REPORT ON THE PROPERTY OF KX 67-89

THE HEALY RIVER COAL COMPANY

SUNTRANA, HEALY RIVER DISTRICT, ALASKA

By Geo. Watkin Evans,

Consulting Coal Mining Engineer

Seattle, Washington.

[redacted]

Seattle, Washington.

October 30th, 1922.

THE HEALY RIVER COAL CORPORATION,

Suntrana, Alaska.

Gentlemen:

Following is a report covering my recent visit to your property located in the Healy River Coal Mining District of Alaska.

The report is intended to present to you my views of the property more especially with reference to the method of mining to employ and also suggestions for the erection of the tipple over which to handle coal to the railroad car.

It is not the intention of this report to enter into the monetary value of this property, nor yet to discuss indetail the possible markets for the product of your mine.

LOCATION AND SURROUNDINGS:

The property of the Healy River Coal Corporation is situated about four miles from the junction of the Healy River with the Nenana River. By rail the property is 57 miles from Nenana, 113 miles from Fairbanks and 248 miles from Anchorage.

It is situated in the valley of the Healy River and extends from a point south of the river to a point some distance to the north. The coal area lies almost entirely north of the river but the townsite lies to the south of the stream.

The townsite of Suntrana is pleasantly situated in a minature basin, protected by hills on all sides except to the westward. Wind blows considerably in the district, but because of the protected location there is little or no wind within the townsite itself.

DESCRIPTION OF TOWNSITE:

Beginning at a point which bears 685 feet east from corner of Sections 23, 24, 25 and 26 T 12 S. R 7 W. Fairbanks Meridian, thence easterly 660 feet to post number 2, thence northerly 660 feet to post number 3, thence westerly 1015 feet to post number 4, thence southerly 660 feet to point of beginning, containing 13 acres more or less.

DESCRIPTION OF COAL PROPERTY: (Land Office Number 01068) Granted Feb. 15th, 1922

Beginning at a point which bears 84 deg. E. 3973 feet from corner of Sections 22, 23, 26 and 27, T. 12 S.R. 7 W., thence 3300 feet north, thence 2640 feet east; thence 3300 feet south; thence 2640 west to point of beginning, containing 200 acres more or less in unsurveyed sections 23 and 24 T. 12 S. R. 7 W.

DESCRIPTION OF EXTENSION: (Pending)

Beginning at a point 2640 feet east from marker stake, which marker stake bears 84 deg. east 3973 feet from corners of Sections 22, 23, 26 and 27, T. 12 S. R. 7 W. F. M.; thence 3300 feet N; thence 2640 feet 30 deg. north of east; thence 3300 feet S.; thence 2640 feet 30 deg. south of west to point of beginning, containing 200 acres more or less, and contiguous to permit Number 01068 issued to the undersigned by the Secretary of Interior on February 15th, 1922.

The climate in this part of Alaska is equitable, the summers are moderate and the winter weather is not as cold as in portions of the Yukon Valley. In all, the district is well blessed so far as climate is concerned.

There is sufficient timber in the area tributary to the property to last a good sized coal production, for many years. In places the soil is of such character that vegetables can be raised for local needs.

The neighboring streams contain sufficient water for all mining purposes and wells can be driven to supply the domestic needs of the new town.

When considered from every angle, the mine and town are well situated so far as living conditions are concerned, and this in itself is a splendid asset to the undertaking.

TRANSPORTATION:

The new Government Railroad, known as the Alaska Railroad, is at the present time completing a spur, off the main line between Fairbanks and Seward to the mine. The spur about four and one-half miles in length, leaves the main line at Mile Post 359, from Seward.

This spur is well constructed and has easy grades and good curvature. One week point in it is the pile bridge over the Nenana River that no doubt will go out each spring when high water prevails.

TOPOGRAPHY AND ELEVATIONS:

The area immediately surrounding the mine consists of the Valley of Healy River, which traverses the line of contact between the older Schist Formation, beneath the coal beds, and the coal formation itself. To the south the land rises in gentle slopes for about two miles to the crest of a hog back, while to the north, the bluffs in which the coal beds outcrop, rise almost vertically for several hundred feet. At the top of the bluff the land rises at a gentle slope until the high hills are reached between the Healy River and Lignite Creek Divide.

GEOLOGY:

Geological Age:

The United States Geological Survey, classifies the coal beds of this field as Tertiary, and from the best information, is supposed to be Eocene. Personally I am inclined to the belief that if these beds are Eocene they are upper Eocene and younger than those that occur about seventeen miles up the Nenana River above the town of Healy.

The Healy River coal beds lie unconformably on a deposit of much older Schists that form the base of the range of mountains thru which the Nenana River has cut a deep gorge in the area south of the town of Healy. Overlying the coal series is a large deposit of gravels that rest unconformably on them.

Structure:

The coal beds dip to the north at angles varying from 30 to 40 degrees in the vicinity of Suntrana. To the eastward, along Healy River, it is reported that the beds flatten considerably. As far as observed, there are no faults in the vicinity of the mine, the beds are continuous as far as one can trace their outcrops.

The beds on Lignite Creek, to the north, also dip northerly and there must be either a syncline between these two coal areas or a very large fault to the north Healy River. However, as far as determined to date, the beds along Healy River dip to the north continuously for long distances, and there is no need for alarm so far as their continuity is concerned.

Rocks:

The rocks in which the coal beds occur, are soft unconsolidated sandstones and shales, there are also some conglomerates. For the greater part the rocks are light colored and suggest lime as the cementing material.

The inclosing rocks are so soft that they weather very readily, thereby causing the coal beds to stand out prominently along the faces of the bluffs, this being particularly true of the lignitic beds in the upper portion of the series.

These unconsolidated rocks will rest on the beds as dead weights and will not be able to support their own weights over large areas which will be a handicap in the mining of the coal. Were the rocks more indurated or harder, they would assist materially in the process of mining, by bridging over larger spaces.

Coal Beds:

The coal beds occur in two series, the upper series is shown in Plate 2 accompanying this report, the lower series has not yet been sufficiently exposed to allow one to take measurements and make cross-sections.

