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THE HORSESHOE BASIN AREA

of the

TETON COAL FIELD IN SOUTHEASTERN IDAHO

by

George Watkin Evans

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The original publication was no longer of reproducible quality. Geologic and English usage appear as in the original. Only minor typographical errors have been corrected.

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Foreword

by

Francis A. Thomson

Blessed with an abundance of economic minerals both metallic and non-metallic, the state of Idaho is nevertheless one of the few western states in which workable coal deposits appear to be confined to a relatively small area. This situation makes the Teton coal field an area of especial importance from the view point of the internal economy of the commonwealth.

The report herewith was written early in 1922, and somewhat less than a hundred copies have been distributed from time to time to interested persons. In view of a renewed interest in the area it has been thought advisable to make it more generally available as one of the series of Bureau pamphlets.

Mr. Evans, the writer of this report, is a coal mining engineer of wide experience, who has been consulting engineer for the U. S. Bureau of Mines and for the U.S. Navy in connection with the development of the coal fields of Alaska. Mr. Evans has also been consulting coal mining engineer for the Northern Pacific Railroad, the Southern Pacific Railway, and the Union Pacific Coal Company.

As the writer has inspected the field personally with Mr. Evans, he may perhaps be permitted to summarize the general conclusions of this report by saying that the Horseshoe Basin coal field contains possibly 11,000,000 tons of high grade sub-bituminous coal, low in ash and moisture and high in heating value. The coal is, however, somewhat friable and the seams stand at a high angle; both of these conditions will tend to increase the cost of producing lump coal, suitable for domestic use.

In general it may be said that the problem of utilizing the Teton coal is one of balancing the extra cost of mining against a possible saving in freight rate, in comparison with the same items from the Wyoming and Utah fields.

STATE OF IDAHO
Chas. C. Moore, Governor
- - - - -
BUREAU OF MINES AND GEOLOGY
Francis A. Thomson, Secretary
- - - - -

Report on the Horseshoe Basin Area of the Teton Coal Field in Southeastern Idaho

by
George Watkin Evans
- - - -

Introduction

The purpose of this report is to present to the reader a brief outline of the commercial possibilities of coal field west of the town of Driggs in Teton County, Idaho. This field is variously referred to as the Teton coal field, the St. Anthony coal field, and the Horseshoe Basin coal field. This particular report deals specifically with the Horseshoe Basin area within the Teton coal field.

The following publications deal with the area:

Woodruff, E. G., The Horseshoe Coal District of the Teton Basin Coal Field, Fremont County, Idaho: U. S. Geological Survey Bull. 541, pp. 379-388, 1917.
Evans, Geo. W., Preliminary Report on the Horseshoe District of the Teton Coal Basin, Southeastern Idaho: U. S. Bureau of Mines Bull. 166, pp. 90-103, 1919.
Mansfield, G. R., Coal in Eastern Idaho: U. S. Geological Survey Bull. 716-F, pp. 123-153, 1921.
Kirkham, V. R. Petroleum Possibilities of Certain Anticlines in Southeastern Idaho: Idaho Bureau of Mines and Geol. Bull. 4, 1922.

The first three have been freely consulted and references thereto will be found herein.

The general geology of the area has been covered by the United States Geological Survey in the Publications named, and therefore the only geological features studied by the writer, while in the field, were those that had direct bearing on the probable mining conditions.

A report on this field is not complete without a complete statement concerning the marketing possibilities of this coal. The writer has not had time to go into this matter himself, but he takes the liberty of outlining what in his judgment should be done in the way of preparing such a report.

Location and Area

The Horseshoe coal basin lies about fifteen miles west of the boundary line between the states of Idaho and Wyoming and about twelve miles in a direct line west of the town of Driggs, which is located on a branch line of the Oregon Short Line, running from the town of Ashton to Victor.

