The Union Pacific Coal Co.

INSPECTOR'S ANNUAL REPORT

MARCH, 1911.

John McNeil, M. E.

WESTERN UNION TELEGRAM

Form 260

GEORGE W. E. ATKINS, VICE-PRESIDENT NEWCOMB CARLTON, PRESIDENT BELVIDERE BROOKS, VICE-PRESIDENT

JOHN McNEIL, M. E. PRESIDENT

RECEIVER'S No.	TIME FILED	CHECK

SEND the following Telegram, subject to the terms on back hereof, which are hereby agreed to

Omaha September 25 1916

Mr F P Briscoe
c/o Union Pacific Coal Co
Cheyenne Wyoming

Wire quick amount of voucher favor John Mcneil for making examination mines early part of nineteen eleven

F A Manley

Charge

11:55 A M

THE WESTERN UNION TELEGRAPH COMPANY
INCORPORATED
NEWCOMB CARLTON, PRESIDENT

NEWCOMB CARLTON, PRESIDENT

Words: this is a day message. Otherwise its character is indicated by the symbol appearing after the check.

RECEIVED AT 1321 FARNAM STREET, OMAHA, NEBR. ALWAYS OPEN.

1916 SEP 25 PM 3 20

A539D 13

CHEYENNE WYO 213P 25

FRANK A MANLEY 771

1112 U P BLDG OMAHA NEBR

YOUR TELEGRAM TODAY VOUCHER FAVOR MCNEIL FOUR HUNDRED NINETY THREE DOLLARS ELEVEN CENTS

F P BRISCOE

TELEGRAM

NUMBER	SENT TO	TIME SENT	SENDER	RECEIVER
		M		
NUMBER	RECD FROM	TIME RECEIVED	SENDER	RECEIVER
		M		

All messages must be written in ink or typewritten on these blanks, and those for parties on trains (except trainmen) delivered in sealed envelopes. The exact sending and receiving time, initials of sending and receiving operator and signal of receiving office, must be entered in proper space in every instance. Operator must note on back of telegrams time of calls and cause of delay, if any.

*Time Filed*_____*M*

67sakkm

CacheJct Sept 25 1916

K W Bock, Omaha

Does the figure $4710 you gave me as cost of McNeil's report cover both 1913 and 1911 reports. If not how much did the 1911 report cost. Answer care Mr Calvin on OSL.

Paul Rigdon

1137 am

JOHN McNEIL, PRESIDENT

RECEIVED AT 1321 FARNAM STREET, OMAHA, NEBR. ALWAYS OPEN.

1916 SEP 25 PM 5 03

A
62D 37

CHEYENNE WYO 352P 25

FRANK A MANLEY 912

1112 UNION PAC BLDG OMAHA NEBR

VOUCHER FAVOR MCNEIL FOR EXAMINING MINES IN MAY NINETEEN ELEVEN TWENTY SEVEN HUNDRED FOUR DOLLARS TWO CENTS WHICH INCLUDES ONE HUNDRED FOUR DOLLARS THIRTY FIVE CENTS FOR OFFICE WORK AND EXPENSES YOUR NUMBER NAUGHT FOUR THREE TWO

F P BRISCOE.

Does not include extra expense

JOHN McNEIL, PRESIDENT, M. E.

A. M. McNEIL, TREASURER

Night Letter

Patrons should mark an X opposite the class of service desired; OTHERWISE THE TELEGRAM WILL BE TRANSMITTED AS A FAST DAY MESSAGE.

TELEGRAM

NEWCOMB CARLTON, PRESIDENT

Time Filed

Send the following telegram, subject to the terms on back hereof, which are hereby agreed to

Omaha, Sept. 25th 1916

John McNeil,

Mining Engineer

Denver, Colo.

Will you please advise what we paid you for making examination of our properties per your report of March nineteen eleven

F A Manley

Charge.

3:55

THE WESTERN UNION TELEGRAPH COMPANY
INCORPORATED
NEWCOMB CARLTON, PRESIDENT

8. No employee of the Company is authorized to vary the foregoing.

the foregoing terms.

7. Special terms governing the transmission of messages under the clauses of messages enumerated below shall apply to messages in each of such respective clauses in addition to all

filed with the Company for transmission.

6. The Company will not be liable for damages or statutory penalties in any case where the claim is not presented in writing within sixty days after the telegram is

by one of the Company's messengers, he acts for that purpose as the agent of the sender.

5. No responsibility attaches to the Company concerning telegrams until the same are accepted at one of its transmitting offices; and if a telegram is sent to such office

contract for him for such delivery at a reasonable price.

towns. Persons will be delivered free within one-half mile of the Company's office in towns of 5,000 population or less, and within one mile of such office in other cities or

NEWCOMB CARLTON, PRESIDENT

RECEIVED AT 1321 FARNAM STREET, OMAHA, NEBR. ALWAYS OPEN.

1916 SEP 25 PM 6 37

A752D 44 COLL NL

DENVER COLO 25

FRANK A MANLEY 150

VICE PRES UNION PAC COAL CO OMAHA NEBR

YOUR WIRE MY FATHER ABSENT FROM OFFICE I THINK FOLLOWING CORRECT

TOTAL FOR SERVICES THREE THOUSAND FOUR HUNDRED SEVENTY FIVE DOLLARS

TOTAL EXPENSES NINE HUNDRED SEVENTY FIVE DOLLARS THIS INCLUDES

WASHINGTON UNION ROCKSPRINGS SUPERIOR RELIANCE SCOFIELD HANNA

CUMBERLAND PORTER MAILING COPIES OF BILLS

A M MCNEIL.

3 975 150

TELEGRAM

GEORGE W. E. ATKINS, VICE-PRESIDENT NEWCOMB CARLTON, PRESIDENT BELVIDERE BROOKS, VICE-PRESIDENT

RECEIVER'S No.	TIME FILED	CHECK

SEND the following Telegram, subject to the terms on back hereof, which are hereby agreed to

Omaha September 26 1916

Mr E E Calvin

On O S L R R

Your wire yesterday Cost of McNeil's report nineteen eleven fortyfour hundred fifty dollars Nineteen thirteen fortyseven hundred ten dollars

F A Manley.

8:45 A M

Send this as a Red Company message.

JOHN McNEIL, M.E., PRESIDENT

A. M. McNEIL, TREASURER

5

THE McNEIL COAL COMPANY

Routt County's Very Best Coal

KINDLES QUICKLY · BURNS BRIGHTLY · NO SLATE OR BONE · NON COKING · SLIGHTLY SMOKING · RICH IN CARBON

SIX POINTS OF MERIT FOR OUR COAL

GENERAL OFFICES FIRST NATIONAL BANK BLDG.

MINES AT MAC GREGOR ROUTT CO., COLO.

DENVER, COLO. Sept. 26, 1916.

. F. A. Manley,
Vice-Pres. & Gen'l Manager,
Union Pacific Coal Co.,
Omaha, Nebr.

ar Mr. Manley:

Returning to my office this morning, my son Alexander owed me your telegram of the 25th inst. as follows:

"Will you please advise what we paid you for making amination of our properties per your report of March 1911."

so his answer herewith."Your wire. My Father absent from office think following correct. Total for services three thousand ur hundred seventy five dollars, total expenses nine hundred venty five dollars. This includes Washington Union, Rock Springs, perior, Reliance, Scofield, Hanna, Cumberland, Porter. Mailing pies of bills."

Herewith enclosed you will find itemized copies of e bills, which I trust will serve your purpose, I am

Sincerely yours,

John McNeil

COPY

Denver, Colo. May 20th, 1911.

Mr. D.O. Clark,
Vice-Pres't & Gen'l Mgnr.
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., DR.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making examination and reports on Nos. 7 and 9 and Nos. 8 and 10 Mines, Rock Springs, Wyoming.

Feb. 27th, to March 12th (less March 7th), 12 days at $25.00 per day, ----------		$300.00
To reports on Nos. 7 and 9 Mines,-----		200.00
To reports on Nos. 8 and 10 Mines,----		200.00
		700.00

Expenses:

Feb. 27th,	R. R. ticket, Denver to Rock Springs, Wyo., --------	$12.00	
27th,	Pullman, ----------	2.75	
	Meals, hotel and other expenses, to balance acct.,	38.50	
27th,	Telephone to Mr. Black Cheyenne, as per attached bill, ----------	.75	
Apr. 7th	To Am. Express Co., as per attached bill, --------	1.00	
	Forward,	55.00	700.00

D. O. C.--#2

	Carried For'd,	$55.00	$700.00
May 6th,	To Alexander & Meyer, printing and binding, as per attached bill, -------	6.00	
12th,	To The Clason Map Co., as per attached bill, -------	54.50	
20th,	To Blanche Evans, Stenographer as per attached bill, -----	30.45	145.95
			$845.95

Received payment,

_____M.E.
Consulting Engineer.

COPY

Denver, Colo. May 20, 1911.

Mr. D.O. Clark,
Vice-Pres't & Gen'l Mngr.,
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., DR.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making an examination of No. 1 Mine and Sinking Shaft at Reliance, Wyoming, with report on same.

Mar. 7th and 16th, two days at $25.00 per day, --		$ 50.00
To Report on same, ----------		100.00
		150.00

Expenses:

May 6th,	To Alexander & Meyer, printing and binding, as per attached bill, ----------	$3.00	
12th,	To Clason Map Co., as per attached bill, ----------	7.25	
20th,	To Blanche Evans, Stenographer as per att. bill, ----------	9.00	19.25
			169.25

Received payment,

_____ M.E.
Consulting Engineer.

COPY

Denver, Colo., May 20th, 1911.

Mr. D. O. Clark,
Vice-Pres't & Gen'l Manager,
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., DR.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making an examination of "B" and "E" Mines, and "D", "C" and "A" Mines at Superior, Wyoming.

March 13th to 17th, inclusive, (Less Mar. 16th) 4 days at $25.00 per day, ----------			$100.00
To Report on "B" and "E" Mines, ----------			200.00
To Report on "D","C" and "A" Mines, ------			200.00
			500.00
Expenses:			
To R. R. ticket, Rock Spgs. to Denver, ----------		$12.00	
To Pullman, ----------		2.75	
Local fares, meals and incidentals, ----------		7.85	
Apr 12 To telegram, Mr. Brennen, as per attached bill,-----		.95	
19 and 20th, To American express Co., as per attached bills,		2.15	
19 To Mailing tube, as per attached bill, ----------		.20	
May 6, To Alexander & Meyer, as per attached bills, ------		6.00	
12, To Clason Map Co., as per attached, bills ----------		59.10	
20, To Miss B. Evans, Stenographer, per att. bill,---		24.80	115.80
			$ 615.80

Received payment,

M.E.
Consulting Engineer.

COPY

Denver, Colo., May 20th, 1911.

Mr. D. O. Clark,
Vice-Pres't & Gen'l Mngr.
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., DR.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making an examination of Nos. 2 and 3 Mines, Hanna, Wyo., Feb. 9th to 14th, 5 days at $25.00 per day, ---------- $125.00

To reports on same, ---------- 350.00
$475.00

Expenses:

Feb. 9th,	To R. R. ticket, Denver to Hanna, Wyo., ----------	$7.25	
	To Pullman, Denver to Hanna ----------	2.00	
13th,	To R. R. ticket, Hanna to Denver, ----------	7.25	
	To Pullman, Hanna to Denver	2.00	
	To meals and other expenses	7.25	
May 6th	To Alexander & Meyer, printing and binding, as per attached bills, ---------	6.00	
12th,	To the Clason Map Co., as per attached bills, ---------	74.67	
20th,	To Blanche Evans, Stenographer, per att. bills, ----------	24.60	131.02
			$606.02

Received payment,

M.E.
Consulting Engineer,

COPY

Denver, Colo., May 20, 1916.

Mr. D. O. Clark,
Vice-Pres't & Gen'l Mngr.,
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making an examination of Nos. 1 and 2 Mines, Cumberland, Wyoming, and reports on same.

Apr. 1st to 5th, inc., 5 days at $25.00 per day		$125.00
To report on Nos. 1 and 2 Mines, -------		250.00
		375.00

Expenses:

Apr. 1 R. R. fare and pullman, Salt Lake to Green River, Wyo.,	$5.85	
2, R. R. fare and pullman, Green River to Kemmerer, Wyo.,	2.65	
4, R. R. ticket and pullman, Kemmerer to Denver, ---------	17.80	
1, to 5th, Meals, hotels and other expenses,----------	15.80	
May 6, To Alexander & Meyer, printing and binding, per att. bill,----------	3.00	
12, To Clason Map Co., as per att. bill, ----------	23.45	
20, To Blanche Evans, Stenographer as per attached bill, -----	18.05	87.60
		$ 462.60

Received payment,

_____ M.E.
Consulting Engineer.

COPY

Denver, Colo. May 20, 1916.

r. D.O. Clark,
Vice-Pres't & Gen'l Mngr.
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., DR.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making an examination of Mines and property of The Porter Fuel Co., Durango, Colo.

May 1st to 6th, 5 days at $25.00 per day, --------- $125.00

To report on same ---------- 200.00
325.00

Expenses:

May 1,	To R. R. ticket, Denver to Durango--	$19.60	
1,	To Pullman and parlor car to Durango ----------	2.75	
5,	To R. R. ticket, Durango to Denver--	19.60	
5,	To parlor car and pullman, ---------	2.75	
	To hotel, meals and incidentals-----	15.25	
11,	To Von Schulz & Low, Chemists as per attached bill, ----------	8.00	
19,	To The Clason Map Co., as per att. bill,----------	52.30	
19,	To Alexander & Meyer, printing and binding, as per att. bill -------	3.00	
20,	To American Express Co., as per att. bill, ----------	.50	
20,	To Blanche Evans, Stenographer, as per attached bill, ----------	12.55	136.30

$ 461.30

Received payment,

_____ M.E.
Consulting Engineer.

COPY

Denver, Colo. May 20th, 1911.

D. O. Clark,
Vice-Pres't & General Mngr.,
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., Dr.,
Consulting Engineer,
Equitable Building,
Denver, Colorado.

To services rendered in making an examination of The Washington Union Coal Co's Mines, Jan. 19th to 31st, 12 days at $25.00 per day, ----------			$300.00
To report on same, ----------			250.00
			$550.00
Expenses:			
Jan. 19th,	R. R. ticket, Denver to Seattle and return, ------	$80.00	
	Pullman, Denver to Portland, ----------	9.50	
	29th, Pullman, Portland to Denver, ----------	9.50	
	19th to 31st, To meals, hotels and moneys paid out to balance account, ---------	73.00	
Feb. 14th,	To Alexander & Meyer, binding and printing, as per attached bill, ----------	3.00	
17th,	To Clason Map Co., as per attached bill, -------	32.26	
18th,	To Am. Ex. Co., att. bill	.35	
May 20th	To B. Evans, Stenographer as per att. bill,---------	17.55	225.16
			$ 775.16

Received Payment,

_____ M.E.
Consulting Engineer.

COPY

Denver, Colo., May 20th, 1911.

Mr. D. O. Clark,
Vice-Pres't & Gen'l Mngr.
Union Pacific Coal Co.,
Omaha, Nebr.

TO JOHN McNEIL, M. E., DR.,
Consulting Engineer,
Equitable Building,
Denver, Colo.

To services rendered in making an examination of The Pleasant Valley Mine, Scofield, Utah, and report on same.

Mar. 26th to 31st, inc., 6 days at $25.00 day,		$150.00
Report on same, ----------		250.00
		400.00
Expenses:		
Mar. 26, R. R. fare, Denver to Salt Lake,	$17.25	
Pullman, ----------	4.00	
R. R. fare, Salt Lake to Colton and return, ----------	6.45	
Mar. 26 to 31, Meals, hotels, fares, Colton to Scofield and return, Pullman Salt Lake to Colton and return, and other incidentals, ----------	22.75	
May 6 To Alexander & Meyer, printing and binding, as per att. bill	3.00	
12 To Clason Map Co., as per attached bill, ----------	46.75	
20, To Miss B. Evans, as per attached bill, ----------	15.65	115.85
		$ 515.85

Received payment,

_____ M.E.
Consulting Engineer

SHEET OF DIAGRAMS
SHOWING
SECTIONS OF COAL SEAMS
IN
Nº 2 MINE
"IDEAL SECTION" OF FULL COAL SEAMS **HANNA WYOMING**

A

Coal	5'-6"
Slate parting	0'-4"
Coal	18'-0"
Bone	0'-3"
Coal	6'-0"

B

Coal	2'-9"
Black Shale	1'-6"
Coal	11'-0"

C

Coal	7'-9"

D

Coal	4'-7"
Rock	0'-4"
Coal	1'-11"
Rock	0'-2"
Coal	0'-8"

E

Coal	4'-7"
Rock	0'-3"
Coal	2'-7"
Rock	2'-6"
Coal	4'-0"

F

"Clod" Shale	0'-6"
Coal	4'-7"
Black Rock	0'-4"
Coal	2'-7"
Rock	3'-6"
Carbonaceous Shale	3'-0"
Coal	3'-4"

G

Top Coal	3'-0"
"Clod" Coal	0'-6"
Rock	0'-2"
Coal	3'-3"
Rock	0'-4"
Coal	2'-8"
Rock & Coal	4'-2"

H

Top Coal	2'-0"
Clay Shale	1'-3"
Coal	0'-6"
Rock	0'-2"
Coal	3'-2"
Bone	0'-6"
Coal	2'-6"
Black Slate	5'-0"

I

Coal & Shale	3'-0"
Shale	1'-6"
Coal impure	1'-0"
Coal	2'-7"
Bone & impure coal	0'-8"
Coal	2'-0"

J

Coal	4'-7"
Bone	0'-2"
Coal	2'-9"
Black Shale with coal	3'-5"

K

"Clod"	0'-4"
Coal	4'-6"
Rock	0'-3"
Coal	2'-8"
Rock	4'-0"

L

"Clod"	0'-8"
Coal	4'-2"
Bone	0'-5"
Coal	2'-6"
Rock mixed with coal	4'-9"

M

Top Coal	2'-6"
"Clod"	1'-0"
Coal impure	0'-6"
Bone	0'-3"
Coal	3'-5"
Black Rock	0'-7"
Coal	2'-8"
Rock with thin seams of coal	5'-0"

N

Coal	1'-6"
Bone Coal	0'-6"
Hard Bone	0'-3"
Coal	3'-2"
Bone	0'-4"
Coal	2'-6"

O

Coal	18'-6"

P

"Clod"	1'-2"
Coal	13'-0"

Q

Top Coal(up)	8'-0"
Slate	0'-3"
Coal	10'-6"
8' of coal probably under this	

R

Top coal(up)	6'-0"
Clod	0'-5"
Coal	8'-3"
10' of coal may be under this	

S

Top coal(up)	5'-6"
Coal	20'-5"
about 6' of coal may be under this	

T

"Clod"	1'-3"
Coal	4'-5"
Bone	0'-3"
Coal	5'-7"
Coal still under this	

To illustrate Report of John McNeil

I N D E X.

-----o-----

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.

Cost of this report
$44.50.00
B. 9/26/16.

REPORT

On

THE WORKING CONDITIONS AND SAFETY OF EMPLOYEES,

At

NO. 2 MINE,

Of

THE UNION PACIFIC COAL COMPANY,

HANNA, WYOMING.

By

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

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

Dear Sir:

Introductory:

In compliance with your instructions, I made an examination of No. 2 Mine of The Union Pacific Coal Co., situated at Hanna, Wyoming, and I have the pleasure of presenting you, herewith, my report on the same.

As requested in your letter of February 6th, 1911, I made a thorough inspection of the coal seam in order to locate places having "rock" or impure coal, and took "sections" wherever impurities or inferior coal was in evidence.

Please unfold sheet of diagrams in front of this report.

The Mine Consists Of A Slope Opening, driven on the approximate dip of the coal seam, from which entries are turned at regular intervals. Unfold and see map of the underground workings, attached at end of this report.

The Dip: A uniform inclination of about 17 to 18 degrees from the horizontal.

The Thickness of The Coal Seam, where normal conditions prevail, including the top, middle and bottom benches, aggregate about 30 feet. See sectional Diagram "A".