The upper series contains six coal and lignite beds that can be considered of commercial importance. In addition to these, there are several smaller beds. The lower series contains five and perhaps more beds, the majority of which will prove to be of commercial value.

Generally speaking, the coal in the lower portion of the geologic section, is better than the coal nearer the top of the series. Near the bottom, the coal is more cubical and is truly a sub-bituminous coal, whereas in the upper beds the coal is more woody and shows distinct lignitic structure.

I have taken the liberty of naming the coal beds that give promise of having commercial value, and by referring to Plate 2 the reader can see the positions of the beds and also the thickness and character of the associated strata.

At the top of the Upper Series is the Sharkey bed, then below it occur in respective order the Wilson, Jinx, Donaldson, Lathrop and Bowen. Below the Bowen bed is a large stratum of sandstone and some conglomerate, and below this are at least five other coal beds. These have not been named nor numbered, with the exception of the top bed, which has been called the Conley. When these beds have been more thoroughly prospected it will be well to take accurate cross-sections of them and take representative samples.

Sharkey Bed:

This bed occurs at the top of the Upper Series and contains coal in four benches, only two of these benches can be considered as having any commercial value. The 7' 6" bench and the 6' 0" bench are the only ones worthy of consideration. The 3-foot bench on the bottom of the bed, cannot be mined under present marketing conditions. The coal in this bed is more lignitic in structure than is true of the lower beds of the series.

Wilson Bed:

The Wilson bed is made up of three benches of coal; the upper bench contains about 4 feet of coal and below this is a bench of bone coal about 2' 6", which in places might be considered of value. The middle bench of 2' 3" of coal has no commercial value. The lower 6' 6" of coal can be mined as a separate bench, using the bone on the top and bottom as walls. This bed as a whole is none too promising and will have to be worked at a time when the other beds of the property are very nearly exhausted, unless with underground development, the bed changes for the better.

Jinx Bed:

The Jinx Bed, is in two benches, the top one 3' 8" and the bottom one 12' 0". The coal in this bed appears to be distinctly lignitic and has a woody structure. With depth under cover it might prove to be more promising and the analyses of the bed might prove that it is of greater value than an inspection of the outcrop indicates.

Donaldson Bed:

This bed is made up of 19' 6" of coal and bone coal. The bone coal might, when under greater cover, prove to be of greater value than is indicated at the outcrop. It will be necessary to have this bed thoroughly sampled after the bed is opened up by underground work to prove what portions of the bed can be mined to advantage. How much of the bone can be mined with the coal and marketed, remains to be seen after the bed is further developed. The ash content and the burning qualities of the benches of bone coal will be the determining factors. There is apparently 17' 2" of good coal in this bed that can be recovered, and probably more.

Lathrop Bed:

The Lathrop Bed occurs in two principal benches of coal with a bone coal near the bottom of the bed. The upper bench is about 10' 0" in thickness and appears to be coal of good quality. The lower coal bench is about 6' 0" in thickness and also of good quality. Below the lower coal bench is a bench of bone coal about 3' 0" thick that should be sampled after the bed is opened underground, to determine its commercial value.

The suggested method of mining this coal bed is discussed at some length under the heading of "METHOD OF MINING."

Bowen Bed:

This is the lowermost bed of the Upper Series, and contains a total of 38' 0" of coal, but the principal benches are in four parts. The top one is 7' 0", the next is 18' 0", the next 7' 0" and the lowermost 6' 0". All four of these benches can be mined, and contain sub-bituminous coal of good quality.

It will be necessary to mine this coal in benches, and this phase of the report will be discussed in detail under "METHODS OF MINING."

Tonnage:

There is no basis at the present time in which tonnage for this property can be computed. It will be necessary to map the bounderies of the holdings and also the outcrops of the several beds contained within the property. There is a sufficient tonnage to warrant the necessary expenditures for the development of a coal mine, and enough coal to last the market requirements of the area tributary to this coal field, for many years.

When the mapping is completed, it will then be possible to calculate with some accuracy the mineable tonnage contained within this lease. The mineable tonnage will be considerably less than the apparent tonnage, because of the fact that in mining thick beds, such as occur on this property, it will not be possible to mine all the coal, except at a very great expense.

THE MINE:

Negri Drift:

At present there are three openings on the property, the upper one or the one fartherest up the river, is the Negri Drift, which has been driven in a distance of about 335 feet on a bench of the Bowen Bed; five breasts or wide chutes have been turned off this entry and some of them driven to the outcrop of the bed.

It is the intention to drive in on this bed in the near future and open out enough breasts to supply the demands until such time that the main tunnel has penetrated the Lathrop Bed and sufficient breasts have been opened to bring the tonnage of the mine up to the required amount.

Main Tunnel:

The Main Tunnel which is being driven across the strike of the coal measures was in a distance of about seven sets at the time of my visit. The plan is to drive this tunnel until it intersects the Sharkey Coal bed, which will be a distance of about 1050 feet from the portal of the tunnel.

After the Lathrop bed is reached, it is planned to drive East and West and after proper distances are reached beyond the main tunnel and the distance to the outcrop warrants the driving of breasts, chutes and crosscuts will be driven and when the distance to the outcrops is great enough to warrant doing so, breasts will be opened and the coal mined on the breast and pillar system.

Keyes Drift:

Down the river, from the main tunnel, a short drift has been driven on the Bowen bed a distance of about 170 feet. Openings have been made in this drift from which some coal was taken last winter. This opening will not be continued from the present portal.

Tipples:

Small chutes or tipples were built at the Negri and Keyes openings and coal shipped last winter, but after the main tunnel has been sufficiently developed these structures will be abandoned and give way to the new tipple to be constructed at the portal of the main tunnel.

The new tipple will be about 35 feet above the level of the tracks and will, when completed, consist of a Rotary Dump and Stationary Screens, also a Kick Back Switch over which the empty cars will run. The grade of the track from the mine will be at one per cent in favor of the loaded cars, and the return grade from the Kick Back will be at the same grade in favor of the empty cars.

