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-----O-----

John McNeil, M.E.
Consulting Engineer
EQUITABLE BUILDING.
DENVER, COLO.

...UCTION WORK, EXAMINING AND REPORTING ON
COAL PROPERTIES A SPECIALTY.

TWENTY-FIVE YEARS EXPERIENCE IN COLORADO.
TEN YEARS AS STATE INSPECTOR OF COAL MINES.
CLASS 1884.

R E P O R T

On

THE GENERAL WORKING CONDITIONS

And

SAFETY OF EMPLOYEES

In

"B" A N D "E" M I N E S,

Of

THE SUPERIOR COAL COMPANY,

At

S U P E R I O R, W Y O M I N G.

By

JOHN McNEIL, M. E.,
Consulting Engineer,
Equitable Building,
Denver, Colorado,
MARCH, 1911.

To: D. O. CLARK, ESQ.,
Vice-President & General Manager,
Superior Coal Company,
Omaha, Nebraska.

Dear Sir:

I n t r o d u c t o r y:

In compliance with your wishes, I made an examination of "B" and "E" Mines of the Superior Coal Co., and herewith present to you, my report on the same.

The Location Of The Superior Mines, is at Superior, Sweet Water County, Wyoming, situated at the terminus of a branch railway about nine miles (north) from Thayer Junction on the main line of the Union Pac. R. R. and about 18 miles in a north-easterly direction from the coal mining district of Rock Springs.

The Geological Characteristics, of the coal field are identical with Rock Springs, both forming a part of Wyoming's most important and prolific coal area. The lithological character of the rocks remain very much the same as at Rock Springs, consisting of successive beds of sandstone, massive and laminated, of the Laramie Cretaceous period.

The coal bearing area, is doubtless quite extensive, and indications point, that collieries at Superior will furnish large outputs of coal for many decades to come.

The Quality Of The Coal, is about the same as that at Rock Springs; gives good results as a steam fuel and is received favorably for domestic use.

The percentage of moisture in the coal, from what is known as "Number 1 Seam" (being the horizon of the coal bed worked so extensively by Number 1 Mine at Rock Springs), is higher at Superior.

Analyses:

	"A" Mine, #1 Seam	"B" Mine, #7 Seam	"C" Mine, #1 Seam	"C" Mine. #7 Seam
Moisture,----------	11.04%	7.81%	10.57%	9.92%
Volatile Matter,----	37.02	37.07	36.95	34.99
Fixed Carbon,-------	47.14	50.20	45.23	47.26
Ash,----------	4.80	4.92	7.25	7.83
	100.00%	100.00%	100.00%	100.00%

In The Following Brief History Of The Mines, we will state, that four years ago, they were in the initiative stage of opening.

So marked has been their rapid construction and development, that upwards of one thousand workmen are now employed in and about the mines, and during the past year, about 1,000,000 tons of coal have been produced.

We think this industrial showing carries with it a degree of superior merit.

I shall not attempt to describe, in detail, the character of equipment, the modern improvements and installation of electric power in the conduct of this up-to-date colliery, as any semblance to such an undertaking would require much more time and space than would be prudent for me to indulge in, at this time. Suffice is to say, however, that I saw a most admirably fitted up colliery in manner of design and equip-

ment, to successfully mine and handle large quantities of coal, up to 5,000 or 6,000 tons per day, whenever necessity shall press for it.

The Power Plant, is indeed a model of its kind, and it is seldom that such massive construction of buildings, or installation of such units of electric power are seen at coal mines.

The Power House, consists of a solid re-inforced concrete building of a very pleasing design, 30 ft. by 80 ft., in which are installed four alternating and two direct current General Electric generators, each unit having a capacity of three hundred kilowatt. All rest on massive foundations, exhibiting a fixed stableness and uniformity of operation agreeable to the eye.

The Boiler House, is also a solid re-inforced concrete building of 68 ft. by 80 ft. with off-set sustaining columns in the walls at intervals. The smoke stack is also a monolith concrete structure, which lends to the symmetry of the buildings as a whole.

There are in operation, four 300 H. P. and four 250 H. P. internally fired boilers, all admirably equipped with underfed stokers. The coal is automatically fed from over-head bins, and the ashes are removed through an under-ground passage to the ash-pile.

The Company's Mercantile Store, is a concrete structure of spacious dimentions, with a substantial basement throughout, in which a refrigerating, cold storage and ice manufacturing plant is a unique feature.

The building, as a whole, is of good proportions, nicely arranged. Its imposing appearance confers upon the town of Superior, an air of corporate dignity.

The Company's Office Building, a one and one-half story structure of stone, of pleasing design and proportions, with commodious rooms for the Superintendent, his clerical force and engineering department.

The Dwellings Of The Workmen, have a cosy and pleasant appearance, are of varied design, neatly painted, well arranged and situated on high sloping ground.

An Abundant Water Supply, for the works and the town, is furnished by a system of well borings (nine in number), eight of which are situated in proximity to the power plant and one at the "D" Mine.

For location, depth and size of wells, casing, pumps, capacity and analyses of water, etc., see "Record of Wells" at end of this report.

It will be observed that there are three beds of water sand.

The water on being pumped from the well, has a decidedly dark color, but settles and clears up after standing.

An Electric Lighting Plant, furnishes light for the mines, store, office and town.

The Coal Seam In "B" and "E" Mines, is undermined and no shot hole is permitted to be drilled beyond the back of the mining. Thus, no tight shooting can be experienced, which is a great redeeming feature of safety in a coal mine.

Powder Used To Coal Mined, is as follows:

"B" Mine: Pick mining, 88 tons per keg of F black powder.

" " Machine mining, 9.6 tons per pound of permissible powder, Trojan and Monobel.

"E" Mine: Machine mining, 2.25 tons per pound of permissible powder--all narrow work in developing entries and air-courses.

Remarks: You will notice that the permissible powders show an excellent record with machine mining, 240 tons of coal per 25 lbs. of powder used, while but 88 tons were mined by miners, per keg (25 lbs.) of single F. black powder.

I do not know what the difference in the percentage of slack is, but looking at the paramount feature of safety, it points favorably to the use of permissible powders.

You will also note that in "E" Mine, with narrow work entirely (mined by machines), 56 tons of coal were mined per 25 lbs. of permissible powder used.

The Dip Of These Mines, trend in a north-easterly direction with an inclination from the horizontal of about 4 degrees.

For Haulage, A 75 H. P. Electric Hoist, is placed above the 6th North Entry, which delivers the coal to the main drift, at the foot of the plane.

A Three-Ton Electric Locomotive, hauls the coal on the 3rd North Entry to the plane.

A Three-Ton Electric Locomotive, hauls from the 3rd South Entry to the plane.

A Ten-Ton Electric Locomotive, hauls from the main drift (from the bottom of the plane) and from the dip to the tipple. But few horses are used.

The Stabling Of Horses And Mules, is entirely on the surface; no stables are in the mines.

Spontaneous Combustion, has never occurred at Superior Mines. Like Rock Springs, the physical character of the roof and floor of the coal seams are not susceptible to "heating" when crushed by a "creep" or squeeze.

Marsh Gas ($C. H.^4$), has never been detected in these mines, and from experience in the operation of the same meas-

ures at Rock Springs, it would seem that this gas is non-existant throughout the field.

Precautions Taken Against Fire, both throughout the underground workings of the mines and about the buildings on the surface, were in fairly good evidence.

The Ventilation Of The Mines ("B" and "E"), is produced by a fan (electrically driven, 60 H. P.), placed at the air shaft of "E" dip, having a capacity of 60,000 cu. feet of air per minute.

Volume of air in cubic feet per minute at "B" inlet, 49,000.

Volume of air passing from the mine at outlet, 54,000 cu. ft. per minute.

Cu. ft. of air per minute at face of Main Entry,-----	21,000
" " " " " " " Main In-take, E Mine,---	22,750
" " " " " " " face of No. 1 No. Entry,	7,130
" " " " " " " " " " 2 No. Entry,	6,900
" " " " " " " " " " Slope,----------	7,500
" " " " " " " " " " No. 2 So. Entry,	4,620
" " " " " " " " " " 1 So. Entry,	10,660
" " " " " " " Main Return,----------	26,400

Both mines are well ventilated.

"B" Mine, is a "drift" opening or tunnel driven through faulted or barren ground for about 2,000 feet before reaching the coal seam in place and in workable form.

Note: If the reader will please unfold the map showing the underground workings of "B" Mine, at end of this report (it is the first of a series of maps there attached), and keep the same before him for reference during the perusal of this report, a better understanding of what I shall advance will be obtained.

It will be observed that the entrance of the "drift" (or tunnel) is in proximity to the line of the coal outcrop of "No. 7 Seam".

Upon workable coal being reached (2,000 ft. from the portal), the main drift was continued on its course, on the coal seam (see map) to the section line of Government land and foot of the plane.

The plane is driven directly to the raise, and from it are turned, at regular intervals, the 2nd, 3rd, 4th and 5th South Entries, also the 2nd, 3rd, 4th, 5th and 6th North Entries.

The Face Of The Second South Entry, has reached the faulted area of ground passed through in the main drift, and there is 2' 6" of slate in the center of the coal seam, which has been abandoned. Some pillars here are left in, as they are under a portion of the town.

For Section Of Coal Seam At Face Of 3rd So. Entry, see Diagram "A" on Sheet of Diagrams showing the character of the coal seam of "B" and "E" Mines at the front of this report.

For section of the seam, back on 3rd South Entry at a point where No. 37 room from the 2nd South comes through, see Diagram "B".

At face of Room 20 (3rd South Entry), see section of seam in Diagram "C".

For Section Of Coal Seam At Face Of 4th So. Entry, see Diagram "D".

For section of coal seam at entrance of No. 11 room, see Diagram "E".

In No. 13 room (4th South) the "intervening stratum" of shale is timbered up. It appears to get thicker and stronger and the shot-firers see that sufficient and proper timbering is done.

For Section Of Coal Seam At Face Of 5th So. Entry, see Diagram "F". The slate over the coal where it is broken down back in the entry, shows it to be 9" in thickness. One foot of coal lies above this.

For Section Of Seam At Face Of Plane, see Diagram "G".

At a point from the air-course, opposite the "hoist", on Main Plane, a sump is being made to hold water, at this high elevation, to which a pipe line will be connected for the successful watering of the workings under it.

Pipe Lines For Sprinkling, purposes, to dampen the coal dust on roadways, were in evidence throughout the mine.

There Is An Air Shaft, a little above the 6th North Entry, which adds much to the ventilation.

Face Of 6th North Entry, see section of coal seam in Diagram "H". The shale over the coal seam here is 1' 9" in thickness. Above the shale, there is 1 ft. of coal.

Face Of 5th North Entry, for section of coal seam, see Diagram "I". The shale over the coal is timbered up, but it is fragile and breaks around the timbers and looks as if it should be taken down. Think it may be difficult to timber this slate up in rooms.

Room No. 11, in 4th North Entry, see section of coal seam in Diagram "J".

Face Of 4th North Entry, see section of coal seam in Diagram "K".

Face Of 3rd North Entry, see section of seam shown by Diagram "L".

In Room 16, note section of seam shown in Diagram "M". At this point (see map), note that the entry has reached "forbidden ground" (Government). Here, the intervening stratum of shale is timbered up with apparent success.

In face of No. 8 room, 2nd North Entry: for section of seam, see Diagram "N". The "intervening" shale is but 3" in thickness here.

Face Of 2nd North Entry, for section of coal seam, see Diagram "O". This entry is also up to the section line of Government land.

Face Of Dip Entry, for section of coal seam, see Diagram "P".

The physical conditions here are very good, but the face of the entry is approaching Government land.

The Hydraulic Mining Cartridge, a substitute for powder in breaking down coal, I saw tested in Room 24, "B" Mine. The width of the room was 30 feet and was mined (by a machine) 6 feet deep. The coal seam was 7 feet in thickness.

Two men were with the machine; they drilled two holes, one on each side of the room, about 6 feet from the rib, two

cartridges were put in place and the thrust made in 30 minutes. The coal thrust to the floor was about thirty tons, being 26 feet front face by 16 feet at the back.

The coal was large and "lumpy", with very little slack.

It seems that the pressure from the cartridge "shears" back over the "rib" into the solid pillar and seldom cuts off on the rib-side, but often shatters the coal there to such a degree that difficulty is experienced in shooting the "rib corners" down, as the force of the powder charge seeks lines of least resistance through the shattered cracks in the coal.

I understand that Mr. Brennan (Supt.), will make exhaustive tests, which I trust will meet with a fair measure of success.

