal yet known. The possibilities of this market are immense.

In giving 150 million tons as the estimated coal contents of your holdings, I have made a conservative allowance for the workable coal in the seams proved, leaving out of consideration altogether one good seam on account of its proximity to the one below it at the place seen. Further investigations will very likely prove that it also can be economically worked, and other workable seams may be proved.

The least favourable feature about the field is the presence of shale bands in the coal seams. This, however, is characteristic of all the coalfields in the

country, and will be got over by the use of an up-to-date washery.

If, by diamond drilling, you prove the continuation at moderate depth, and of a workable character, of the known seams under the whole area as estimated, it would be reasonable in valuing the property, to use less conservative figures as a basis than I have done.

Yours faithfully,

(Sgd.) C. F. J. GALLOWAY, B. Sc.

A P P E N D I X I.

SECTIONS OF SEAMS AS GIVEN IN MR. WINDLE'S REPORT,

(November 1910)

N E W S E A M

Discovered by J. Wendle, November, 1910.

SECTION:- As exposed after making an opencut, three to ten feet deep, through the overlying drift.

The footwall of this seam consists of about nine feet of shale, containing numerous small streaks of coal. (This makes the division between the NEW SEAM and SEAM No.1, and for which it is the hanging wall).

SECTION: Commencing at footwall side.

Coal	19"
Shale	1"
Coal	14"
Bony Coal	6"
Coal	18"
Shale	3"
Coal	24"
Shale	1"
Coal	24"
Shale	4"
Coal	185"
Shale	3"
Clay	3"
Fine conglomerate, about	60"
Shale and Sandstone.	

NOTE:- The cut exposing this seam cuts it at an angle, nearly one half of it is below drainage level. We had

trouble in keeping the water out, so as to get this data and samples for analysis. The series of measurements taken for this section were taken as carefully as possible - measuring at right angles to the strike and dip - But taking approximately the position of the cut and seam - a calculation shows an error, and that the section should be condensed something like one fifth.

(Signed) J.Wendle.

S E A M No.1. (S I X F O O T S E A M).

As shown by crosscut, November, 1910. Starting with thirty inches of sandstone, as the footwall, which is also the hanging wall for Seam No.2.

SECTION: Commencing at footwall side.

Sandstone	30"
Coal	8"
Shale	1/2"
Coal	12"
Shale	2"
Coal	5"
Shale	1"
Coal	5"
Shale	1/2"
Coal	4"
Shale	2"
Coal	10"
Shale	2"
Coal	11"
Shale	1"
Coal	12"
Shale	6"

Gravel and Shale.

A shot fired in the face of this crosscut blew back, causing a chamber, exposing the last four notes, and permitting them to be taken beyond the end of the crosscut. Where the formation appears along the river's edge, the hanging wall of this seam is shale containing numerous small streaks of coal.

(Signed) J. Wendle.

S E A M No.2. (E I G H T F O O T S E A M).

As shown by crosscut, November, 1910. The footwall of the following sections consists of thin layers of coal, shale and sandstone, extending for about twenty feet. (This is shown along the river's edge where the formation is exposed.)

SECTION: Commencing at footwall side.

Coal	1"
Shale	1"
Coal	3"
Shale	1-1/2"
Coal	2"
Shale	1/2"
Coal	8"
Shale	5"
Coal	8"
Shale	1"
Coal	1"
Shale	5"
Coal	12"
Shale	1/2"
Coal	9"
Shale	1-1/2"
Coal	10"
Shale	1"
Coal	17"
Shale	3"
Coal	9-1/2"
Shale	2"
Coal	2"
Shale	3/4"
Coal	17"
Shale	1"
Coal	3"
Shale	2-1/2"
Coal	2-1/2"
Sandstone	30" - hanging wall.

(Signed) J.Wendle.

NOTE:

Mr. Wendle's sections all start from the footwall, whereas those in my report are given in the natural order, commencing at the roof, C.F.J.G.

APPENDIX II.

DESCRIPTION OF PHOTOGRAPHS ACCOMPANYING THIS REPORT.