The area covered by this report includes Secs. 5 and 6, T. 4 N., R. 44 E.; Sec. 1, T. 4 N., R. 43 E.; Secs. 30 and 31, T. 5 N., R. 44 E.; Secs. 23, 24, 25, 26, and 36, T. 5 N., R. 43 E. Woodruff states that there are approximately six square miles of coal land within this area. According to Mansfield's map (Bulletin 716 F, Plate XV.) there are 31 sections of land within this area more or less underlaid by the so called Frontier Formation, a large part of which is coal bearing. It is not assumed, however, that this entire area is underlaid by coal beds of commercial value. Extensive prospecting would be necessary to determine the amount of commercial coal within the field.

The nearest town to this coal field is Driggs, Idaho, which has a population of about 700 people. The coal district is at present connected with Driggs and the Victor branch of the Oregon Short Line by a branch line connecting at a point between Driggs and Tetonia. It is also connected by a good highway.

Topography

The Teton Basin proper, which contains the towns of Victor and Driggs, and several other smaller towns, lies between the Teton mountains on the east and the Big Hole mountains on the west and south. The average elevation of the basin floor in the vicinity of Driggs is 6,000 feet above sea level. The foot hills are reached about eight miles to the westward. From the mouth of Horseshoe Creek, where it comes out of the canyon into the Teton Basin flats, the hills become more rugged as one approaches the crest of the Big Hole mountains. Elevations of the coal mines range from 6,300 to nearly 8,000 feet.

It has been found feasible to build a standard gauge railroad into the coal field proper with a very moderate grade. Advantage was taken of the banks of Horseshoe Creek in this construction.

Horseshoe Creek and its tributaries traverse the area and contain a sufficient amount of water of good quality for all domestic uses. By building a dam it will be practicable to impound sufficient water to supply the coal washeries for properly cleaning the coal in this field.

The region about the mines is covered for the greater part with a good stand of pine and spruce. There is no doubt sufficient timber of all sizes within this field to last for fifteen or twenty years at a reasonable production of from 500 to 1000 tons a day.

Geology

Rocks: The rocks of the region are made up of sandstones and shales. The predominating rock appears to be a gray colored sandy shale, but numerous instances were observed of massive sandstone occupying prominent ridges within the field. In addition to the sandstones and shale there are some beds of clay.

No intrusive igneous rocks were observed within the coal field, but along the north limits of the Pack Saddle Creek Basin we observed lava flows that apparently overlie the coal measures. It is probable that in future years, when this coal field is more thoroughly prospected, it will be found that there are additional coal areas underlying these younger lavas. If this proves to be correct, the total coal area is likely to be considerably increased.

According to Mansfield the coal formation within this district is of Cretaceous age and belongs to the Frontier, Aspen, Bear River and Wayan formations and Gannett group.

Folds: No well defined folds were observed in the field, but there is evidence that an anticline occurs along the E. 1/2 Sec. 31, T. 5 N., R. 43 E.; whether this is a fold or a fault block is not determinable at this time.

Mansfield suggests that there is a syncline passing along the western portions of Sec. 1, T. 4 N., R. 43 E., and Secs. 24, 25, and 36, T. 5 N., R. 43 E.; also that the two beds mapped by Woodruff in his report are one and the same beds on opposite limbs of a closed syncline. Mansfield lays particular stress on this point and says: "The generally trough-like structure east of the great thrust fault and clearly shown at the south end of the district has an important economic bearing, for it leads to the suggestion that the two coal beds mapped by Woodruff may in reality be the same bed caught in a rather closely folded syncline of which the two beds would represent the opposite limbs....."

Mansfield indicates that the bottom of this syncline may extend to a depth of between 4000 and 5000 feet below the surface. If this should prove to be true, there is no occasion for alarm, because the probable workable depth for this field would probably not be greater than 3000 feet. Therefore, these two outcrops, even if they represent the same seam, to all intents and purposes, from a practical mining standpoint, are two separate beds. Unless the syncline is much shallower than has been supposed, there is really no need for being exercised over this structural feature.