Note:--In large coal seams like Hanna and Pleasant Valley, the Hydraulic Cartridge will be very successful in pulling down top coal in rooms when "retreating" back with pillars. In both mines, 10 feet of top coal should be left up in "advancing" the workings.

The continuation of the underground workings from "D" Mine, north of the dip entry (see map) enter into territory that is known as "E" Mine.

"E" Mine, consists of a shaft opening, sunk to a depth of 110 feet, with double hoisting compartments.

Only development work is now being followed, and the coal therefrom is hauled through "B" Mine and dumped over its tipple, and may so continue for sometime to come, probably until sufficient development will warrant a production which will be more economically handled by the modern equipment now installed and in readiness at the pit top of "E" Mine, which bids fair to be one of the up-to-date coal pits in the West.

The Hoisting Derrick, Tipple and Shaking Screen erections are constructed entirely of steel, set upon concrete foundations.

A 200 H. P. Electric Engine, is set in place upon the top of the derrick head frame, thus admitting the cables to run from the winding drums of the engine perpendicularly to and from the hoisting compartments of the shaft.

The Hoisting Cages Are Self-Dumping, i. e. the coal is dumped from the pit car without the car itself leaving the cage.

The Box-Car Loader, is of the most improved type. The R. R. car is tipped lengthwise at such an angle that the

coal from the loading chute of the mine tipple, runs by gravity to the end of the box-car. When one end is loaded, the great cradle like crane of the "loader" is again put in motion and tilts the empty end down so the coal will run into it (the weight of the coal on the inclined loaded end of the car holds itself in place). When loaded, the car is brought to a horizontal position (with the rails) and is run off, when the loader is in position to take on another empty car.

A Storage And Rescreening Bin, with belt conveyors, has been erected to screen out the by-product of fine slack and convey it to the bins in the boiler house of the power plant, as an economic fuel.

At Face Of 1st North Entry, "E" Mine, (from the slope), see section of coal seam in Diagram "No. 1".

The physical conditions of the roof and the coal seam are good. It will be observed, however, that the face of the entry is approaching in close proximity to the line of Government land.

At Face Of 2nd North Entry, direct from the bottom of the shaft, see section of coal seam shown by Diagram "No.2". This entry will also soon reach the line of Government land.

For Section Of Coal Seam At Face Of Slope, see Diagram "No. 3".

As I understand it, your company owns Section 21, and indications point that the slope may enter into a good body of coal in that direction.

For Section Of Coal Seam At Face Of 3rd So. Entry, see Diagram "No. 4."

At Face Of No. 3 North Entry, see section of seam in Diagram "No. 5".

At Face Of No. 2 South Entry, note section of seam in Diagram "No. 6".

At Face Of No. 1 South Entry, see section of coal seam in Diagram "No. 7".

At The Bottom Of "E" Shaft, steel and concrete are used instead of timber, and the lower 25 feet of the shaft (above the coal seam) is concreted, as a precaution against fire.

Respectfully submitted,

John McNeil M. E.

Consulting Engineer.

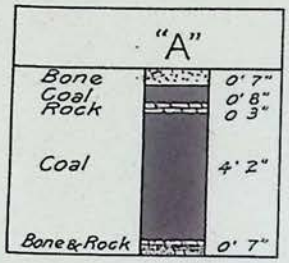
SHEET OF DIAGRAMS

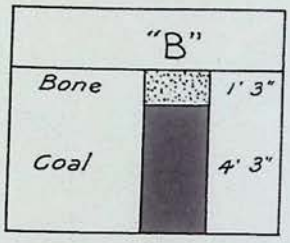
SHOWING

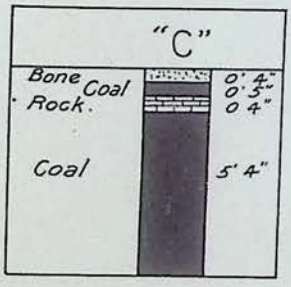
SECTIONS OF COAL SEAMS IN D, C & A MINES

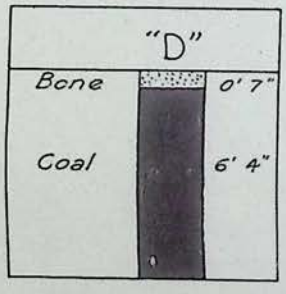
SUPERIOR WYOMING

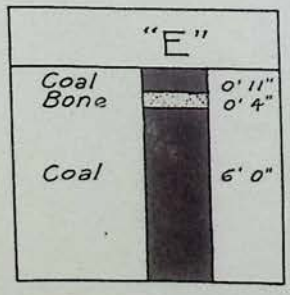
D MINE

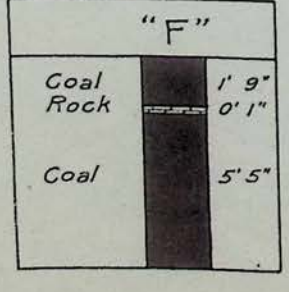


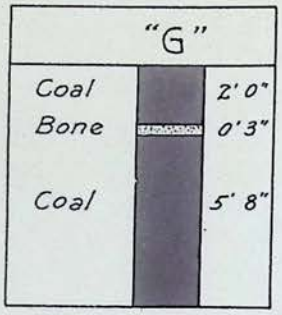


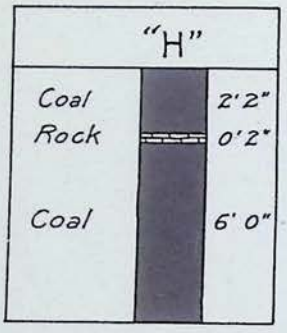




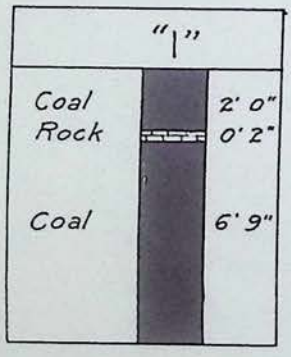


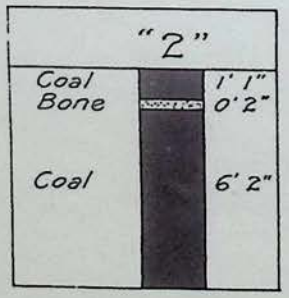


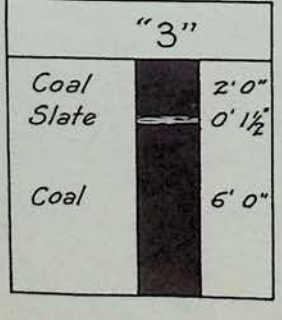


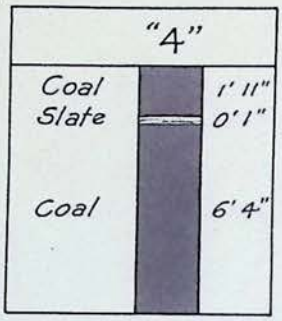


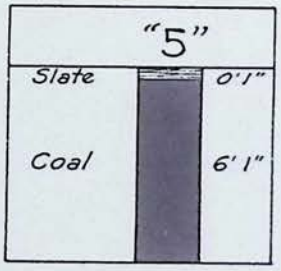
C MINE

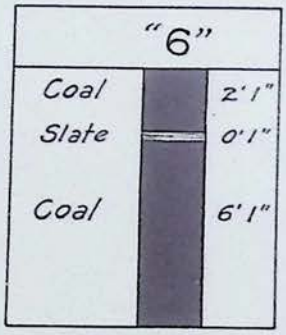




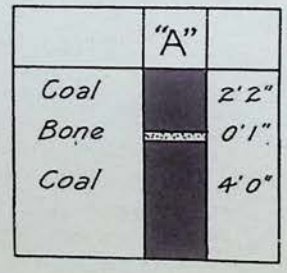


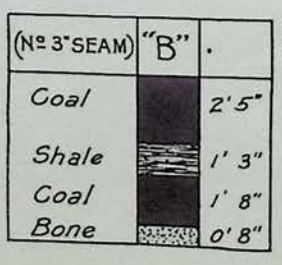


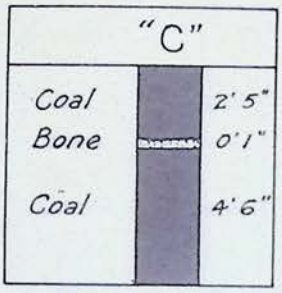


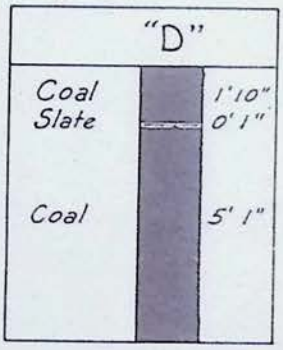


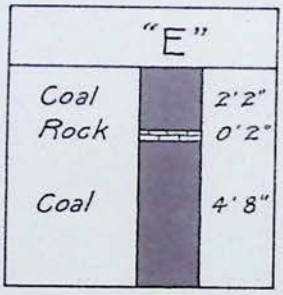
A MINE

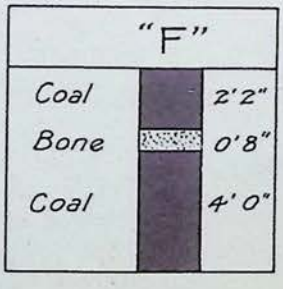


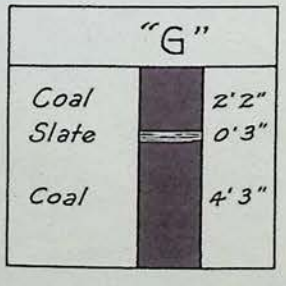


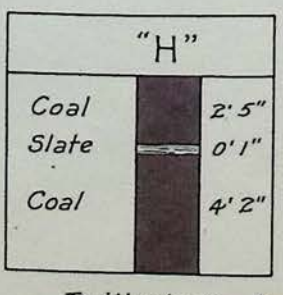


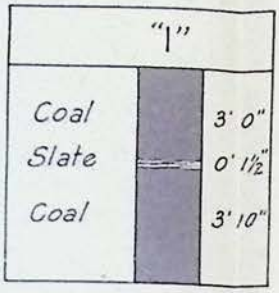


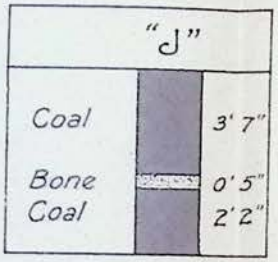


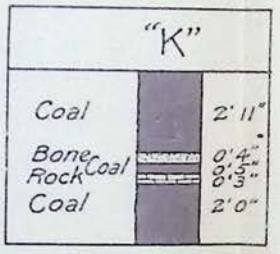


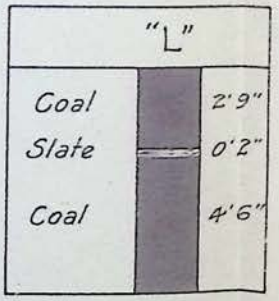












To illustrate Report of John McNeil

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John McNeil, M.E.
Consulting Engineer
EQUITABLE BUILDING.
DENVER, COLO.

...TION WORK, EXAMINING AND REPORTING ON
COAL PROPERTIES A SPECIALTY.

TWENTY-FIVE YEARS EXPERIENCE IN COLORADO.
TEN YEARS AS STATE INSPECTOR OF COAL MINES.
CLASS 1884.

R E P O R T

On

THE WORKING CONDITIONS

And

SAFETY OF EMPLOYEES,

In

"D", "C" AND "A" MINES,

Of

THE SUPERIOR COAL COMPANY,

At

SUPERIOR, WYOMING.

By

JOHN McNEIL, M. E.,
Consulting Engineer,
Equitable Building,
Denver, Colorado,
MARCH, 1911.

To: D. O. CLARK, ESQ.,
Vice-President & General Manager,
Superior Coal Company,
Omaha, Nebraska.

Dear Sir:

I n t r o d u c t o r y:

In compliance with your instructions, I made an examination of the underground workings of "D", "C" and "A"

Mines at Superior, Wyoming, and I herewith present to you, this, my report on the same.

As I have, in my report on "B" and "E" Mines (of even date), referred to the geological characteristics of the field; the quality of the coal; history of the mines; the power plant, etc., etc., I deem it superfluous to repeat the same here. So, in this, I shall confine my remarks to a general description of the mines, and such salient features as may bear directly on the same.

"D" Mine: is operated on "No. 1 Seam" and consists of a drift opening. See map of the underground workings attached at end of this report.