1. Panoramic view of "Hepburn Coal Exposures," showing cut bank, exposed measures, tunnel and cabin. (See Plan 4.)
2. Tunnel.
3. Opencut trench to north of tunnel. The nearer shovel indicates the position of the floor, and the farther one that of the highest part seen, of the Big Seam.
4. View across river from bench above Hepburn Coal Exposures. The sandstone strata crossing the river are clearly seen forming riffles (See Plan 4.) End of Siwash Mountain in distance.
5. Cabin.
6. Looking up river from above Hepburn Coal Exposures. Sugar Bowl Mountain is seen dark against the distant mountains.
7. Seymour Pass from above E, (Plan 3). The flat bench land is well seen in this and the next view. Siwash Mountain on left, Sugar Bowl Mountain on right.
8. Bend in river taken from above F, (Plan 3).
9. Siwash Mountain from L, (Plan 3).
10. Siwash Mountain from M, (Plan 3).
11. Clay deposit in cut bank at N, (Plan 3).
12. Cottonwood flat near proposed borehole No.9, (Plan 3). Note the beaver cuttings.
13. Black Pine flat. NE. Corner of Section 4864.
14. Timber on higher ground. NE.Corner of Section 4846.
15. Meadow in Seymour Pass, from O, (Plan 3).
16. View from P, (Plan 3), near N.E. Corner of Section 4869, looking south.
17. View from near the same point, looking southwest. The high peak in the distance is known as Coal Mountain. The course

of the river may be dimly seen as a light streak across these two photographs, which give a good idea of the extent of the basin.

18. Looking up river from the limestone bluff, Q, (Plan3).
19. Looking down river from below Q. The dip of the limestone is seen on the rock in the river.
20. Looking southwestwards towards Willow Creek Pass from above C, (Plan 3).
21. Coal exposed in Mr. Wendle's cut at D, (Plan 3).
22. Loop in river from R, (Plan 3), showing flat ground covered by the two isolated sections.
23. Survey party building boat at Lesser Bear Lake.
24. Boat passing down rapids 18 miles below Lesser Bear Lake.
25. Canyon about 30 miles below Lesser Bear Lake.
26. Boats on trip down to coal property.
27. Loading boats on November 8th, to start out from coal property. Note the ice in the river.
28. Passing down the river where the ice is getting thicker.
29. South Fort George from across the Fraser River.

APPENDIX III TO REPORT ON BEAR RIVER COAL PROPERTY

.....

C L A Y D E P O S I T.

November 16th, 1912.

A. E. Hepburn, Esq.,

Vancouver, B.C.

Dear Sir:-

The sample of clay from the deposit mentioned on P. 22 of my report on your Bear River coal property having recently been recovered along with the other things left there last winter, and brought to Vancouver, I am now able to submit to you its analysis, made by Mr. J.O'Sullivan, F.C.S., of this City, as follows:-

Silica	58.6%	Silicate of
Alumina	19.6	Alumina
Oxide of Iron	10.4	
Lime	1.0	
Magnesia	0.3	
Sulphuric Acid	none	
Loss on Ignition	9.5	
	99.3%	

"This clay is of good commercial quality; it is very plastic and suitable for the manufacture of first class pressed and common brick, coarse pottery, etc."

"It would also answer very well as an ingredient of Portland Cement."

(Signed) J.O'Sullivan, F.C.S.

P/C

The High percentage of Iron Oxide precludes any idea of its being used as a fireclay, but the low content in Lime and Magnesia, and the absence of Sulphuric Acid, are points greatly in its favour for brick making.

A great deal cannot be learned from the chemical analysis of clay; its economic value depending upon qualities which can only be ascertained by physical tests, but the analysis shows it to be low in the deleterious elements, which fact, coupled with its observed plasticity, affords good ground for the belief that it will prove commercially valuable.

As soon as transportation is available, a quantity, say about a cwt., should be sent down here and tested in a brick works.

The clay having only been observed in the one cut-bank, a series of test pits will have to be dug in order to ascertain to some extent its area. The thickness of clay observed was, as mentioned in the report, twenty feet above the level of the river, the lower limit not being seen.

With the growth of Fort George as a centre of population and industry, a ready market for brick will be assured.

Yours faithfully,

(Signed) C.F.J.Galloway.

THE BEAR RIVER COALFIELD.

.....

This coalfield is situated in the Cariboo District of British Columbia to the east of Fort George and is intersected by the Bear River which rising in the mountains north of Barkerville flows northwards into the Fraser River, see Map.

The property embraces fourteen sections of one square mile each. These are held under Coal and Petroleum prospecting licences from the Provincial Government. Twelve of them are in one block, and have been surveyed.