Faults: According to both Woodruff and Mansfield, there is a thrust fault called the Darby fault cutting off the coal field along its west margin. According to Woodruff, the dip of this fault is nearly vertical, but in his later and more detailed work Mansfield concluded that the dip of the fault is less than the dip of the coal bed; if this be true, the fault will have little or no bearing on the economic value of the field, except for its crushing effect on the coal beds adjacent to the fault plane.

In addition to the Darby fault, there are doubtless other faults within the area in addition to those that were observed in the workings of the Brown Bear Mine. In this mine, within a distance of about 2000 feet along the strike of the bed, five faults were observed. All of these are normal faults and their strikes are nearly parallel with the dip of the coal bed. Their displacement ranges from 2 to 60 feet.

No doubt other faults will be found in this field and this fact will unquestionably be the means of discouraging operators in trying to work the field. One not accustomed to faulted and folded ground, such as exists within the coal fields of western Washington, would assume at first sight that the Horseshoe Basin coal field is hopelessly disturbed by faulting.

Coal Beds

Horseshoe Coal Bed: This bed varies slightly from place to place but has approximately the following cross section:

	Ft.	In.
Roof, sandy shale		
Coal	5	
Sandy clay		11
Coal	6	
Floor, shale		

This bed strikes about N. 27 W. and the dip 65-75 S. W. The coal bed at the point examined contains coal of very good quality but appears to be more or less friable, and it is likely that in actual mining operations a considerable amount of small sized coal will be produced, especially in the more steeply dipping areas.

Coal Bed at Bell Gulch Drift: The coal bed at the Bell Gulch drift, no doubt, is the same as that in the Mormon tunnel at the Horseshoe mine, and is, therefore, the Horseshoe bed. The following is a cross-section of the bed at the Bell Gulch drift:

	Ft.	In.
Roof, dark shale		
Coal	3	0
Dark shale		1
Light shale, fine grained. .		9
Good coal	3	3
Carbonaceous shale, hard . .		1
Coal, soft		7
Carbonaceous shale	2	0
Floor, dark shale		

The bed strikes N. 30 W. and dips 78 S. W. The coal at this particular place, although apparently of good quality, is more or less crushed, and the percentage of lump coal would probably be small.

Brown Bear Bed: The bed known as the Brown Bear coal bed is overlain with hard resistant sandstone with flint-like nodules. In places local lenses of shale occur between the sandstone and the coal. The following is a section of the bed, measured at the slope.

	Ft.	In.
Roof, sandstone		
Coal, good, hard	3	4
Coal and shale mixed		2
Coal	1	0
Impure coal, crushed		3
Floor, sandy shale		

Boise Bed: The coal bed known as the Boise bed was not exposed at the bottom at the place sampled. The sample represents 3 feet 5 inches to 3 feet 9 inches of coal. The analysis is given as sample 3, on page 97. The bed strikes N. and dips 40 W. The roof is a massive sandstone that has major and minor joints, the major joints being parallel to the dip, and the minor joints nearly parallel to the strike. These joints will undoubtedly cause caving in breasts that are driven wider than the width of the jointing system, and the roof will require a considerable amount of timber.

Mining

History: In 1901 coal was discovered in the Horseshoe Basin by Mr. William Hill. At about this time the so called Mormon tunnel was driven at the Horseshoe mine. In 1904 the tunnel was abandoned and remained idle until 1916 when the

Horseshoe and the Brown Bear mines were consolidated. During the summer of 1916 and until the summer of 1917, development work was continued on the Horseshoe mine but was discontinued July 1917. The Brown Bear mine was opened in 1905 and has been operated on a small scale since that time, until within the past two years. In all, about 30,000 tons of coal have been shipped from this property.

In 1917, Mr. R. S. Talbot, of Spokane, and his associates, took over the property and organized the Idaho Coal Mines Company. This organization has been instrumental in having a spur built from the Victor branch of the Oregon Short Line into the coal property. In addition to this, considerable money has been spent on the property in surface improvements, such as roads and trails, and also the erection of a considerable number of houses and cabins. A head frame with chute and bin has been constructed at the top of the Brown Bear slope. During September of 1921, no effort was being made to work this property except to keep the water pumped out of the Brown Bear slope.