The entrance of the drift is on Section 20, which comprises a portion of the land that under some pretext reverted to the Government, after considerable coal had been mined therefrom, and as will be seen by the map, operations on quite a number of pillars and rooms were stopped by the Government Feb. 28th, 1909.

This and the annulment of filing rights to Section 18 was indeed a serious set-back to your pre-arranged plans of development at this mine, and it is to be hoped that some amicable adjustment may be made, with a spirit of fairness, by Government officials and that these and other lands shall, in some manner, be returned to and enjoyed by your company.

To have prohibited the working out of the pillars referred to, was, to say the least, a silly command, for, if not taken out within a reasonable period, the coal will be lost to all concerned.

Your company is not under any obligations to maintain the timbering of roof in the workings developed within canceled territory, and the "conservation" of it may be of a too practical nature to be in accord with the present Government policy.

A "right-of-way" has been obtained from the Government upon ground on which improvements have been made; also a right-of-way has been given of 325 feet (162-1/2 feet on each side from the center of the main drift) from the entrance of the mine to the section line of 19, which is property of the company.

A right-of-way has also been given, of 400 feet wide, to admit the passing of the slope through the corner of Sec. 18 (see map) into Sec. 17 (property of the company), where good mining conditions exist and from which a large tonnage of coal will doubtless be mined.

It will be noticed, on the map, that the main "drift" on approaching the Section line (of 18) is turned in its direction and run as a "plane" parallel with the section line, leaving for safety, a margin of 50 feet of the coal seam.

From this plane, entries are turned at intervals and worked back towards the surface outcrop of the coal.

For Sections Of The Coal Seam, see Sheet of Diagrams in front of this report:

For Sec. of seam at face of No. 2 Plane,------								see Dia.		A
"	"	"	"	"	"	"	" 10 Room, 4 S.E,	"	"	B
"	"	"	"	"	"	"	" 5 Room, 3 S.Entry	"	"	C
"	"	"	"	"	"	"	" 1 North Entry,--	"	"	D
"	"	"	"	"	"	"	"11 Room, 1st N.E.	"	"	E
"	"	"	"	"	"	"	" 2 North Entry,--	"	"	F
"	"	"	"	"	"	"	Slope,----------	"	"	G
"	"	"	"	"	"	"	3rd So. Entry,----	"	"	H

The Haulage Of The Coal, on planes and slope, is operated by electric hoists, which deliver the coal to the main drift, and between the plane and the tipple on the main drift, the haulage is done by a ten-ton electric locomotive.

The Ventilation, is produced by a fan and a "furnace".

The Slope Inlet, has passing in 27,000 cu. feet of air per minute, and the outlet at the fan (capacity 40,000 cu. ft.) 21,000 cubic feet per minute.

No. 2 Inlet, has passing in 22,680 cubic feet per minute, and at the outlet (furnace shaft) 26,400 cubic feet per minute.

The ventilating furnace has air passages between the fire arch and the rib of the passage, and well protected against fire. I would advise, however, against the use of furnace

ventilation. It is only where they have a long heating column (deep shaft) that they really give efficiency.

The mine is well ventilated.

There are 156 men employed.

Number of mules in the mine, 10.

An Escape-Way is driven to the surface in proximity to the head of No. 2 Plane.

A Fairly Good Sprinkling System, was observed, and a degree of natural moisture was found in the slope workings.

The Coal Seam Is Undermined, either by pick mining or machines and no coal is permitted to be shot from the solid.

The Tons Of Coal Mined per Keg of Powder Used, is 105. Here all narrow work is undermined with machines and the tonnage of coal produced with one keg of powder averages '52 tons.

The Daily Production of The Mine, is about 800 tons of run-of-mine coal.

The Stabling of Mules, is on the surface, and precautions against fire are well observed.

"C" Mine: Consists of a slope opening, driven on the true dip of the coal seam.

The portal of the slope is on the outcrop at the surface in Section 20, which is land that also reverted to the Government.

A right-of-way to the area upon which the tipple and improvements are on, was obtained from the Government, and also a 325 ft. right-of-way was granted from the slope entrance to the line of Section 21 (see map) to admit of haulage operations through the slope.

Here, also, a good deal of development in entries, rooms, and pillars was stopped by the Government's order of Feb. 28th, 1909.

For Sections Of The Coal Seam, see Sheet of Diagrams in front of this report for "C" Mine, numbered from 1 to 6 inclusive.

For Sec.	of	seam	at	face,	6th	North	Entry,------	see	Dia.	1
"	"	"	"	"	"	7th	" " ------	"	"	2
"	"	"	"	"	"	of	Slope,----------	"	"	3
"	"	"	"	"	"	6th	South Entry,------	"	"	4
"	"	"	"	"	"	5th	" " ------	"	"	5
"	"	"	"	"	"	#52	Room, 4th So. Entry,	"	"	6

The Haulage, on entries, is principally done by small electric mine locomotives delivering the coal to the slope.

A 4-ton locomotive operates in the 3rd South Entry,
" 3-ton " " " " 5th " "
" " " " " " 4th " "
" " " " " " 6th " "

From the 6th South Entry, panel slopes are being driven 600 feet apart and the haulage is done by small electric engines of about 20 H. P. One of these hoists is now situated at "No. 1 Panel", see map.

A small 20 H. P. electric hoist I found in use in proximity to the 7th North Entry, which is used to hoist coal from the slopes to the entry switches, thus obviating the necessity of the main slope hoist from pulling coal (by single cars) from the face of the slope as development work progresses, which is indeed an admirable plan.

The Pumping Of Water From The Slope, face, is done by an electric rotary pump. As to the growth of water in gallons per minute, I have no definite knowledge, but the volume is, however, an immaterial quantity.

The Mining Of The Coal, is done chiefly by machines. The driving of the slope, entries and other narrow work is done (and to very good advantage) by machines, but some pick mining is also done.

Absolutely no shooting from the solid is permitted.

The Tonnage Of Coal Mined To Each Keg Of Powder Used, gives us a most excellent showing here. It is indeed refreshing to record it.

Pick Mining: In pillar work, shows 220 tons Produced to each keg of F Powder used.

Machine Mining: Gives 120 tons per keg of F Powder used.

Machine Mining: Furnishes 8.25 tons of coal for each pound of Monobel permissible powder used, or, in other words, 206 tons for each 25 lbs. of powder used.

The above, taken as an average, is certainly a pace for other mines to follow.

Note: Pardon me for taking this opportunity to draw another comparison of powder used in Hanna No. 2 Mine, producing 28 tons per keg of powder used, from a 28-ft. coal seam.

Give your order to mine all coal at Hanna.

The Ventilation Of The Mine, is produced by a 60 H. P. fan, electrically driven, has a capacity of 60,000 cu. feet per minute, and is situated at the air shaft, in proximity to the entrance of the slope.

No. 2 and 3 South Inlet, 11,520 cu. ft. of air per minute,
" " " " " Outlet, 11,500 " " " " " "
" 4 " Inlet, 12,960 " " " " " "
" 4 " Face, 9,600 " " " " " "
" 4 " Outlet, 12,000 " " " " " "
" 5 " Inlet, 9,360 " " " " " "
" 5 " Face, 8,910 " " " " " "
" 5 " Outlet, 9,000 " " " " " "

There are employed,--- 137 men,

Number of mules,------ 8

Mine mules and horse are stabled on the surface.

The mine is well ventilated.

A Sprinkling System, with pipe lines on the entries, was in fairly good evidence.

Concrete Over-Cast Air Bridges, and rock stoppings of an improved type are being put in place, generally speaking, throughout the collieries at Superior.

The Daily Production Of The Mine, is about 1,200 tons of run-of-mine coal.

"A" Mine: is a slope opening, operated on "No. 7 Seam".

The Daily Production Of The Mine, is about 900 tons per day.

For Sections Of The Coal Seam, see Diagrams on sheet marked "A" Mine, from Dia. "A" to "L", inclusive.

For section of seam at down-throw fault to the north in a room in proximity to the rock man-way from the surface on the north-west corner of the mine (through which I entered to commence my examination, see Diagram "A".

For Section Of "No. 3 Seam", which lies higher in the measures than No. 7 seam, but which is brought down nearly to the horizon of No. 7 by the down-throw fault to the north, see Diagram "B". No. 3 seam, whenever in its normal condition, is from 6 to 7 feet in thickness.

For section of No. 7 Seam at fault, see Diagram "C".

For sec. of seam in #19 Room, 2nd N. Entry, see Dia. D,
" " " " " 22 " 3rd " " " " " E,
" " " " " 3 " 3rd " " " " " F,
" " " " at Face of 4th " " " " " G,
" " " " " " " Slope, " " H

For sec. of seam at Face of 4th S. Entry, see Dia. I,
" " " " " " " 3rd " " " " " J,
" " " " " " #29 R, " " " " " " K,
" " " " " " (Entry stumps) " " L,

The Ventilation Of The Mine, is produced by a fan, electrically driven.

Cu. feet of air at Slope inlet,----------	30,800
" " " " " Manway inlet,----------	21,000
" " " " " North Manway inlet,----------	6,500
" " " " " No. 1 North inlet,----------	4,320
" " " " " " " " face,----------	3,000
" " " " " " " " outlet,----------	4,800
" " " " " " 2 " inlet,----------	4,590
" " " " " " " " face,----------	3,600
" " " " " " " " outlet,----------	4,800
" " " " " " " South intake,----------	4,200
" " " " " " " " face,----------	4,200
" " " " " " " " outlet,----------	4,200
" " " " " " 3 " inlet,----------	3,780
" " " " " " " " face,----------	3,000
" " " " " " " " outlet,----------	3,900
" " " " " " 4 " intake,----------	6,000
" " " " " " " " face,----------	5,250
" " " " " " " " outlet,----------	6,300
" " " " " " 5 " intake,----------	4,800
" " " " " " 4 North and slope face,--	4,800
" " " " " " " " " " outlet,	6,000
" " " " " " " Return at fan,----------	51,300

The mine is very dry, there being no natural moisture throughout the workings. Water from the surface in a creek conveniently near by, was let into the mine, with beneficial results, and at the time of my visit, there was considerable water at the face of the slope from this source.

Concrete air-bridges and good stoppings were in evidence.

The Coal Is Undermined, and no shooting is permitted from the solid.

The Tonnage Of Coal Mined Per Keg Of Powder Used, by miners, pick mining, is 105 tons.

The Stables For Mules And Horses, are on the surface.

Fire extinguishers were in evidence at convenient places, and telephone connections extend through the colliery, and precautionary safeguards are in good evidence, generally.

You will note maps attached for two "A" Mines. The "A" Mine not described in this report was not examined, there being only a small area of coal to work out, prior to its abandonment.

Trusting this report will meet with your approval, I am,

Sincerely yours,

John McNeil M. E.

Consulting Engineer.

A P P E N D I X.

-----o-----

Remarks: It is said, the inevitable risks in American coal mines exact in their toll of accidents, 34%, and 66% due to the negligence of employees and employer.

In 1908, 2,450 fatal and 6,772 non-fatal accidents occurred in the mines of the United States. It seems that many deaths occurred from risks taken to save labor, being in too much of a hurry, and ignorance or non-observance of company's special rules.

I would advise that general instructions be frequently given to employees regarding the proper and safe conduct of their work by those in charge at the mines. See to it that all employees understand the company's rules, and demand an uncompromising obedience to the same.

Protect workmen and property against the dangers arising from spontaneous combustion of the "gobs" and ordinary fires in and about the mines with every known precaution.

Have adequate ventilation for the comfort and health of the men at the face of the work.

Prohibit "shooting from the solid"; no shot hole to extend beyond the mining.

Do not allow two or more shots to be fired in one place at the same time, let a sufficient interval elapse between blasts.

Do not permit wooden or other inflammable tool houses, boxes, seats, etc. in the mines; have same constructed with non-combustible materials, as far as practicable.

Remove all coal dust and other debris from haulage roads from time to time, keeping tracks as clean as possible, to prevent such debris from being ground up and carried off in suspension with the air-currents.

Demand an uncompromising obedience to your order, in having inspections made of every working place before the regular workmen enter, to see whether or not gas is generated; and have fire-bosses and mine foremen see that miners who are ignorant or indifferent to their own safety, are compelled to properly timber their working places.

The Organization Of A Class For American Red Cross First Aid Instruction, at each of your collieries, could not fail in its humane object of rendering, at times, incalculable good in the skillful handling and ministering timely aid to injured workmen, in the absence of a doctor.

Such a class might well include the superintendent, pit-boss and clerks at the mine, adding a few conscientious workmen of temperate habits and humane feelings who would find

their reward for services in alleviating the sufferings of their injured fellows. The class could be instructed, from time to time, by your regularly appointed physician.