The sections referred to are as follows:-

No.of Lot.	Name.		Date of Licence.
4866	A. E. Hepburn.	No.1	10th Nov.1911.
4864	do	2	do
4863	do	3	do
4867	do	4	do
4846	do	5	do
4868	do	6	do
4870	James Thompson.		23rd Nov.1911.
4869	Roy Thompson		do
4845	Thomas Blair		do
4844	A. Harper		do
4871	J. Rowan		1st March,1912.
4865	Mrs.F.H.Hepburn		do
	Unsurveyed		
Surveyed 1912 -	Mrs.F.J.Rowan		1st March,1912.
	W.H.Price		do

The cost of a lease is 15 cents per acre and $100 worth of work must be spent on development per annum in respect to each section, but ten contiguous sections may be grouped together.

Incorrect(see Lease Schedule { Surface rights are included with sections 4870,4869,4845, 4844,4871 and 4865, but not with the other sections. After all the conditions of the lease have been fulfilled a Crown Grant giving a permanent unalienable title may be obtained for these

six sections. The cost of this will be $15.00 per acre for six sections.

The other eight sections will cost $20.00 per acre, and the grant will include surface as well as coal.

Crown Grants need not be applied for for eight years, viz., five years from the date of the lease and a renewal for a further term of three years.

At the expiration of this period of eight years, the price to be paid for the Crown Grant would therefore be $160,000.00.

Incorrect see Lease Schedule

So much of the surface as may be required for actual mining may be used on any of the sections.

Townsite,-only six of the sections are available, and of these No. 4865 appears to be the most likely location.

Timber, - timber required for mining purposes may be cut on any or all of the sections.

The following is a copy of the Analyses made by Mr. J.O.Sullivan, Analytical Chemist of Vancouver,B.C. of four samples of coal.

	Big Seam	Six feet seam	Eight feet seam	3'6 seam
	11'-6"	Right Hand S.Crosscut side of tunnel.		from crop
Moisture	3.7	4.5	4.2	3.5
Volatile Combustible matter	45.0	40.2	39.4	42.1
Fixed Carbon	48.2	50.2	47.6	43.1
Ash	2.5	4.5	8.0	10.5
Sulphur	0.6	0.6	0.8	0.8
	100.00	100.00	100.00	100.00
British T.U's	11,843	12,393	10,849	10,489

P/C

Mr. O'Sullivan remarks that "These coals are bituminous of good coking qualities, and are therefore valuable for metallurgical as well as steaming and domestic purposes. They compare favourably with Vancouver Island and Mainland products. There is every reason to believe that the quality of the coal will improve considerably when cover is obatined".

With seams of good quality already discovered it does not appear to be necessary at the present time to put down a number of bore holes to exploit the property for other seams which in all probability overlie or underlie these.

The seams of coal which have been prospected by Mr.A.E.Hepburn by means of a tunnel commencing a little above the river water level, dip under the river into the basin to the North or Siwash Mountain side of the river. They also rise in the opposite direction, and either crop out under the glacial drift material or follow the direction, of the anticlinal fault which forms a boundary on this edge of the basin. To further prospect this field and to prepare for its development, the best policy will be to drive a cross measures tunnel in a south westerly direction, from some point in the region of the Hepburn Cabin, and after inter-secting the three coal seams already referred to continue to drive upwards to the out-crop and also to the dip.

As the principal area of coal lies under the land on the opposite side of the river, it may be found advisable to drive this dip in the lower or EIGHT FEET COAL so as to keep a good thickness of strata overhead. After having reached the eastern side of the river, the main development should be continued in the 11½ feet seam.

By proceeding on this line, no shafts need be sunk for some time to come. The coal being drawn up the incline or slopes direct to the surface, may be shipped into the railway cars at a low cost.

There being no wagon road into the property it would only be possible to take in heavy machinery at a great expense. A whole twelve months development work may however be done on the lines suggested, without the aid of any hauling machinery driven by steam.

The following is a section of the principal coal exposure near the Hepburn tunnel:-

FINE CONGLOMERATE ROOF.