The screens are to be constructed so that they can be masked with very little effort and Run of Mine Coal or Screen Coal shipped at will. For the first year or so, and perhaps longer if found to give satisfaction, the screens will be stationary bar screens. Later, if the market requirements are such they will be replaced with shaking screens. The upper screen will have spaces 4 inches between bars, and the lower screens 1-1/2 inch between bars. The grade of the Lump Coal chute (see Figure 7) is to be 25 degrees, and the Egg Coal chute, 32 degrees. Below the lower screen will be built a bin to hold screenings and a chute from a point beneath the screen will divert boiler coal to the boiler room.

The tracks are to be spaced 18 feet apart and there must be sufficient clearance so that a box car or a locomotive will pass beneath the screenings bin. The outline of the tipple is shown in Figure 7.

METHODS OF MINING:

The Lathrop Bed:

When one first observes the unusually thick beds of coal outcropping on this property there is a tendency to conclude that they can be mined very simply and at a very low cost, but this is misleading.

Beds of this thickness require greater care in mining than ones ranging from 6 to 12 feet because of the fact that it is usually more difficult to avoid mine fires in thick beds than in thinner ones. In thick beds there is a tendency to drive wide rooms or openings and leave correspondingly narrow pillars to protect the roof, and after a room or breast is driven and a squeeze begins to take place within the remaining pillar, the sides of the openings begin to slough off and after a time the coal breaks down into samll particles and a fire starts.

In the State of Washington, there are several mines in which coal of a quality similar to that occuring in this property is mined. In the best regulated mine in which the coal bed is 16 feet thick large pillars are left so that in the event a mine fire starts, stoppings can be built and in this manner smother the fire. In other mines working under similar conditions, there afe several instances wherein pillars too small are left and when fires break out, there is not enough coal left in the pillars to accommodate stoppings and as a result the fires break through into the live workings and in some instances mines have been ruined from this cause.

By referring to Plate 6, the reader will observe an outline suggested for the working of the Lathron Coal Bed, and the experience gained from the operation of this bed will be a guide for future development and operation in other beds.

The sketch shows a bed mined on the Breast and Pillar system on a coal bed dipping at an angle of 40 degrees. The gangway is driven about 9 feet wide, and at intervals of 50 feet chutes 8 feet wide and 6 feet high are driven on the full pitch of the bed. When the chute has reached a distance of 30 feet from the upper side of the gangway, a six-foot cross-cut is driven horizontally until it connects with the cross-cut in the next breast outside. After the chute is continued a distance of 14 feet above the cross-cut, the right hand rib is widened, as shown, to a total width of 20 feet and continued in this manner until either a chain pillar or a surface pillar is reached. At intervals of 50 feet, six-foot cross-cuts are driven to connect with the next cross-cuts outside.

A row of props is carried up the pitch about 3 feet from the left hand rib and lagging placed on the chute side; this provides for a chute about 4' 6" in width down which the coal will flow to the gangway. This row of props and lagging are continued up the pitch for the full length of the breast.

After a breast is driven past a cross-cut sufficiently for the next cross-cut and when the connection with the last cross-cut is made, the cross-cut below is stopped off with canvas brattice cloth so that the air will not short circuit and cease to flow to the working face. When the upper limit of a breast is reached, wood stoppings are built and the breast sealed off so that air does not circulate and start fires spontaneously. In order to carry the air to the top of the working face it is sometimes necessary to carry a canvas brattice, as shown in sketch.

The coal can either be sheared along one side while mining in the breast or shot from the solid, whichever method will produce the greatest amount of large size coal at the least expense. That is, provided shooting from the solid does not become a matter of danger from blown out shots.

By referring to the Side Elevation of Plate 6, it will be seen that I have shown a foot of coal left at the top and bottom of the breast. The reason for suggesting this is to provide the working places with a stronger roof than is possible by mining to the sandstone immediately above the coal. I believe the coal will hold up much better than the sandstone, which appears to be very short grained and not capable of carrying much of its own weight. The foot of coal is left on the bottom so that in getting the coal from the working faces down to the gangway, the stratum of carbonaceous shale and other impurities are not carried down with the coal, thereby adding unnecessarily to the ash content of the product.

In order to protect the overlying strata and not injure the future workings of the overlying coal beds, it will be necessary to either leave the pillars in until such time that the overlying beds are mined, or adopt a filling system and then split the pillars and after the coal from them is mined out, fill in that space also.

A very good plan to my mind would be to try out the following experiment and if found to be satisfactory, adopt it as the method to follow: After a series of breasts have been driven to the boundry of the lift, then before the timber rot and allow the roof to cave, arrange a set of flumes and with water properly directed, sluice into the worked out breasts a properly proportioned mixture of sand and gravel and fill all the worked out places. This will serve two purposes, first, to eliminate sloughing of the sides of the pillars and starting mine fires, and also fill in the worked out area so that it in turn will take the weight of the overlying strata and permit the working of the coal left in the pillars.

After the filling has been allowed to set firmly, then the pillars can be split and the coal in them mined in the same manner as was done in the breasts. By this method, there will be very little settlement of the lower beds so that the mining of the upper beds will not be impaired.

The breasts must be driven on sights so that the widths of the opening and pillars will be uniform. Too often care is not taken in driving breasts and as a result the pillars become thin in some places and wide in others and as a rule the breasts become much wider than is safe, so that squeezes develop and the thin pillars of coal left take weight and slough and in due time fires begin.

By lining up the row of props about 3 feet from the left hand rib of the breast, they can be kept in line and in this manner uniform methods of mining be put into effect.

The Donaldson Bed:

The exact method of mining the Donaldson Bed can be determined only after the bed has been intersected in the Main Tunnel and careful sections taken underground and samples taken to determine the character of coal in the several sub-divisions.

Whatever bench is driven on, the pillars in this operation should be kept vertically above the workings of the Lathrop bed.

The Bowen Bed:

At the level of the Main Tunnel, there will be no opportunity of driving to the west on this bed from the point at which the tunnel intersects this bed. A good plan will be to drive west on the Lathrop bed until a point is reached opposite the Bowen Bed where it will justify driving breasts toward the outcrop from this level, then driven a rock tunnel over to the bed and in this manner mine the coal from it.