There would, of course, be a necessary expenditure of money connected with the class, the maintenance of supplies, medicine, stretchers and other paraphernalia, but there might also be created, ways and means by which the general public would gladly contribute to the aid of such a humane cause, and should a tax to your companies reach a mill per ton, it would be a legitimate, as well as a humanitarian charge to the cost of coal.

The opportunity and pleasure was mine to meet 1st Lt. M. J. Shields, Medical Reserve Corps, U. S. Army, but now among coal miners in the interest of the American Red Cross as Medical Director to members of coal mine rescue cars and life saving stations.

In my talk with Doctor Shields, I was deeply impressed with the humane nobleness and vital importance of coal mining rescue work. This generously good and able gentleman kindly presented me with a copy of the American "Red Cross Abridged Text Book on First Aid", of which he is author, jointly with Major Charles Lynch, Medical Corps, United States Army.

Faithful to the request of Dr. Shields, I have carefully read his manual of instruction, with the result that I here-with enthusiastically recommend to your personal and mature

consideration, the adoption of "First Aid" work at the mines of your several coal companies.

Dr. Shields related to me, in part, the life saving value which these classes and organizations of "First Aid" have already proved in the coal mining districts of Pennsylvania.

Allow me, for your information, to herein copy the following brief remarks from the pages of the manual of First Aid:

"To gain the first-aid certificate of the Red Cross, it is, of course, necessary for students in associations to pass the same examination required from those in classes.

"The following course of instruction is recommended:

1. Structure and mechanism of the body.
2. First-aid materials.
3. General directions for rendering first aid. Shock.
4. Injuries without the skin being pierced or broken.
5. Injuries in which the skin is pierced or broken.
6. Local injuries from heat, cold and electricity.
7. Unconsciousness and poisoning.
8. Handling and carrying of the injured.
9. Special injuries of mine or railroad, etc.
10. Lecture by an expert on means for preventing accidents.
11. General review.
12. Sanitary matters, prevention of contagious diseases, such as tuberculosis, typhoid, scarlet fever, etc.

"The lectures should be shorn of all technical terms and half an hour is quite enough for them. Then the medical director or teacher should ask questions and superintend practical work by the class for half an hour. Practical work should be increased as much as possible just as soon as the men can do anything in this direction. After this, if possible, have the men discuss the subject among themselves, telling about recent injuries they have seen, how they have dressed them, etc.

"All the men should, if practical, have date cards for the year with numbers on the margin which are to be punched out at each meeting.....

"Contests in different classes or associations and between such organizations have been found to be one of the best ways to stimulate study of first aid as well as to arouse public interest in this important subject.

"The events in such contests should naturally be those having to do with first aid problems of special interest to the particular organizations concerned. As a sample of such contests, the following is taken from a program of an actual contest in the Pennsylvania mines.

Event No. 1--Man insensible from gas, totally helpless. One man to pick him up, carry him fifty feet to good air, lay him down and perform artificial respiration for one minute.

Event No. 2.--Man injured in lower part of body. Two men to form four-handed seat and carry him fifty feet.

Event No. 3.--Man injured; leg broken. Three men to splint his leg with a mine sprag and some straw or hay; make temporary stretcher out of two mine drills and two coats, and carry fifty feet.

Event No. 4.--Man injured; wound right side of temple; one man to open packet and dress wound.

Event No. 5.--General contest of eight teams. Man unconscious; wounds, simple fracture of right arm between elbow and shoulder; crushed foot with severe hemorrhage; apply tourniquet for bleeding, splints for fracture, perform artificial respiration for one minute, place on stretcher, carry fifty feet over car loaded with coal, pile of mine rock, then over fence and place in ambulance.

"An officer in charge, judges, a time-keeper and a starter will be required for such contests.

"The First Aid Department of the Red Cross will arrange such contests when desired and will award medals to successful contestants.

Red Cross Examination and Certificate.

"The Red Cross stands ready to arrange an examination for its certificate for any class of twenty persons on the conclusion of a course of instruction in first aid."

In Conclusion, it must not be construed that my enthusiasm for "First Aid" inspires me to the extent that such a class at a coal mine should necessarily have to deal with the prevention of contagious diseases or become students in anatomy, but I do think that such a class should be taught to handle and care for, in a practical manner, injured workmen in and around coal mines.

I have personally known of cases where men, becoming insensible from "after damp" gas, die for lack of medical aid, when, if the principles of "First Aid" had only been known to their fellow workmen, their lives might have been saved.

Again, I have witnessed injured men suffering much unnecessary pain, which could have been alleviated by more skillful handling.

It remains for well-regulated coal companies, such as yours, to be leaders in this humane and most worthy cause.

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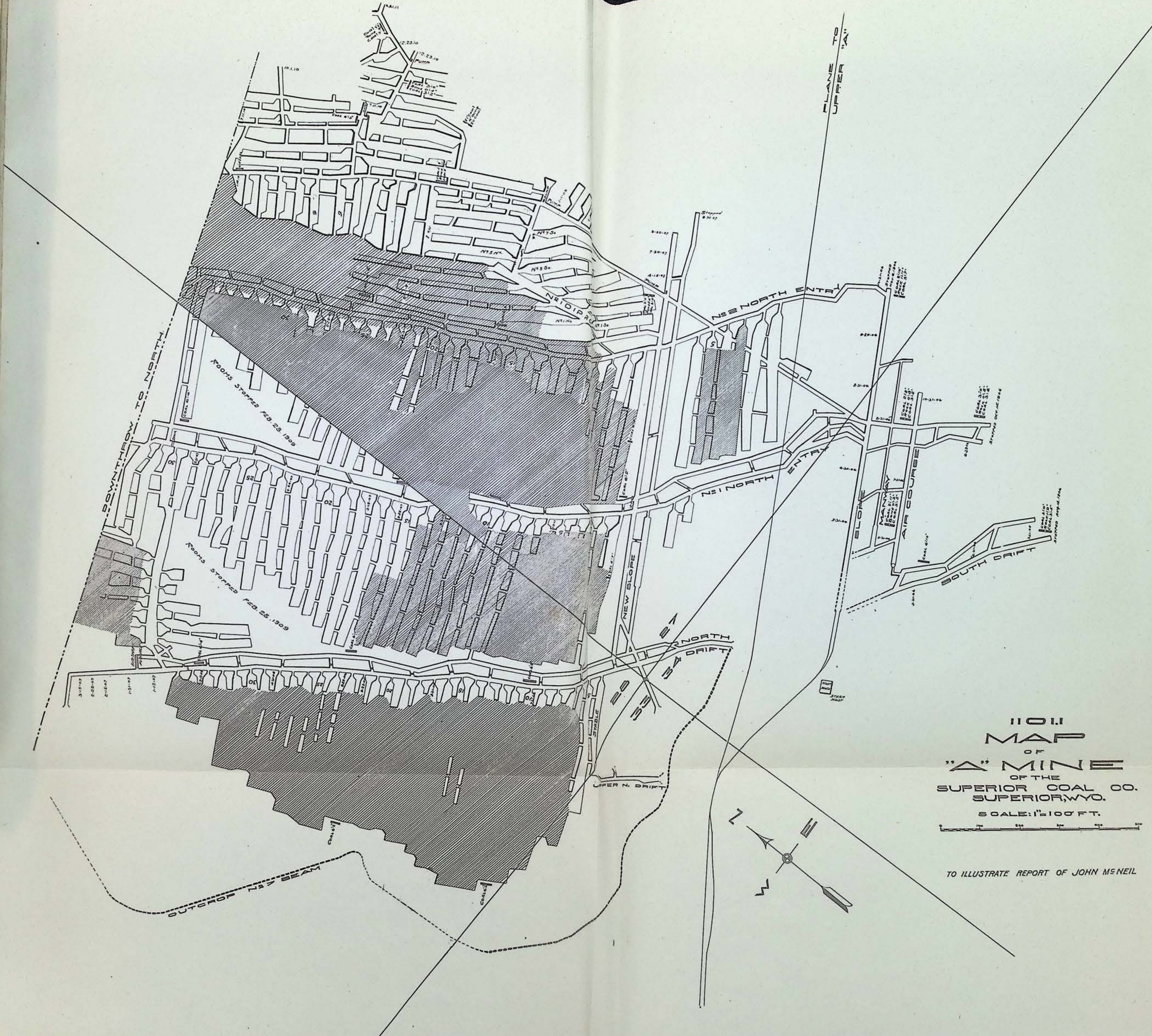

TO ILLUSTRATE REPORT OF JOHN McNEIL

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John McNeil, M.C.
Consulting Engineer
EQUITABLE BUILDING.
DENVER, COLO.

CONSTRUCTION WORK, EXAMINING AND REPORTING ON
COAL PROPERTIES A SPECIALTY.

TWENTY-FIVE YEARS EXPERIENCE IN COLORADO.
TEN YEARS AS STATE INSPECTOR OF COAL MINES.
CLASS 1884.

REPORT

On

THE COAL LANDS AND MINES

Of

THE PORTER FUEL COMPANY,

At

DURANGO, COLORADO.

By

JOHN McNEIL, M. E.,
Consulting Engineer,
Equitable Building,
Denver, Colorado,
MAY, 1911.

To: D. C. CLARK, Esq.,
Vice-President & General Manager,
The Porter Fuel Company,
Omaha, Nebraska.

Dear Sir:

Prefatory:

In obedience to your instructions, I made an examination of the mines of the Porter Fuel Company, as to their working conditions and safety of employees, and herewith have the pleasure of presenting to you, this, my report on the same.

I also examined certain sites of valuable disclosures of coal (made since my previous examinations) which I

shall herein briefly set forth; further, I shall narrate briefly, a few of the most salient features of our past and present geological deductions, so that this report, on the property, as a whole, may be found for your files as tersely complete as possible.

The Coal Beds And Formation Of Rocks, in the Durango mining district, are in the Laramie and Fox Hills Groups of the cretaceous age of coal bearing measures, containing varieties of coal common to the carboniferous period.

There Are Two Distinct Horizons Of Coal Seams, known as the Upper and Lower Series, separated by 3,000 feet or more of strata (practically barren of coal), consisting of massive and laminated sandstone with intervening beds of shale. See Sectional Diagram of Upper and Lower coal seams in front of this report.

The Upper Series Of Coal Seams, are embraced within the Laramie Group, containing, usually, three workable veins of from fifteen to twenty feet in thickness, but are badly interstratified with bone and other impurities, and the coals in themselves, carry a rather high percentage of inherent ash, and although of a coking quality (within certain areas), the

coke manufactured therefrom would be unsatisfactory, compared with the coke product produced from the purer coals of the thin seams of the lower series.

The Lower Series Of Coal Seams, (as before stated) are embraced within the coal bearing measures of the "Fox Hills Group", lying 3,000 feet, or more, beneath the horizon of the large coal seams of the Laramie Group.

The lower series of measures contain from three to five economic seams of coal ranging, according to location, from 2' 6" to 6 feet in thickness.

The quality of the thin coal seams are much superior to that of the thick beds of the upper series, and within the coking area of the Fox Hills Group, a most admirable coke of the highest grade is produced.

The quality of these coals and coke will be further referred to later on in this report.

The Underground Workings Of The Porter Mines, are situated under portions of Sections 26, 27, 34 and 35 in Twp. 35 North, Range 10 West, about three miles in a westerly direction from Durango.

These mines, as you are aware, have been closed down since June 6th, 1908, the date on which their surface erections and screening and dumping appliances were destroyed by fire, and

the portals to their several drift openings are sealed up, consequently, the underground workings were not examined at this time; but, from the knowledge gained by past examinations of the same, I can here speak understandingly.

There are, at least, three workable coal beds embraced within the measures at Porter, ranging from 2' 6" to about 5' in thickness.

The Porter Seam (No. 3), is the lowest coal bed in the measures and has been the principal seam mined at Porter. Its thickness there ranges from 2' 6" to 3' 3"; but in other portions of the field, it has been found 5' to 6' thick, of which we will speak later.

The Peacock Seam (No. 2), lies about 32 feet above the Porter Vein, and is found from 4' to 5' in thickness, containing (where in normal condition) a band of slate 3" to 4" wide, about 1 ft. from the floor; also a thin parting of sulphureous slate from 1/4" to 1" located in the vein about 18" from the roof.

An abnormal condition, however, exists at the present time in a drift at Porter, on the Peacock seam, where the lower intervening slate band (as previously reported) has reached a thickness of over 3 feet, but it is to be expected that in driving this drift ahead, it may pass through the disturbed portion of the seam into normal conditions again.