The Quality Of The Coal, is a good grade of lignite, as the following analysis of the same will show:

Moisture,	8.80
Vol. Matter,	40.96
Fixed Carbon,	44.05
Ash,	6.19
	100.00%

Specific gravity, 1.320.

In No. 2 Entry, commencing in the vicinity of No. 70 room, the coal seam changes from its normal condition, in-so-

far as a band of hard carbonaceous slate, three to four inches in thickness, appears in the "middle bench", about four feet from the bottom and continues persistently to room No. 77. The coal deteriorates from this point on towards the face of the entry.

The bottom bench of coal gradually becomes interstratified with rock to such an extent that it has no commercial value. The middle bench, which usually runs 18 feet in thickness, gets thinner, and a stratum of carbonaceous shale intervenes the middle and top benches of coal. The top bench gets thin and more-or-less impure.

The "shute hole" at the entrance of room No. 91, disclosing the bottom bench of coal, shows it to consist of rock almost entirely.

For section of the coal seam taken at No. 94 room, see Diagram "B". A shot was put in here to disclose the top bench, and the condition shown in the lower bench was observed in the shute hole referred to, at the entrance of No. 91 room.

Diagram "C", represents a section of the coal at the face of the entry. At this point, the seam contains thin "stringers" of sulphurous impurities; and "rolls" in the floor were observed.

You will note the middle bench of coal has become thin, with a slate parting in the upper portion of it, and the lower bench is of no value.

In No. 3 Entry, at room No. 91, the bottom bench of the seam is destroyed with rock; the middle bench is thin and carries some impurities. See Diagram "D", showing a section of the coal at the face of the entry.

In No. 4 Entry, the ideal conditions of the coal seam, as noted at the slope and throughout the first 80 rooms, change in the vicinity of room No. 86 and get more unfavorable towards the face of the entry.

The dip increases to about 22 degrees, frequent "rolls" are met with in the floor, and the coal is more-or-less inter-stratified with slate and sulphur bands.

The 18-ft. middle bench of coal decreases in thickness to seven or eight feet.

See section of the seam taken at No. 87 room, shown in Diagram "E".

Diagram "F" shows section at room No. 92.

Diagram "G" represents section of coal at No. 98 room, and "H" shows sectional diagram of seam at room No. 104.

In the last cross-cut near face of the 4th Entry, the top bench of coal was shot down to obtain a complete vertical section of the same. See Diagram "I".

The shale floor (directly under the 2 feet of coal) is loose and "shells" off readily while shoveling coal from it, and no doubt more-or-less of this impurity gets into the pit

car, even where reasonable care may be taken, but, with careless and indifferent miners, an abnormal quantity of such debris might be loaded with the coal.

Conditions here, geologically, indicate that the entry is approaching a "fault" or pinching out of workable coal; and while it may be well to prospect the ground ahead, either by drilling from the surface or driving out the entry for a couple of hundred feet to determine true conditions, if by the latter method, the material removed therefrom should be largely sent to the waste pile, and certainly not put with the product of the mine.

I have no doubt but much of your trouble from complaints of dirty locomotive and commercial coal has come from this source.

In No. 5 Entry, about the same conditions exist as in Entry No. 4.

For section of the coal seam at room entrance of No. 82, see Diagram "J".

Section of seam at room No. 87 is represented in Diagram "K".

Section of coal in room No. 92, is shown in Diagram "L".

Diagram "M" shows conditions of the coal bed at room No.96.

In the last cross-cut in proximity to the face of the entry, a shot was put in to determine the condition of the top

bench of coal, and the result of the same is added to section taken at the entry face, shown in Diagram "N".

The "rolling" conditions of the floor, the increased dip, and the impure curly structure of the coal, is about the same as that described in No. 4 Entry.

In Entry No. 7, at room No. 20, the coal seam is about normal. The middle bench is represented in Diagram "O".

The coal bed at room No. 36 is shown by section in Diagram "P".

At room No. 42, rock commences to show up in the bottom bench of coal.

Between rooms Nos. 50 and 51, an "upthrow fault" of about 5' 6" was observed, and at this point a portion of the lower bench of coal has been taken out, but the entry floor is gradually graded out until the track gets on top of the lower bench of coal, as before.

With the exception of one foot to eighteen inches of rock lying between the middle and lower benches of coal, the seam is in good condition, and the middle bench is not less than about 14 feet in thickness.

It is quite likely that in loading out coal from rooms, some rock from between the middle and lower benches may have been shoveled into the pit cars by unscrupulous miners. From

personal experience, I find Greek miners almost universally unprincipled loaders of dirty coal.

In Entry No. 9, the coal seam is about normal. See section shown in Diagram "Q".

In Entry No. 10, the coal seam at the face has a stratum of shale parting between the middle and top benches of coal. See section of seam shown by Diagram "R".

In First Main Return, now being driven to "undercast" Entry No. 10, a very fine showing of coal was in evidence, having been shot down. For section, see Diagram "S".

At Face Of Entry No. 11, the coal seam, with the exception of a stratum of slate between the middle and upper benches of coal and 3" of carbonaceous slate about the center of the middle bench, looks very well. For section, see Diagram "T".

At Face Of The Slope, 8 feet of coal is visible and six inches of black carbonaceous shale is seen at the bottom of the middle bench of coal. For section, see Diagram "U".

The coal at the face of the slope and throughout the lower workings seems to have a greater degree of hardness and looks to be as good, if not the best coal I have seen in the Hanna District; and from existing indications, it appears that a good field of coal ahead and to the left of the slope may be expected.

The Method Of Extracting The Coal, is that known as "Shooting Off The Solid", i. e. no undermining or shearing is done to lessen the great binding resistance of the coal seam "lying in place", but is rent ruthlessly from its solidity of "bed" between the rocks of the roof and the floor by the sheer explosive force of a powder cartridge seeking lines of least resistance from the back of a strongly stemmed drill hole.

The above perilous and unwarranted practice of shooting in or off the solid, I shall here condemn in strongest terms, for, knowing as I do, the sad havoc of death and ruin caused by this hazardous and unnecessarily vicious mode of blasting coal, it shall ever have the unreserved severity of my most urgent protest and disapproval.

There is absolutely no excuse for not undermining the coal at Hanna, and, more-over, you are now paying the scale for "pick mining". Why not have the coal under-mined? You exact an uncompromising obedience to your orders in Rock Springs,

Superior and Reliance Mines, that all coal must be undermined before blasting the coal, and that the depth of the shot hole shall not exceed the depth of the undermining. Yet, in Hanna Mines where the danger of an explosion is infinitely greater, owing to their coal seams generating fire damp, C. H^4, (the presence of which has not been detected in the mines of Rock Springs, Superior or Reliance) and the percentage of combustible hydro-carbons in the coal is higher than in that of Rock Springs, etc., hence its coal dust is more inflammable, we tolerate holes to be drilled five feet on the solid. Why should this be done?

Bear in mind that the coal seams in Hanna are about three times the thickness of those in the mines above mentioned, thus the area of floor space to be undermined per ton of coal, is correspondingly less and the price paid per ton for pick mining is about the same; so you will note, much less undermining is required at Hanna than at Rock Springs, etc. Then Why not undermine?

It may be said that the coal seam is more difficult to undermine than those in your collieries farther west, but surely this is not a sufficient reason that life and property should be endangered by "blasting off the solid".

I am well aware that the class of miners there, prefer to undermine coal with powder rather than with picks, but when disaster comes, the responsibility is yours, never-the-less.

After the first explosion at Hanna, I tried the undermining for about one hour and convinced myself, absolutely, that the coal can be mined, and were the seams six feet instead of 20 to 30 feet in thickness, they would necessarily have to be undermined or the percentage of slack would be abnormal.

To save labor, it is always a temptation with miners, to blast large coal seams from the solid--stop it at Hanna.

I will here quote from my report to you of February, 1904, after the first explosion at Hanna.

> "Blasting Coal From The Solid, in this mine, is a most vicious and dangerous practice, and should be abandoned at once. There is no good reason that it should continue for a day. If there are miners unskilled in the art of undermining coal, at Hanna, have them learn, or remove them from the mine, all will come out well in the end. The risk is too great to tolerate it; do not be deceived that you can have it regulated. It will be a failure. Even the most experienced miners are sometimes careless, and will take risks that are not only fool-hardy, but criminal, and the most vigilant management will fail to detect it at all times.
>
> "Your management may regulate the system of absolutely undermining the coal, and by searching for

portions of holes drilled beyond the back of the mining on their tours of inspection, may prohibit blasting from the solid. But, to undertake the shooting of coal (passing judgment on every shot, if you will), let me say that the most experienced cannot always tell just what the behavior of a blast is going to be. A "slip" unseen may cause a flying shot with much vibration and flame, while a "niggerhead", unnoticed, may cause just the reverse, a tight "windy" shot. Herein lies our greatest risk to guard against. Have the coal undermined, and regulate shot-firing.

"The writer has undermined a coal seam, less than four feet in thickness, which was as difficult to mine (if not more so) than that of Hanna.

"On my last visit there (Hanna), I tried the undermining sufficiently to satisfy myself that there should be no difficulty in mining the coal. In a thin vein, the undermining is a considerable portion of the work. But in a mammoth seam like Hanna, 20 square feet of mining would be more than ample for a day's coal for one man. Knowing that the practice of blasting from the solid is the most prolific cause of coal mine explosions, it is

a sacred duty we owe to all concerned, to condemn and abandon it."

Serious Results In Firing Tight And Blown-out Shots, have occurred, it is claimed, where neither gas or coal dust were present, and especially where the fumes of shots just previously fired were present in the vicinity of a "fiery blast". But, in this connection, we will relate an authentic case where a violent explosion was reported to "Mines And Minerals" by Hon. Richard Newsam, which occurred on January 31st, 1907, in his Kingston Mine, Illinois.

Mr. Newsam contracted with a party to drive an entry from the outcrop of the coal seam. "The entry was wet from the mouth of the mine to the face of the coal, water dropping all along the top, making the entry so wet that a water car was in constant use. The heaviest covering of strata over this entry did not exceed 35 feet. There was no marsh gas given off at the place and never has been, and there was no dust present.

"The entry was in about 103 yards from the drift mouth to the face, where the explosion occurred. No one was hurt, as the men, after lighting the fuse, went outside of the mine. The report of the two miners states that there was about three pounds of powder in the hole. The hole was a "dead" one, and was drilled in the face of the entry without cutting and was

tamped with slack, the hole being 2-1/4 inches in diameter and containing 18 inches of powder.

"It blew the tamping, and, according to the reports of an eye witness and the two miners, the flame came out of the mine something over 20 feet. The hole was drilled through a horseback.

"The father of the two miners, who was loading coal in a wagon 100 yards from the mouth of the mine, states that the explosion was something terrible. A water car, standing probably 50 feet from the face of the entry and filled two-thirds full with water, was blown outside of the mine. Now the only reason these men are living after firing a "dead" hole (tight-shot), is because they were outside of the mine in the open atmosphere."

Of a similar case, I have a personal knowledge, which occurred in a drift-opening a number of years ago in the Canon City Coal Field, Colorado, when I was there with the Santa Fe Coal Department.

The above are phenomenal cases, I admit, but we are well aware that strange phenomena have ever accompanied colliery explosions.

In Hanna Mines, the tight shooting followed in entries and other "narrow" work eight to nine feet in width, with neither undermining or "shearing" done, must occasion numerous "dead" holes, and I am informed that shots with very heavy

detonation, are not infrequent. One of these "tight fiery blasts", at an opportune moment in the "brunt of a busy day" when the air currents are carrying in suspension an unusually large quantity of finely attenuated coal dust, might be the fatal detonator percussion cap to explode the mine.

It is said that in the Kemmerer and Diamondville mines, the coal is entirely shot off the solid, but that is no good reason why you should do so.

Machine Mining In Entries And All Narrow Work, can be followed, not only successfully, but more economically than by the barbarous method practiced at present.

If the rooms, now run direct on the pitch (about 18 degrees), are too steep for machine work, change the plan of working, that they may be so mined.

There is no question in my mind but you can produce coal in that mammoth seam at a lower cost by undermining it with machines and loading out the coal strictly with loaders paid by the ton, by a method of working which I shall, later, herein recommend.

The Panel System Of Mining Coal, so successfully followed in many of the collieries of Great Britain, is manifestly applicable to the physical conditions at Hanna, and admirably adapted to surround the workmen with a maximum

measure of safety. In recommending it to your consideration for operation in the Hanna District, let me assure you that the coal produced on the plan, as advised, cannot fail to be obtained at a minimum cost. See map showing the "Panel System of mining coal" at end of this report.

Let me call your attention especially to one very important feature which I wish to attach to the panel system, for the operation of the abnormally thick coal seams at Hanna, which will add much to the general safety of the miner and economy in producing the coal.

The feature is this: In advancing rooms, headings and cross-cuts, mine out only six to seven feet of the lower portion of the seam, leaving up ten to fifteen feet, or more, of "top coal", as the case may be, until the rooms reach their destination. Then, when the pillars are being drawn (extracted), the top coal can be "pulled" down absolutely without powder, by the use of the "Hydraulic Mining Cartridge".

In "pulling" the pillars and top coal retreating down hill, sufficient loose coal may always be kept on the floor to enable timber men to conveniently examine and reach the roof while setting props.

In advancing rooms up-hill with 15 to 18 feet of coal, as at present, considerable danger is encountered and much difficulty experienced in keeping in close touch with the true

condition of the roof, and in setting props by use of a ladder, etc., all of which would be obviated in advancing the workings with but seven feet of coal face.

The "drawing" out of pillars and top coal by work of retreating from the boundary or destination, as the case may be, would also surround the miner with safe guards, reducing danger to a minimum, and would insure the company a maximum available tonnage of coal per acre mined.

The Average No. of Tons Of Coal Mined Per Keg Of Powder used, during the year 1910, was 28. Think of it--one keg of powder (25 lbs.) burned to obtain 28 tons of coal in a 30-ft. seam, being four times the quantity used in a six or seven foot seam at Rock Springs. Remember, 28 tons is the average, including rooms 15 to 20 feet high, top coal, etc., wherein the maximum quantity of coal is obtained. But in entries, air-courses and cross-cuts (narrow work) which furnish the minimum amount of coal for the maximum quantity of powder, may not be more than 14 tons of coal mined per keg of powder used. For illustration, the breaking strain of a chain is its weakest link, not the average strength of all the links, thus, in an eight or nine foot entry by seven or eight feet high, is the weakest link in our perilous chain of dangers attending the hazardous risks of shooting coal off the solid. This mode of blasting in entries is performed in

about the same manner as driving a rock tunnel. Rock dust will not burn; coal dust is highly inflammable.

The Ventilation Of The Mine, is produced by a "Stevens" exhaust fan 10 feet in diameter, run at a velocity of 156 revolutions per minute.

The total volume of air entering the intakes is about 85,000 cubic feet per minute. The total amount of air passing from the outlet is about 90,000 cubic feet per minute.

A Guibal fan 20 feet in diameter is now in course of construction to increase the volume of air. A scarcity of good air was noticed at places.

Where so very much powder is used, a strong current of air is a necessity, but in the event of a dust explosion, it adds much to its general destruction, having present an abundance of oxygen to support and propagate the combustion of the dust.

Cu. ft. of air per minute near face of Entry	#2,	7,035
" " " " " " " " " "	3,	6,755
" " " " " " " " " "	4,	5,670
" " " " " " " " " "	5,	5,440
" " " " " " " " " "	7,	5,616

Total number of persons employed underground, 194

The Mine Is Naturally Dry And Dusty, and a much less degree of humidity was found in the air than in that of No. 3 Mine. This is especially true throughout the upper workings. In the lower workings, natural moisture was noticed and a fair degree of saturation was perceptible in the air.

A Sprinkling System, with pipe line connections for dampening coal dust in the roadways, was observed in the mine.

I believe it a difficult matter, owing to rapid evaporation, to keep these upper workings up to a satisfactory degree of moisture to meet our purposes, namely, to arrest the progress of a local dust explosion, should one occur. There is plenty of dust on the "rib" sides and roof of roadways in rooms and in suspension with the air to feed and propagate the flame of a local dust explosion, even with a faithful performance of a systematic watering over the floor of the roadways. What we should do is to reduce to a minimum the possibility of local dust explosions by stamping out their most prolific cause, shooting coal from the solid.

Explosive Marsh Gas, C. $H.^4$, is given off from the coal seam, and while generally not freely, it accumulates in places at times so as to demand the vigilant care of the gas-watchman. This is another good reason why we should prohibit blasting coal from the solid.

In looking over the record book of the "gas-watch", I noticed that occasionally 200 to 500 cubic feet of gas had been detected by fire-bosses.

The Source of Spontaneous Combustion, where pillars are being drawn and caves of the roof take place, will be present, and will require special attention in that connection. I noticed, in places, the precaution taken in driving small cross-cuts. I would advise this universally, so that if a fire should occur, small openings could be built off rapidly to isolate the fire from air.

The Haulage On Entries, is done by electric motors, and on the slope by the hoisting engine on the surface with cable connection. No mule or horse haulage is done.

The Daily Production Of The Mine, is 1,200 to 1,400 tons per day.

An Escape Way Has Been Driven, connecting with the entries through to the surface, to be used as a traveling way in case of an emergency, and it is well; but should a sudden occasion ever press the necessity for men to make good their escape by that passage, it must be remembered that to travel up 2,000 feet or more on a rising incline of 18 degrees,

would be a strenuous task for men, if wanting in physical strength. Reduce the possibility of such a crisis and give your positive order to absolutely undermine the coal seam.

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

Very respectfully,

John McNeil M. E.

Consulting Engineer.

APPENDIX.

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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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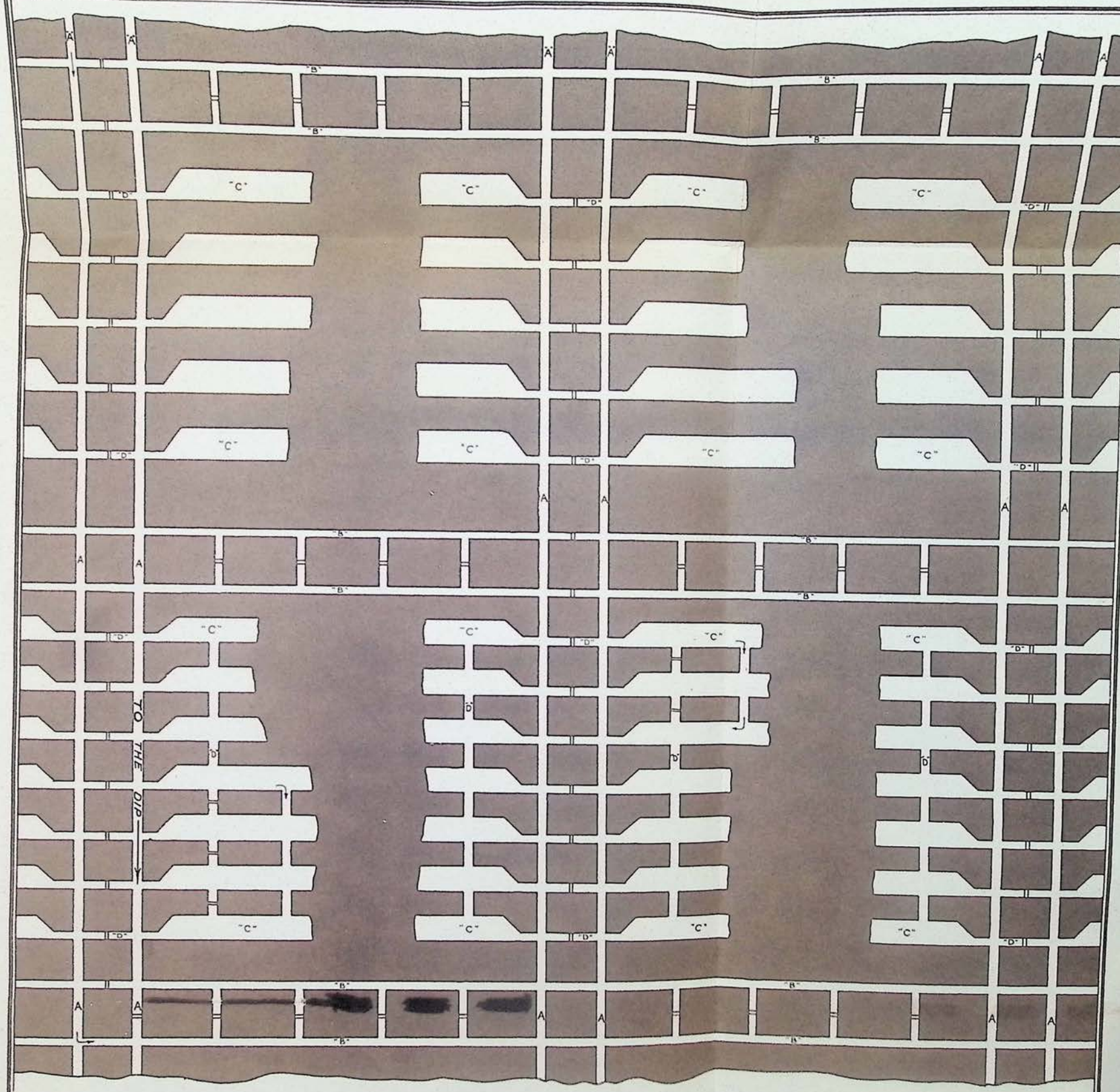

PLAN

SHOWING APPROXIMATELY

THE MODE OF WORKING COAL

BY

THE "PANEL" SYSTEM

LEGEND

"A" Planes or slopes
"B" Levels
"C" Rooms
"D" Cross cuts

PLANES OR SLOPES ARE DRIVEN TO THE RAISE AND DIP OF THE COAL SEAM
LEVELS AND ROOMS ARE DRIVEN ON THE STRIKE (LEVEL) OF THE SEAM

To Illustrate Report of John McNeil

I N D E X.