The method of mining coal in this bed will have to be studied with considerable care, so that the maximum coal be recovered. It is a very thick bed and should be studied at the point underground where the rock tunnel, from the Lathrop gangway, intersects it.

It has been suggested that it might be practicable to drive a large gangway on the Bowen Bed, from a point at track level, and take railroad cars into the mine and load coal from the chutes. This would indeed be a novelty, and whether or not such a plan would be practicable could be found out only after trying it out.

At first I thought the idea impracticable, but after studying the situation on the ground with considerable care, I believe it will be worth while to at least experiment with such a plan. I would not do so, however, until I were assured that I could depend on this winter's supply of coal from another source, for fear that something unexpected might slip up and cause the experiment to be unsuccessful.

A plan of this nature would necessitate driving a gangway of such size that a standard railroad car could be pushed into the mine and loaded from properly constructed chutes. The one great advantage such a plan would have, would be to load directly into the railroad car and not into mine cars, then haul them out to the tipple and dump them into railroad cars. The number of drops the coal would have by loading directly into the railroad car would be fewer than in the ordinary method, hence a larger percentage of lump coal would be produced, but on the other hand, only Run-of-Mine Coal could be sent to the market from such an operation.

One of the difficulties with a large car plan would be loading from the gangway into the railroad car when driving the gangway. One method would be to use a conveyor of some description to carry the coal from the working face into the car. The upper bench of the gangway could be driven in advance and a small car so arranged that the coal could be taken over the top of the railroad car and dumped. The lower portion of the gangway could be handled as stated above, by some form of conveyor.

The experiment should be tried and costs kept of all operations and compared with the work to be done in the Lathrop and other gangways where they are driven by the usual methods.

If the experiment proves to be successful, the coal from the Lathrop could be loaded into the railroad cars through a rock chute driven in such a manner from the Bowen Bed that the coal will run on sheet-iron.

EQUIPMENT:

At present, side dump cars are used. These will no doubt do for the coming winter but should give way next year to a well balanced mine car with solid ends and with a track gage of 36 inches. The car should hold from a ton and a quarter to a ton and a half, and the distance between wheels should be carefully considered.

I think cars properly designed can be purchased in Seattle at some of the car shops for less price than they could be made at Suntrana. They could be knocked down with each part properly marked and holes bored so that they could be assembled with the least cost after arrival at the mine.

The cars that are now being used could be taken over to a point east of the railroad spur and a drift driven on the Conley Bed, which can be developed at a slight cost, to be used as an emergency in the event the demand for coal becomes greater than the other openings can supply.

There should also be a boiler or two erected for the purpose of supplying the necessary power to generate electricity for driving the fan, also pumps for town water and for lighting the mine and town. These boilers are at Healy and could be installed at a point west of the tipple, in such a position that the slack coal would run by gravity into the boiler house.

There should also be provided for the men a wash and change house so that all employes who care to do so can wash and change before going to their rooms or homes. There should be provided a suitable number of showers for this purpose. A good location for the wash and dry room would be west of the boiler room where the waste steam from the boiler could be used.

A Sirrocco or Jeffrey Fan should also be installed to provide ventilation for driving the tunnel and chutes, in advance of the air. The fan should be of such size that it will serve the needs of the mine for several years. There should also be provided about two thousand feet of Flexoid Tubing or its equivalent for the purpose of splitting the air current into several branches where necessary.

A small Generator Set should be installed for generating sufficient electricity for the needs of the mine for several years, but so arranged that when occasion requires additional power it can be added with least expense.

One Electric Drill should be purchased for driving in rock and also coal. The selection should be made after comparing several drills that are now on the market and if found to be entirely satisfactory, additional drills could be purchased.

UTILIZATION:

Using Coal In The Raw State:

It is not my purpose to discuss the utilization of coal to any great extent, but it will be well to call attention to some features in connection with the use of this coal because of the fact that a market for the output of this mine is going to be limited for at least some years. In fact to my mind the marketing of this coal is one of the most important features connected with the enterprise.

To begin with for the time being at least this coal must be used in its raw state in coal stoves where they can be had, and many times in wood stoves because of there being so many wood burning stoves in Alaska. Steps should be taken at an early date to acquaint the hardware dealers of the territory with the fact that coal is now available in quantities and at such prices that people should be encouraged to use coal rather than wood. Also furnaces should be so equipped that they can burn coal instead of wood. It will be necessary on the part of the salesmen handling this coal to do considerable missionary work among the prospective users of this coal, so that they will get best results and not become discouraged. They will not find it quite as satisfactory to use as some of the coals they have been accustomed to use in the States, and for this reason there will be knockers developed when least expected.

Boilers should also be equipped with properly constructed grate bars and be properly drafted to use the coal. It will be found that plants using wood will have grate bars too coarse and the fire boxes not adapted for burning coal, and after attempting to burn coal under these conditions, they will give up in despair and become knockers of the coal instead of boosters. A great deal of attention must be given to these little details for it will not be possible to convert a group of wood burners to coal burners, without some effort and considerable time.

The Alaska Railroad is one of the principal users of fuel both on the railroad as locomotive fuel and at steam plants. At present, the Commission is using coal mined in the Matanuska Coal Field which is higher in both heat units and ash than the Healy River coal. It is reasonable to assume that for some special purposes the Commission will continue to use coal mined from the Matanuska Field, especially on the south side of the Broad Pass, but I can not see any logical reason why any of that coal should be used on the north side of the divide.

The Oregon and Washington Railroad in the State of Washington has been using about 1220 tons a day of coal higher in moisture and ash than the Healy River Coal and lower in heat units. They have experimented for years with various types of fire boxes and grates, and have finally evolved a combination that gives very good results.

It is claimed that the sub-bituminous coals similar to Healy River Coal are not suitable for locomotive use because of the fact that the locomotives spark too badly and set fire to the area through which the railroad passes. This can be overcome to a very large extent by using the proper size of screens on the stack of the locomotive.