The "Twelve Hundred Foot Tunnel Seam" (No. 1), the uppermost coal bed now developed at Porter, shows a very uniform vein from 3' to 3' 3" in thickness.

In former reports, but especially that of October, 1909, I gave detailed information and maps showing systems of "Long-wall" mining for thin coal seams, and selected a site to open a mine in the 1200-foot tunnel for a supply of coking coal. I still believe the site an advantageous one.

The Quality Of The Porter coal, in all three seams, is exceptionally good for the manufacture of coke.

Coal Analyses:

	(Top) No. 1 Seam	(Middle) No. 2 Seam	(Porter) No. 3 Seam
Moisture,--------	1.19%	1.14%	0.58%
Volatile Matter,-	31.40	31.63	35.03
Fixed Carbon,-----	60.38	61.44	56.30
Ash,-------------	7.03	5.79	8.09
	100.00%	100.00%	100.00%

Coke Analysis:

Moisture,----------	0.28%
Volatile Matter,---------	1.54
Fixed Carbon,----------	85.08
Ash,----------	13.10
	100.00%

The foregoing is an average of 18 samples of coke made from unwashed coal.

The coal samples, from which the coke was made, were selected by me from twelve different locations upon the thin coking coal seams within the Durango district, and were coked by me in the ovens of the American Smelting & Refining Co. at Durango in November, 1905.

The analyses of the coke were made by the Test Department of the Union Pac. Railroad Company.

The Hesperus Mine, is situated in Sections 14, 15, 22 and 23, T. 35 N. R. 11 W. about ten miles in a westerly direction from Durango, and about seven miles north-westerly from Porter, and consists of a drift opening. See map attached at end of this report.

The Coal Seam, is from four to five feet in thickness, and a fair idea of its character, as to interstratifications of impurities and uniformity of thickness will be obtained by an examination of the several Sectional Diagrams on the map at end of this report.

For sec. of seam at face of 2nd Level West of Slope, see Dia. A
" " " " " " " 1st " " " " " " B
" " " " " " " Main " through fault, " " C

For sec. of seam at face of 4th Level near fault, see Dia. D
" " " " " " " 5th " from Plane, " " E
" " " " " " " Plane (above elec. hoist) " " F
" " " " " " " 5th Level East of Plane, " " G
" " " " " (inside of fault) 4th " " " " " " " H
" " " " at face of Slope,---------- " " I

The Dip Of The Coal Seam, trends southeasterly at an inclination from the horizontal of about 12 degrees.

The Method Of Removing The Coal From Its Bed, is supposed to be strictly that of undermining the vein by hand pick mining, with instructions that no shot-hole be drilled into the solid coal in advance of the undermining. But, that such instructions are being disregarded, I found conclusive evidence (upon several occasions), during my examination of the underground workings.

In one instance, I found that a shot had been fired with a "grip" on the solid coal of not less than three feet at the back of the hole. At another point, I found a hole charged and ready to fire, where a subterfuge attempt towards undermining, failed in the concealment of the fact that the drill-hole was entirely on the solid and was from 18" to 2' beyond the undermining at the back of the hole.

In fact, from evidences gleaned in this connection, I felt that "solid shooting" was being tolerated more-or-less throughout the mine.

My views as to the great danger which lurks in this vicious mode of extracting coal are so well known to you that I need not enlarge upon the subject, further than to appeal to your good sense of humane propriety for the issuing of your positive command against this perniciously dangerous practice.

The undermining of Hesperus coal is a simple matter; there is an admirable clay parting immediately underneath the coal.

The Number Of Tons Of Coal Mined Per Keg Of Powder Used, from April, 1910 to March, 1911, inclusive, was 62.7. In the absence of a due proportion of narrow work being performed during a period of inactive operations, the percentage of powder is high and can be reduced.

There Is A Fairly Good Degree Of Moisture, throughout the greater part of the mine, partly due to a natural dampness in the strata, and also from the filtration of surface water through the superincumbent rocks, where caved in proximity to the outcrop of the coal seam, consequently, there is almost an absence of dry coal dust (a great redeeming feature) and at semi-dry or dusty places, I found the dust consisted chiefly of fine attenuated shale which disintegrates from the roof by

the influence of the air-current, so, in this respect, a good degree of safety is enjoyed.

There Is An Admirable Escape Shaft, from the inner workings of the mine, equipped with a substantial slanting ladder-way with platform landings, is 60 feet in depth and safely timbered throughout.

There is also an escape tunnel driven to the surface, almost at the face of the Main Entry, inside of the fault. See mine map at end of this report.

This tunnel also serves the purpose of an intake air-course, an excellent condition in the ventilation of a mine.

The Mine Is Ventilated By A Fan, 15 feet in diameter by 4' 6" across the blades. The volume of air passing into the mine at the main intake, I found to be 20,520 cubic feet per minute.

The volume of air passing out from the mine in the main return to the fan, was 32,800 cubic feet per minute.

The reason for such an increased volume in the return is owing chiefly to currents of air passing into the mine through surface caves and expansion from usual rarefication of the air current.

Number of men employed underground, 25,

Number of mules underground,------- 3.

The underground workings are well ventilated, and on the whole, with the exception of disobeying instructions in tolerating "tight" shooting beyond the back of the undermining, the operations of the mine are attended with a maximum degree of safety for employees therein.

The Present Production Of The Mine, is limited to about 100 tons per day through lack of market for the product.

The Haulage Of The Coal, underground, from the levels to the plane and the slope, is done by mules; the coal is delivered from the entrances of the levels on the plane and slope to the main entry by a 50 H. P. electric hoist, and the haulage on the main entry to the tipple is operated by a ten-ton electric locomotive.

The Mine Has A Capacity, to produce about 350 tons per day, the dumping and screening appliances being of a rather crude calibre, and should ever your necessities press for a greater tonnage, a new and more modern tipple will be necessary.

Mining coal from the dip will also have to be provided for before a larger output than the present can be had.

Slopes driven from the main entry on the true dip of the seam could rapidly open up good producing territory, the haul-

age from which could be advantageously operated by electric hoists run from the present plant, which has ample power for an output of 300 tons or more per day.

There are now installed 2 boilers of 125 H. P. each; two 75 K. W. generators, 250 volts, and two 14"x14" McEwan Engines of 124 H. P. each.

The Quality Of The Coal At Hesperus, is of a very fine domestic variety, and is sure to be received with favor wherever introduced. It will have no peer in southern or western markets. The coal mines out in large pieces, is hard, has a bright luster and will stand storage and transportation well.

The following analyses were made from average mine samples forming full sections of coal seam in each case.

Analyses:

Mark of Sample	Moisture.	Volatile Matter.	Fixed Carbon.	Ash.	Total:
No. 1,	2.50%	31.80%	59.40%	6.30%	100.00%
" 2,	2.80	32.67	59.60	4.93	100.00
" 3,	3.95	34.75	52.22	9.08	100.00
" 4,	3.26	34.65	55.09	7.00	100.00
" 5,	3.20	33.80	58.40	4.60	100.00
" 6,	3.55	36.25	55.20	5.00	100.00
" 7,	2.66	32.07	58.77	6.50	100.00
Average,	3.14	33.72	56.96	6.18	90.68% Fuel.

Several Drill Holes On The Company's Lands, have been bored since I last reported on the property, and as to their depth, location and findings, a better understanding may be had by an examination of the Land Map and condensed diagramic sections of borings taken from the "log" records of the drillers than can be portrayed by my writing here.

No. 1 Drill Hole, was bored with a "spring pole", and, as will be noted, reached a workable seam of coal at a depth of 181 feet, when drilling was abandoned.

No. 2 Drill Hole, (bored with hand diamond drill), situated on the "flat" in proximity to the Animas River (see map), passed through three workable coal beds. This is an admirable location for an opening to supply coking coal for a plant of ovens in that vicinity.

Note:--Those accustomed to operating large coal beds without experience in mining thin seams, can hardly appreciate the economic value of the latter, when properly worked upon an improved system of "Long-wall" mining. But, as I have fully discussed this subject in previous reports, I shall not dwell on it here, further than to state that in such superior coking coal as yours, I consider coal beds 2 feet and over, workable seams.

Drill Holes Nos. 3 and 9, were drilled at the same location. No. 3 reached a depth of 351' 9", with no coal reported, and was bored with a hand diamond drill.

No. 9 was drilled by a large power diamond drill to a depth of 455 feet, passing through six inches of coal at a depth of 293' and 11 inches at 304 feet. These must have been passed through by the hand diamond drill. It might be well to drill deeper there.

Drill Holes Nos. 4 and 6, as will be noted on the map and sections of bores, were drilled at the same location. No. 4 was put down with a hand diamond drill to a depth of 351 feet with no economic coal reported.

No. 6 was drilled by a power diamond drill along side of No. 4, and note, that at a depth of 344 feet, a seam of 4' 9" of clean coal was passed through, the "core" of which is in Mr. Gifford's office. It looks as if it might be difficult for the hand diamond driller to explain why he did not find the above seam of coal.

No. 5 Drill Hole, was bored with a power diamond drill, and at a depth of 373 feet, had passed through three workable seams of coal. Note, the first coal bed was struck at a depth of 195 feet. Just why this coal bed was encountered at such a shallow depth, is difficult to infer.

You will note the location of this boring is south and east of the site of drill hole No. 6, hence, to the dip of the

measures, so, under normal conditions, should have been deeper (than No. 6), and the logical explanation for such a discrepancy in the depth of these coal seams, is, that a dislocation of the strata forms an "up-throw fault" to the east.

No. 7 Drill Hole, was also bored with a large power diamond drill, and at a depth of 399 feet, struck 3 feet of coal. We would also have expected to have gone deeper for this seam, and under normal conditions, to have encountered another coal bed within the distance drilled, under the 3-ft. seam.

Drill Hole No. 8, situated almost at the extreme dip of the lands, was bored by the large power diamond drill, and reached a depth of 1,067 feet. This drilling may (judging from the location) have been chiefly, or wholly in a portion of the intermediate rocks lying between the upper and lower series of coal beds, and while my surface examinations of these 3,000 feet of strata failed to disclose such coals as noted in the drill hole, they may, of course, be in these measures. So, as to whether they are embraced within the "intermediate" rocks, or situated in the "Fox Hills Group", I would not, without further search, care to offer here any definite deductions.

An Important Disclosure of Coal, was opened about two years ago in the N. E. 1/4 of Sec. 21, T. 35 N. R. 10 W., known at that time as the Sherwinton Mine, situated at Herr's

old saw mill site, see map. The title of this property is now in the name of the San Juan Investment Co., and known as the Peerless Mine, which is operated by a few miners to supply coal for wagon trade for the City of Durango.

Mr. Gifford is of the opinion that a portion of the underground workings of this mine has encroached upon your land, situated in the N. 1/2 of the N. E. 1/4 of Sec. 21, and he is now having a survey made to determine the extent of the trespass.

Accompanied by Mr. Gifford, I made an examination of your property there and was much pleased with what I saw. The coal bed referred to is doubtless the Porter seam and is about six feet in thickness, as follows:

Coal,----------	1' 2"
Sulphur band,-------	0' 1"
Coal,----------	4' 0"
Clay shale,---------	0' 3"
Coal,----------	0' 9"

The lower 9 inches of coal is left on the floor of the workings, for the reason that it makes an abnormal percentage of slack, and as lump coal is desired for their trade, it is left in the mine, which is doubtless the best portion of the coal seam for the manufacture of coke.

I took an average sample of the coal (on your land) from different parts along 50 feet of the seam, and had an analysis made of the same by Von Schulz & Low, Chemists, Denver, with the following results:

"Analysis of Coal For Mr. John McNeil:

Coal "Z".

Moisture,	1.45%
Volatile Matter,	36.74
Fixed Carbon,	57.41
Ash,	4.40
	100.00%

Fuel, -- 94.15%

Denver, Colo., May 11th, 1911.

(Signed) Von Schulz & Low."

A quantity of slack had been coked on the ground at this mine, and I selected an average sample of the coke from the pile and had an analysis made of the same by Messrs. Von Schulz & Low, with results, as follows:

"Analysis of Coke For Mr. John McNeil:

Coke "Z".

Moisture,	0.35%
Volatile Matter,	1.22
Fixed Carbon,	81.92
Ash,	16.51
	100.00%

Denver, Colo., May 11th, 1911.

(Signed) Von Schulz & Low."