Mine Openings: The Bell Cut drift, sometimes referred to as the Horseshoe drift, has been opened in the southeast corner of Sec. 31. This has been driven a distance of 800 feet. Chutes have been driven toward the surface and the coal extracted to the outcrop. In order to mine further coal from this bed at this point, it will be necessary to sink on the bed.

At the Brown Bear mine a slope has been sunk on the full dip of the bed nearly 500 feet. The water level gangway has been driven about 2100 feet to the north and nearly 1000 feet to the south of the rock tunnel. From the lower level, at the bottom of the slope, a gangway has been driven northerly about 600 feet and one southerly 300 feet. Nearly all of the coal above the level of the rock tunnel has been mined, and some of the coal has been mined from the present bottom of the slope. The mine makes but little water; in fact, a small pump can keep the property well drained. When the long tunnel is driven from the 6518-foot-foot level, it is estimated that several million tons of coal will be available above water level.

The Brown Bear mine is ventilated by a multiblade fan, with a capacity of 100,000 cubic feet per minute. In the upper levels there was little or no gas, but when the lower levels were reached considerable gas was encountered. It is more than likely that considerable gas will be found in this field when the workings become extensive. However, it is probable that the conditions in this respect will not be markedly different to those found in the coking coal regions of the Pierce County field in the state of Washington.

Quality of Coal: From numerous analysis of the coal beds of this area, one must conclude that the general quality of this coal is good. It has been claimed that the coal of this field has good coking properties. The writer tried coking tests on some of this coal in 1917 but failed to get any coke. However, this is perhaps due rather to the lack of time for a more complete field test than to the quality of the coal to make coke. A much more thorough test should be made on the coal from various beds in this field before it is concluded that it does not have coking properties. If it is an advantage to have coking coal from this area, it is suggested that samples of this coal be sent to the nearest coke ovens and tests made at that point. Should this fail, it is suggested that samples be submitted to by-product coke manufacturers to have a thorough test made in a by-product oven. It frequently happens that coals which do not coke well in bee-hive ovens make a very fair grade of coke in by-product ovens.

According to the analysis (see table following) the ash content is comparatively low, ranging from 2.9 in the Boise bed to 5.6 in the Bell Cut bed. The calorific power varies from 13,190 to 13,460 B.t.u. on air dried samples. From these analyses it is evident that this field contains a good quality of fuel. The larger sizes can be used for domestic use and the smaller sizes no doubt would be found very satisfactory for steam purposes and should the coal be found to have satisfactory coking properties, it no doubt would be found an advantage to use this coal in the manufacture of gas in the larger cities of Idaho and probably Montana.

Method of Working: Both the room and pillar system and a modified long-wall system have been tried in the Brown Bear mine. In the upper levels a modified long-wall system was used and in the lower levels a room and pillar system has been used in which a room 30 feet wide was driven up on the full pitch of the bed, allowing a pillar of 20 feet between the rooms. The coal mined in the room was drawn through chute necks on the gangway and loaded into the mine cars. From this point the coal is taken and dumped into a hopper at the bottom of the slope and from the hopper into the skip, from the skip into another hopper on top, from this hopper into a chute, and from the chute into a bin and from the bin into a wagon. This was a very excellent method of breaking a coal which is very friable to begin with.