The Oregon & Washington Railroad has developed an automatic stoker for the burning of Tono Coal that has proven very satisfactory; in fact, the Fuel Engineer in charge of this work has stated that with these stokers and the price at which they were able to buy Tono coal they could successfully compete with California fuel oil even when it was at a very low price. Recently, with the new drop in the price of fuel oil and the continued high wages to the coal miners, the railroad has converted some of its locomotives to oil, but the majority of them still burn coal.

Fire boxes in the stationary plants, should also be readjusted with a view of burning this coal. It will be found that greater efficiency will be obtained when burning sub-bituminous coal with a properly designed firebox than can be had from burning a higher grade coal in an improperly designed firebox or furnace.

The question of which coal the Commission will burn at different points along the system depends upon the number of millions of effective B. T. Us they can purchase at the mine for a given price rather than the grade of the coal.

Using It As Briquets:

Numerous efforts have been made to successfully briquet sub-bituminous coals alone without the admixing of bituminous coals, with rather indifferent success. There is a briquetting plant operated by the Pacific Coast Coal Company near Seattle that produces a very satisfactory briquet from a sub-bituminous coal, but to this coal is added a large percentage of two bituminous coals, one a non-coking, the other a coking coal. To these is added an Asphalt binder amounting to about 7 or 8 percent.

Very recently there has been called to my attention a secret binder process in which successful briquets have been made from sub-bituminous coal without the addition of bituminous coals. I have had briquets made under my own observation, from a coal of lower grade than the Healy River Coal, and have burned the briquets with very good results. It is claimed by the advocates of this process that a One Hundred Ton plant can be erected for from $30,000.00 to $40,000.00, and it is also claimed that the binder is of reasonable cost. Just how this process will apply to the briquetting of the coal under consideration I do not know.

In the process of briquetting mentioned, the operation consisted of first driving off a large percentage of moisture and thereby increasing the heat value of the coal at the plant. This is an important factor in a coal containing nearly 20 per cent moisture.

I am planning on having a sample of the Healy River Coal briqueted with this process and determine the quality of the resulting briquet. I plan also to secure figures as to the cost of installing a plant in Alaska and also the cost of binder and other factors that enter into a project of this nature.

It might be found an advantage, in time, to erect a briquetting plant so as to make the product of this mine of such character that it will be of higher heat value and also have better storing properties.

Using It As Powdered Coal:

The use of coal in pulverized form has made great strides during the past six or seven years. At one time powdered coal was used only in the manufacture of cement, but within the past four years several central power plants have been constructed using powdered coal as the fuel. One of these was built in Seattle, and one other in Milwaukee, Wisconsin. Both of these plants have demonstrated the practicability of using coal in this form for the development of power.

In addition to the use of pulverized coal for generating power, coal is also used in this form in smaller installations for heating homes, apartment houses and office buildings. In Seattle one firm specializes in installing small plants for homes and other similar uses.

When using coal in powdered form, the moisture is driven off, thereby greatly increasing the heat value of the coal, and the complete combustion obtained increases the efficiency of burning the coal over that of ordinary methods.

Powdered coal is also used in smelting ore, so that if large bodies of ore are found in the Interior of Alaska and it is thought feasible to smelt the ore, powdered coal from this district can be used for smelting it. It might also be possible to make a briquet that can be used in blast furnaces in lieu of coke. This, however, is a later consideration and a subject that will require more study before any conclusion can be drawn.

It will be entirely feasible to dry and pulverize this coal at the mine and ship it in air-tight tankers very much as California fuel oil is shipped at present. The coal in this form can be used for many purposes as suggested in the foregoing paragraphs.

Carbonizing The Coal:

Claims have been made by several firms that they are capable of taking the lower grade of coal such as sub-bituminous coals, and by a process of destructive distillation drive off successively the moisture, gases, light oils, heavy oils and ammonium sulphate, then briquet the residue, which consists of charred coal. A process of this character has been used successfully in Germany for many years, and one firm in the United States spent a million or more dollars with a process which took up some of the stages mentioned in the foregoing description, but as nearly as I can determine, they have not arrived commercially. I have made some investigations along this line and have not satisfied myself that a plant of this nature can be constructed for a reasonable amount and made to pay interest on the necessary investment. I believe the time will come when a process of this nature will be evolved and coal will be utilized in this manner, rather than the present crude forms. I doubt, however, if such a plant could be constructed with our present knowledge of the subject that would be a commercial success, and for this reason I am willing to dismiss this phase of the subject for the time being.

Automatic Stokers:

There are several types of automatic stokers, both over-feed and the under-feed types. Several improvements have been made in recent years in stokers of a large size and before anyone installs a stoker plant it will be well to get the very latest information on the subject. The American Combustion Corporation of New York has developed a stoker within the past few years that gives excellent satisfaction at some of the plants in which their stokers are installed.

Of the smaller size stokers, the Smokeless Stoker Company of Seattle have developed an automatic stoker for small power plants and residences that is proving very satisfactory for the use intended. These stokers should work well on the smaller sizes of the Healy River Coal and eliminate a large part of the labor cost in some plants. One of these stokers should serve very well in an apartment house where it is necessary in winter to keep the temperature at a certain stage. They are equipped with thermostats so that any range of temperature can be established that is desired.

Central heating plants, properly located, should prove a good investment in the larger towns of Alaska, such as Cordova, Valdez, Seward, Anchorage, Nenana and Fairbanks. With automatic stokers and using the smaller sized coal from this mine, I believe that such an investment would give the business houses of those cities heat at a minimum rate and at the same time prove satisfactory to the company making such installations.

It would not be a bad plan for the company mining the coal on this property to at least experiment with one plant at the city that seems to offer the best location, and if the plan succeeds, then extend the system to other cities. In this way the overhead could be kept at a minimum. It would, of course, be an advantage to interest some of the leading business men of each of the cities in the venture so that local good will be established.

MANAGEMENT:

Every enterprise, no matter how promising it might be, requires competent management to succeed. This statement applies with equal force to the property of the Healy River Coal Company.

The direction of the work at the mine should have first consideration. The man directly in charge should know what is needed for the opening and operation of a practical coal mine. He should know how to engage men and after they are hired they should be handled with consideration insofar as living conditions and surroundings are concerned. I do not believe in toading to the average miner, but do believe that he should have good wage and comfortable surroundings, as well as due consideration in the matter of his work at the working face. Good men are an asset to any company, and the right type of Manager and Mine Foreman will attract the men you will want.