Judging from the analysis of the average sample of the coal taken by me from the seam, there is an excessive proportion of ash in the coke, and no doubt the slack from which it was made contained an overdue amount of refuse matter; but, notwithstanding, the sample of coke, to have been burned on the ground, is very good.

Within this part of the field, there are at least three workable coal seams, ranging from 2' 10" to 6 ft. in thickness which offers an excellent site for a mine to supply coking coal whenever future necessity shall press for the same.

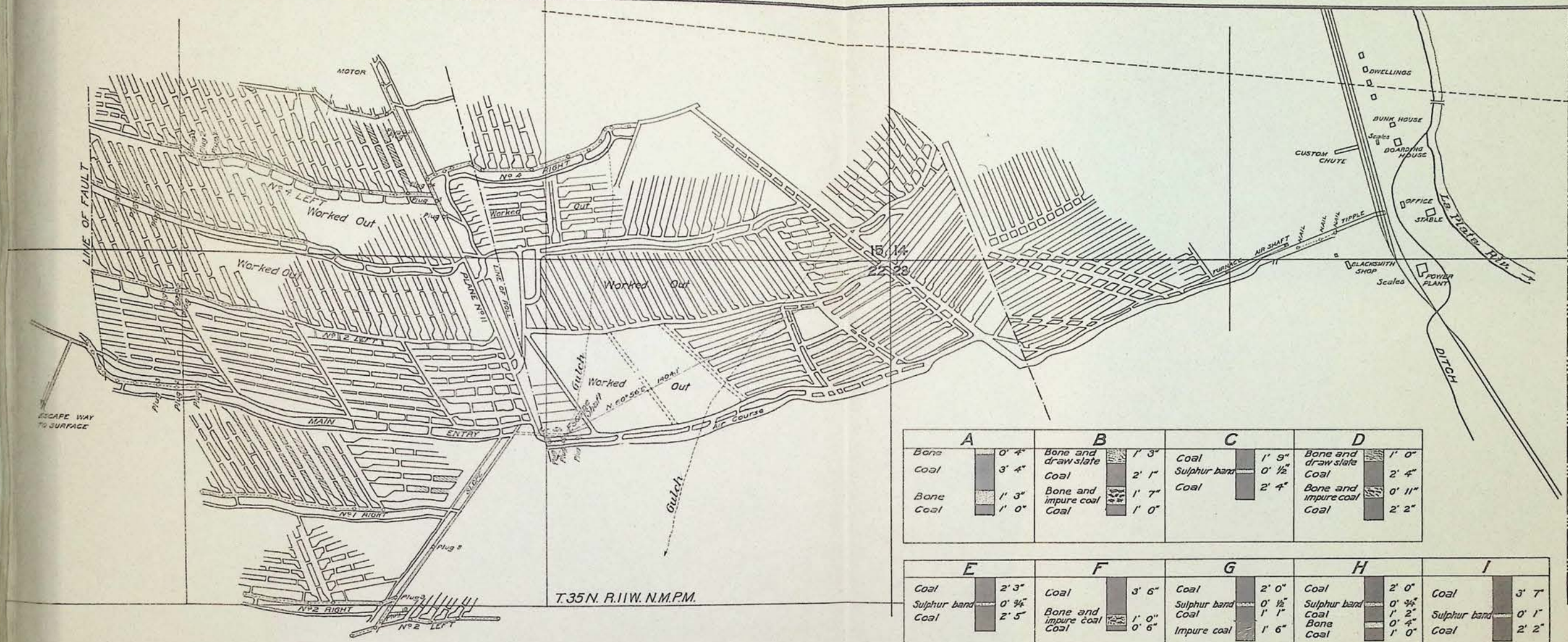
In Conclusion, I was much pleased with the results of my recent examination of this vast property (covering some 21,000 acres), as the late measure of success in the prospect work performed thereon, bestows additional confidence as to its future intrinsic value, when connected with your great railway systems.

Trusting my work will meet with your approval, I am,

Sincerely yours,

John McNeil M. E.

Consulting Engineer.



A		B		C		D	
Bone	0' 4"	Bone and draw slate	1' 3"	Coal	1' 9"	Bone and draw slate	1' 0"
Coal	3' 4"	Coal	2' 1"	Sulphur band	0' ½"	Coal	2' 4"
Bone	1' 3"	Bone and impure coal	1' 7"	Coal	2' 4"	Bone and impure coal	0' 11"
Coal	1' 0"	Coal	1' 0"			Coal	2' 2"

E		F		G		H		I	
Coal	2' 3"	Coal	3' 6"	Coal	2' 0"	Coal	2' 0"	Coal	3' 7"
Sulphur band	0' ¾"	Bone and impure coal	1' 0"	Sulphur band	0' ½"	Sulphur band	0' ¾"	Sulphur band	0' 1"
Coal	2' 5"	Coal	0' 6"	Coal	1' 1"	Coal	1' 2"	Coal	2' 2"
				Impure coal	1' 6"	Bone	0' 4"		
						Coal	1' 0"		

PORTER FUEL CO.

HESPERUS MINE

La Plata County, Colorado

TO ILLUSTRATE REPORT OF JOHN MS NEIL

MAP

SHOWING A PORTION OF THE

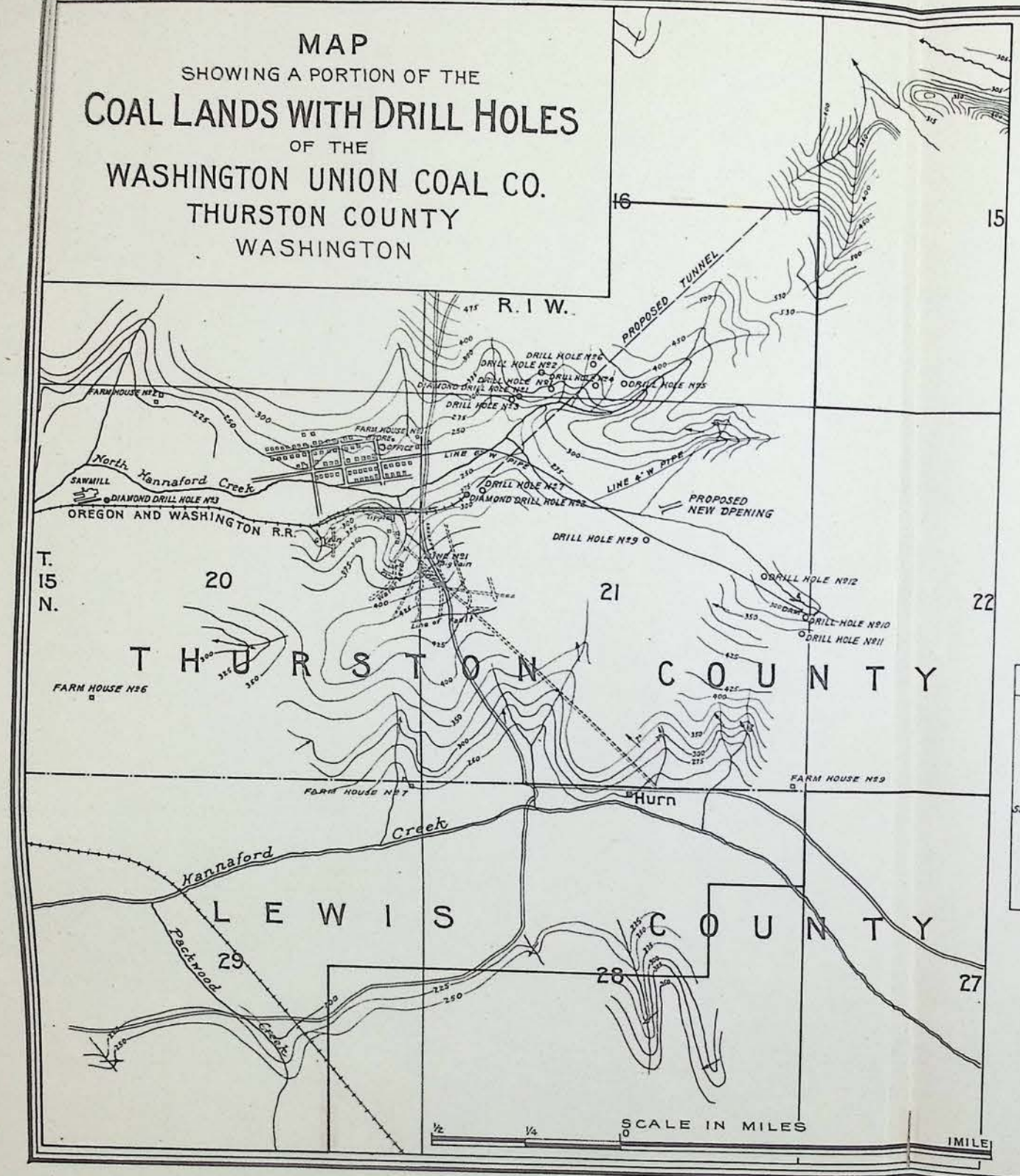
COAL LANDS WITH DRILL HOLES

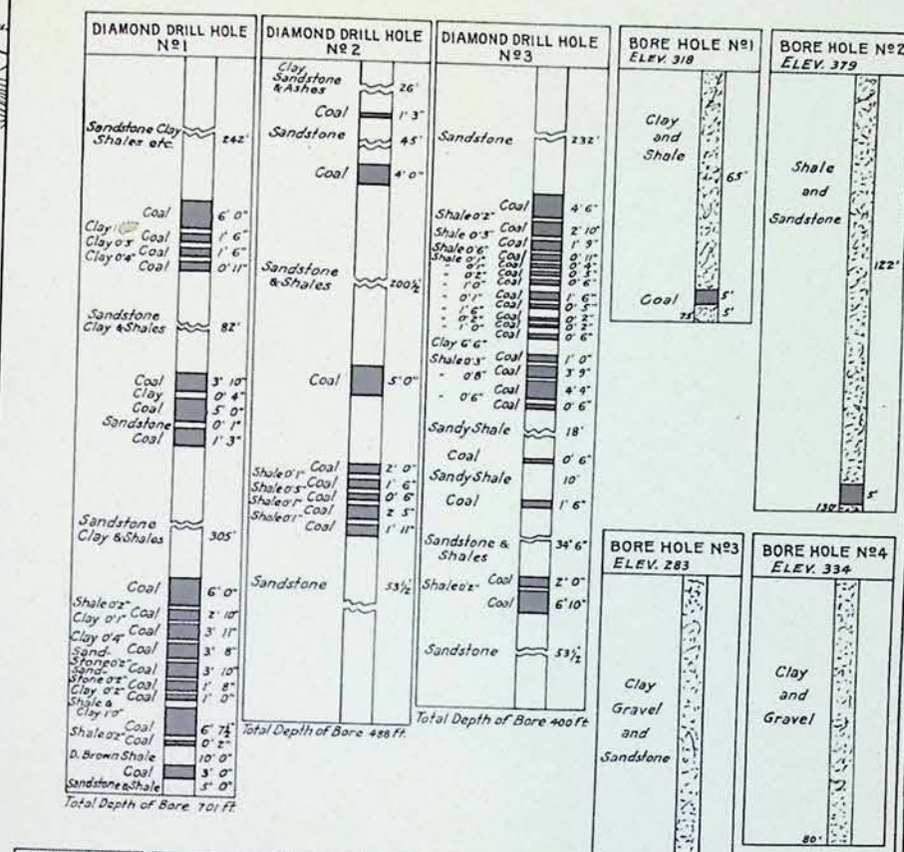
OF THE

WASHINGTON UNION COAL CO.

THURSTON COUNTY

WASHINGTON





To illustrate report of John McNeil

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John McNeil, M.C.E.
Consulting Engineer
EQUITABLE BUILDING.
DENVER, COLO.

CONSTRUCTION WORK, EXAMINING AND REPORTING ON COAL PROPERTIES A SPECIALTY.

TWENTY-FIVE YEARS EXPERIENCE IN COLORADO.
TEN YEARS AS STATE INSPECTOR OF COAL MINES.
CLASS 1884.

REPORT

On

COAL PROPERTIES

Of The

WASHINGTON UNION COAL COMPANY,

Situated at Tono in the Hannaford Valley,

Thurston County,

WASHINGTON.

With

Recommendations Relating To The

Safety of Employees Engaged in its Mining Operations.

By

JOHN McNEIL, M. E.,
Consulting Engineer,
Equitable Building,
Denver, Colorado,
JANUARY, 1911.

To: D. O. CLARK, Esq.,
Vice-President & General Manager,
Union Pacific Coal Company,
Omaha, Nebraska.