Suggested Method of Working: In the Horseshoe seam it might be well to adopt a system of mining which has been found very satisfactory in mining the Wilkeson coal in Pierce County, Washington, and might be referred to as the Wilkeson system. At the Wilkeson mine the beds dip from 60 to 90 degrees and are from 9 to 12 feet in thickness. An effective method used at Wilkeson is to drive the gangway along the strike of the bed for the full width of the bed, when it is not over 11 or 12 feet wide, and at intervals of fifty feet drive chutes 6 by 6 feet in the clear up on the full pitch of the bed. These chutes were continued up for a distance of 30 feet, at which point a return airway, about 6 by 6 feet, was driven parallel with the gangway and connecting these chutes. This cross-cut, so called, is used as a return airway. From the cross-cut, the chutes are continued up the full pitch of the bed for about 15 feet and from this point two chutes are started at angles so that they would have a pitch of about 45 degrees. These chutes are continued along these angles across the dip of the coal bed and at intervals of 50 feet, diagonal chutes are driven from these two chutes connecting them. This system of diagonal chute driving is continued until the chain pillar, or a surface pillar, is reached. After the chain pillar has been reached with these chutes, it is customary then to begin drawing back the blocks or pillars between these chutes. These blocks are diamond shaped and it is the practice to begin at the bottom of the uppermost block and after building the necessary batteries and other stoppings, the block is started and it has been found that in many instances, as much as 60 or 70 tons a day can be drawn from these blocks by one man. After this block has been extracted, the miners then step down the length of another block and beginning at the bottom of the next diamond shaped body of coal, the process is continued until the series of blocks next above the cross-cut is reached. These pillars are left to protect the return airway.

It is necessary to select one of the chutes driven across the pitch to act as a manway and airway and then some of the other chutes can be used for leading the coal as it is mined, down to the gangway.

By driving these chutes across the pitch at an angle of 45 degrees, there is much less danger to the men, both while driving the chutes and later in going to and from their working places. Furthermore, it is much easier to make the necessary repairs on the flatter pitch than on the heavier pitch. Another advantage is that coal does not break up as badly when traveling down the flatter chutes as when it is dropped down the full dip of the bed.

Brown Bear Bed: Experiments should be conducted on this seam to determine whether it is more economical to work by the room and pillar, chute and pillar, or the long-wall system. Either the chute and pillar or the room and pillar system can be used on this bed, but if the roof is not too strong, thereby causing too much weight along the working faces, it might be well to adopt a long-wall system. By this method it would be possible to secure a larger percentage of lump coal than by either the chute-and-pillar or room-and-pillar system and since the profits for mining in this district will depend largely upon the percentages of the larger sizes, it will be well to spend some money experimenting with the long-wall system.

A stepped long-wall system whereby the working faces are carried across the pitch would no doubt be much more satisfactory than the long-wall face carried either across the strike of the bed or on the full dip of the bed.

New Workings: The cross-cut rock tunnel which has been started from the 6518-foot datum, is to be driven across the measures a distance of about 5500 feet. At a point about 3800 feet from the portal of this rock tunnel, it is expected that the Brown Bear bed will be struck, and that at a point about 1100 feet further in, the horseshoe bed will be cut. It is expected that this tunnel will cost, when completed, about $90,000. If one were assured that there were a positive market for the output of this mine at a good margin of profit, there would be no hesitancy in recommending an expenditure of this magnitude. Had the development of this mine been left to the writer, he would have used different methods on opening up the property. A better plan would have been to make a very careful study of the market for this particular size and grade of coal and if possible secure options for contracts for the large steam plants, such as the sugar refineries and others. He would then have constructed a logging road connecting the mine with the Oregon Short Line along the same right of way that has been selected for the present standard road. It would have been well to adopt a permanent terminal at the coal mine for the railroad and at this point construct the first units of a large coal cleaning plant. A slope driven across the pitch, on the Brown Bear seam, or the Horseshoe seam, so that the slope would have an angle of about 45 degrees, would have been the next step. A return airway could have been driven parallel with this slope at the same time the slope was being driven and in this manner conducted the ventilating system along with the slope sinking. From the top of the slope a horizontal tramway could be constructed to some point on the surface where an inclined plane could be driven from the tramway connecting with the site for the cleaning plant.

If the slopes were sunk on the Brown Bear bed, then it would have been advisable, after the gangway had been driven from the foot of this slope in both directions at an elevation so that these gangways would connect with the rock tunnel with proper grades, to drive a rock tunnel or the proposed line of the main cross-cut tunnel connecting the Brown Bear bed with the Horseshoe bed. In this manner it would be possible to develop the workings on both beds simultaneously. All this work should be done with the view of using it as a part of the ultimate plan for the contemplated main rock tunnel.