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

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

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

REPORT

On

THE WORKING CONDITIONS

And

SAFETY OF EMPLOYEES

In

NO. 3 MINE,

Of

THE UNION PACIFIC COAL COMPANY,

At

HANNA, WYOMING.

By

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

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

Dear Sir:

Introductory:

In accordance with your instructions, I made an examination of No. 3 Mine at Hanna, Wyoming, and, as directed in your letter of February 6th, I added to my general examination, a careful inspection of the coal seam throughout

the underground workings to find localities where coal of an inferior quality was being mined, of which I shall write you later on in this report.

The Coal Seam Forms A Semi-Synclinal Basin, outcropping to the north, the east and west, and cut off by a downthrow fault adjoining No. 1 Mine on the south. See map attached at end of the report.

In all my mining experience, I have never seen (in part) a more characteristically formed coal basin confined to such a limited area.

The axis of the basin passes through approximately in proximity to room 31 on No. 1 Entry, No. 19 room on 3rd Entry, and No. 10 room on the 5th Entry. See map at end of this report.

The Mine Consists Of A Slope Opening, entering from the western "rim" of the synclinal, and is driven in a southeasterly direction towards the center of the basin, crosses the "trough" and continues on its course to the raise towards the outcrop on the eastern "rim" of the synclinal, and at the time of my visit, it lacked only a few feet of being through to the surface, thus, from "rim to rim" of the basin, the line of the slope forms the shape of a bow.

Entries Nos. 1, 3 and 5 are turned from the northerly side of the slope on the "strike" of the coal seam, and to maintain a level course for mule haulage, they necessarily extend in a direction forming a semi-circle around the "bowl" of the basin, back towards the slope. See attached map.

The Thickness Of The Coal Seam, is about 18 to 20 feet, uniformly throughout the mine, and is divided by a "parting" of slate about six feet from the top.

At a point about six to seven feet under the "parting", above mentioned, there is a stratum of carbonaceous shale from two to four inches in thickness, and this, with six feet of coal, is left on the floor under the tracks, in entries.

The Quality Of The Coal, is a lignite of a fairly good grade, as the following analysis will show:

Moisture,----------	9.47%
Volatile Matter,------	42.51
Fixed Carbon,---------	44.14
Ash,----------	3.88
	100.00%

Specific gravity, 1.288.

Remarks: No. 3 Mine is operated on No. 1 Seam, i. e. on the same horizon as No. 1 Mine coal bed.

A Good Deal Of "Crop" Coal Was Being Mined, at the time of my visit and was perceptibly "earthy" and quite inferior in quality.

In No. 1 Entry, near the face, the coal was very soft and soggy, like "peat", and the same was more-or-less true throughout 20 rooms back from the face of the entry. See map and note their close proximity to the line of outcrop.

A fall of roof had taken place at the face of the entry, which showed a covering of surface clay over the coal seam of only 12 to 15 feet in thickness, and in a number of the rooms, the cover is about the same thickness.

I have no doubt but much of the complaints made to you about "poor" coal came from this source.

A Gob Fire From Spontaneous Combustion, occurred in No. 3 room of No. 1 Entry about nine months ago, resulting from a cave-in of the roof and from the fact, no doubt, that a mixture of clay, debris and fine coal heated under this fall.

The fire was successfully walled off with stone stoppings for a distance of six rooms, and at the time of my visit, the temperature in their vicinity was found to be normal. But, as the fire will get air through the caved strata to support combustion, it is doubtful if it has been entirely extinguished, and yet, carbonic acid gas C. $O.^2$ may have formed to such an extent as to arrest the progress of combustion,

though we have no means of determining this. In future, when stoppings are put in, to wall off fires, I would recommend that a pipe with a valve be built into the wall of the stopping so that the character of gases formed, if any, could be determined from time to time.

Marsh Gas ("Fire Damp") $C.H^4.$, has never been detected in this mine, from the fact, no doubt, that the workings have been approximately near the outcropping of the coal seam and the covering of strata (over the coal) being comparatively shallow, and now that the strata is more-or-less broken, it is not likely that explosive gas will ever be met with in this mine.

I found, however, that the precaution of having gas watchmen to examine the underground workings was being observed and a daily record book kept and examinations inscribed therein with the same regularity as if gas were present and expected.

But in making a search through this book, there was not an instance in which the presence of gas had been recorded.

While I think it doubtful that gas will be met with there, yet I was pleased, not a little, to see that a careful daily search with safety lamps was being made before the workmen entered their working places.

I recommend a faithful continuance of such inspections.

The Underground Stables of 16 Stalls, are partitioned off with iron pipes, the mangers, or feeding troughs are principally made of sheet iron, and the grain chest is covered with iron and all doors in connection with the stables are carefully covered with sheet iron.

There is a "fire plug" at each end of the stable and a good supply of water in pipes continually under pressure, if ever required.

The stable is well lighted up with electric lights, and naked miner's lamps, etc., are strictly forbidden, and must be left outside of the stable gateway.

A sufficient volume of air is in circulation, clean water troughs were in evidence, and altogether, good, sanitary conditions, conducive to the health and comfort of the mules, were observed; and the precautions taken against the possibility of fire were very good.

Evidences Of A "Creep" or Squeeze Of The Strata, were observed in several localities in Entries Nos. 3 and 5. In Entry No. 3, Room No. 19, where seven rooms are turned from it to work out the coal in the vicinity of where the line of the synclinal axis passes, a "squeeze" on the pillars of the over-lying strata, is in evidence.

Also, embracing Rooms 21 to 25 in No. 3 Entry, another squeeze of considerable magnitude, was quite perceptible.

It is my opinion that these two localities now crushing, will form into one general squeeze.

In No. 5 Entry at room No. 5, where seven rooms are turned at right angles from it, there is another "creep" and crushing of the coal pillars going on.

Now if the reader will carefully examine the map, it will be noticed that the series of "creeps" mentioned, have occurred on a line with the axis of the synclinal, already referred to.

Such a squeeze and crushing condition is the natural sequence wherever rooms are worked in the usual way along the axis of a coal basin, for, upon such a line, the compressive force of the superincumbent strata is always much more severe in pressure than on a level or continuously inclined plane.

In the case at point, there are three inclinatory sides (from the east, west and north) pressing their downward flexure to a common line.

Such a condition in a coal mine, especially where mammoth seams are in operation, as at Hanna (20 feet or more), is indeed an abnormal one. With thin seams of coal, the consequences of a squeeze would not be so serious. In a metaliferous mine, it would be less severe. But the pillars of thick coal seams crush easily when the compressive force of is indeed an abnormal one. With thin seams of coal, the consequences of a squeeze would not be so serious. In a metaliferous mine, it would be less severe. But the pillars of thick coal seams crush easily when the compressive force of a creep or settling of the overlying strata comes upon them, and no system of timbering can arrest such a squeeze.

You will recall that an abnormal pressure came upon pillars in the vicinity of the basin of the synclinal in No. 1 Mine. In that case, we advised going to the boundary in the solid and working back. In the present case, I can advise no better plan than to drive a few places out to destination laid out for rooms to reach, and from there work back and thus recover as much coal from the crushed ground as possible.

In the future, when the axis of a synclinal is reached, I would advise that no rooms be turned, and that entries be driven out to the boundary or destination, and from there work the coal seam out "retreating".

It is not only the expense and loss of coal met with in a "squeeze" we have to consider, it is the unknown quantity of a gob fire, from spontaneous combustion we dread most, as a "squeeze" is a prolific cause of such fires in lignite mines.

The Ventilation Of The Mine, is produced by a fan 20 feet in diameter, of the Guibal type.

The total intake air current in cubic feet per minute,---------- 56,750.

The total volume of air at the outlet, in cubic feet per minute,---------- 62,370

Volume of air in cu. ft. per minute, Entry #1 12,090

" " " " " " " " " 3 14,490

" " " " " " " " " 6 6,600

The number of men employed in the mine night and day shifts,---------- 158

Number of mules and horses,---------- 14

There was present a fair degree of natural moisture throughout the mine, but lines of pipe are in place and where dust is present, sprinkling is followed.

The Number Of Tons Of Coal Mined Per Keg of Powder Used, in this mine, notwithstanding the abnormal thickness of the coal seam (18 to 20 feet) is but 36 tons. Altogether too much powder is being used.

The Daily Production Of The Mine, is about 1,000 tons, or more, of run-of-mine coal.

The System Of Mining, is that of "blasting from the solid", no mining or shearing is done to lessen the binding resistance of the coal seam lying in place, but is ruthlessly blasted from its solidity of bed. I condemn this vicious and dangerous mode of mining.

As I have fully covered this very important matter in my report to you of No. 2 Mine, Hanna, it would be superfluous to repeat such further comment here.

The Active Producing Life Of This Mine, we are aware, cannot be over a couple of years or so at most, and to change

the method of mining to that of mining machines, as recommended in No. 2 Mine, would, of course, be an unreasonable expenditure of money (in No. 3). But, I see no reason why the system should not be changed at once to pick mining. You are now paying the pick mining scale. Change it. The risk that lies in "solid shooting" is too great not to do it.

To undertake regulating blasting and sprinkling coal dust, carries with it a good deal of "bluff", where we permit the greatest known danger to us, blasting off the solid.

It is most likely that you will open a new mine in the Hanna District soon, to take the place of No. 3 Mine, and if so, I would be pleased to assist you in the pre-arrangement of a plan of working that would entirely obviate the danger, expense, annoyance, and loss of coal from a "creep" or squeeze of the overlying strata upon insufficient pillars.

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

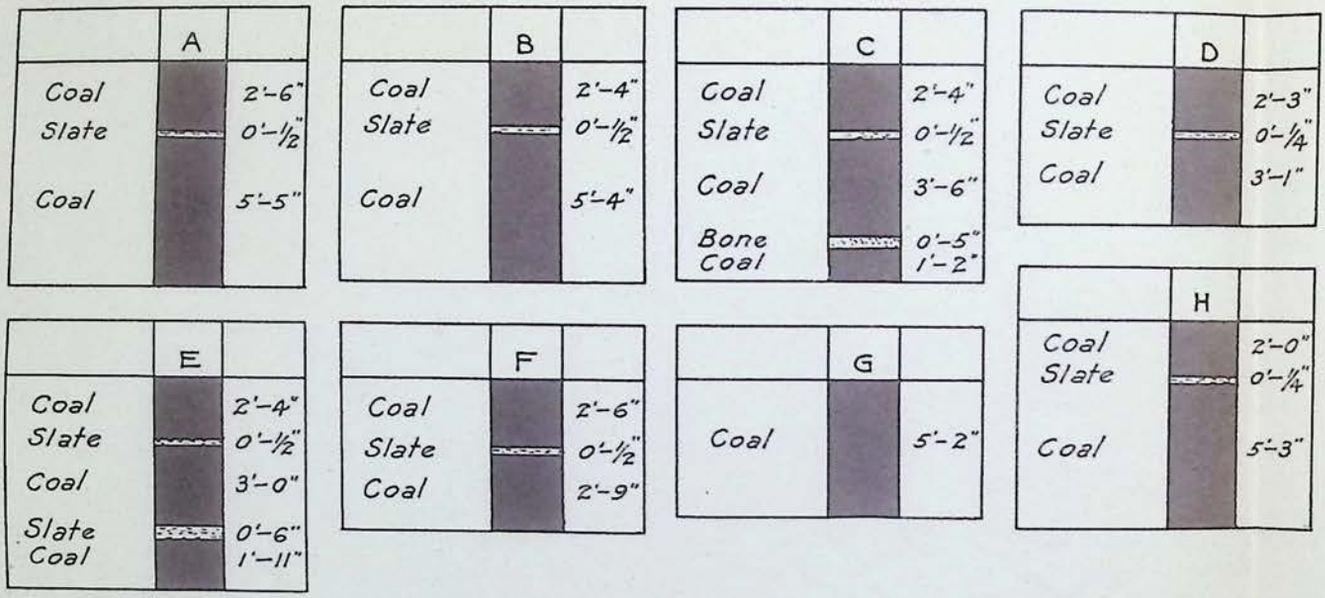
Sincerely yours,

John McLeish M. E.

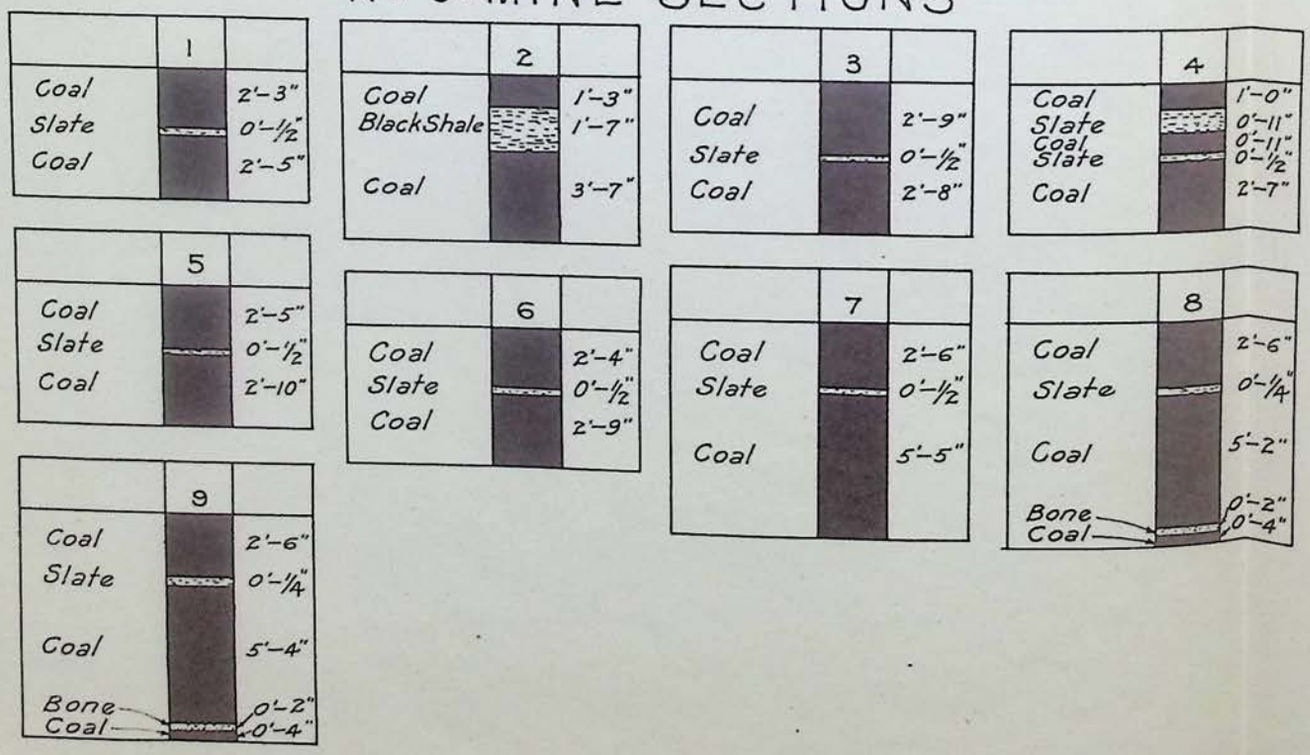
Consulting Engineer.

DIAGRAMS
OF
SECTIONS OF THE COAL SEAMS
Nos 7 & 9 MINES
ROCK SPRINGS WYOMING

No 7 MINE SECTIONS



No 9 MINE SECTIONS



To illustrate Report of John McNeil

I N D E X.

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

...CTION 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

N O S. 7 A N D 9 M I N E S

Of

THE UNION PACIFIC COAL COMPANY,

At

ROCK SPRINGS, WYOMING.

By

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

To: D. O. CLARK, ESQ.,
Vice-President & General Manager,
Union Pacific 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 Nos. 7 and 9 Mines, at Rock Springs, Wyo., and herewith have the pleasure to submit, this, my report on the same.

No. 7 Mine, consists of a drift opening, and is operated on the same coal seam as Nos. 8, 9 and 10 Mines at a horizon, geologically, of about 260 feet under No. 1 seam.

Note: (No. 1 coal seam was successfully operated in No. 1 Mine upwards of 40 years. It consisted of a slope opening and was probably the largest and most steady producer in the state. The coal was of a superior quality for domestic and general use, and was ever a favorite fuel on the market. But, on account of expensive mining, caused by an increased cost of pumping and haulage from great depths and distances, operations were abandoned during the past year for the reason that coal for present use, and some decades to come, could be mined at a lower cost from the coal field by new openings in other localities.

No. 1 coal seam, however, in itself, never looked better in thickness and freer from "bone" and slate impurities than at the face of its abandoned workings. So, no doubt, at some distant future period, when necessity shall press for fuel, and deeper mining is followed, No. 1 Mine may again become one of the leading coal producers of the state.

With this said, no further mention, at this time, will be made of No. 1 Mine.)

The Ventilation of No. 7 Mine, is produced by the mechanical means of a 6-ft. face by 20 ft. in diameter Guibal exhaust fan, operated by steam, and runs about 90 revolutions per minute.

The volume of air entering the inlet to the mine is about 44,000 cu. ft. per minute, and the volume passing through the outlet from the mine is about 51,000 cu. ft. per minute. The increase at the outlet is not due entirely to expension, there is doubtless a small leakage from the air current of the adjoining mine.

Air Measurements:

No. 2 Dip,----- 11,275 cubic feet per minute,
No. 1 " ----- 7,200 " " " "
"A" Entry,----- 8,400 " " " "
"B" " ----- 3,240 " " " "
"C" " ----- 4,800 " " " "
"3" " ----- 2,205 " " " "
"C" Plane,----- 6,880 " " " "
Total number of men employed,---------- 262,
Number of mules and horses,---------- 25,

While the above volume of air, after making an allowance of 6,000 cubic feet per minute for mules, meets (just about) the requirements of the state law, I would advise an increase in the total volume, on account of the air being depleted to

a more-or-less degree, i. e. robbed of its due proportion of oxygen by the extremely long distance the air current has to travel in its circuitous route from the inlet to the outlet of the mine, powder fumes and noxious gases met with.

A 7 ft. Stine "booster" fan, electrically driven, is situated in the return air-way at a point about two miles from the steam fan at the outlet, which does fairly good service.

I will recommend that a large ventilating fan be placed at the spacious air shaft on "E" Plane, No. 7 Mine, to increase the ventilating currents generally, throughout Nos. 7, 8 and 9 Mines, as there is no doubt in my mind but that during summer months, miners at the working faces will suffer and labor under considerable difficulty, owing to a scarcity of good air.