Big Seam	(Coal	7-0	See plan 7.
	(Stone band	4	
	(Coal	3-9	
	(Stone band	4	
	(Coal	9	
	(Bands of Coal and shale	4-3	
	(Shale	5-3	Coal 11'6"
Six feet Seam	(Coal	7	
	(Stone band	4	
	(Coal	7	
	(Band of shale	4	
	(Coal	1-0	
	(Shale	2	
	(Coal	2-4	
	Shale & sandstone		
	(	3-2	
	(Bands of coal & shale	2-7	Coal 4'6"
Eight feet Seam	(Coal	9	
	(Stone band	4	
	(Coal	1-5	
	(Stone band	3	
	(Coal	9	
	(Shale	4	
	(Coal	1-7	
	(Shale	7	
	(Coal	8	Coal 5'2"
	Coal and shale Bands	2-2	

	Small Fault		
	Sandstone	2-0	
	Coal with two bands of shale	2-0	
	Shale	8	
	Coal with 2" of shale	1-0	
	Shale	1-0	
	Bands of coal and shale	4-0	
	Sandstone and shale	1-8	
	Coal	1-6	
	Sandstone	2-0	
Three Feet six inch seam	Coal	0-8	
	Shale	2	
	Coal	4	
	Shale	2	
	Coal	6	
	Shale	2	
	Coal	1-1	
	Shale	3	
	Coal	II	Coal 3'6"

SHALE FLOOR

The Grand Trunk Pacific Railway now being constructed to the north of the property will pass within about six miles of the coalfield. A branch line has also been projected to pass through the property from Fort George to Barkerville.

Electrical power will presently be available from a Hydro electric power plant which is to be erected on the Willow River, say 20 miles to the west of the coal field.

Geologically the coalfield is in the shape of a basin, surrounded by Mountains of volcanic origin. The coal seams in the centre of this basin will probably be found to lay horizontally. No bore holes have been put down to prove how many seams underlie the area referred to, but the fact that several seams outcrop on the banks of the river is in itself sufficient to prove that the field contains a very valuable deposit of Coal.

No other high grade seams of bituminous coal have been discovered in the neighbourhood of Fort George,

and it is therefore clear that a very large market, local market is open to the product from this field. The Grand Trunk Pacific Railway will require quite a tonnage for its locomotives and the towns of Fort George and Barkerville with their industries, and the steamers on the rivers will also require a large tonnage.

This property embraces Fourteen Sections of 640 acres, each two of which are separated from the others.

The area which should be developed in the first place is the centre part of say 3840 acres. On the western side of this area several seams outcrop on the west side of the river. Three of these seams have a very small thickness of strata separating them and therefore they cannot be worked or mined at one and the same time. The thickest seam of eleven and a half feet appears to be the best one to be opened up by the first scheme of development, as it is a very good marketable bituminous coal with a low ash content.

QUANTITY OF COAL.

Assuming that this property has an area of 3840 acres underlain by the big seam of 11'6" thick, it may be expected to yield over FORTY FOUR MILLION TONS OF COAL. It is therefore clear that a very large tonnage of coal can be wrought from this seam alone, for many years, and that if in later years the coal market demands an increased output, this can be supplied by

one or other of the lower seams.

COST OF WORKING.

The cost of working this seam will not exceed two dollars per ton, and therefore there is every inducement for investors to take chance in a company which offers such good dividends.

The coalfield is situated in a very good position as regards markets, and its output being of high grade cannot fail to ensure a large demand.

(Signed) JAMES ASHWORTH.

January, 1913.

Ipswichdale al Cumberland

C O P Y

J. O'SULLIVAN, F. C. S., Etc.
ASSAYER

Vancouver, B.C.
Oct. 9th, 1912.

A. E. Hepburn, Esq., M.P.,
City.

Dear Sir:-

As you were not in the office yesterday, when I handed in my Analyses Reports on your Bear River Coal Samples, I take this opportunity to congratulate you on the excellent quality of the coal outcropping, which indicates that a Coal of very superior quality will be encountered when cover is obtained.

I quite forgot to mention in the Report, the fact that the high volatile combustible matter proves the Coal to be far superior to the Vancouver Island Coal for gas-making, and that the bi-product - a good, firm coherent coke, - could be used for foundry purposes, as well as in hot-air and blast furnaces, and would be cheap at $12.00 per ton, which is the price paid in the City for the Australian product, which gives as high as 16% Ash.

Yours faithfully,

(Signed) J.O'Sullivan,F.C.S.

C O P Y

J. O'SULLIVAN, F. C. S., Etc.

ASSAYER

Vancouver, B.C.

October 8th, 1912.

Analyses of four Samples Bear River Coal outcropping, taken by Mr. Jas Ashworth, M.E.