Had this plan been carried out, it would have been possible to develop the mine at a minimum cost and in this way the company would have been able to determine the cost of mining and also know what sizes and grades of coal these beds would produce in actual mining operations. It also would have been possible to make a more definite study of the coal market and to make contracts for the output of the mine.

All the work done on this plan would have been a part of the ultimate plan and it would not have been necessary to risk the great amount of money which has been expended to date on this property. Furthermore, a coal mine would have been developed in the minimum length of time.

Tonnage Estimate

From the limited information at hand, it is impossible to make a reliable estimate of the minable tonnage in this field. In the first place we do not know exactly the total area of the coal bearing strata, nor do we know the number of workable coal beds contained within this field. Any tonnage estimate made at this time must be based upon arbitrary figures and the quantity might be either much more or much less than the figures given.

If we assume that the Horseshoe bed and the Brown Bear bed are two separate and distinct beds and that the Horseshoe bed will contain 9 feet of coal and that this bed can be mined for a distance of one-half mile on the dip, and that the bed will continue of fairly uniform character for a distance of 2 miles along the strike, there would be within the Horseshoe bed approximately 5,000,000 tons of coal, provided it will average 6 feet of minable coal and if we allow 1300 tons per foot acre. The Brown Bear bed has an average thickness of about 4 feet and on the same basis would contain a little over 3,000,000 tons of coal. The Boise bed, allowing an average thickness of 3 1/2 feet of minable coal, contains nearly 3,000,000 tons--in all approximately 11,000,000 tons of coal.

It is not improbable that with future investigations it will be found that the total tonnage of coal in this field is very much greater than the amount of tons suggested. On the other hand, it might be found that the coal contained within these beds is very friable and will not produce any considerable quantity of the larger sizes, and furthermore, it is probable that the market tributary to this field will be so exacting that only the larger sizes can be successfully marketed.

Coal Cleaning Plant

It is proposed to construct a coal cleaning plant at a bunker site near the portal of a projected rock tunnel. Care should be taken in the erection of a coal cleaning plant that equipment is installed which will save the coal from unnecessary breakage and at the same time give a full opportunity for

A careful study should be made of the principal towns along the Oregon Short Line north of Pocatello and as far north as Butte, Montana, with a view of determining the amount of domestic coal used, the grades of coal consumed and the prices paid. Also all of the steam plants in this district should be listed and studies made as to the method of utilizing coal, whether by hand firing or automatic stokers. Also prices paid for these steam coals should be determined and what connection, if any, these large steam plants might have with coal mines either in Utah or Wyoming.

There should also be a table prepared showing first, name of town or city; second, population 1920; third, distance from Talbot, freight rates from Talbot, rate per ton mile from Talbot; fourth, distance from Rock Springs, freight rate from Rock Springs, and rate per ton mile. These same figures should be obtained for the Kemmerer field and also the Utah field. This same table should be prepared for Montana coal entering the Butte market. After all these facts are obtained, ratios could then be worked out showing whether or not there is discrimination in favor of any of the coal fields. If this can be proven, then it might be well to try to have an adjustment so that the coal from the Teton field would receive the advantage of the shorter haul into these cities.

If any considerable quantities of lump coal can be produced in this field and there is a market found for the smaller sizes in the steam plants tributary to this area and an equitable freight rate obtained so that the field would receive the advantage of a shorter haul, there should be developed a market for a considerable output of coal from this area. However, since the market end of it can be pretty well determined in advance, there is no necessity for assuming any great risk in the matter of expenditures until this feature has been definitely determined.

Conclusion

If after a thorough market survey has been made, it is found that there is a good market for the smaller size coal from this field at a good price, and that the railroad rates from Talbot to various industrial centers in the surrounding country are based upon the shorter haul from this place, it is not unreasonable to believe that this mine can be made a commercial success, provided it is properly managed.