The installation of a fan at the shaft mentioned, could be done at a minimum cost, in-as-much as electric power, to run it, could be obtained from the wires which will conduct the current to the hoist to be placed on "E" Plane.

The air current at the face of No. 3 Entry travels 16,000 feet on entries alone, besides through rooms and cross-cuts, and has yet to return to the outlet.

The air at the face of entries and in many of the rooms, was rather poor and impure at the time of my visit. I am aware that the operations of these mines may be discontinued

in the comparatively near future, but the ventilation absolutely needs improvement now.

The Air-Current Carries Moisture, to a fair degree of saturation in this mine, and but very little sprinkling of water is required. Fine coal dust on the roadways show a decided dampness and "brattice screens" become more-or-less damp and in cases are literally wet.

This admirable condition not only keeps the coal dust damp, but also renders a beneficial effect of a comparatively low temperature in the mine.

This saturation, or natural moisture in the air, however, gives trouble, in places, not a little, in depositing moisture upon the roof of the entries, and in the absence of top coal, disintegrates and breaks down the shale roof by its moist atmospheric influences which have caused a perceptible increase in the cost of timber and care of roadways, as compared with conditions where the workings were in closer proximity to the outcrop and consequently drier. Natural moisture was almost entirely absent in the workings nearer the outcrop.

The Thickness of the Coal Seam, and its condition, was measured and noted by me in numerous places throughout the mine, and its thickness ranges from about 4' 9" to 8 feet.

Note: Please unfold sheet of diagrams and note sections taken of the seam; also unfold map of the workings at end of this report and note references made thereto.

For Sec. of coal seam at face, No. 1 Entry,------See dia. "A"
" " " " " " " " 2 " ------ " " "B"
" " " " " " " R 48, A Entry,----- " " "C"
" " " " " " " B Entry, D Plane,-- " " "D"
" " " " " " " Room 31, B Entry,-- " " "E"
" " " " " " " 3 Entry, D Plane,-- " " "F"
" " " " " " " C " " " -- " " "G"
" " " " " in pillars A Entry, C Plane, " " "H"

Remarks:

"E" Plane will soon be started as a producer.

Face of No. 2 Entry is being driven out rapidly, planes on the panel system will be opened from it every 600 feet, and rooms from same will be turned and run on the "strike" or level of the coal seam. Electric hoists of 20 H. P. will be set to operate these planes, one of which is now in successful operation.

At face of "C" Entry on "D" Plane, the coal seam appears a little disturbed and looks "curly", and the dip there has changed from normal (5 to 7 degrees) to 17 to 22 degrees. This condition, however, may be local.

"A", "C" Plane, pillars are being drawn.

"B" and "C" on "C" Plane, entry "stumps" are being drawn. About 20 miners are so employed and may take a year to mine out these pillars.

I was pleased to note the large percentage of coal being recovered from pillar work generally, probably over 90% of the coal is being taken out in pillar drawing. This is, indeed, a very good showing, and, on the whole, there are few coal mines in which a higher percentage of coal is extracted from the seam.

The Quality Of The Coal, may be classed in the category of sub-bituminous. It is free burning, without tendencies to coke, is a fairly good steam fuel, and is received with favor for domestic use.

The following analyses were made by the late Morgan Grifiths, at Rock Springs, Wyoming:

Analyses:

	No. 7 Mine.	No. 9 Mine.
Moisture,----------	10.91%	12.04%
Volatile Matter,---	37.90	35.30
Fixed Carbon,------	48.19	47.86
Ash,---------------	3.00	4.80
	100.00%	100.00%
Specific Gravity,--	1.298	1.288

The Coal Is Extracted By Machine And Hand Mining, and shooting from the solid is strictly prohibited, hence,

the danger that lurks in the gloom of that unnatural and uncalled for system of mining coal, is never in evidence there, for which, all concerned should feel truly thankful.

The System of Mining, is by the mode of Room and Pillar on the double entry system, from which planes are driven to the raise at intervals of about 5,000 feet apart. See map.

The Haulage Of The Coal, in these mines, is becoming a seriously expensive factor, and it is essential that only the most modern systems be followed, to render it a fair degree of commercial success. By referring to the map, it will be seen that the coal is being hauled from four to four and one-half miles. Such distances of underground haulage are abnormal.

Electric Locomotives are used on the main haulage-way to the tipple, running at a speed of about 8 miles per hour with trains of 50 to 70 pit cars.

Engines Electrically Driven, are stationed at the head of each inclined plane, and with cables, hoist and lower trains of empty and loaded cars to and from the various entries to the electric locomotive stations on the main haulage entry.

Electric Light And Bell Signals are used, and are admirably arranged for convenience and safety. The permanency of trackage and traveling speed of trains over this haulage

system, is veritably railroading underground. Unlike railroading on the surface, however, there is not only the cost of properly ballasting and keeping the track in repair, but there are many other additional items of expense which drain upon resources, such as cleaning tracks, sprinkling with water the coal dust thereon, taking down "bad" rocks from the roof, or timbering them up, as the case may be, and keeping in repair hundreds of stoppings, and numerous over-cast air-bridges to prevent leakage of the air currents, so as to conduct and maintain an adequate supply of air for the workmen at the interior of the workings and throughout the entire ramifications of the mine.

The cost of these, in the aggregate, is becoming excessive, so much so, that it will soon be a question, whether a much further extension of these workings would be a reasonable expenditure of money, and if the sinking of deep shafts ahead of the present interior might not be a profitable and warranted investment of capital to obtain a lower working cost per ton of coal.

The Capacity Of The Mine is about 1,000 tons per day.

There is no Pumping Of Water required in this mine, as little, if any, is met with, and that which may appear,

drains to the dip to No. 10 Mine, where the pumping of water is done for Nos. 7, 8 and 9 Mines, as well as the growth from its own workings.

The Tons Of Coal Mined Per Keg Of Powder Used, for the year ending December 31st, 1910, were 108.5 tons of 2,000 lbs.

For the thickness of the coal seam, namely about an average (being mined) of 5 ft. 9 in., the above, compared with coal mines generally, is a fairly good showing. I sincerely trust, however, that even this quantity of powder may be, in the near future, materially reduced by a measure of success with the "Hydraulic Cartridge", which I saw under test at your Superior Mines with a fair degree of success.

The Underground Stables, as a protection from fire, have partitions and props covered with sheet iron. They are lighted with electricity and no naked lamps are permitted inside the stables. Good sanitary conditions, for the general comfort of horses and mules, were in evidence.

Spontaneous Combustion In Gobs, has never been known to have occurred in these mines at Rock Springs.

The floor of the coal seams consists chiefly of sandy or arenaceous shale, which is hard and compact, does not "heave" and withstands the compressive force of a "creep" or squeeze

of the strata and the coal does not sink into the floor. "Creeps" of the strata seldom occur there, unless when "drawing" pillars, and as a rule, the overlying strata breaks off and caves in readily and the workings have a low temperature, compared with most mines, all of which conditions are favorable for the prevention of spontaneous combustion.

Fire Proof Rock Stoppings, were in evidence throughout the mine, and were well built generally, also carefully plastered with sandy loam, which is well adapted for such use. In fact, it is only the substantial nature and solidity of stoppings that make it possible to extend the workings to their present abnormal distance from the surface with such a small volume of air entering the inlet.

In such an extensive mine, it is a mistake to have less than 70,000 cubic feet of air entering the intake; and I sincerely hope that the installation of a fan at the shaft on "E" Plane will meet with your approval.

Air-bridges and Trap Doors, were also built with a fair degree of observance as to precautions against fire.

The Following Recommendations are presented for the further prevention of mine fires by accidental origin from the probable ignition of wooden tool chests and board seats. The

abandonment of these, cannot fail to lessen the risk of fire.

I noticed, during my tour of inspection, a number of wooden boxes, the dimensions of one, in which were kept the tools of day men, oil cans, etc., and made of 2" plank, was about 7 ft. long, 4 ft. 6 in. wide and 4 ft. high; and in close proximity, was a wooden seat between props, a place where the under-foreman receives and gives orders to shot-firers, machine men, etc.

An order from you, prohibiting wooden boxes and seats (unless covered with sheet iron) throughout the mines, would be a step in the right direction.

No. 9 Mine: The entrance of No. 9 Mine is by a self-acting incline plane, known as No. 1 or "A" (opened in proximity to No. 7 Mine, see map) on a raise of 5 to 6 degrees for a distance of about 1,000 feet over which the haulage is operated by gravity (by a drum and cable) from the head of the incline to tipple on the surface.

The Main Haulage-Way, from the head of the plane to the interior of the workings, is a level, known as No. 3 Entry, about four and one-half miles in length, which intersects four engine planes that lower the coal to the main haulage-way and

is hauled from there to Plane No. 1, by electric locomotives in trains of 60 to 72 pit cars.

The Output of The Mine, is about 1,100 tons per day.

The Ventilation Is Produced by "double Murphy" exhausting fans 10 feet in diameter, electrically driven at about 80 revolutions per minute.

There are four airway intakes to this mine, furnishing an aggregate volume of 58,000 cubic feet of air per minute, and the total return air-current at the outlet is 60,500 cubic feet per minute.

The following are the measurements of air circulating in the various entries:

Air Measurements:

No. 4 Entry face,	----------	6,600	cu. ft.	per	minute,	
No. 5 " "	----------	6,000	"	"	"	"
No. 6 South Entry face,	-------	7,680	"	"	"	"
No. 8 North " "	-------	7,200	"	"	"	"
No. 9 " " "	-------	5,500	"	"	"	"
No.10 " " "	-------	4,750	"	"	"	"
No. 9 " " 3 Plane Face		6,050	"	"	"	"
No.11 " " " " "		10,500	"	"	"	"
No. 3 Plane face,	----------	6,500	"	"	"	"

The number of men employed, 254,

Number of horses and mules, 26.

The Thickness Of The Coal Seam, and its conditions, will be seen on sheet of diagrams in front of this report.

For sec. at face of--------	#10 No. Entry, D Pl.	see Dia. #1,
" " " " " --------	9 " " " " " "	2,
" " " " " --------	8 " " " " " "	3,
" " 125' from face of---	8 " " " " " "	4,
" " at face of,-------	5 " " " " " "	5,
" " " " " --------	4 Entry on 4th " " "	6,
" " " " " --------	14 " " 3rd " " "	7,
" " " " " --------	13 " " 3rd " " "	8,
" " " " " --------	12 " " 3rd " " "	9,

Remarks:

The coal seam in No. 10 North Entry is stained with a white discoloration, as if affected by proximity to the atmospheric influences near the outcrop, but has a fairly good degree of hardness, and may be marketable fuel for some distance yet.

The stratum of slate in the coal at the face of No. 9 Entry is absent on the surface outcrop, thus, it may be local.

Note normal section of seam at face of No. 8 Entry, while 125 feet back from the face there is a stratum of slate 11 inches in thickness, see Dia. No. 4.

Nos. 6 and 7 Entries are worked up to the boundary line of Section 8, owned by the Gunn-Thompson Coal Company.

Throughout these exterior workings (in nearer proximity to the outcrop) it is naturally dusty, and in places, "bone dry". Without a copious supply of water, it is a difficult matter to satisfactorily wet coal dust.

Water is hauled from No. 1 plane in specially constructed steel tanks, each holding about 375 gallons, and from nine to twelve tanks of water are sprinkled on some portions of the roadways (within the dusty zone) daily.

Water sprayed from a tank (without pressure) cannot sufficiently wet coal dust, and the dryness of the air circulating in these outer workings (especially in cold weather) frees the dust from moisture rapidly by absorption, and carries it in saturation towards the interior workings.

No. 9 Mine presents the driest underground conditions at Rock Springs. In this connection, however, we are glad to state that the coal seam is undermined and that there is absolutely no shooting off the solid, hence the dry and dusty conditions are very much less dangerous on account of this redeeming feature.

Note:--Mr. George Pryde, Supt., and Mr. Medill, Foreman, informed me that they experienced trouble sometime ago with men from Hanna and other "solid shooting" districts, in getting them to undermine the coal.

In one case, a miner fired a "tight" shot on the solid, resulting in blowing powder and dust flames down on the entry and causing such severe concussion that a man engaged in building a stopping in the entry cross-cut, received a considerable shock, and thinking something seriously had occurred, he ran for Foreman Medill, who, it is needless to say, discharged the miner.

I mention this instance here, designedly to show: What might have been.

I never hear a "windy shot" in a dusty coal mine without being thankful for a safe deliverance.

Wherever a coal seam is under-mined, it insures a maximum of safety from "windy" shots.

The face of No. 5 Entry has now reached the unusual distance of four and one-half miles from the entrance of the mine. The coal seam here is about normal. See Diagram No. 5. A copious amount of natural moisture is present, which keeps the coal dust and workings in an admirable state of saturation. But, the good feature which produces this moist condition (saturated air-current), has a bad effect in disintegrating the roof, which for 20 inches immediately over the coal, consisting of thin laminated layers of arenaceous shale, "cuts" and falls down readily. Above this roof, the rocks contain more sand and become stronger to withstand the disintegrating influence of the saturated air current.

In such entries, I would advise leaving up top coal for the roof and taking up a portion of the floor to make the

necessary height where the coal seam is low, as a matter of economy in the saving of moving debris and timber.

The face of No. 4 Entry shows the coal also a little thin but normal as to impurities. See Diagram 6.

For section of coal at face of No. 14 Entry, 3 Plane, see diagram No. 7. A portion of the top coal is left up for a roof to save timbering. See section of coal seam, Dia. 8, taken at face of No. 13 Entry off of 3 Plane.

At face of 12th Entry, 3 Plane, we have about the same conditions as in Entry 13. See Dia. 9.

In No. 11 North Entry, off 3 Plane, the pillars are being drawn out successfully, obtaining a maximum percentage of the coal. The thickness of the seam there is about 7' 6".

In No. 8 So. Entry, the pillars are also being taken out with success.

In No. 8 No. Entry, 3 Plane, a number of Jap miners are engaged in taking out pillars, recovering most of the coal.

The Underground Stables, consisting of 26 stalls (in which were stabled 22 head of mules and horses) are well lined with sheet iron, lighted entirely by electricity--open lamps are strictly prohibited. Water under pressure is constantly at hand, and other evidences were present of precautions being taken to reduce to a minimum the possibility of fire origin.

The stables are well ventilated, and the air passing through same is conducted to the return air-course, away from the workmen.

Heating In The "Gobs" By Spontaneous Combustion, has never been detected, and for the prevention of progress from fires by accidental ignition, barrels of water are kept in readiness on double switches with powder kegs to form a bucket line in case of an emergency.

Stoppings And Air Bridges, are constructed from stone, and otherwise made as near fire proof as possible.

To Revivify Persons From Electric Shock, printed instructions are framed in glass and posted at prominent places in the mine, and "day" employees are required to acquaint themselves with the same, so as to resusitate anyone who might be overcome by an electric shock.

An Underground Telephone System, is kept in working order throughout the workings of the mines for general conveniences, but is especially invaluable in case of an accident to employees when the doctor, nurse and ambulance may be called for from the interior of the underground workings to receive an injured person or persons upon reaching the surface.

Electric Signal Bells On Engine Planes, are admirably arranged, for safety as well as for hoisting instructions generally.

"Escape Man Holes" In The Sides Of All Haulage-Ways, in the mines, whether on engine planes, or electric locomotive ways, are admirably provided, for persons to enter while trains of pit cars are passing; and further "man-way" traveling passages are provided, parallel with all hoisting slopes or planes, wherever too dangerous for travel.

"Man trip trains", with safety appliances, are used to take the workmen to and from the interior workings, as to travel to and from their working places in such extensive mines would be an altogether too strenuous undertaking.

Explosive Gas "Fire damp" ($C. H^4.$) has never been detected in the Rock Springs Mines.

This most valued feature, together with the fact that the coal seam is absolutely undermined before blasting, also the presence of natural moisture, in places, and the partly sprinkling of dusty zones, with other safeguards enumerated, explain, we think, the large tonnage of coal produced per life lost within these mines, as compared with gaseous collieries, or in mines where the odious system of blasting coal from the solid, is permitted.

The Tons Of Coal Mined Per Keg Of Powder Used, for the year ending December 31st, 1910, were 72 and 2/3 tons of 2,000 lbs.

The average thickness of the coal seam over the mine is about 5' 3". Considering the thickness of the coal seam, the showing is fair, but we shall hope that by the use of the hydraulic cartridge, the above quantity of powder may, in the near future, be materially reduced.

The systems of mining and haulage are about the same as in No. 7 Mine.

There is no pumping required in this mine.

Trusting these reports shall meet with your approval, I am,

Very Respectfully yours,

John H. McNeil M. E.
Consulting Engineer.

A P P E N D I X.

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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. Oneman 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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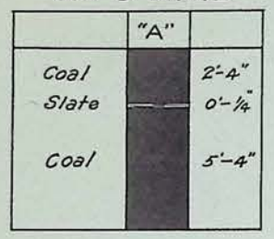
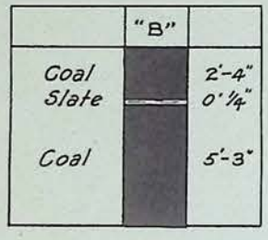
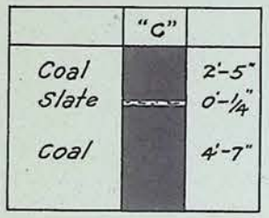
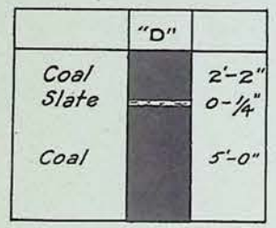
SHEET OF DIAGRAMS OF Nos 8 & 10 MINES AT ROCK SPRINGS WYOMING