	"Big Seam" 11' 6"	"3' 6" Seam" "Crop Sample"	"6' Seam" "Right hand side of tunnel"	"8' Seam" "South Cross-cut"
Moisture	3.7 %	3.5 %	4.5 %	4.2 %
Vol: Combustible Matter	45.0 %	42.1 %	40.2 %	39.4 %
Fixed Carbon	48.2 %	43.1 %	50.2 %	47.6 %
Ash	2.5 %	10.5 %	4.5 %	8.0 %
Sulphur	0.6 %	0.8 %	0.6 %	0.8 %
	100.0 %	100.0 %	100.0 %	100.0 %
B.T.U	11.843	10.429	12.393	10.849

These Coals are bituminous of good coking quality, and are therefore valuable for metallurgical as well as steaming and domestic purposes. They compare favorably with Vancouver Island and Mainland product. There is every reason to believe that the quality of the coal will improve considerably when cover is obtained,

(Signed) J.O'Sullivan, F.C.S.

RE BEAR RIVER COAL PROPERTY

LEASES GRANTED UNDER SECTION 21 OF THE COAL & PETROLEUM ACT.

DATE OF INDENTURE	DATE APPROVED	LICENSE NO.	SURVEY NO.	AREA	TERM	DATE OF LEASE GRANTED	RENEWAL DATES	RENTALS	ASSE WO
29th November 1912	18th October 1912	3972	4871	640 acres	5 years	1st March 1913	1st March 1914	$96.00 year	$10 y
-do-	-do-	3973	4865	-do-	-do-	-do-	-do-	-do-	-d
-do-	-do-	3373	4844	-do-	-do-	23 Nov./12	23 Nov./13	-do-	-d
-do-	-do-	3371	4869	-do-	-do-	-do-	-do-	-do-	-d
-do-	-do-	3370	4870	-do-	-do-	-do-	-do-	-do-	-d
-do-	-do-	3372	4845	-do-	-do-	-do-	-do-	-do-	-d
-do-	-do-	4743	4866	-do-	-do-	10 Nov./12	10 Nov./13	-do-	-d
-do-	-do-	4744	4864	-do-	-do-	-do-	-do-	-do-	-d
-do-	-do-	4745	4863	-do-	-do-	-do-	-do-	-do-	-do
-do-	-do-	4746	4867	-do-	-do-	-do-	-do-	-do-	-do
-do-	-do-	4747	4846	-do-	-do-	-do-	-do-	-do-	-do
-do-	-do-	4748	4868	-do-	-do-	-do-	-do-	-do-	-do
th June/13	14th April/13	3974	7868	-do-	-do-	1st March/13	1st March/14	-do-	-do-
-do-	-do-	3975	7869	-do-	-do-	-do-	-do-	-do-	-do-

8960 ACRES

NOTE: Referring to the cost of Crown Granting areas: you will see that C. F. J. G 4 is incorrect, also James Ashworth's report page 1 & 2 is also incorrect, taken from the 5 year leases as granted by the Provincial Government of B.C To crown grant coal & surface rights will cost $89,600.00, this grants use except section 4744. A further 3 years' lease will be granted, making a to before the owners need Crown Grant.

"ARTHUR E. HEPBURN".

R COAL PROPERTY

21 OF THE COAL & PETROLEUM ACT.

E OF LEASE RANTED	RENEWAL DATES	RENTALS	ASSESSMENT WORK	CROWN GRANTS	REMARKS
t March 1913	1st March 1914	$96.00 year	$100.00 year	$10.00 per acre including $5.00 coal rights, $5.00 surface	Coal and surface rights open for purchase
-do-	-do-	-do-	-do-	-do-	" "
Nov./12	23 Nov./13	-do-	-do-	-do-	" "
-do-	-do-	-do-	-do-	-do-	" "
-do-	-do-	-do-	-do-	-do-	" "
-do-	-do-	-do-	-do-	-do-	" "
ov./12	10 Nov./13	-do-	-do-	-do-	" "
-do-	-do-	-do-	-do-	-do-	The holder of this lease will not be entitled to the use of any of the timber that may be covered by timber leases Nos 44930 & 44931.
do-	-do-	-do-	-do-	-do-	Coal and surface rights open for purchase.
do-	-do-	-do-	-do-	-do-	" "
do-	-do-	-do-	-do-	-do-	" "
do-	-do-	-do-	-do-	-do-	" "
March/13	1st March/14	-do-	-do-	-do-	" "
do-	-do-	-do-	-do-	-do-	" "

ting areas: you will see that C. F. J. Galloway's report Pagen
's report page 1 & 2 is also incorrect, for the above data was
ated by the Provincial Government of B.C.
s will cost $89,600.00, this grants use of timber as well
ears' lease will be granted, making a total time of 8 years

'ARTHUR E. HEPBURN".