All mining work should be placed on contract as soon as practicable and a man on contract deserves to make more than a man on day wages, so make the contract an incentive.

The Mine Foreman should know how the coal is to be mined, how it is to be taken from the face to the gangway, and how it is to reach the tipple with the least expense, breakage, and delays. He should and must know how to combat mine fires when they occur, and for this reason it will be necessary, when the mine becomes extensive and considerable ground is opened, to have a man with experience in similar mines elsewhere. The right type of Mine Foreman will avoid fires where the incompetent man will develop them.

In addition to handling the affairs at the mine satisfactorily, the Manager must give attention to the marketing of coal and must co-ordinate the mining arrangement with the demands of the markets.

MARKET:

At the earliest opportunity there should be a thorough canvass made of the Interior of Alaska and also the coast towns as far east and including Cordova, to determine the present consumption of fuel of all kinds, wood, coal, oil or other fuel. Find out also the qualities of the competing fuels such as Nanaimo Coal, Fuel Oil, grade of wood, whether dry or otherwise, and any Alaskan coals that are used. Try and figure out these competing fuels on a B.t.u. basis in terms of tons of Healy River Coal, considering, of course, the question of the amounts of ash and whether or not the fuel creates a considerable amount of soot.

After the amounts and prices of these several fuels are tabulated for each place of any size, you are then in a position to figure on whether or not you can compete with any given fuel in each of the towns under consideration.

Figure also the freight rates from your mine to various points and that of the Matanuska Coal, and have these all in convenient tabular form for ready reference.

If a certain building has been using wood for years, inquire into their method of burning and also how changes can be made from wood to coal, and if a long time contract at a certain price will cause the prospective customer to change over, then work along those lines. Try always to find a market for the SCREENINGS, they are the most difficult to get rid of. Most people will consider LUMP coal at a reasonable price, but not so with the smaller sizes.

By starting in early to tabulate all information on the marketing of your coal, you can add to it from time to time so that in a few years you will have a complete grasp of the situation. These figures should be arranged for ready reference but kept under cover.

I believe it will be necessary to confine the marketing of your coal to Alaska exclusively and perhaps no farther East than the city of Cordova. The high moisture content of this coal will not permit transporting it to great distances in competition with low moisture coals, even though the latter be sold at a considerably higher price. This statement is made after several years observation of the subject.

The Bluff Point Coal would, if properly financed and managed, be a competitor of your coal because of the lower transportation rates to points along the water front. The Evan Jones Coal will also be a factor in the limited market for Alaska Coal.

When we come to analyse the Alaskan Coal situation, it resolves itself very much to the following summary: The high grade coals of the Bering River and Matanuska Coal fields are so badly disturbed by faulting, folding and intrusives that their high cost of mining will not allow them to compete with other fuels at the present marketing conditions. The lower grade coals, such as Bluff Point and Healy River, can be mined at a reasonable price, but not lower than at many places in the State of Washington, hence these coals must of necessity find a market in the towns of Alaska, not too far removed from the points at which the coals are mined.

The great amount of propaganda that has been spread about the revolutionary character of Alaskan Coal when available on the Pacific Coast city markets has served its purpose - that of causing people to believe in the first place that each coal claim in the Bering River Field was worth a fortune, and the other, that there was unlimited coal resources in the Matanuska Valley as a foundation for the construction of the Government Railroad. The fact is, anyone seeking an investment in Alaskan Coal should first of all surround his market and see if it will fit in with his mining costs.

Table of Distances and Elevations in Connection with Shipment of Coal from both Matanuska and Healy River Coal Fields

From Suntrana To:		Elevation &	From Jonesville To:
Nenana	54 Miles	362 Feet	283 Miles
Happy	106 "	609 "	---------
Fairbanks	113 "	448 "	338 "
McKinley Park	14 "	1732 "	---------
Summit	50 "	2337 "	---------
Curry	114 "	546 "	---------
Wasilla	202 "	339 "	31 "
Matanuska Jct.	211 "	36 "	22 "
Anchorage	248 "	28 "	59 "
Portage	298 "	33 "	109 "
Grandview	-------	1063 "	---------
Seward	362 "	20 "	173 "

(Elevation Suntrana, approximately 1370 feet)
(" Jonesville 837 ")

RECOMMENDATION:

I recommend that the Main Tunnel be driven in to the Wilson Coal Bed and after each bed is intersected that a thorough sample of the bed be obtained at the earliest convenience; burning tests should also be made of the coal of each bed for future reference.

When the Lathrop Bed is intersected by the Main Tunnel, a gangway should be driven right and left and when the distance to the outcrop is sufficient, Breasts and Pillars should be opened. Also that gangways be started on the Donaldson Bed, but unless the other openings made cannot supply the coal, that the opening of Breasts on this bed be delayed until a later date.

A properly driven gangway should be driven on the Bowen Bed at the Negri Drift Site to supply coal until such time that the Lathrop Bed is ready to furnish the coal. Also a Trial Large Gangway be started at the level of the tracks so as to accommodate a Railroad car, but this later work should not be done at a sacrifice to the Lathrop and Negri gangways, for from these two we will expect to get this winter's coal, they are the most certain - especially the latter.

The tipple should be completed so as to prepare the necessary sizes for any contracts that might present themselves. The outline submitted, if followed, will serve your needs very well for some time to come.

A fan should be installed at an early date to ventilate the Main Tunnel and also the two branches of the Lathrop gangways. This will necessitate the erection of the bôiler house and boilers to supply steam, and also a generator of some kind to supply the electricity.

The townsite should be given attention and require that the people building follow a definite outline, and no more trees should be cut than are necessary. No litter of any kind should be allowed to accumulate. By starting in with a neat townsite it can be kept so for all time.

CONCLUSION:

I believe you have a coal property which, if properly handled, will return to you a reasonable rate of interest for the investment necessary for the opening and operation of a mine.