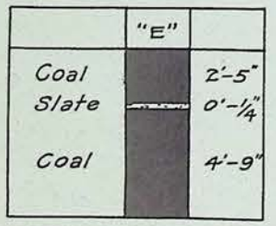
No 8 MINE

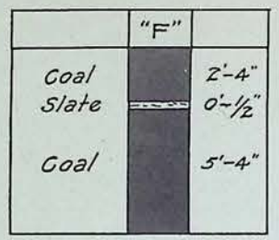


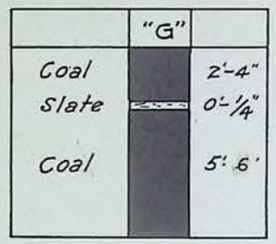


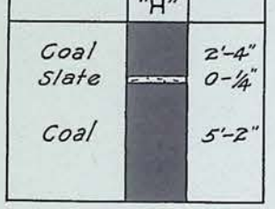


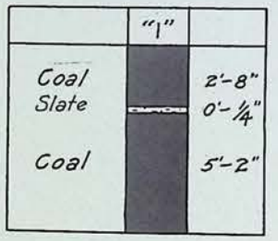


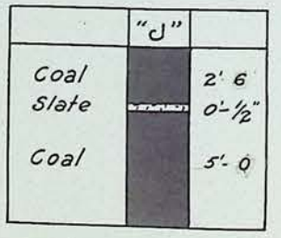


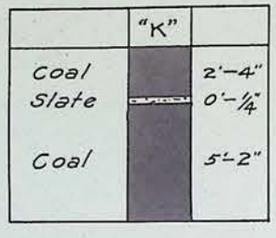


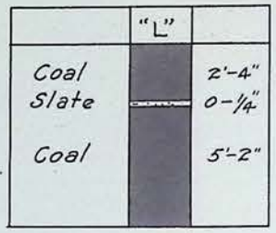


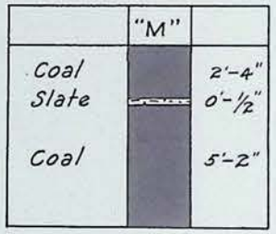


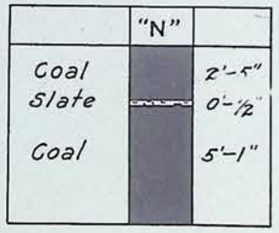


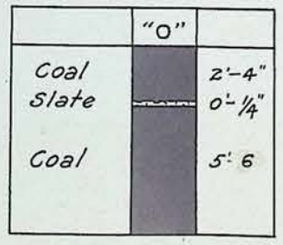


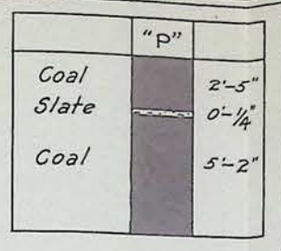




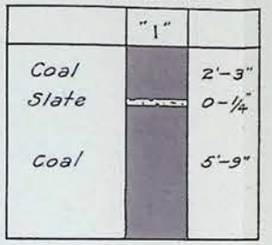


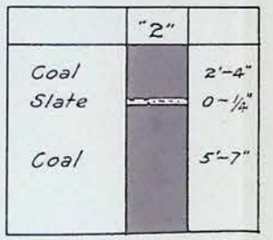


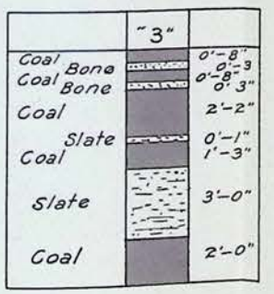


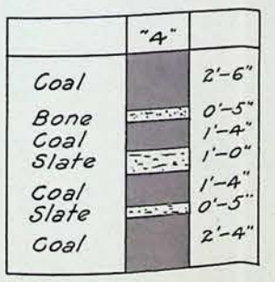


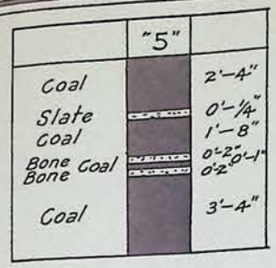
No 10 MINE

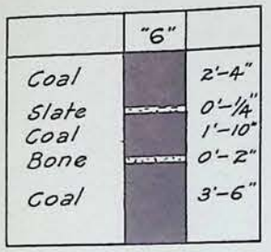


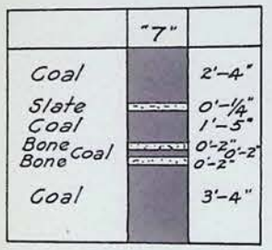


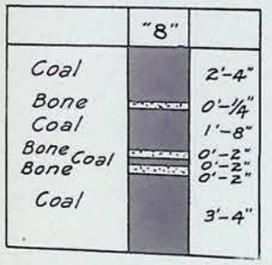


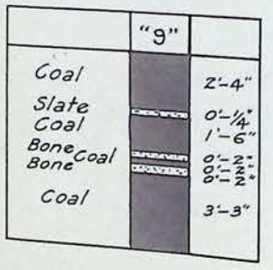


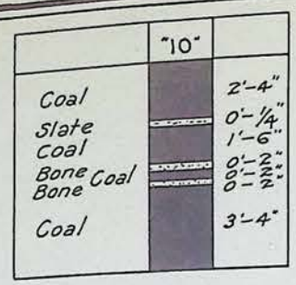


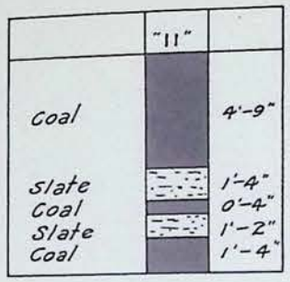


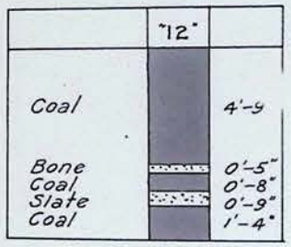


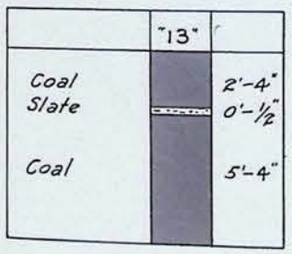


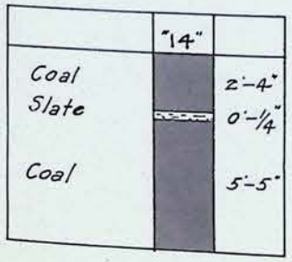


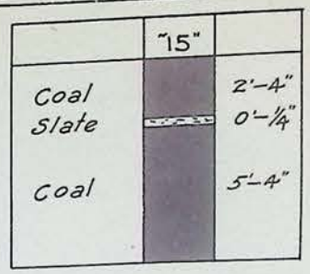


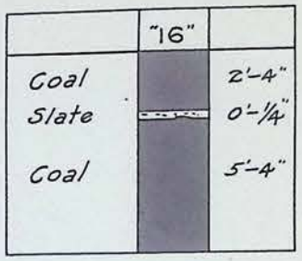


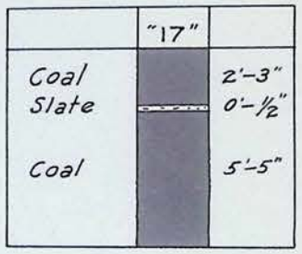


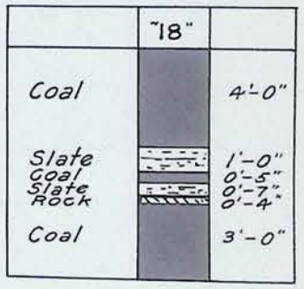


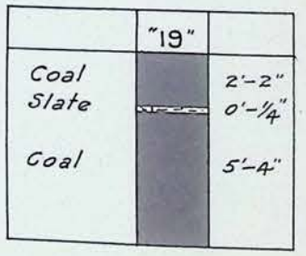


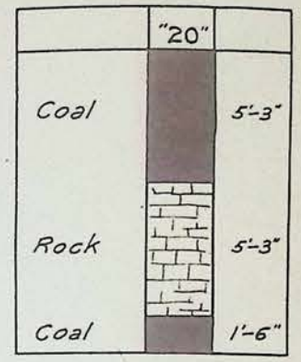


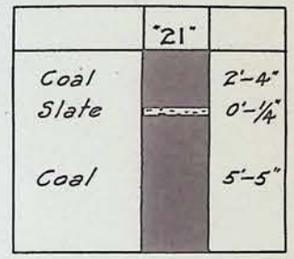












To illustrate Report of John McNeil

I N D E X.

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n McNeil, M.E.
Consulting Engineer
QUITABLE BUILDING.
DENVER, COLO.
N WORK, EXAMINING AND REPORTING ON
AL 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

N O S. 8 A N D 10 M I N E S

Of

THE UNION PACIFIC COAL COMPANY,

At

ROCK SPRINGS, WYOMING.

By

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

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

Dear Sir:

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

In accordance with your instructions, I made an examination of Nos. 8 and 10 Mines at Rock Springs, Wyoming, and herewith respectfully submit my report on the same.

No. 8 Mine, is a shaft opening with double hoisting compartments, sunk to a vertical depth of 180 feet, is equipped with modern hoisting engines and dumping and screening appliances, and has an output of about 1200 tons per day.

The Main Entry, is driven north-easterly on a level from the bottom of the shaft (see map) and intersects the different engine planes from which the daily output is mined. See accompanying map attached to end of this report.

The Haulage Of The Coal, in these mines is becoming an expensive item, requiring a great deal of motive power and the employment of men, hence a maximum expenditure of money, in hauling the coal from the now very far off coal faces to the R. R. cars at the mine tipples.

Electric hoists deliver the coal from the planes and slope to stations on the main entry. From these stations to the tipple, the haulage is by electric locomotives.

The cost, the care and maintenance of so many miles of roadways and other items charged to haulage, is becoming a serious matter, as will be seen by the following figures:

Cost of haulage in Rock Springs Mines for:

Year 1908, $ .286 per ton,
" 1909, .279 " "
" 1910, .320 " "

The indications are, that for the present year, the cost of haulage will be higher.

The Ventilation, is produced by a Murphy fan, 10 feet in diameter, situated at the top of the air shaft (at No. 8), and is run, "forcing", at a velocity of 150 revolutions per minute, and is assisted by a 20-ft. Guibal fan at No. 7 Mine.

The volume of air from the main intake in cubic feet per minute, is,---------- 43,128

Intake air from No. 7 Split, is,---------- 5,700

48,828

Volume at outlet is 49,500 cubic feet per minute.

Reading of air in cu. ft. per mi.,	face 41 Entry,	6,225
" " " " " "	" " " 42 "	6,050
" " " " " "	" " " 43 "	5,400
" " " " " "	" " " Main "	7,020
" " " " " "	" " " 2 on 5 Pl.	6,600
" " " " " "	" " " 3 " 5 "	6,490

Number of men employed, about 280,

" " mules and horses,-- 28.

After making a due allowance of air for mules and horses, there is left, about the quantity required by law for each person, 150 cu. ft. per minute. But, owing to the depleted condition of the air currents, in being conducted a number of miles throughout the workings, giving off deleterious gases from the strata in a greater or less degree, from the burning

of some hundreds of lamps using low grades of oil, powder fumes and gases, fine coal dust, and the excrement of mules and men.

At the time of my examination, I was fully convinced that the air at the working faces was impure and unwholesome.

It is not the volume of air that registers on our anne-mometer that counts for life giving principles, it is purity that is required.

It has been said (and I think truly) that the foul air of poorly ventilated coal mines, may carry prematurely to the grave, a greater number of men during the average working life period of coal miners, than mines generating "fire damp". The latter must, of necessity, be well ventilated, and for this reason we sometimes meet miners who prefer to work in gaseous mines.

A person not accustomed to being in coal mines, on traveling in one poorly ventilated, for a few hours, is surprised at the quantity of dust and foreign matter inhaled. The throat, lungs and nose become liberally charged, and he expectorates fine carbonaceous matter for a few days afterwards.

A continuously active miner, in such an atmosphere, is never free from such black discharges. The lung tissues, with years of service, become thickened, and their original color almost destroyed.

Dr. William Thompson (of Edinburgh, Scotland), has recorded a number of cases of coal miner's lungs which were infiltrated with black matter; the following are a few of them:

D. C., aged 58, miner 12 years, lungs uniformly dark in color.

D. G., aged 54, coal miner from boyhood, lungs uniformly black, not a vestige of natural color left.

G. H., aged 62, coal miner all his life, whole lungs dyed with matter resembling lamp black, and above one ounce of charcoal was obtained out of the mass.

Pathologists all attribute what is known as coal miner's consumption, to the inhalation of impure dust-ladened air.

Note:--I feel that if the eminent Dr. Thompson could examine the lungs of the writer, he might find a stiffening of the tissues and traces of coal miner's consumption as a result of breathing foul air in the gloomy depths of coal mines, fighting "gob" fires and examining the indiscriminate mass of colliery explosions.
I also feel very sure, that had Dr. Thompson made a post-mortem of the lungs of your late superintendent (faithful to a fault), and my sincere friend, Mr. Morgan Griffiths, his diagnosis would have been that the principal cause of his death was "coal miner's consumption".

I trust you will order a good fan to be erected on air-shaft at head of "E" plane, No. 7 Mine.

The cost of ventilation in these mines has also become an expensive item. The air bridges and stoppings must of necessity be built in a very substantial manner, and the

repairs on the same, from time to time, must be dilligently looked after, must be continually clayed up so that the air currents will not leak through, and as there are hundreds of stoppings to care for, in conducting the air several miles, the cost becomes high.

The following is the average cost of all the Rock Springs Mines:

Cost of ventilation for year 1908, $ .038 per ton,
" " " " " 1909, .039 " "
" " " " " 1910, .049 " "

Many of the air-courses parallel to the entries, are fallen-in to a considerable extent, and I would advise that they be cleaned out as much as possible, i. e. drive rooms through the pillar and therein "gob" debris from the air - courses. It is needed badly.

The General Mining Conditions, are quite favorable throughout this mine. The coal seam is exceptionally uniform, of good thickness, and practically free from impurities, as will be seen by the diagrams representing sections of the seam taken by me.

Please unfold sheet of diagrams at front of this report.

For Sec. of coal seam, #54 Room, 5th Entry, 4th Pl., see Dia. A

" " " " " Face of " " " " " " " B

" " " " " #43 Room, " " " " " " " C

" " " " " #12 Pillar 4th " " " " " " D

" " " " " #45 Room, 3rd " " " " " " E

" " " " " Face of " " 5th " " " F

" " " " " #53 Room, 1st " 4th " " " G

" " " " " Face of Main " ... " " " H

" " " " " #20 Room, " " 5th " " " I

" " " " " Face of 2nd " " " " " J

" " " " " # 8 Room, " " " " " " K

" " " " " Face of " " 5 Slope, " " L

" " " " " # 4 Room, " " " " " " M

" " " " " Face of ... " " " " N

" " " " " " " 1st " " " " " O

" " " " " #47 Room, " " 4 " " " P

The Coal Seam Is Undermined, and no blasting from the solid is permitted under any circumstances.

The entries, cross-cuts and the drawing of pillars are worked by pick miners; but the major portion of the output is mined by machines.

There are now in use in this mine:

5 Goodman chain breast machines,
1 Jeffrey " " "
1 Sullivan "long-wall" " "

For drilling purposes, there are now in use 4 Jeffrey electric drills.

Note:--In No. 7 Mine, there are :
3 Jeffrey electric chain breast machines,
4 Goodman chain breast machines,
1 Jeffrey short-wall "
4 Jeffrey electric drills

In No. 9 Mine, there are:
6 Jeffrey chain breast machines,
4 Jeffrey electric drills.

In No. 10 Mine, there are:
2 Harrison compressed air "puncher" machines,
4 cutter-bar Legg machines,
2 Goodman chain machines,
1 Jeffrey Electric Drill,
4 Compressed air drills.

Average No. of Tons of Coal Mined Per Keg of Powder Used, for year 1910, was 110. We think this a fairly good showing, but hope to see, in the near future, the present quantity of explosives used reduced at least by 75%, through the successful operation of the Hydraulic Cartridge, which you are now testing out, as a humane measure, at the Superior Mines; for in such proportions as we can reduce the percentage of blasting powder in our coal mines, we will, in a like measure, be rewarded in reducing the possibility of underground fires and explosions.

Coal "breaking" by Hydraulic pressure, may be a seeming trifle more expensive, per ton of coal mined, but it will not fail to save that which money cannot buy--the lives of men, and in the end, may save to your company expenses untold. Continue the test.

The Stables Underground, 32 stalls, are made practically fire proof. The partition between the stalls consist of old smoke stack sheet iron, and all supporting posts and the manger troughs are securely covered with powder keg iron.

A well constructed stone wall, with an iron door, protects the entrance to the stable and to the motor hoist.

In and about the stables, everything is kept clean. No old sacks, waste, or other combustible matter of any kind is permitted to accumulate.

No open lamps are allowed within the stable door. Electric lights are used entirely in the stables and in the underground hoist room.

A pipe line, with a good pressure of water, is kept on hand at all times.

The Drawing Of Pillars, in this mine, is being followed at the present time quite extensively and with good results; probably over 90% of the coal is being taken out.

Under-ground Telephone Connections, and electric light signals, and many other safeguards I noticed in substantial evidence throughout the mine.

Printed instructions, framed under glass, I found at prominent places, also showing by diagrams how to resuscitate persons overcome by an electric shock, by Augustin H. Goelet, M. D.

I found a fairly good degree of natural moisture throughout the mine and a perceptible saturation in the air.

The haulage ways were kept fairly well cleaned up and dust kept damp, and upon the whole, the mine is well kept and cared for.

Your general foreman, Mr. George Pryde, accompanied me throughout my examination, and to him and the pit-bosses, I gave my opinions and ideas freely, when considered for the company's welfare.

No. 10 Mine, as will be noticed on the accompanying map, is to the dip of No. 8, and consists of a slope opening, its portal being in proximity to No. 8 Shaft.

The slope is driven through the strata overlying the coal on an inclination of 10 degrees from the horizontal, and intersects the seam at a point about 700 feet from the entrance.

No. 10 Mine is operated on the same coal seam as Nos. 7, 8 and 9 Mines, which lies about 260 feet lower in the measures than the seam known as "No. 1".

The Daily Production Of The Mine, is about 1,000 tons, and the general mining conditions are about the same as those already described in my report of No. 8 Mine, i. e., as to the dip of the coal seam (which runs from 4 to 5 degrees), the

character of the roof and the floor, mode of working, etc.

The Ventilation, is produced by a 20-ft. Guibal fan.

The volume of air at the intake, is 73,710 cubic feet per minute.

The volume of air at the outlet is 74,700 cubic feet per minute.

Reading at face of #2 Entry, is 3,000 cu. feet per minute,

" " " " 5 " " 6,720 " " " "

" " " " 7 So." " 5,100 " " " "

" " " " 7 No." " 4,800 " " " "

" " " " 8 " " " 4,700 " " " "

" " " " 9 " " " 4,800 " " " "

There are employed,---------- 190 men,

The number of horses, about,- 25.

There is a good degree of natural moisture throughout this mine, it being to the dip of the other openings, and water from them drains to No. 10 Mine, which keeps the coal dust damp.

The Haulage, consists of mules on entries that haul the coal to the planes; from there the coal is delivered to stations on the main level by electric and compressed air

hoists. From the main entry stations to the tipple, the coal is hauled by electric locomotives.

The Underground Stables, consisting of 29 stalls, are made as nearly fire proof as possible. All posts and woodwork is carefully covered with sheet iron; no open lamps are allowed within the stable gate, electric lights being the only kind in use. Pipes and water for fire protection were in good evidence, and the stables were clean and in a good sanitary condition.

The Coal Seam Is Undermined, by pick and machine mining, and no shooting from the solid is permitted.

The Tonnage Of Coal Mined Per Keg Of Powder Used, is 135 tons. This is an excellent showing.

The Thickness Of The Coal Seam, ranges from about 5 to 7-1/2 feet, and is interstratified with slate and bone to a greater extent than in the other mines, as will be seen by the following description of the coal seam in sections showing impurities (see sheet of diagrams at front of this report, which were taken by me during my examination of the mine).

For	sec.	of	coal	seam,	Face of	3rd	Entry,	4th	Slope,	sec	Dia.	#1
"	"	"	"	"	#26 Room	"	"	"	"	"	"	2
"	"	"	"	"	Face of	4th	"	5th	"	"	"	3
"	"	"	"	"	" "	"	"	4th	"	"	"	4
"	"	"	"	"	" "	5th	"	5th	"	"	"	5
"	"	"	"	"	#10 Room	"	"	"	"	"	"	6
"	"	"	"	"	# 3 "	"	"	"	"	"	"	7
"	"	"	"	"	Face of	6th	"	"	"	"	"	8
"	"	"	"	"	" "	7th	"	"	"	"	"	9
"	"	"	"	"	" "	...		"	"	"	"	10
"	"	"	"	"	" "	...		4th	"	"	"	11
"	"	"	"	"	" "	10 So.	"	"	"	"	"	12
"	"	"	"	"	" "	9 No.	"	"	"	"	"	13
"	"	"	"	"	# 8 Room	9	"	"	"	"	"	14
"	"	"	"	"	# 3 "	9	"	"	"	"	"	15
"	"	"	"	"	Face of	8	"	"	"	"	"	16
"	"	"	"	"	# 7 Room	8	"	"	"	"	"	17
"	"	"	"	"	Face of	7	"	"	"	"	"	18
"	"	"	"	"	#27 Room	7	"	"	"	"	"	19
"	"	"	"	"	Face of	7 So.	"	"	"	"	"	20
"	"	"	"	"	#17 Room	7	"	"	"	"	"	21

It will be observed, by looking over the diagrams showing the character of the coal seam, that it deteriorates, in becoming interstratified with foreign matter, particularly to the west;

and judging from the record of diamond drill holes, Nos. 14, 16 and 19 shown on the map to the west of No. 10 Slope, there is no indication that the coal seam cleans up in that direction.

On No. 5 Slope, between Nos. 4 and 5 Entries, I observed a point which appeared to be the center of a badly disturbed portion of the coal seam, containing, at that place, about 8 feet of black rock in the center of the seam, section, as follows:

Coal, 3' 4"
Rock, 8' 0"
Coal, 3' 6"

From this central point, the intervening rock gradually gets thinner in both directions, almost disappearing at either side, showing the disturbed distance to be about 800 feet in length.