... Coal Fields.

... 45 Miles East of ...
... miles by Road South of ...
... near Nat. Railways ...
... merly known as the ...
... Mogilewsky ... Direction ...
... the Fraser ...
... on a basin ...
... which may or may not ...
... certain directions ...
... determined at a later ...
... building. The measures are ...
... of Clay and ...

ARTHUR E. HEPBURN
C.M.I. A.I.M.E., F.G.A.
CONSULTING MINING ENGINEER

CABLE ADDRESS: "RUHTRA," VANCOUVER
CODES:
WESTERN UNION BEDFORD McNEILL
MORSING & NEAL

TELEPHONE Seymour 2016

304 WINCH BUILDING
VANCOUVER, B. C.

Information March 1913

Buildings on property:-

1	Cabin	12' x 14'
1	"	12' x 16'
1	"	11' x 13'6"
1	Bunk House	16' x 20'
1	Stable	14' x 24'
1	"	14' x 16'

Tunnel driven in 60' 5' wide 7' high with cross-cut 10' left & 14' Right all in coal.

The shale is rapidly disappearing & the coal is clean & hard.

From tests recently made it is extremely low in sulphur & makes an excellent coke.

It is a rich fuel coal & very pure.

Titles perfect to date.

A. E. H.

SKETCH MAP
OF PART OF
CARIBOO DISTRICT, B.C.

shewing approximate railway locations

to accompany Report on Bear River Coal by
C. F. J. Galloway, B.Sc.
March 1912

Scale of Miles

0 5 10 15 20

N

True Meridian

FRASER RIVER
FORT GEORGE
GRAND TRUNK PACIFIC RAILWAY
EAGLE LAKE
GREAT BEAR LAKE
Warren Creek
BEAR RIVER COAL
WILLOW RIVER
BARKERVILLE RAILWAY
BEAR RIVER
LESSER BEAR LAKE
FRASER RIVER
GRAND TRUNK PACIFIC RAILWAY
VANCOUVER BRANCH
BLACKWATER
QUESNEL
COTTONWOOD
O'STANLEY
BARKERVILLE
RICHFIELD

Railway this side.

Note:- From Hepburn coal exposure Railway in 15 miles distant, with level grade.

Note:- The owners of this coal Charter will agree to lay steel to Colliery, provided we will let them haul coal to Eagle Lake, or point of intersection with the Grand T. Pac Ry.

01

PLAN 2


PLAN OF
BEAR RIVER
COAL PROPERTY.
held by A. E. Hepburn Esq.
to accompany Report by C. F. J. Galloway, B. Sc.
March. 1912.
W. H. Price
Mrs J. Rowan
Shale
K
No 6
No 5
No 4
assumed contact
Volcanics here
Willow Creek
R
Conglomerate
Coal
BEAR
RIVER
not seen
Shale
SIWASH MOUNTAIN
J
B
P
SEYMOUR PASS
No 7
4871
4870
No 8
4869
WILLOW CREEK PASS
PROPOSED RAILWAY TO WILLOW RIVER
Probable Anticlinal Axis
No 2
4865
4866
No 3
4867
No 12
4868
RIVER
Proposed Mine
Volcanics here
Hepburn Coal Exposures
Volcanics here.
No 11
No 1
4864
4863
4846
PROPOSED RAILWAY TO FRASER
LINE OF SECTION (PLAN 6)
SUGAR BOWL MOUNTAIN
KENNETH CREEK PASS
INDEX TO GEOLOGY.
Visible
Probable Extension
Intrusive Igneous Rocks
Coal Measures
Limestone
E
Shale
N
Conglomerate here with volcanic cobbles
No 9
4845
4844
No 10
H
volcanics here.
Contact assumed.
A
not seen
G
M
Swamp Creek
my assumed contact
N
S
W
E
True Meridian
Approximate Elevations in Feet thus - 2400
Proposed Borehole Locations shewn thus - No 1
Scale of Miles
01