Dear Sir:

Introductory:

Acting upon your instructions, I made an examination of The Washington Union Coal Company's colliery, situated at Tono, in the Hannaford Valley, lying chiefly within Sections

20 and 21, Township 15 North, Range 1 West of the Williamette Meridian, Thurston Co., Washington, and herewith, I have the pleasure of presenting to you my report on the same.

As advised, I shall give prominence, in this report, to the special features suggested for my examination, viz., a strict observance to the prevention of accidents and general safety to life and limb of employees, and advice for the best preservation and welfare of The Washington Union Coal Co's property.

I was accompanied throughout the property by your Superintendent, Mr. James Needham, who was especially kind, and rendered valuable assistance in expediting the work of my examination.

An Examination of The Underground Workings, extended throughout the ramifications of the mine, including what is known as the "water level", the entrance to which is situated about 300 feet south of the main opening.

Note: If the reader will please unfold and examine the attached maps from the first and last pages of this report, a better understanding of the same will be obtained.

The Mine Consists Of A Slope Opening, which, at the present time, has been driven to a distance of about 1900

feet in a south-easterly direction.

About 1300 feet from the entrance of the slope, a "down-throw fault" was intersected, which displaced the plane of the coal seam 32 feet (see map to the right).

This displacement, however, has been admirably graded out so that the original course of the slope and general system of haulage remain unchanged.

The True Dip of The Coal Seam, trends in an easterly course, thus the main slope crosses the dip towards the south, which necessitates the turning of entries on an oblique angle from the slope to put them on their required course (the "strike" or level of the coal seam). This is the reason for the displeasing appearance of the map as compared, geometrically, with the right angular workings of your maps generally.

It is obvious to you, of course, that all things being equal, a slope should be on the true dip and the entries at right angles from it (on the "strike" or level of the coal seam), and ultimately, such will approximately be the case at Tono as the face of the slope is now reaching the "basin"; and again, you will note on the map, that Mr. Needham has turned a slope marked "north slope" but running in an easterly course, almost on the true dip.

The reason, no doubt, in planning the direction of the main slope as it is, was the idea of mining through on a

straight line to the southern outcrop of the seam (to day-light) in the vicinity of the original site of Hurn Post Office, so that coal might be mined along the southern outcrop and hauled to the railway and tipple at Tono with electric motors--not a badly pre-arranged plan, and the feasibility of it for future production will appear later on in this report.

The Aggregate Thickness Of The Coal Seam, is 16 feet, divided by two thin streaks of argillaceous shale.

The Roof and Floor, consist of soft arenaceous and clay shales, which disintegrate readily on being exposed to air and water.

The Percentage of The Dip, ranges from 9 degrees on the "rim" or outcrop of the "basin" to probably almost flat in the center of the basin.

The Mode of Working Out The Coal, is that known as Room-and-Pillar. Seven feet of the lower bench (of the 16-ft. seam) is worked out in advancing the workings. The top bench, with the pillar coal, should be extracted by "retreating", after the entries have reached their boundary or destination. It is difficult, at this time, to determine just

what percentage of the top coal and pillars may be available in practical work, but I think the yield should not be less than 60%. I make this estimate from experience in mining out coal from a lignite seam of similar physical conditions at Lafayette, Colorado.

An Excellent Coal Roof, is in evidence throughout the mine, and owing to the material thickness and tenaceous character of the top coal, left up in advancing the workings, no timber is required in the entries, air-courses, cross-cuts or other "narrow work". In the rooms, prop timber is used.

The falling of top coal is of rare occurrence, thus the most prolific cause of accidents in most coal mines is almost entirely obviated in your colliery at Tono, which is certainly a great redeeming feature for safety to the employees.

The Quality Of The Coal, consists of a fair grade of Lignite. It is free burning and does not produce a hard clinker as most Washington Lignites do.

The following is an average analysis of three samples of coal taken by me in former examinations from the 16-ft. seam now in operation, selected at different locations on the property:

Analysis:

Moisture,	15.50%
Volatile Matter,	32.11
Fixed Carbon,	45.75
Ash,	6.64
	100.00%

(Signed) Von Schulz & Low, Chemists,
Denver, Colorado.

The above analysis average favorably with, if not surpassing the average quality of the lignite coals from Sheridan, Wyoming, which are so successfully used as a locomotive fuel by the Burlington Railway.

The following is a copy of an analysis made from a sample of coal taken, by the writer, from the coal seam of a Sheridan Mine:

Analysis:

Moisture,	15.90%
Volatile Matter,	34.80
Fixed Carbon,	42.50
Ash,	6.80
	100.00%

(Signed) Von Schulz & Low, Chemists,
Denver, Colorado, March 7th, 1903.

The coal from the Washington Union Coal Co's property at Tono averages well with the lignite coals from Boulder and Weld Counties, Colorado, as will be noted by the following average analyses also made from numerous coal samples, taken by me, from the Lafayette, Louisville and Erie Districts:

Lafayette Dist., Boulder Co.

Moisture,	17.11%
Volatile Matter,	32.29
Fixed Carbon,	45.55
Ash,	5.05
	100.00%

(Signed) Von Schulz & Low, Chemists,
Denver, Colorado.

Louisville Dist., Boulder Co.

Moisture,	13.71%
Volatile Matter,	36.29
Fixed Carbon,	44.27
Ash,	5.73
	100.00%

(Signed) Von Schulz & Low, Chemists,
Denver, Colorado.

Erie Dist., Weld Co.

Moisture,	15.82
Volatile Matter,	34.76
Fixed Carbon,	44.09
Ash,	5.33
	100.00%

(Signed) Von Schulz & Low, Chemists, Denver, Colorado.

Remarks On Uses Of Coal From Tono: While in Portland, I called at the office of Mr. Graham, Supt., Motive Power of the O. R. & N. Co., and while I did not meet him personally (he was at home sick), I gleaned, of course, in his office, gratifying information regarding the successful firing of Tono coal on the "Mikado" locomotive.

I also called on the General Manager, Mr. O'Brien, who talked enthusiastically on the subject, and in a most gentlemanly manner expressed his regrets that necessity compelled him, in the past, to speak so discouragingly of the coal as a locomotive fuel when fired on the common type of engine. But now, Mr. O'Brien is quite decided upon the fact that the great "burning" question is at last admirably solved, and from all information I could glean, the appearance of the Mikado

locomotives is anxiously awaited at Portland by all interested parties, from the General Manager down to the firemen.

As your Consulting Engineer and purchaser of the Hannaford Valley coal lands, you can appreciate the ecstacy of my feelings towards the "Mikado" in bringing about such a <u>great</u> "change of heart" on the O. R. & N., and now that success is assured, I wish to extend to you my sincere thanks for never once intimating to me any dissatisfaction.

I called on your Mr. Gillespie and talked over the coal with him, as a domestic fuel. I asked him: 'Providing you had Tono coal prepared over bar screens with apertures of eight inches between bars, what figure would it cut in the domestic trade of the North-west'. He replied: 'With such a preparation of Tono lump coal, I could control the domestic market to a very large extent'.

Lignite lump coal prepared over one and one-quarter inch bar screens has never been favorably received in any market, and is readily out-sold, as you know, wherever six or eight inch coal comes in competition with it.

There is no doubt but that the Mikado locomotives will burn 8" mine-run coal, and while any domestic fuel "shot from the solid" will deteriorate in transit more than when machine mined, yet, even with "powder mined coal" I am inclined to believe Mr. Gillespie's statement is correct. With coal undermined by machines, his chances to "take" the market would be better.

Machine Mining Of The Coal At Tono, under such an excellent coal roof and favorable dip of the seam, would meet with success, not altogether on the reduction of cost of mining, but also will insure your company an output of coal when required.

Wherever Unionism and labor difficulties prevail and skilled wielders of the pick are scarce (which is now practically true everywhere) and conditions are applicable, I never hesitate in suggesting a mining machine plant; and I certainly have no hesitancy whatever in recommending you to put in such a plant for the Washington Union Coal Co. at Tono.

I can foresee confidently, that the expenditure of money in this connection cannot fail to bring good results, both financially and otherwise.

Ultimately, I estimate a reduction in your cost of mining of about ten cents per ton in the aggregate.

The cost item of undermining a coal seam of such abnormal thickness, with other conditions so favorable, should not exceed ten cents per ton (run-of-mine coal), and the shooting and loading would be well paid at 30 to 32 cents per ton. You are now paying, for hand mining, 52 cents per ton.

With electric chain cutting machines of the Jeffrey type, myself and sons are now mining and loading coal from a six-ft. seam for 40 cents per ton (run-of-mine coal).

Before putting in the machines, we paid 50 cents per ton for hand mining. With the machines, we get a better grade of coal for our domestic trade; we eliminate the danger of "windy" shots (our mine is quite dusty) and we get an output when we require it. Loaders of coal can be secured at almost any time, but good pick men are hard to get.

When "drawing" back pillars with top coal (9 feet) in your mine at Tono, there will be but little undermining to do, and you should then get some very cheap coal.

The Present Capacity of The Mine, we may place safely at 600 to 700 tons per day, including the "Water level" entry. But, with trade to gain development work, the output can be increased in 90 days or four months to 1,000 tons or more.

The Ventilating Air-Current Throughout The Mine, is produced by the mechanical means of a fan, twelve feet in diameter, of the Crawford & McCrimmon type, with a maximum capacity of about 30,000 cubic feet of air per minute entering the in-take air-way, and about 6,000 cu. feet reaching the interior of the workings.

While such a volume of air is adequate for present needs and probably for a year to come, it is never-the-less evident that when the daily production reaches or exceeds 1,000 tons,

the fan will be found inadequate to maintain a hygienic condition throughout the interior workings of the mine, for the preservation of bodily health of miners and mules therein.

We must not lose sight of the fact that the universal mode of extracting the coal seam from its bed in that colliery, is that of shooting entirely from the solid, thus an abnormal quantity of black powder is used, which not only produces deleterious fumes, but may generate dangerous explosive gases. In fact, a colliery explosion occurred some years ago in an Iowa mine (wet at that), which, it is said, resulted wholly from gases produced by the combustion of common black powder.

I know just how the above statement will jar on the ear of the average practical miner, should he be a layman in technical knowledge; but, upon reflection of the fact that about 40 per cent of the gases formed by the combustion of common black powder are indeed explosive, the semblance of truth is seen, and with modern "permissible" powders, the percentage of inflamable gases is higher.

In view of the fact that the Tono mine may soon be called upon for a large tonnage of coal for use on Mikado locomotives, I would recommend that the erection of a second fan, or one larger with a maximum capacity of at least 100,000 cubic feet per minute, be given your consideration.

In the event of opening the proposed new mine (referred to later on in this report), I would advise you to also install

a fan there with a maximum capacity of not less than 100,000 cubic feet of air per minute.

In case of "falls" where pillars may be drawn, the strata is of such a nature as will give off black damp ($C.O._2$), the diffusion of which demands liberal currents of air.

Fire Damp, $C._{H_4}$, has never been detected in this mine, and while there is no absolute assurance that its presence never will be met with, yet, judging from the physical conditions and composite nature of the measures, we do not believe them characteristic to generate carbureted hydrogen gas; thus, from our observations in our examination, we do not anticipate any danger in this connection.

Coal Dust Is Non-Existent Throughout The Mine, owing to the liberal wetness of the coal seam and the over and underlying strata. The humidity of the air current, too, is nearly always up to full saturation, depositing moisture, perceptibly, at times, on ones clothing, hence danger is entirely eliminated from the operation of the mine in this connection. Even any fine attenuated coal dust that might get in suspension with the air, must soon become moist and re-deposit itself on the damp floor or sides of the roadways. This is an all-important and great redeeming feature for safety

to the employees in the mine, for there is no doubt that in coal dust lurks one of the greatest dangers which we have to contend with in coal mining. It is on account of this fact alone that blasting entirely from the solid can be safely tolerated.

In The Probable Occurrence of Spontaneous Combustion or "Gob-fires", we foresee, from our past experience in mines of such lignitic quality of coal and argillaceous character of strata, the most likely menacing danger, against which the management should ever guard with suspicious care.

Fortunately, however, this impending menace in a practically new mine like Tono, may be successfully guarded against by pre-arranged plans to prevent conditions which invite the susceptibility of spontaneous combustion either in the crushed abandoned workings of the distant future or those now in operation, by faithfully carrying out the following (and other known) salient precautions:

First: Allow no slack coal to be left in the underground workings, nor "gob" any "coaly" or clay debris into cross-cuts.

Second: If at all possible (and I believe it is), do not commence to mine out pillars in any entry until it has reached the boundary line

or destination, and then begin to mine from the interior only, "drawing" but a few pillars at a time, and take out as large a percentage of the pillar and top coal as is practicable to do.