Men who attempt to operate this property should have a thorough knowledge of coal mining operations as they are conducted in the Pierce County coal mines of western Washington. To be successful will require careful management and a thorough understanding of the engineering problems attending coal cleaning the larger and also the smaller sizes. A suitable dump should be installed and a bin of sufficient size to store 150 tons and from this bin an automatic feed should allow the coal to go to properly constructed shaking screens. From the end of the shaking screens the lump coal should go onto a traveling picking table, provided with good light, so that the slate pickers can eliminate the impurities from the larger sizes. After the coal has been properly cleaned on the picking table it should then pass to a loading conveyer of some kind and in this manner placed in the railroad car for shipment. It is poor practice to load lump coal into a storage bin at the mine for the reason that unnecessary breakage takes place.

The material which has passed through the screens should pass into two bins, if two sizes are made, and these bins should be of sufficient capacity to hold a half day's output of the mine. If two sizes are made, then an automatic feed should lead from each of the two bins to properly designed and operated jigs, each of which will handle its own specific size. It is represented by some companies that pre-classification is not necessary before jigging, but it is found in the state of Washington that in order to get the best results it is essential that the coal be sized before it goes to the jigs. Among the approved types of jigs used in the state of Washington are the following: For the smaller sizes--Elmore, Faust, Blair and Lhurig, the Forester jig is also used to some extent; for the larger sizes--Elmore, Montgomery, Shannon and Blair jigs, and at some mines the Robinson and Howe tub washers are still in use.

Market

The chemical analysis of this coal indicates that the coal in this field is of as good quality as any mined in Utah or Wyoming. The principal question is whether or not this field can produce a sufficient percentage of lump coal to compete with the larger sizes from Utah and Wyoming.

Before expending any great amount of money attempting to develop this field, a market survey should have been made by the owners to determine what amounts of the various sizes of this coal could be disposed of and at what price. People who have been accustomed to using Utah and Wyoming coals believe that it is not practicable to burn the smaller sizes. This is a fallacy and when we consider the large amount of small coal consumed in the city of Seattle, we must realize that the people of other areas could make a large saving in their yearly fuel bill by using the smaller size coal. So far we do not know what percentage of plus 3-inch coal this field will produce, nor do we know what the percentage will be through 3 inches and over 1 1/2, nor yet the amount which we call screenings that passes through 1 1/2-inch screens.

operations within a field that has coal beds pitching at high angles and in which the coal is more or less friable and the formation disturbed by faulting.

If this field is properly developed, it should produce fuel at less cost to the cities and towns in this part of Idaho and in this manner stimulate further industrial development. With this increased development, there should be an increasing market provided for this coal. However, the great problem at present is the market for the smaller sizes at good prices.

Analyses of Coals from Horseshoe District

(Bulletin 166, U. S. Bureau of Mines, page 97, from a Preliminary Report on the Horseshoe District of the Teton Coal Basin, Southeastern Idaho, prepared by the writer)

Bell Gulch Bed

		Coal (air dried)	Coal (as Received	Coal (Moist-ure free)	Coal (Moist-ure and ash free)
Moisture	per cent	2.7	8.4	......	......
Volatile matter	do	41.3	38.9	42.5	45.2
Fixed carbon	do	50.4	47.4	51.7	54.8
Ash	do	5.6	5.3	5.8	......

Air-dry loss 6.2 per cent.

Brown Bear Bed

Moisture	per cent	2.7	7.0	......	......
Volatile matter	do	42.5	40.6	43.7	45.
Fixed carbon	do	50.8	48.6	52.2	54.5
Ash	do	4.0	3.8	4.1	......

Air-dry loss 4.6 per cent.

Boise Bed

Moisture	per cent	3.6	9.1	......	......
Volatile matter	do	42.1	39.7	43.7	45.1
Fixed carbon	do	51.4	48.5	53.3	54.9
Ash	do	2.9	2.7	3.0	......

Air-dry loss 6.1 per cent.