Do not be misled by the belief that because of the great thickness of the coal beds that you can mine the coal for practically nothing; nor yet with the thought that there will be no mining difficulties. The cost of mining, for the first five or six years, will be reasonably small, but at the time your cheapest coal is being mined you should set aside a fund for future trouble and unlooked for expense.

The greatest problem you will be confronted with - aside from probable mine fires - is finding a larger market for the coal than is now apparent. Every method should be used to extend this market, and with the introduction of cheaper fuel within certain areas, new life will be given to mining and other industries, and this in turn will create greater markets for the coal.

Respectfully submitted,

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Consulting Coal Mining Engineer

A D D E N D A

THE UPPER NENANA COAL AREAS NEAR RILEY CREEK:

There might be added to this report a few remarks concerning the so-called Upper Nenana Coal Areas near Mile Post 341.

I spent one day visiting this coal area in company with Mr. Robert Donaldson of the Healy River Coal Company, and on this trip met Mr. Anderson, one of the prospectors who has done the work along the railroad track near Mile Post 341.

I visited four outcrops of coal and carbonaceous shale all west of the railroad track. None of these had been very well exposed and from the shallow openings it is impossible to state what would be uncovered with depth. The outcrops showed that carbonaceous matter does occur in this area and that there are particles of coal among it, some of the samples quite good.

The principal outcrops on which most of the work has been done is up on the side of the mountain above the track, and has the following cross-section:

Roof, Igneous Rock 20 feet thick		
Impure coal at outcrop	2'	6"
Coal of anthracitic character	3'	6"
Bone coal	1'	6"
Carbonaceous shale	1'	4"
Floor Shale		

Dip to the north at about 70 degrees, the strike is about east and west. The Elevation of the outcrop above the railroad track is about 900 feet.

By comparison, I would state that the Coal Creek, the Chickaloon and the Kings River Areas of the Matanuska Coal Field are more promising, and these, as you know, are closer to a greater market than is true of the Upper Nenana Coals.

I was informed by Mr. Anderson that he had much better prospects up Riley Creek about eight miles or so from McKinley Park, and I suggested to Mr. Donaldson that he keep in touch with this prospect and see if anything more promising develops. It is possible that beds of good coal occur in these sedimentary measures, at some point, so that it will be well to keep your ear to the ground.

Personally, I would not spend money at the Anderson prospects along the railroad track in view of my knowledge as to what can be done at Suntrana. The risk is too great to bother with. Commercial coal might be found, but only after considerable money is spent, and it will cost a considerable sum of money to develop it, and with the limited market I would consider the expenditure of money highly speculative and uncertain.

Respectfully submitted,

(signed) Geo. Watkin Evans

Consulting Coal Mining Engineer

U. S. Geological Survey and Personal Observation PLATE NO. 1

MAP OF CENTRAL ALASKA

Showing Position of Nenana Coal Field

STRATAGRAPHIC SECTION OF COAL FORMATION ALONG CASCADE CREEK

Massive Sandstone	--	
Coal & Imp. "Sharkey Bed",	20'	5"
Gray Shale	3	0
White Mass Sandstone	6	0
Coal & Imp. "Wilson Bed"..	30	3
Sandstone,................	21	0
Lignite	1	0
Gray Shale	18	0
Conglomerate	16	0
Coarse Sandstone	58	0
Iron Stained Sandstone ...	12	0
Lignite	2	0
Gray Shale	5	0
Lignite	1	10
Gray Sandstone	32	0
Lignite	2	0
Gray Shale	6	6
Gray Stratified Sandstone,	7	0
White Sandstone	14	0
Lignite	3	8
Sandy Shale	4	0

Coal & Imp. "Jinx Bed" ...	16	4
Shale	13	0
Gray Stratified Sandstone,	8	0
White Massive Sandstone ..	66	0
Coal and Imp. "Donaldson Bed	24	8
Shale	4	0
Stratified Sandstone	20	0
Massive Sandstone	75	0
Coal & Imp. Lathrop Bed ..	20	2
Shale	7	8
White Sandstone	24	0
Coal & Imp. "Bowen Bed" ..	40	7
Gray Sandy Shale	--	

BOWEN BED

Sandstone	24'	0"
Coal	7	0
Carb. Shale	0	3
Coal	18	0
Bone	0	8
Coal	7	0
Dark Shale	0	3
Coal	0	3
Dark Shale	0	5
Coal	0	6
Soft Shale	1	0
Coal	6	0
Sandy Shale	------	

LATHROP BED

Sandstone	75'	0"
Coal (splendid)	10	0
Crb.Shale & Bone ...	2	6
Coal	6	0
Coal & Bone	3	0
Carb. Shale	1	8
Gray Shale	....	

PLATE NO. 4

DONALDSON BED

Ma. Shale	66'	0"
Crb. Sh. Bone	1	0
Coal	4	0
Bone	1	3
Coal (good).......	13	2
Bone	1	8
Coal (good)	2	4
Crb. Shale	1	3
Gray Shale	3	0

JINX BED

Sandstone	14'	0"
Coal	3	8
Carb. Shale	0	4
Sandy Shale	4	0
Coal (lignitic) ..	12	6
Carb. Shale	1	1
Dark Shale	12	0

PLATE NO. 5

WILSON BED

Sandstone	60'	0"
Bone	0	8
Coal	4	0
Bone Coal	2	6
Gray Shale	2	6
Coal	2	3
Gray Shale	10	0
Bone	0	10
Coal	6	6
Bone	1	0
Gray Shale	8	0

SHARKEY BED

Massive Sandstone ...	-------	
Imp. Coal	1'	0"
Coal	0	10
Brown Shale	0	3
Coal	7	6
Bone	0	5
Coal	6	0
Gray Shale	1	5
Coal	3	0
Gray Shale	3	0
Massive Sandstone ...	60	0

PLATE NO. 6

PLAN OF WORKINGS.

PLATE NO. 7

OUTLINE SKETCH OF NEW TIPPLE

For Healy River Coal Co.,
Suntrana, Alaska.