In talking with your general foreman, Mr. George Pryde, we decided that a considerable area of this disturbed portion of the seam might be worked to advantage, and a goodly quantity of coal recovered, by the system of "Long-wall Retreating". I would certainly favor an effort by that system of working, to recover the major portion of this coal.

We have, in connection with this disturbance, a rather strange feature, geologically, in the fact that the divided parts of the coal seam hold their usual thickness seemingly throughout the disturbed area.

The face of the 7th North Entry from the Main Slope is now being driven through "faulted" ground, in which it has now entered about 80 feet, and from work done ahead, it is known that it will get into good coal after passing through 75 feet more of this faulted ground.

The Pumping Of Water, from Nos. 7, 8, 9 and 10 Mines is all done at No. 10, but from this coal seam, very little water is made.

Pumps with a capacity of about 250 gallons per minute are in place, with a six-inch column pipe to the surface. The volume of water pumped, however, is much less than the pumps' capacity.

The cost of drainage, for the past two years, is as follows:

Cost of drainage for 1909, was $ .019 per ton,
" " " " 1910, " .013 " "

The Cost Of Coal, during the past few years (at Rock Springs), has gradually increased, on account of long haulage-ways, the nature of the roof requiring more timber, increased cost of ventilation, and cost of materials, all being items that have advanced materially.

The following will show the increase in timber used from 1904 to 1910, inclusive:

	1904.	1905.	1906.	1907.	1908-9.	1909-10.
Lineal feet Per Ton.	0.75	0.89	0.85	0.92	1.15	1.18

The Cost of Materials for 1908, $ .213 per ton,
" " " " " 1909, .178 " "
" " " " " 1910, .193 " "

The following is the average cost of coal of all charges made at the mines:

	1908.	1909.	1910.
Total Tons Of Coal Mined,	1,247,985	1,350,874	1,212,779
Mining,----------	$ .636	$ .625	$ .655
Hauling,----------	.288	.279	.320
Loading,----------	.062	.062	.071
Entry,----------	.012	.015	.027
Ventilation,----------	.038	.039	.049
Drainage,----------	.051	.019	.013
Deadwork,----------	.031	.025	.027
Total Cost,----------	$1.118	$1.064	$1.162

The increase in the costs from ill-advised Unionism must also aggregate a material quantum, not only from the advance in wages or reduction in hours, but also from a marked absence of interest in the work by employees, generally.

Their teaching seems to be: get all you can and give as little in return, as possible.

The docile foreigner of former days has changed into a bold conspirator to the "cause", and many english-speaking miners seem to have a false honor they must adhere to. Should a small fall of slate occur on the room roadway that five minutes work would clean up, it may be the cause of the room being a non-producer for two hours, waiting for the boss to send a laborer to do the work. The moto being: Do nothing without pay, the "committee" will see that no harm shall come from it.

New demands, is the object point in view. Advance wages and raise the price of coal on the public. Will they always stand for it? There will come a time when you cannot concede to further demands and may have to fight.

Colorado coal operators came to that pass sometime ago, and for self-preservation, did fight, and won, and now enjoy the right to run their own business, notwithstanding that you kept off, in your offices, dues, fines and assessments from employees and gave it to the walking deligates to send to Colorado to fight the coal operators. Of course, this was something you did not like to do, but thought you had to do it.

If you could but stop acting as secretary for Union collections, it would be easier to assert your rights some day.

Your disciplining in the mines has been seriously affected.

It seems to me that the time has come, for the coal operators of Wyoming, Colorado and Utah to understand each other with a view of some day standing together.

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

Sincerely yours,

John M. Nash M. E.

Consulting Engineer.

I N D E X.

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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.

REPORT

On

RELIANCE, MINES,

Of

THE UNION PACIFIC COAL COMPANY,

At

RELIANCE, WYOMING.

By

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

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

Dear Sir:

Prefatory:

Acting upon instructions received from you, I made an examination of the work done at Reliance, and I herewith present this brief report on what I saw there.

The operations being followed, at this time, are in a progressive state of development, but with sufficient

known disclosures in the coal measures to place the venture safely beyond experiment (as the prospect work now performed has proven beyond any reasonable doubt that the coal bearing rocks are underlaid with various seams of coal of such thickness and of such quality as to make the future success of the Reliance collieries now apparent).

The Location Of Reliance, is about six miles in a northerly direction from Rock Springs, in Township 20 North, Range 104 West. No. 1 Mine is opened in Section 31.

The Coal Formation, extends from Rock Springs, and the outcrop of the seams may be traced from there on to Reliance. The lithological character of the rocks and characteristics of the coal seams remain very much the same throughout this portion of the field.

The Rock Springs Coal Field, contains six workable coal seams within about 1,700 feet of strata, and for convenience in giving here a synopsis of the same, I shall designate the top seam (nearest the surface) as "A", the second "B", and so on, descending through the measures.

Coal Seam "A", 10 feet in thickness, was opened in 1882 by No. 6 Slope, 45 acres were worked out; dip 17 degrees, abandoned in 1886, account of inferior coal.

Coal Seam "B", 6 feet in thickness, opened in 1879 by "old No. 5 Slope"; dip, 11 degrees; 31 acres worked out; abandoned 1885 account of inferior coal.

Coal Seam "C", (216' under "B"), 7' 6" in thickness, opened in 1873 by No. 3 Mine; dip 9 degrees, 491 acres worked out; abandoned 1895 account of poor roof, inferior coal and expensive mining.

Coal Seam "D", (239' under "C"), 9' 6" in thickness, opened in 1869, abandoned a little over a year ago, account of long haulage, heavy pumping, expensive mining; dip from 6 to 20 degrees.

Coal Seam "E", (260' under "D"), 5 to 7' in thickness, is now in operation by Nos. 7, 8, 9 and 10 Mines, dip 4 to 5 degrees.

Coal Seam "F", (450' under "E") 3' 6" in thickness, has never been worked by Un. Pac. Coal Co., but has been operated by others.

No. 1 Mine, is opened on the horizon of "D" Seam, the fourth from the surface (better known as No. 1 Seam), by a slope opening. See map attached at end of this report.

The Thickness Of The Coal, is 12' 6" and runs thus very uniformly throughout the mine.

The coal is practically free from impurities, and presents a good appearance.

The Dip, trends westerly, at an inclination from the horizontal of 15 degrees.

The roof, the floor and character of the coal show about the same physical properties as that of No. 1 Mine (the same coal horizon) at Rock Springs.

The Quality Of The Coal, no doubt will, with depth, be about the same as at Rock Springs, but at the present time, the percentage of moisture is higher.

Analyses:

	No. 1 Mine, (No. 1 Seam)	No. 4 Prospect, (No. 5 Seam)
Moisture,----------	7.31%	6.96%
Volatile Matter,------	41.26	38.25
Fixed Carbon,---------	47.03	50.11
Ash,----------	4.40	4.68
	100.00%	100.00%
	12' 8" Clean coal,	5' Clean Coal.

No. 5 Seam, referred to with the above analyses, is "C", the third seam from the surface.

It might be well to adopt alphabetical letters or numbers to designate the horizon of the different coal beds.

It will be seen by referring to the analysis of "No. 5 Seam", that the coal shows up well.

The Coal Is Being Undermined, and shooting from the solid is strictly prohibited.

In The Plan Of Working, it will be noticed on the map that the pillars left are of good proportions to withstand the pressure that may be brought upon them by the overlying strata, providing proper proportions of the coal seam is also left, in pillars in the working of the rooms. I would recommend that only 40% of the coal seam be mined in advancing the workings. But, better still, I would strongly advise that entries, wherever possible, be driven to the boundary and work back by the retreating system from there. See plan herewith attached at the end of this report.

I did not make any examination along lines geologically, in the correlation of the seams, but I understand that the coal bed horizons from "B" to "F" are embraced within the measures in portions of the district, and no doubt a vast tonnage of available coal will be found at Reliance and its vicinity.

A Spacious Shaft, of double hoisting compartments, with pumping, air and ladder ways, is now in process of sinking, and had reached, at the time of my visit, a depth of 170 feet.

Considerable difficulty was being experienced with the pumps getting badly cut and worn by the passing of fine sand with the water, through their working parts. This trouble became so marked that it seriously retarded the progress of sinking.

Mr. Manley, his General Foreman, Mr. Pryde, and I, after an examination of existing conditions, talked with the party in charge of sinking operations, and we decided there was too much water reaching the bottom of the shaft (approximating some 200 gallons per minute), so Mr. Manley gave orders to excavate a lodgment in the side of the shaft to hold about 15,000 gallons of water, and to cut a "ring" around the sides of the shaft, in proximity to the lodgment, to drain all water possible into such reservoir and place a pump to throw the water from there to the surface.

These orders carried out, there will be but little water to pump from the shaft bottom, and consequently but very little sand.

A rotary pump for the bottom of the shaft was also talked of, which might discharge into the lodgment, draining the water through a mesh screen.

On my second visit to the shaft, this work was nearing completion, and I have no doubt but when sinking was resumed, the work would progress more favorably.

The stratum of sand being passed through at that time, while hard in the solid, disolved quickly into very fine

division with the water, when broken, and had a badly scouring effect on the working parts of the pumps.

Of The Geological Horizon Of The Shaft Mouth, (in the measures), I have no definite knowledge. No doubt the drilling records in the field shall have indicated this approximately to you; and as I am informed, the shaft shall pass through the horizons of at least "C", "D" and "E" coal beds (Nos. 5, 1 and 7 Seams) within a reasonable depth.

Trusting the longevity of the Reliance shaft, with large annual tonnages of coal, shall meet your most sanguine hopes, I have the pleasure to remain,

Yours obediently,

John McNeil M. E.

Consulting Engineer.

A P P E N D I X.

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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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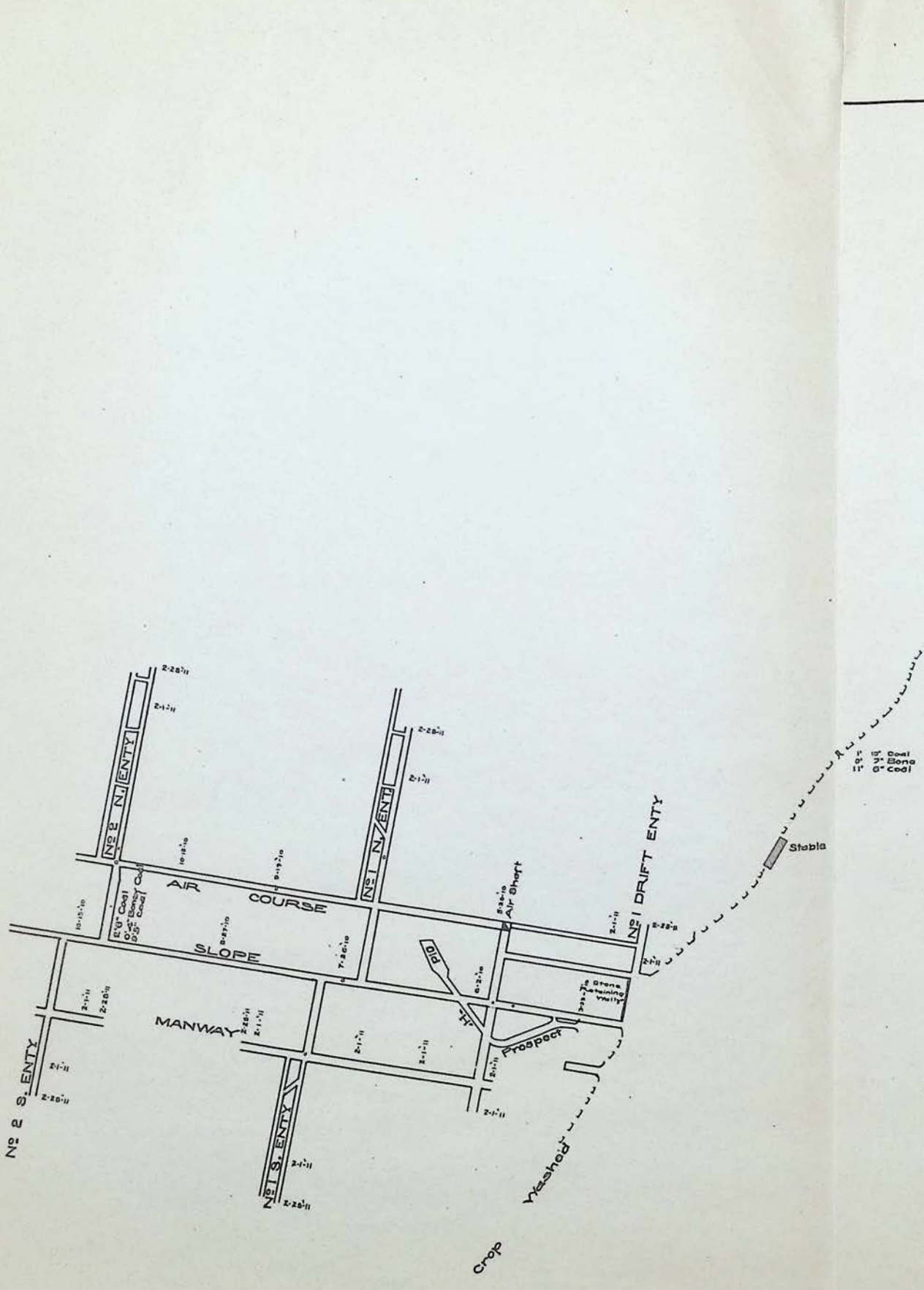
30 | 29

31 | 32



THE UNION PACIFIC COAL CO.

151.31-A

MAP

OF

No. 1 MINE

RELIANCE, WYO.

T. 20 N., R. 104 W.

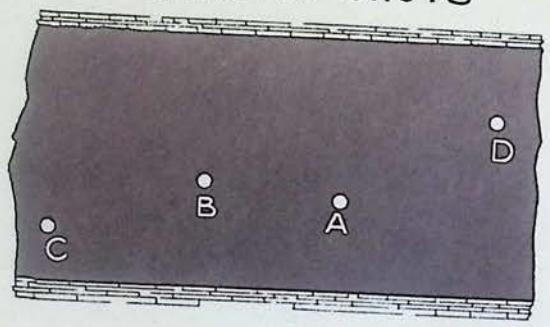
Scale :- 1 inch = 100 ft.

TO ILLUSTRATE REPORT OF JOHN McNEIL

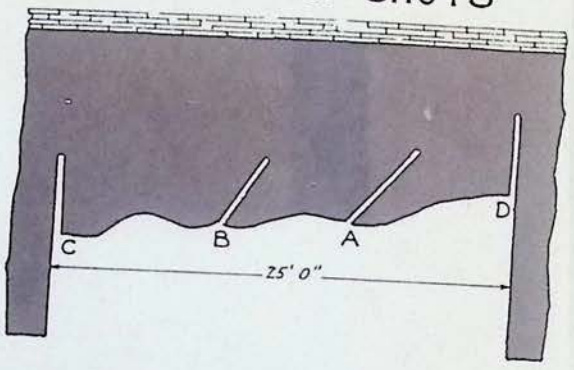
The Union Pacific Coal Co.,
Rock Springs, Wyo.,

PLEASANT VALLEY MINE
SCOFIELD UTAH

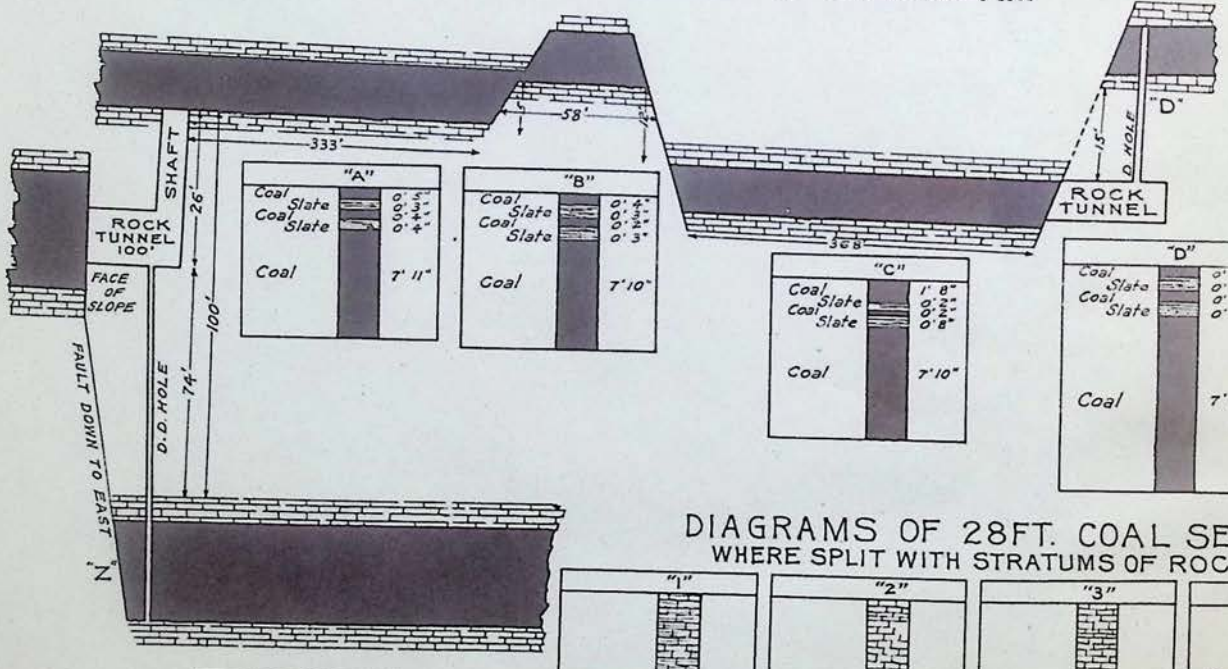
VERTICAL SECTION OF ROOM
SHOWING
POSITION OF SHOTS



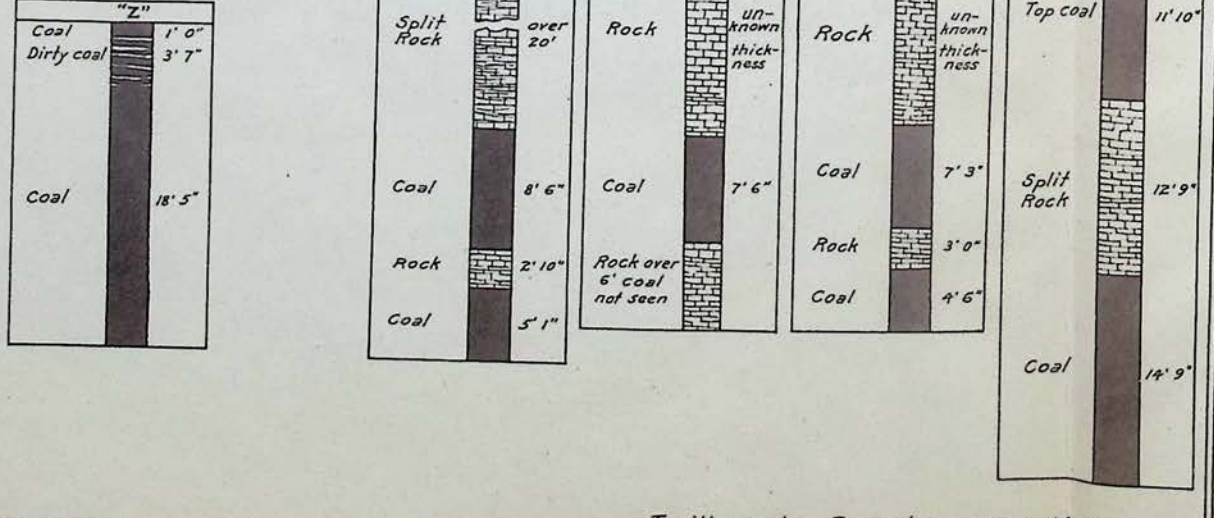
HORIZONTAL SECTION OF ROOM
SHOWING
POSITION OF SHOTS



HORIZONTAL SECTION SHOWING
FAULT DISLOCATION IN 8FT. COAL SEAM



DIAGRAMS OF 28FT. COAL SEAM
WHERE SPLIT WITH STRATUMS OF ROCK



To illustrate Report of John McNeil

I N D E X.