Third: Watch for any rise of temperature or odor from the "gobs" or where "falls" of roof and top coal have taken place. If an odor or an abnormal temperature be detected, remove or turn over the heating debris, or, with water, if convenient, bring temperature down to normal Use a thermometer for such determinations.

If, however, spontaneous combustion has progressed and is at a point which cannot be practicably reached and treated as above, or has reached such a stage that it cannot be removed, then we must lose some coal and retreat to an advantageous point and erect stoppings in the main and back entries and in cross-cut through the pillar in the room next to the "gob", so as to isolate the fire from air; and as the nature of the strata is such as will give

off black damp (Carbonic acid gas C. O_2), it will, in the absence of oxygen, extinguish the fire.

The Pumping Of Water From The Mine, at the present time, is of little moment, being an immaterial quantity--probably not to exceed 50 gallons per minute. But this volume will increase in its proportions as additional areas upon the coal seam are opened up, owing to the overlying strata being more-or-less saturated with water, and especially so under ravines, low ground or flat wooded areas.

I would strongly advise that the top coal and pillars lying directly under, or in proximity to all such surface drainage courses, be left undisturbed (unworked) until at least the prospective abandonment of the mine is in evidence.

The working out of pillars promiscuously in almost any of Washington's coal fields having a light vertical covering of strata, is attended with more-or-less danger from inundation.

With proper attention given to underground and surface surveys, however, and due precautions taken in the extraction of pillars, it is not likely that any very serious volumes of water, requiring abnormal pumping, will be encountered.

A Site For A New Slope Opening, was selected, after carefully going over the maps and drill hole locations with Mr. Needham, in the North-east quarter of the North-east quarter of Section 21, see land map.

In recent borings, the 16-ft. coal bed was found in drill holes Nos. 5, 7, 9 and 12, and judging from their locations and the profile of the rising ground forming the overlying strata of adjoining lands, the indications are that the big seam underlies the N. E. 1/4 of Section 21, and very probably extends underneath portions of the N. W. 1/4 of Section 22, the S. W. 1/4 of Section 15 and the S. E. 1/4 of Section 16. Thus, such an area with its known and prospective indications for coal, justifies the opening of the proposed mine.

I Recommend The Driving Of No. 1 Slope On To The Southern Outcrop, of the coal seam, on its present course, with night and day shifts to reach, as soon as possible, the southern outcrop of the coal seam on the south side of the hill at "Hurn" or in the vicinity of farm house No. 8. See land map, and note course of No. 1 Slope.

With the southern outcrop of the big coal seam reached, by an extension of the present slope, a vast tonnage of coal from its vicinity would become available to the Tono Mines,

as considerable known areas of coal there could be mined from entries along the southern "rim" of the "basin" by the "Retreating System" and the haulage of coal therefrom be successfully operated by electric motors through the underground haulage-way to the bottom of the Tono Slope in the center of the basin.

The maximum haulage distance to the Tono tipples, including the probable length of the entries along the southern "rim of the coal basin", might not exceed 7,000 feet. But if we are fortunate enough to follow the big seam to a much greater distance, we should certainly have no difficulty in hauling the coal, as the haulage-ways would be protected with a good coal roof; and with permanently laid tracks of 40-lb. steel rails, the coal could be hauled at a comparatively low cost.

The Maximum Tonnage Of Coal Available, to the locations of No. 1 and the proposed site of No. 2 Mines, is, at this time, more-or-less an unknown quantity. But, that we may safely estimate a minimum of 8,000,000 tons tributary to them from the big seam alone, we have no reason to doubt, and future developments will, in all probability prove such an estimate altogether too conservatively given.

As there lie three other large workable coal seams at lower horizons (see drill hole records on Land Map to left),

it will be seen that "Mikado" locomotives may draw liberally upon Tono for their fuel supply for many decades to come.

I feel gratified indeed that the estimate I made in my report to you June, 1907, of 40,000,000 tons of coal being available within the Cherry Hill Lands, has, in my opinion, since been verified by your drilling of these lands.

There Are No Dykes Or Intrusions Of Igneous Rocks, in the coal field, to our knowledge, but developments have disclosed the fact that minor "faults" and dislocations of the strata occur, displacing the plane or level of the coal seams by up or down-throw faults, but not their general continuity. Such dislocations of the measures, and the fact that the surface ground is covered with dense vegetation and alluvial deposits, renders the field a difficult one to prospect or follow the course of the outcrop of the coal seams.

In this connection, however, I would advise the following of the coal seams by actual operations of mining the coal from inexpensive drift or slope openings, with power from your general plant, to open up unknown areas of the field, believing this would be more successful and less expensive than drilling.

The Tono Mines Enjoy Unusual Conditions Of Safety, compared with coal mines generally, for the following reasons,

which I shall again briefly mention:

The workings are universally and naturally moist.

The air-current carries a natural saturation of moisture.

The temperature of the mine is low.

Coal dust is no where in evidence.

The presence of "fire damp" has never been detected.

The underground workings advancing have a safe coal roof.

The above are all redeeming features of safety which will undoubtedly reduce the inevitable risks of coal mining to a minimum.

Remarks: It is said, the inevitable risks in American coal mines exact in their toll of accidents 34%, and 66% due to the negligence of employees and employer.

In 1908, 2,450 fatal and 6,772 non-fatal accidents occurred in the mines of the United States. It seems that many deaths occurred from risks taken to save labor, being in too much of a hurry, and ignorance or non-observance of companies special rules.

I would advise that general instructions be frequently given to employees regarding the proper and safe conduct of their work by those in charge at the mines. See to it that all employees understand the company's rules, and demand an uncompromising obedience to the same.

I recommend that on all slopes or other haulage ways on which persons are permitted to travel, that specially prepared places of a width of not less than four feet from the rail be made at intervals not to exceed 50 feet, and that the same be white-washed with lime so that persons can be within easy reach of and readily observe such places of refuge in case of an emergency from run-away or rapid transit of pit cars.

I would suggest that wherever trap doors or brattice are necessary, that they be constructed of non-combustible materials, as far as practicable.

Further, that no wooden or other inflamable tool houses, stables or boxes be permitted in the underground workings.

The Organization Of A Class For American Red Cross First Aid Instruction, at each of your collieries, could not fail in its humane object of rendering, at times, incalculable good in the skillfull handling and ministering timely aid to injured workmen, in the absence of a doctor.

Such a class might well include the superintendent, pit-boss and clerks at the mine, adding a few conscientious workmen of terperate habits and humane feelings who would find their reward for services in alleviating the sufferings of their injured fellows. The class could be instructed, from time to time by your regularly appointed physician.

There would, of course, be a necessary expenditure of money connected with the class, the maintenance of supplies, medicine, stretchers and other paraphernalia, but there might also be created, ways and means by which the general public would gladly contribute to the aid of such a humane cause, and should a tax to your companies reach a mill per ton, it would be a legitimate, as well as a humanitarian charge to the cost of coal.

The opportunity and pleasure was mine to meet 1st. Lt. M. J. Shields, Medical Reserve Corps, U. S. Army, but now among coal miners in the interest of the American Red Cross as Medical Director to members of coal mine rescue cars and life saving stations.

In my talk with Doctor Shields, I was deeply impressed with the humane nobleness and vital importance of coal mining rescue work. This generously good and able gentleman kindly presented me with a copy of The American "Red Cross Abridged Text Book on First Aid", of which he is author, jointly with Major Charles Lynch, Medical Corps, United States Army.

Faithful to the request of Dr. Shields, I have carefully read his manual of instruction, with the result that I herewith enthusiastically recommend to your personal and mature consideration, the adoption of "First Aid" work at the mines of your several coal companies.

Dr. Shields related to me in part, the life saving value which these classes and organizations of "First Aid" have already proved in the coal mining districts of Pennsylvania.

Allow me, for your information, to herein copy the following brief remarks from the pages of the manual of First Aid:

"To gain the first-aid certificate of the Red Cross, it is of course necessary for students in associations to pass the same examination required from those in classes.

"The following course of instruction is recommended:

1. Structure and mechanism of the body.
2. First-aid materials.
3. General directions for rendering first aid. Shock.
4. Injuries without the skin being pierced or broken.
5. Injuries in which the skin is pierced or broken.
6. Local injuries from heat, cold, and electricity.
7. Unconsciousness and poisoning.
8. Handling and carrying of the injured.
9. Special injuries of mine or railroad, etc.
10. Lecture by an expert on means for preventing accidents.
11. General review.
12. Sanitary matters, prevention of contagious diseases, such as tuberculosis, typhoid, scarlet fever, etc.

"The lectures should be shorn of all technical terms and half an hour is quite enough for them. Then the medical director or teacher should ask questions and superintend practical work by the class for half an hour. Practical work should be increased as much as possible just as soon as the men can do anything in this direction. After this, if possible have the men discuss the subject among themselves, telling about recent injuries they have seen, how they have dressed them, etc.

"All the men should, if practical, have date cards for the year with numbers on the margin which are to be punched out at each meeting.....

"Contests in different classes or associations and between such organizations have been found to be one of the best ways to stimulate study of first aid as well as to arouse public interest in this important subject.

"The events in such contests should naturally be those having to do with first-aid problems of special interest to the particular organizations concerned. As a sample of such contests, the following is taken from a program of an actual contest in the Pennsylvania mines.

Event No. 1.--Man insensible from gas, totally helpless. One man to pick him up, carry him fifty feet to good air, lay him down and perform artificial respiration for one minute.

Event No. 2.--Man injured in lower part of body. Two men to form four-handed seat and carry him fifty feet.

Event No. 3.--Man injured; leg broken. Three men to splint his leg with a mine sprag and some straw or hay; make temporary stretcher out of two mine drills and two coats, and carry fifty feet.

Event. No. 4.--Man injured; wound right side of temple; one man to open packet and dress wound.

Event No. 5.--General contest of eight teams. Man unconscious; wounds, simple fracture of right arm between elbow and shoulder; crushed foot with severe hemorrhage; apply tourniquet for bleeding, splints for fracture, perform artificial respiration for one minute, place on stretcher, carry fifty feet over car loaded with coal, pile of mine rock, then over fence and place in ambulance.

"An officer in charge, judges, a time-keeper and a starter will be required for such contests.

"The First Aid Department of the Red Cross will arrange such contests when desired and will award medals to successful contestants.

Red Cross Examination and Certificate.

"The Red Cross stands ready to arrange an examination for its certificate for any class of twenty persons on the conclusion of a course of instruction in first aid."

In Conclusion, It must not be construed that my enthusiasm for "First Aid" inspires me to the extent that such a class at a coal mine should necessarily have to deal with the prevention of contagious diseases or become students in anatomy, but I do think that such a class should be taught to handle and care for, in a practical manner, injured workmen in and around coal mines.

I have personally known of cases where men, becoming insensible from "after damp" gas, die for lack of medical aid, when, if the principles of "First Aid" had only been known to their fellow workmen, their lives might have been saved.

Again, I have witnessed injured men suffering much unnecessary pain, which could have been alleviated by more skillful handling.

It remains for well-regulated coal companies, such as yours, to be leaders in this humane and most worthy cause.

You will note in the foregoing report that I have not covered the mine equipment, miners' dwellings, boarding-house, store and other buildings, neither have I mentioned the saw mill, timber and farming lands of the coal company, which, of course, are all of considerable intrinsic value, but believing that you already possess as correct an account of these interests as I could possibly give, I assumed you would not require from me here, such detailed information.

It will also be understood that I have, in compiling this report, drawn upon knowledge obtained from past examinations of the property, as well as from my recent inspection, all of which I trust will meet with your approval. I am, sir,

Yours sincerely,

John H. McNeil M. E.

Consulting Engineer.

MAP OF
HANNAFORD MINE No.1

SECTIONS 20 AND 21 T.15 N.R.1W.
THURSTON COUNTY WASHINGTON
WASHINGTON UNION COAL CO.

SCALE IN FEET
100 75 50 25 0 100 200 300 400 500

Water Level 6' Vein
O. & W. R.R.
Tipple
Hoist House No.2
Hoist House No.1
LOADS
EMPTIES
Boiler House
Blacksmith Shop
INCLINE
Water Level
MANWAY
Fan
Caved
Fault
Condition Unknown
No.1 SOUTH SLANT
No.1 S.
No.2 S.
No.2 M.
No.3 S.
No.4 S.
Sump
Line of Fault
COAL SEAM
FAULT DISLOCATION 32 FEET
COAL SEAM

To illustrate report of John McNeil.