PHOTOS, entitled:

LOOKING UP HEALY RIVER FROM JUNCTION WITH NENANA RIVER

OUTCROPS OF LOWER COAL SERIES AT SUNTRANA

APPROACH TO MINE AT SUNTRANA

LOOKING UP COAL CREEK NEAR SUNTRANA

LOOKING ACROSS PORTION OF TOWN-SITE

VIEW OF RIVER CRIB AND COAL IN BLUFFS

GENERAL VIEW OF BLUFF AND SURROUNDING COUNTRY

CLOSER VIEW OF BLUFF

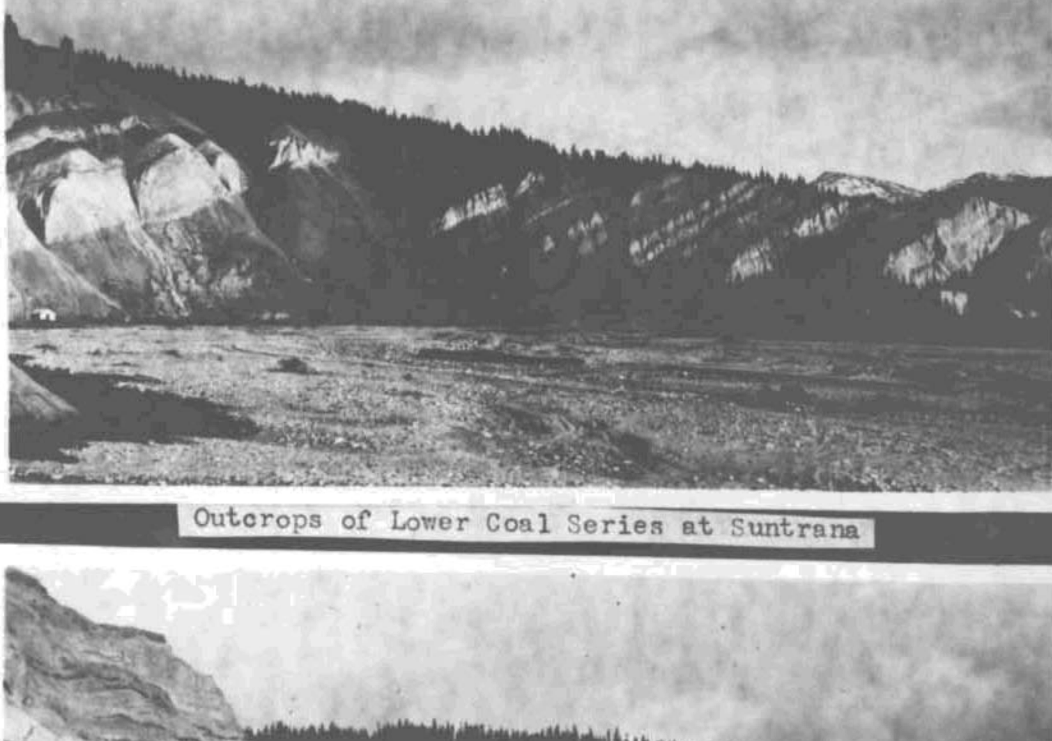
PORTAL OF MAIN ROCK TUNNEL

LOOKING UP HEALY RIVER FROM EASTERN LIMIT OF PROPERTY

LOOKING DOWN HEALY RIVER FROM EASTERN LIMIT OF PROPERTY

LOOKING DOWN HEALY RIVER ACROSS TOWNSITE OF SUNTRANA

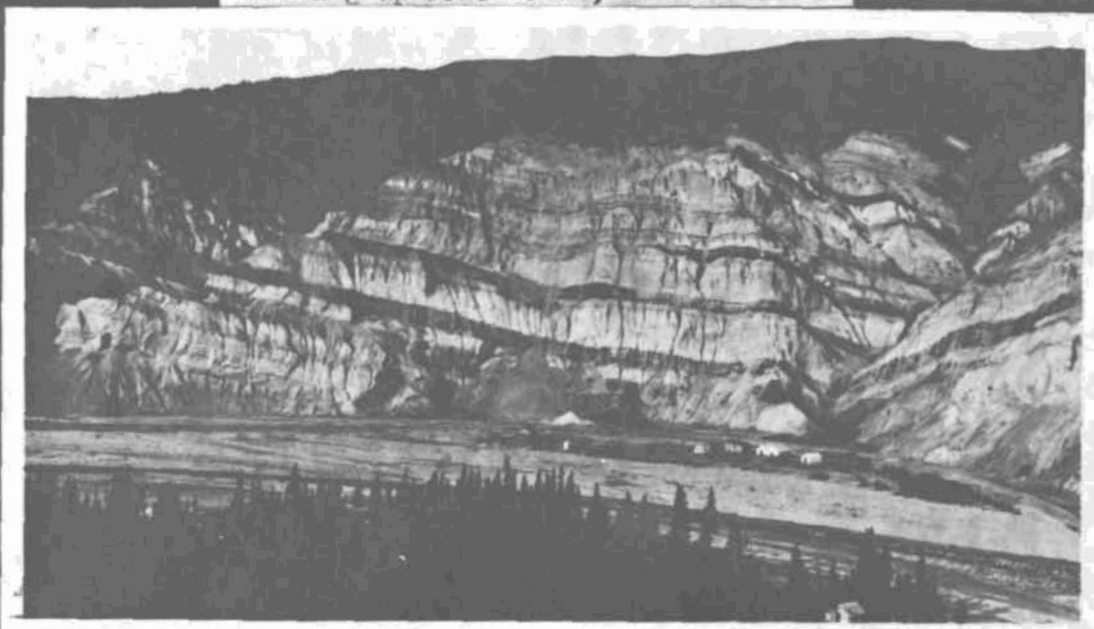
Looking up Healy River from junction with Nenana River



Outcrops of Lower Coal Series at Suntrana

Approach to mine at Suntrana

Looking up Coal Creek, near Suntrana



Looking across portion of town-site

View of river crib, and coal in bluffs

General view of bluff and surrounding country

Closer view of bluff

Portal of main rock tunnel

Looking up Healy River from eastern limit of property

Looking down Healy River from eastern limit of property

Looking down Healy River across town-site of Suntrana