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

PLEASANT VALLEY MINE,

Of

THE UNION PACIFIC COAL COMPANY,

At

SCOFIELD, CARBON CO.,

UTAH.

By

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

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

Dear Sir:

Introductory:

Complying with your request, I made an examination of the Pleasant Valley Mine, and have the pleasure of presenting this, my report on the same.

The Location Of The Property, is in Sections 4 and 33 on the line of Townships 12 and 13 South, Range 7 East,

at Scofield, in the northwest of Carbon County, Utah, situated about five miles north of Clear Creek Coal Mines, and about two miles east of Winter Quarters Coal Mines of the Utah Fuel Company.

The Geological Formation Of Rocks, in this coal field, is the Laramie group of the cretaceous period, the pre-eminent age of coal bearing measures of the Rocky Mountains.

The Lithological Character Of The Rocks, remains much the same as that found in the Grand River Coal Field in Colorado, and, in fact, it is an extension and part of that great coal territory, consisting of successive beds of compact brownish sandstone, massive and laminated, identical with the measures at Grand Junction, New Castle, and Routt and Gunnison Counties in Colorado, all known to embrace superior grades of coal in various workable seams.

The Mines Consist Of Slope Openings, driven in a north-easterly course across the "pitch" of the coal seam, the true dip being in a northerly direction. See accompanying map of the underground workings at end of this report.

No. 1 Mine, is abandoned, and on account of several known "gob" fires, it is sealed off from all connections with

No. 2 Mine, and as, in the latter, we shall cover all important features and physical conditions of the coal seams and characteristics generally, we will make no further direct references to the underground workings of No. 1 Mine.

No. 2 Slope, is driven on about a three degree pitch on the coal seam, to a distance of about 2,200 feet, at which point it intersects a "down-throw fault", lowering the horizon of the coal beds, it is said, 88 feet. But, in this connection, there are conflicting evidences.

On a former visit to Scofield, I was informed by a Mr. Russell, who had been in charge (as pit-boss) of these properties for some 20 years or more, that the fault dislocation had displaced the horizon of the coal seam 72 feet, and if my memory serves me correctly, Mr. Russell did the boring of the hole which gave him his information.

This "fault", in connection with others of a similar character, will be taken up and discussed later on in this report.

The Thickness Of The Coal Seam, now being worked, and where in its normal condition and free from intervening rock strata, is about 28 feet.

The Quality Of The Coal, I shall class in the category of fairly good steaming fuel for locomotive and station-

ary boiler use; it is free burning and does not coke, hence it is also received favorably on the markets with other western coals for domestic use.

Analyses:

	Full Sec. #1 Mine.	#2 Mine.	Prospect at foot of #2 Slope.
Moisture,--------	3.86%	4.88%	4.18%
Volatile Matter,-	42.75	42.30	41.96
Fixed Carbon,----	47.53	45.19	49.26
Ash,----------	5.86	7.63	4.60
	100.00%	100.00%	100.00%

For comparison with three samples of coal obtained for analyses by me, in the vicinity of Scofield, some years ago, note the following:

Analyses:

	No. 1	No. 2	No. 3.
Moisture,--------	4.52%	4.63%	4.84%
Volatile Matter,-	35.95	37.37	32.86
Fixed Carbon,----	51.96	50.20	53.32
Ash,----------	7.57	7.80	8.98
	100.00%	100.00%	100.00%

Remarks:

No. 1, Kimble Mine,
No. 2, Metcalf Mine,
No. 3, Winter Quarters Mine,

All non-coking.

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

Shooting Coal Off Its Solid Bed, as in blasting rock from the face of a railway tunnel, explains the odious system of mining found universally in practice in rooms in the Pleasant Valley Mine.

Note position of four blasts found in a room, charged and ready to fire, in Diagram attached in front of this report, illustrating the most dangerous mode of blasting coal from the solid that I have ever seen practiced in a coal mine.

The good intention of the shot firer (engaged for his skill in blasting) is that blast "A", forming a "bursting shot", will explode first, and "B" second, after which, it is immaterial whether "C" or "D" be last to go off, providing clearances (open ends) were furnished them by a successful removal of coal with shots "A" and "B". But here we may have an unknown quantity (be it understood all four shots are lighted at the same time, a damnable practice), notwithstanding that the fuses have been regulated in length to admit blast "A" to go off first and "B" second.

Suppose blast "A" "hangs or misses fire", as shots not infrequently do, then the skill and good intentions of the shot firer counts for nothing (note diagram); the result is, we have three "tight" shots in "B", "C" and "D", the behavior of which, the most experienced would be assuming much to exactly foretell.

What I have tried to portray in the above, with aid of the accompanying diagram, is not by any means confined to one room, but, as before stated as to method of blasting, is applicable to every room in the mine; and as many as 20 rooms with four shots in each, are usually fired between the hours of 4 to 6 P. M.

Such a number of shots fired in a dusty coal mine, during so short a space of time, is accompanied with more-or-less danger. Each blast contributes its fumes and explosive gases in proportion to the combustion of its charge of powder; each shot also contributes quantities of fine coal dust from newly broken surfaces of the coal seam, which are carried away in suspension with the air current, together with the fumes and gases from the combustion of powder, becoming more dense and heavily ladened with the dust and fumes from each succeeding blast, until the air gets stifling to ones presence. Few miners have escaped some moments of suppressed breathing in such a suffocating atmosphere.

The danger at such a moment, is the fatal presence of flame and oxygen to propagate it. Under these conditions, we may have a colliery explosion in much the same way and with the same results in its propagation as in a flour mill. The flour dust propagates flame with gases produced from its combustion in the air throughout the dust ladened building.

The fine coal dust in suspension in the air-current, extends its fiery tongues of flame throughout the dusty ramifications of the mine in the same way.

Standing under the darkened shades of a D. & R. G. Ry. snow shed on Soldier Summit, on my way from Salt Lake City to Scofield Mine--the day one of brightest sunshine-- it was marvelous to note the great difference of vision between the semi-darkened portions of the shed, compared with apertures where the sun's focused rays shown through.

The former was seemingly an atmosphere fairly clear to my vision, the latter revealed dense columnar and sheeted clouds of smoke and dust from the locomotives and previously moving train; millions of dust particles in fine division, buoyed up amid the smoky fumes, were plainly seen in the sun rays, but were altogether non-existant to the eye under the semi-darkened portions of the shed.

The thought came forcibly to my mind: Could we but see a ray of sunshine peer into the depths of a coal mine, where hundreds of tons of coal were being blasted from the solid by the daily use of 15 to 20 kegs of blasting powder, 100 men shoveling hundreds of tons of dusty coal, 20 horses or mules traveling over more-or-less dusty roadways, and hundreds of loaded pit cars shaking fine coal dust into the ventilating current, the scene would be, to us, alarming, and a most convincing argument against shooting coal from the solid.

The Powder Used For Coal Produced, taking an average for six months, is one keg of 25 pounds used for every 37.7 tons of coal mined.

The powder used is extremely high, compared with other mines, and when we consider the abnormal thickness of the coal seam at Scofield, the traffic in powder there is alarming.

Custom has made the practice of blasting there a habitual system with the experienced miner and lay-man alike, and from usage, a feeling of safety may rest with both; and thus, by the abuse of powder, their physical labors are less than by wielding the pick, and they are in seeming content.

But, to the man who will think, and draw deductions based upon natural consequences, their cherished feeling of safety is a false conception.

From natural consequences, timely warnings have been given. I was informed that local explosions have occurred with considerable concussional force, but, thanks for their deliverance, it was only local--the opportune moment for the death destroying forces had not come, as the propagation of the flames of powder and coal dust (explosive gas has never been detected) failed to reach out over the mine. Maybe, there was not dust enough, but more likely, it may have been a lack of sufficient oxygen to support combustion of the local "blast" at some working face, where a scarcity of air is not at all infrequent.

Note.--In Winter Quarters Mines, belonging to the Utah Fuel Co., situated two miles west of Scofield, it was the sad duty of the writer to look upon the stern havoc of death and ruin caused by a powder and coal dust explosion on May 1, 1900, in which were killed 200 men.

Fire damp (C. $H.^4$) had never been detected in that mine either before the disaster, at the time or since.

After one week's close examination, I decided that the explosion was caused primarily by powder flame, which ignited the coal dust carried in suspension with the air current, and the flames therefrom swept over the greater portion of the mine.

The coal, at that time, was being shot from the solid much in the same way as that now being practiced at your mine in Scofield.

The presence of fine coal dust and powder gases (in the Scofield Mine) from such abnormal blasting off the solid, must be in suspension with the air current (at times) to a large degree. I also noticed much attenuated dust, in very fine division, on the "rib sides" of all roadways and rooms, "bone dry". From natural consequences, attending an extended powder flame from a "tight" or "windy" shot, the mine would not be immune from disaster any more than Winter Quarters was.

To reduce the use of powder, in a coal mine, to a minimum, we reduce the danger of a dust explosion likewise.

For comparison with powder used in mining coal at Rock Springs, Wyoming, note the following:

Average for year 1910.

No. 7 Mine, 108 tons of coal mined per keg of powder used,
" 8 " 110 " " " " " " " " "
" 9 " 73 " " " " " " " " "
" 10 " 135 " " " " " " " " "

The thickness of the coal seam in the above mines is from five to seven feet. Thus, the coal seam at Scofield, though about four times that thickness, yields only about one-third as much coal per keg of powder used, 38 tons.

The system of mining is both expensive and dangerous--undermine the coal.

The Conditions For Machine Mining, are quite favorable and I would recommend, as the most applicable system, that of electric machine mining.

In this connection, I would also recommend that only about seven feet of the coal seam (the bottom part) be mined in advancing the workings, which will strengthen the pillars against a "squeeze" of the overlying strata, and the 20 feet of top coal can be mined out in retreating from the boundary with much better success in obtaining a greater percentage of the

coal seam, will give greater safety to the workmen and furnish you much cheaper coal.

The installation of a well regulated electric machine plant at this colliery, with power for electric haulage, could not fail (with a reasonable production) to save its cost within a period of three years.

The Ventilation Of The Mine, is produced by a 15-ft. Guibal fan.

The total volume of air passing into the intake air-ways, is 50,560 cubic feet per minute.

The total volume passing in the main return, is 59,520 cubic feet per minute.

Cu. ft. of air per minute,	3rd North Split,		7,560
" " " " " "	4th "	"	12,000
" " " " " "	5th "	"	4,700
" " " " " "	4th Incline	"	16,695
" " " " " "	4th South	"	2,300

There is an abundance of air in the mine, but I noticed a scarcity of good air at the working faces, where it was rather smoky. I would advise a stronger current conducted to the inside cross-cuts in proximity to where the men are at work.

The Coal Field Is Faulted, to a considerable extent. At the 88-foot down-throw fault (already referred to) at the

face of the slope, an up-raise has been made to locate a seam of coal, eight feet in thickness, known to exist in other parts of the mine lying at a higher horizon in the measures.

At a point in this up-raise of about 26 feet above the floor of a rock tunnel driven 100 feet ahead of the "down-throw slip" at the face of the slope, the 8-ft. coal seam was found, and a prospect entry has been driven on the "strike" of this seam for a distance of about 800 feet.

In that distance, three faults, or dislocations of the strata have been met with.

At a point 333 feet from the up-raise, an up-throw of 5 feet occurred. See diagram of these faults and coal seam also borings at face of slope, at front of this report.

The 5-ft. dislocation was graded out, and work continued on the coal seam, which, however, only progressed 58 feet until a down-throw fault of 12 feet was encountered.

Again work was pushed forward on the coal seam for a further distance of 368 feet, when another up-throw fault of 15 ft. was met (see diagram).

It is reasonable to suppose that these series of dislocations have gone through the strata and have, in like manner, dislocated the main coal seam under it.

By examining the mine map at the end of this report, the course of the main big fault ("down to the East 80 ft.", at

the face of the slope) may be traced in a north and southerly direction, and has been reached by the 1st, 2nd, 3rd and 4th levels south, from No. 2 Slope, and also at the faces of 4-1/2, 5th and 6th levels south, from the 4th level incline.

The 4th Level Incline, is driven almost on the true dip of the coal seam, and the slope rope haulage system is operated on it.

It will be noticed that two small faults have been cut by the 4th level incline in proximity to the face, as shown on the attached map, but the face of this incline has now been driven beyond these faults, about 500 feet. For section of the coal seam at the face, see Diagram "No. 1" at front of this report. The coal seam is "split" throughout this vicinity.

The "split rock", forming the roof here, was drilled up into about 20 feet, and the top bench of coal was not found.

For section of the coal in the back entry of 4th incline, see Diagram "No. 2". For section of the same 150 feet back from the face of the entry, see Diagram "No. 3".

For full section of the coal seam showing intervening "rock split" in the 11th cross-cut in 4th Incline, see Diagram "No. 4".

Beyond this, to the north and east, the thickness of the top "split rock" is not known. It is my opinion, however,

that throughout the field north and east of this point, there will be no mammoth coal seam, such as has been worked to the south and west, but will be divided into at least two distinct workable seams of coal.

In the Main 4th level incline, about 100 feet ahead of the 3' 7" down-throw fault, a cross-cut about 200 feet has been driven to the east, which has disclosed the main big fault (done since the survey shown on map of January 1st, 1911), which shows it (the main fault) continuing on its course. But, the fact that we have two small lateral faults from it (those observed crossing 4th level incline) indicates that the big fault may be breaking up and tailing out to the north.

From my observation in examinations made of Clear Creek and Winter Quarters Mines, the dislocations of the strata become less in distances coming north. Thus, I would advise, when the big fault is reached by the face of the 4th level incline (as it soon will be), that the coal seam east of the down-throw be prospected for by drilling or sinking. The distance in the dislocation of the coal horizon will probably be found less.

The Eight-Foot Coal Seam, can be reached by, and operated through a rock incline driven from the 4-1/2 Level south, or at any other suitable point selected.

At 4-1/2 Level South, in room marked by dotted lines, near word "fire" (see map at end of report), it is said that a shaft was sunk down on the "slip" of the fault to the coal seam, but of this I could get no record, nor yet any positive knowledge from anyone who really saw the coal at the bottom of the shaft. This work was done prior to your Mr. Murphy's appointment as Superintendent.

The Present Production Of The Mine, is about 500 tons per day of run-of-mine coal.

A Water System Under Pressure, with pipe lines in the mine connected with a large tank at a high elevation on the surface, is used to sprinkle the roadways. But, in-as-much as the coal roof and sides of the roadways "cut" and "shell" off with the action of water, they are not sprinkled; so, in case of a dust explosion, the sprinkling that is done would amount to but little in arresting its progress, for the obvious reason that there would be present, an abundance of dust on the rib-sides and roof of the roadways, cross-cuts and rooms, with that in suspension in the air current, to probably devour, in its combustion, every particle of oxygen in the mine.

The same is more-or-less true of all sprinkling systems, unless they actually wet the mine, and even then, if there be

no humidity in the air, there will still be present, fine coal dust carried off in suspension with the ventilating currents.

Be it understood, I do not discourage sprinkling, for I believe it should be done and that as thoroughly as conditions will admit, for such may prevent the progress of powder and dust flames.

But why not strike at the root and most prolific source of the origin of a dust explosion, i. e. shooting coal off the solid by abnormal quantities of powder?

Undermine the coal seam absolutely, and instead of 38 tons of coal being produced by a keg of powder, there will be about 200 tons, and no "tight" or "gunning" shots to oject their dangerous tongues of fire.

Respectfully submitted,

John McNeil M. E.
Consulting Engineer.

A P P E N D I X.

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 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.

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I N D E X.

I N D E X Continued.

---------O---------

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

ACTION 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

NOS. 1 AND 2 MINES,

Of

THE UNION PACIFIC COAL COMPANY,

At

CUMBERLAND, WYOMING.

By

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

To: D. O. CLARK, ESQ.,
Vice-President & General Manager,
Union Pacific 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 Nos. 1 and 2 Mines at Cumberland, Wyoming, and herewith present to you, my report on the same.

The Mines Consist Of Slope Openings, driven on the true dip of the coal seam, thus the entries run on the

"strike", at right angles to the slopes, making good, "square" work in the mines and a pleasing appearance on the maps. See maps attached at end of this report.

The Dip Of The Coal Seam, is in a westerly course, and the inclination is (from the horizontal) about 22-1/2 degrees.

The Thickness Of The Coal Seam, varies, according to location, from about 8 feet to 19 feet, with a seam of clay from 10 inches to 10 feet in thickness about five feet from the bottom of the coal. Wherever this intervening clay is not over two feet in thickness, it is removed and the bottom coal is taken up.

The Quality Of The Coal, we may accept as a non-coking bituminous, is good steam fuel and for general heating purposes, but is not as favorably received for domestic use as Rock Springs coal.

Analyses:

	No. 1.	No. 2.
Moisture,----------	5.03%	4.04%
Volatile Matter,--------	40.10	41.42
Fixed Carbon,----------	50.54	49.67
Ash,----------	4.33	4.87
	100.00%	100.00%

No. 1 Mine, has reached an inclined distance on the coal seam with its main slope, of about 3,700 feet, at which point it has encountered the "rock fault" (probably a barren zone in the measures) that has been defined in its course and met with by each succeeding North Entry from No. 1 to No. 11 inclusive, see map.

The Lower Portion Of The Mine Is Sealed Off, from present workings by securely built stoppings in the main slope and other points just under the entrance to Nos. 3 North and 3 South Entries, and mining operations now followed are confined to drawing pillars in Nos. 1 and 2 North Entries and 3rd North dip entry.

The history of No. 1 lower workings from the 4th Entry to the face of the slope, is doubtless already well known to you, so I will refer to them here for record in a very brief manner.

A few years ago, when the vertical covering of the strata overlying the coal seam had reached a thickness of 1,500 feet or more, it was found that the pillars left, in advancing the work, were insufficient to withstand the pressure brought to bear upon them and resulted in there being such a severe crush that it became practically impossible to keep the workings open; and, in-as-much as the south entries had run into poor coal generally, and that the north entries and the slope

had reached the rock fault (an unknown quantity), also that the pillars were crushing and the presence of marsh gas $C.H._4$ was more-or-less troublesome, it was decided to abandon and seal off the workings under No. 3 Entries and take out whatever coal that could be gotten from Nos. 1, 2 and 3 North Entries, which, under existing conditions, was really the only course to pursue.

The Daily Production Of The Mine, at this time, is about 800 tons of run-of-mine coal.

The 1st North Entry, at the present time, contributes about 75% of the above output, for the following good reason explained by Supt. McCarty, that he wished to extract all the coal from the pillars from 70 to 80 rooms and have the space caved in to take off the weight and pressure of the superincumbent strata before attacking the pillars at the face of No. Entry No. 2.

I estimate that 90% of the pillar coal now in No. 1 No. Entry, north of the boundary line (Quealey land) can probably be removed.

From Room 40 to Room 29, a "squeeze" of the overlying strata upon the pillars has been active for sometime, and it will be a very difficult matter to extract more than about 15% of the coal remaining in these pillars.

In advancing the first workings in these entries, it is evident that 65% of the coal was mined out; 35%, however, would have been much better mining.

In 2nd North Entry, between the fault and boundary line (in Quealey land), I estimate that 90% of coal in pillars will be extracted.

From the boundary line to No. 40 room, 25% of the coal left in pillars may be mined out; from No. 40 room to No. 27 room, a heavy squeeze or "creep" of the overlying strata is in evidence, and throughout that distance, the amount of coal which may be gotten, is, at this time, very doubtful, maybe 10%, including the entry "chain pillars" might be recovered. From room No. 27 out to the slope, 15% of the pillar coal may be gotten.

Such loss in coal is the penalty now being paid for improperly mining out too large a percentage of the coal in advancing the workings.

In No. 3 North Entry, 90% of the pillars can be mined between the boundary line and the rock fault (in Quealey land).

From the boundary line to room No. 23, the percentage of coal that may be taken from the pillars, is also very doubtful, perhaps 10%.

From No. 23 room out to the slope, probably 15% may be obtained. Much will depend upon how the "creep" of the strata will act when the pillars are attacked.

In 3rd Dip Entry, 90% of the coal lying between the boundary line and rock fault may be available.

The Producing Life Of The Mine, we estimate may be from 15 to 18 months, at its present output of 800 tons per day.