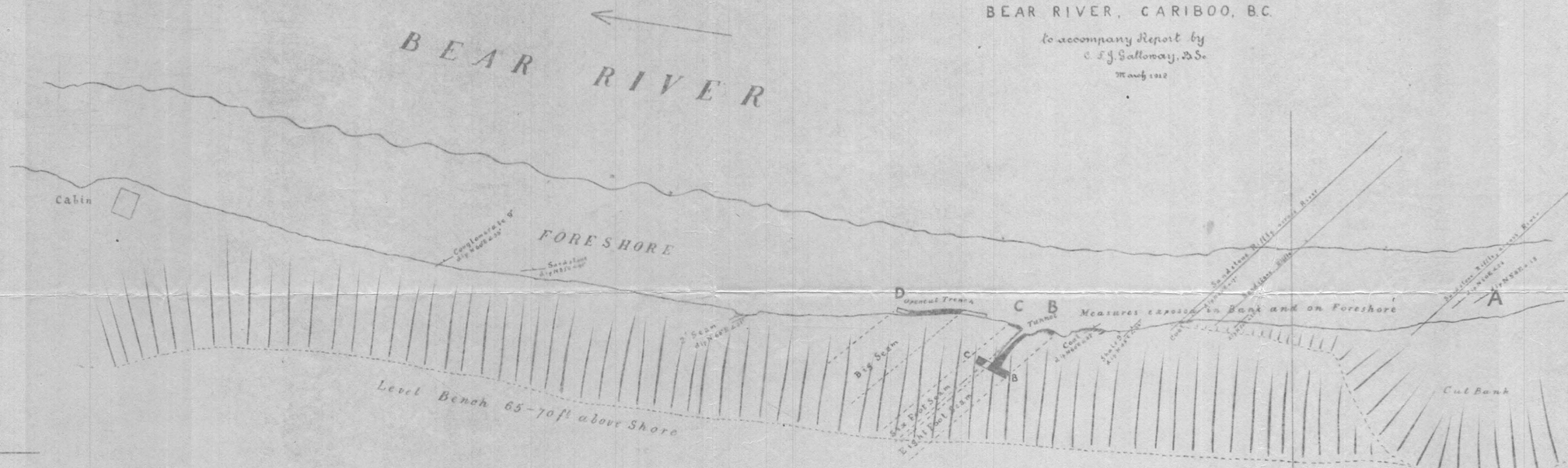
PLAN 3

PLAN OF
HEPBURN COAL EXPOSURES

BEAR RIVER, CARIBOO, B.C.

to accompany Report by
C. F. J. Galloway, B.Sc.
March 1912

(113)



Scale of Feet

100 50 0 100 200

Note:—
More work done since
plan was made (most satisfactory)
in Tunnel—

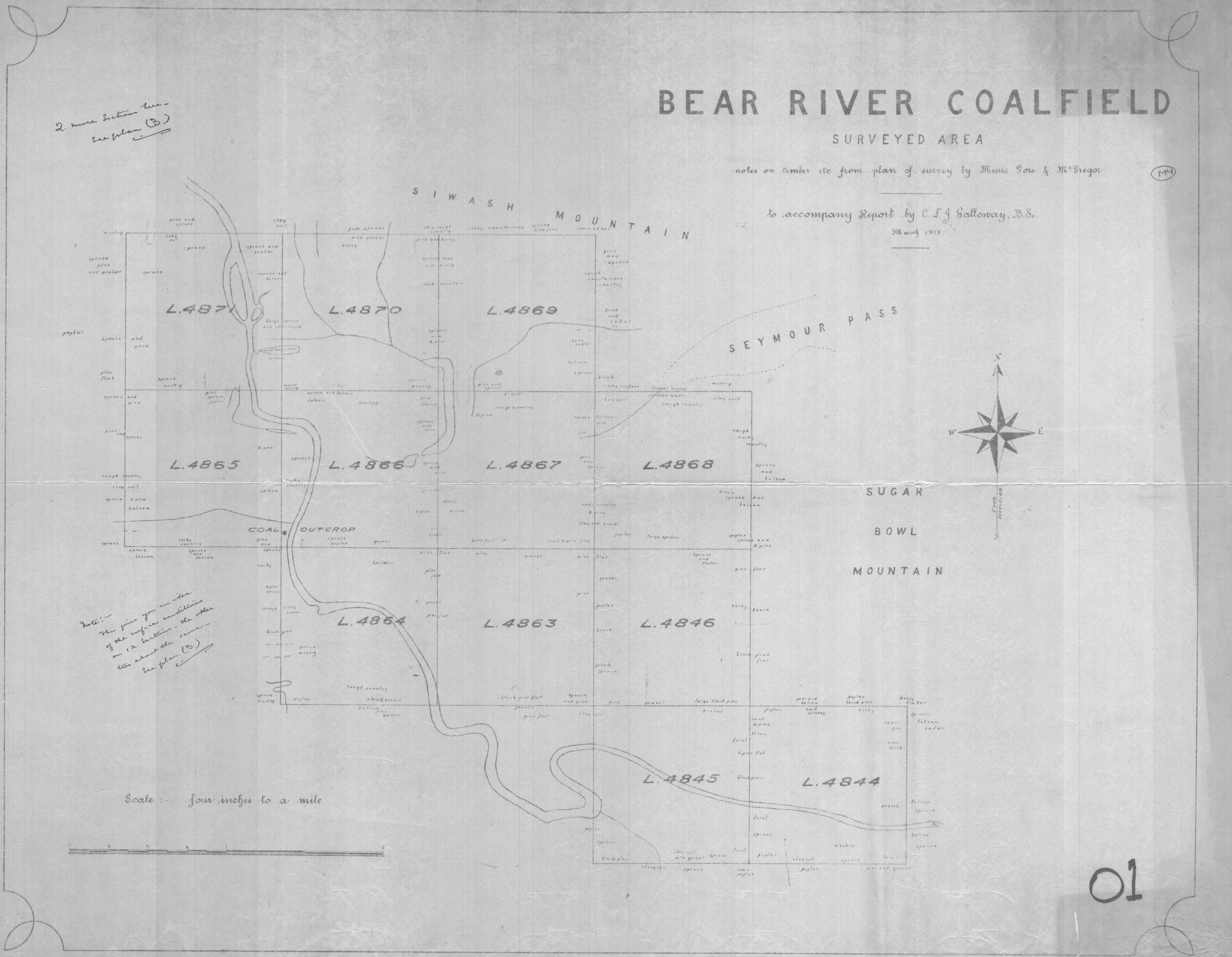
4866 4864

4865

10

01

PLAN 4

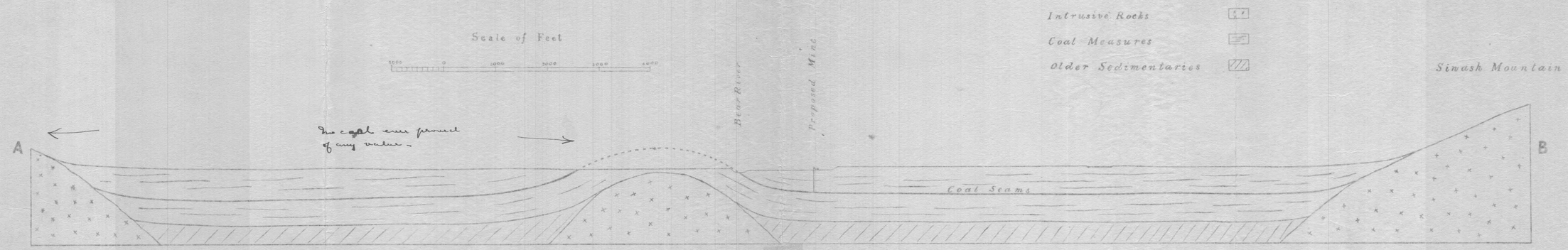

BEAR RIVER COALFIELD
SURVEYED AREA
notes on timber etc from plan of survey by Messrs Gore & McGregor
to accompany Report by C. F. J. Galloway, B.Sc.
March 1912
2 more sections here - see plan (3)
M4
SIWASH MOUNTAIN
SEYMOUR PASS
SUGAR BOWL MOUNTAIN
L.4871
L.4870
L.4869
L.4865
L.4866
L.4867
L.4868
L.4864
L.4863
L.4846
L.4845
L.4844
COAL OUTCROP
N
S
E
W
Note! - this gives you an idea of the surface conditions on 12 sections - the other two about the same - See plan (3)
Scale :- four inches to a mile
01

PLAN 5

BEAR RIVER COALFIELD

HYPOTHETICAL SECTION ACROSS LINE AB

to accompany Report by
C. F. J. Galloway, D.Sc.
March, 1912.



PLAN 6

01

BEAR RIVER
COAL MEASURES

(M6)

Scale:- Half an inch to a foot

to accompany Report by C.F.J. Galloway, B.Sc.
March 1912

Note:— Another 3' 6" Seam of good coal was discovered below the 6' Seam by James Ashworth M.E.

C.F.J. Galloway
Vancouver, B.C.
December 9th 1911.

PLAN 7

01