The Ventilation Of This Mine, is produced by a 20-ft. fan of the Guibal type.

The air measurements of the total intakes, aggregate 86,450 cubic feet per minute.

The total outlet is 88,850 cubic feet per minute.

At face of 1st North Entry, 25,220 cu. ft. per minute,

" " " 2nd " ")
) 38,250 " " " "
" " " 3rd " ")

Number of men employed, night and day shifts, 123,

Number of horses,---------- 12

Air volumes are taken in through some surface caves.

It is needless to say that the present workings are well ventilated.

Explosive Marsh Gas C. H.^{4}, has not been recorded, (hence never been detected) since the lower workings of the mine were sealed off.

Natural Moisture Was In Evidence, along the haulage-ways, percolating, no doubt, from surface caves.

Average Tons Of Coal Mined Per Keg Of Powder Used, 60.76. The average was taken for six months.

The above showing is fair.

The System Of Haulage, is by horses on entries, and by steam engine and cable on slope.

No Pumping, is done at this Mine.

The General Equipment of The Mine, is very good in all its branches, and it is a source of regret, indeed, that an additional coal area cannot be found in the vicinity of Cumberland. Not having personally examined the field, I can have no decided opinion to offer in this connection.

The Operation Of The Mine As To Safety, of employees, is fairly good. Mining pillar coal is accompanied with a greater degree of danger from falls of coal and roof than mining from rooms, but, seemingly, very few accidents from this source have occurred in working these pillars.

It will be understood that in mining out pillars, but a minimum amount of blasting is required, and as there is always a "free-end" to shoot to, the danger in this risk is reduced to a minimum.

In Conclusion, seeing that the end of No. 1 Mine is drawing to a close (18 months at most) and that necessary safe-guards are in evidence for the comfort and safety of the workmen, it would be superfluous to continue this report further. In fact, I know of nothing further of consequence to relate, unless it would be my wish to find for you some millions of tons of coal in this district. But, from all I can learn from the research of others, the finding of coal in paying quantities may be considered doubtful.

No. 2 Mine, has about the same physical conditions as No. 1. The character, dip and thickness of the coal seam are about the same. But the stratum of clay lying between the lower and upper benches of coal, which in No. 1 varies from 10 inches to 10 feet, rarely exceeds 18 inches in No. 2 Mine.

The Slope, is driven on the true dip and has reached an inclined distance on the seam of about one mile, and a

vertical depth from the surface to the face of the slope of about 2,400 feet. See map and profile of the surface and the course of the slope at end of this report.

A Description Of The Mine. It will be observed that from the 10th North and 10th South Entries down, large pillars are left on each side of the slope between entries. This precaution was an absolute necessity, for the purpose of arresting further development of pressure from a general "creep" or squeeze of the overlying strata upon insufficient pillars, which was brought about by a seemingly common, but inexcusable mistake, in working out an altogether too large percentage of the coal seam in advancing the workings of the mine.

As near as I can judge (from observation and information obtained) about 65% of the coal seam was extracted in advancing the underground workings, leaving about 35% in pillars to be worked later.?

Such working proportions in a 6-foot coal seam, with 200 feet of vertical strata over it, might be followed with a good measure of success. But to thus operate a 10 to 20 ft. seam (containing a soft clay stratum in it) and lying on an inclination of 22 degrees dip, with 1,000 to 2,000 feet of vertical measures over it consisting of massive bedded sandstone, was altogether, a huge mistake.

To have extracted 35% of the coal in advancing and left 65% in pillars to be mined out in retreating back from the boundary (or pre-arranged destination) would have been within the bounds of good mining. But with the reverse percentages in practice under existing conditions, it could result only in a needless expenditure of money and an abnormal percentage of loss in coal.

It is to be hoped that the large pillars now left between the 10th Entries and face of the slope, will effectually arrest further development of the squeeze now in progress, from following down upon the lower workings. Of this "creep", we will have occasion to speak later on in this report.

To give anything like a definite estimate as to the tonnage of coal that may yet be produced from this mine, is impossible. So the following estimates must be taken, subject to conditions to be met with, in which, we are aware, there may lie more or less unknown quantities.

It will also be understood that much of the information I am about to give, with reference to the upper workings, has been obtained from your superintendent, Mr. McCarty, as to enter and examine the same is, in many cases, impossible, at this time.

In A Entry, about 40% or more of the coal, is said to have been left in, and being near the surface with but light vertical cover, a goodly percentage of this coal may be expected.

The 1st South Entry, pillars are drawn back from the boundary line to 22 room and is caved to the surface. In the pillars left, about 20% of the coal may be available.

The 2nd South Entry, as will be noticed on the map, struck the north side of the rock fault or barren zone reached by the north entries of No. 1 Mine at the boundary line. See map. The pillars are drawn out from the boundary line to No. 23 room. From No. 23 room to the slope, about 20% of pillar coal, including entry stump, may be gotten.

The 3rd South Entry, is walled off close to the slope. There are 19 rooms to the fault. It is likely this entry can (at the proper time) be entered and say 25% of the pillar coal left there, obtained.

The 4th South Entry, turned 17 rooms before encountering the fault. Over this entry on the surface lies a pipe line and reservoir. Probably 15% of the coal in these pillars may be available.

From The 5th South to The 10th South Entries, inclusive, evidences show that the squeeze (already referred to) has closed up these entries tight, and it is extremely doubtful if any coal whatever will be available from them, at a reasonable cost.

In The 11th and 12th South Entries, from No. 10 room to the fault, is worked out and closed. The blocks (large pillars left) next to the slope may yield 65 to 70% in being mined by retreating, when the proper time comes to extract them.

From The 13th South Entry, pillars are now being extracted from the fault to No. 10 room, contributing about 250 tons per day, which may last for about six months.

From the large pillar left next to the slope, about 80% of it may be available by mining it retreating.

The 14th South Entry, has been driven to the boundary line, since the survey shown on the attached map was made. Rooms are now being turned and some in operation, and from this entry a production of about 250 tons per day may be expected for about a year.

The 15th South Entry, rooms will be turned there shortly, from which may be expected 125 tons of coal daily for the next year.

No. 1 North Entry is still open with the car tracks in, for half of its distance. From these pillars and entry stumps, 15% of the coal standing may be expected, when the proper time comes to extract it. Note creek and R. R. tracks on the surface over this entry.

No. 2 North Entry, can be entered and probably 15% to 20% of the pillar coal may be secured in there.

The 3rd and 4th North Entries are standing, but the tracks are all out. They can probably be entered when the proper time comes to do so, and some coal may be available, but just to what extent, remains at this time, an unknown quantity.

From Nos. 6 to 10 Entries, inclusive, it is believed they are closed tight, and also, fire is known to have existed there, see map. Thus, I would not consider it wise to open up the stoppings that now wall them off.

The 11th North Entry, from No. 10 room to boundary line, is walled off. It is doubtful if any coal can be had from these pillars. From the solid block (large pillar) next to the slope, about 60% may be available.

The 12th North Entry, is still working from No. 10 room to the boundary, and about 85% of this coal has been removed. Work is now being confined to entry stumps. From the large pillar next to the slope, about 70% may be available.

In No. 14 North Entry, the rooms from No. 8 to the boundary line are worked up about half way, and the extraction of a fairly good percentage of the coal from this entry (at this time) appears favorable. From the solid block next to the slope, about 70% of the coal in it may be gotten by mining it retreating.

The 15th North Entry, is now within 200 feet of the boundary and the same favorable conditions exist for the recovery of a good percentage of coal from it.

It will be noticed on the map that the face of the slope is in close proximity to the boundary line.

Explosive Marsh Gas C.H.4, is given off in the lower workings, and upon examination of the record book of the gas

watchman, I noticed that occasionally, the finding of 200 to 500 cubic feet of gas at high points was recorded.

I am pleased to state, in this connection, that I found the best of evidence that a careful watch was being kept in keeping the air current up by "brattice" and otherwise, to the face of the work, to render harmless any gas that might be given off, and further, I found in other respects, good management displayed in mining and blasting the coal and keeping the workings wet, to which I will refer later in this report.

The Coal Seam Is Mined Absolutely, in all entries and rooms, and positive orders are issued by the superintendent that on no account shall any coal be shot from the solid, and a strict obedience to this order is demanded from the shot firers. They have positive instructions to refuse firing a shot, if drilled beyond the mining.

The mining in entries is done about the middle of the seam, while in rooms the mining is done on the top of the coal seam. The top bench of coal is kept ahead of the middle bench, and the middle bench correspondingly ahead of the lower one. In this manner, the coal is shot up in three separate benches so the shooting of any one of the three is practically "free", preventing the possibility of "tight" shooting, as practiced in shooting off the solid.

After our experience in the large seams at Hanna and at Scofield, where the most ruthless form of solid shooting is practiced, it was indeed refreshing to see an admirable system of mining the coal followed at Cumberland No. 2. The mining is all performed by pick work.

It is only fair to note the mining of the coal is more easily performed there, on account of the enormous pressure brought upon the coal seam by the abnormal thickness of the over-lying strata (about 2,000 feet), but soft or hard, it is and should be made a criminal practice to blast coal from the solid in a dusty mine.

A Good Sprinkling System was in evidence wherever work was being followed, either in entries or rooms, and "sprinkling" does not convey the true meaning of what I saw there. I saw a man employed in each entry, with a long hose and nozzle and an abundance of water under a strong pressure, and he not only sprinkled but literally wet the floor and washed down the roof and sides of the entries and rooms.

A High Temperature, was noticeable throughout the lower workings, and notwithstanding the copious watering done, I judged the temperature would be from 75 to 80 degrees. This, of course, at a vertical depth of over 2,000 feet, is but a natural consequence. A fairly good degree of humidity was noticeable in the air.

The Ventilation Of The Mine, is produced by a 20-ft. fan of the Guibal type.

The total volume of air at the intakes, is 90,490 cubic feet per minute, and the total volume passing out at the outlet is 95,940 cu. ft. per minute.

The following are measurements of "splits" in proximity to the face of the entries.

No. 13 So. Entry, 9,600 cubic feet per minute,
" 14 " " 5,320 " " " "
" 15 " " 3,000 " " " "
" 13 No. " 4,600 " " " "
" 14 " " 8,200 " " " "
" 15 " " 2,000 " " " "

On account of the squeeze referred to, it is a most difficult matter to conduct the air-currents to the working places, as any manner of stoppings put in (stone or otherwise) they are almost continuously disturbed and crushed by the great movement and pressure of the over-lying strata, which is uninterruptedly grinding the pillars into smaller and smaller space, according to the compressibility of the coal and floor beneath it; hence the stoppings are subjected to the same pressure, and must be attended to at certain points almost daily to keep them clayed up and air tight.

Again, the coal pillars themselves become so crushed and broken that the air-currents leak through badly. So the

stoppings and pillars must be constantly patrolled, and even then, much air is lost, and at the face of the workings, it is difficult to keep up a good supply of air.

In The Underground Stables, the wood-work and timbers are well covered over with sheet iron; are lighted with electric lights, no open lamps are allowed to pass within the stable gates, and water in pipes with hose connection, under pressure, are present.

Average Tons of Coal Produced Per lb. of Monobel Powder, for a period of three months, was 12.4 tons. The above is an excellent showing, meaning 310 tons of coal mined by 25 lbs. of 3rd grade Monobel powder.

This powder has many features of safety, and providing there is no mistake made in the tonnage of coal produced by it here, the three months test just made is an admirable one.

I have no doubt but the Monobel powder will give best results in blasting coal which has been mined.

Before us, we have in the above, a forcible argument in favor of mining the coal and using, if possible, a "safety" powder.

Note: In Hanna No. 2 Mine, on an average of one year, we have only 88 tons of coal mined to a keg of powder used, in blasting from the solid,

or, in other words, a little over one ton of coal per pound of "black" powder.

In Cumberland No. 2 Mine, where the coal is strictly mined, we have a little over 12 tons of coal mined to each pound of Monobel powder used.

The Haulage of The Coal, like No. 1 Mine, is performed by horses on the entries, and by steam engine with cable on the slope.

Water Pumping From The Mine, is done from a series of stations, as follows:

1st Station: 1st South Entry, Knowles vertical triplex pump, 5 H. P., 3-1/2 x 6, gallons per minute, 35

2nd Station: 5th North Entry, Knowles horizontal triplex pump, 35 H. P. 5 x 8, gallons per minute,---- 103

3rd Station: 10th North Back Entry, Knowles horizontal pump, 35 H. P. 5 x 8, gallons per minute,----- 103

4th Station: 13th North Entry, Knowles vertical triplex pump, 20 H. P. 6 x 8, gallons per minute,---- 117

5th Station: Face of Slope, Knowles vertical triplex pump, 15 H. P., 4 x 8, gallons per minute,--- 52

The total growth of water is said to be about 135 gallons per minute.

The Daily Production Of The Mine, at this time, is about 1,100 tons of run-of-mine coal.

The Probable Producing Life Of The Mine, is a problem we would not care to set forth with any degree of accuracy, owing to the unknown quantity that might result from the general "squeeze" already referred to.

Providing, however, the large pillars left from the 10th Entries down, have arrested the "creep" sufficiently to have caused the compressive force of the strata to find a bearing (above the 10th Entry) to relieve the downward pressure, i. e. if the roof and the floor from the 6th to the 10th entries (the central part of compression) will yield in their compressibility and come together closely to a state of rest, which is probable; then our deductions drawn as to the probable availability of some 600,000 tons of coal (or more) from below the 10th and above the 6th entries may be realized.

Respectfully submitted,

John McNeil M. E.
Consulting Engineer.

A P P E N D I X.

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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 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.

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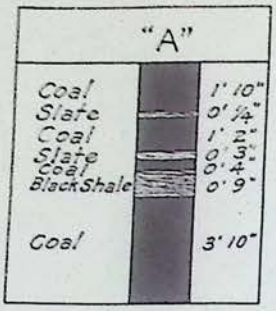
SHEET OF DIAGRAMS

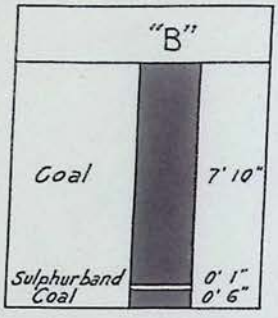
SHOWING

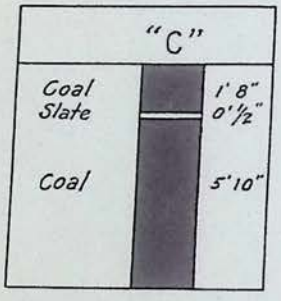
SECTIONS OF COAL SEAMS IN B & E MINES

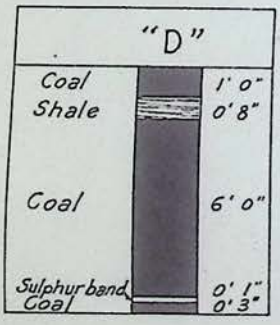
SUPERIOR WYOMING

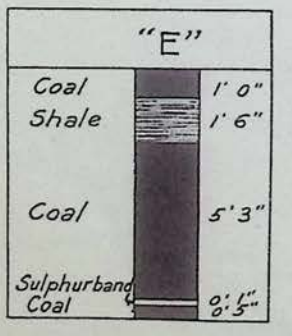
B MINE

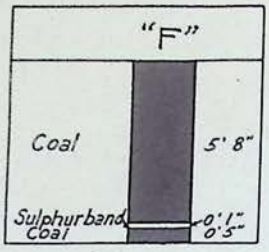


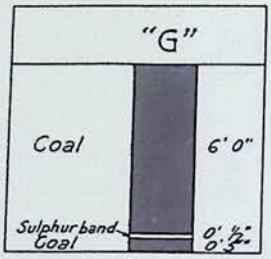


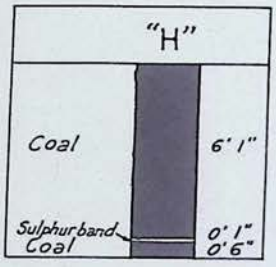


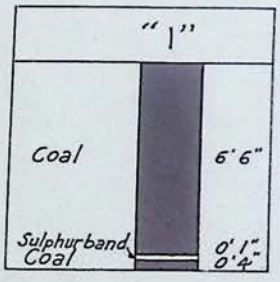


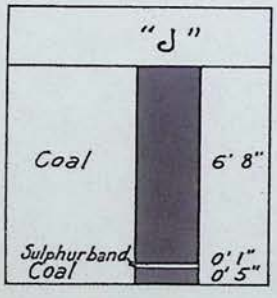


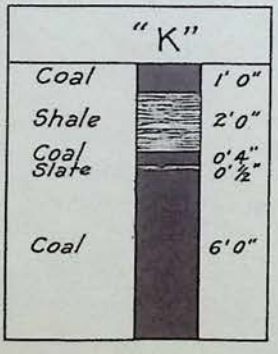


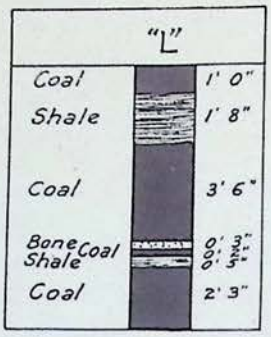


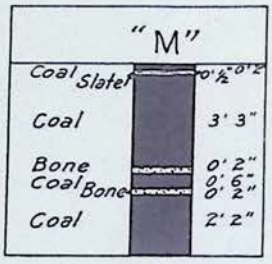


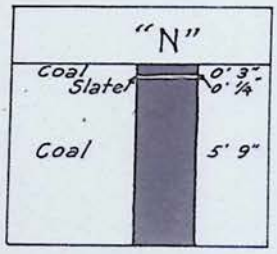


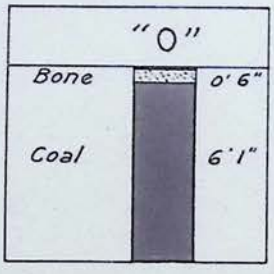


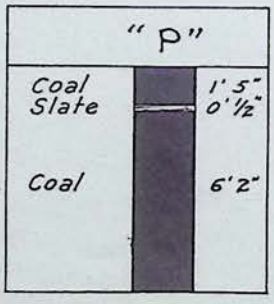












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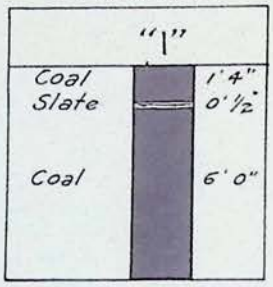

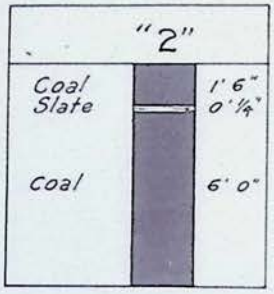

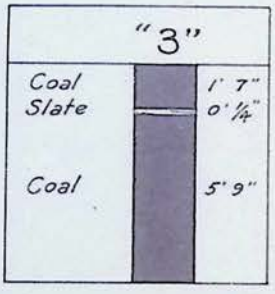

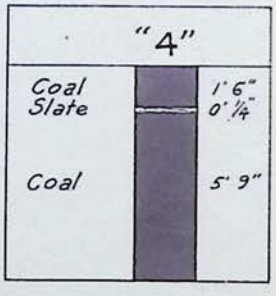

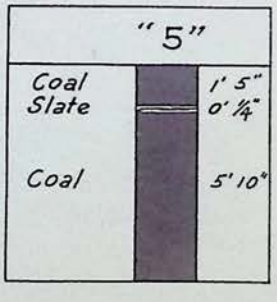

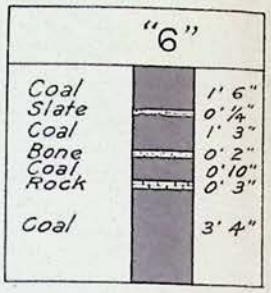

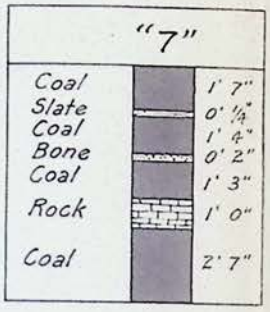

To illustrate Report of John McNeil