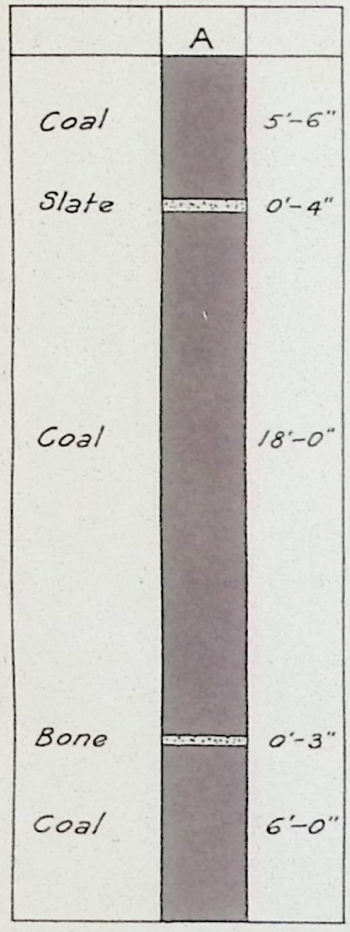
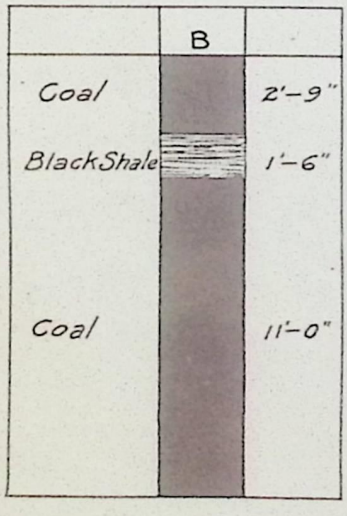
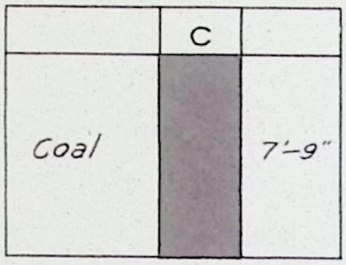
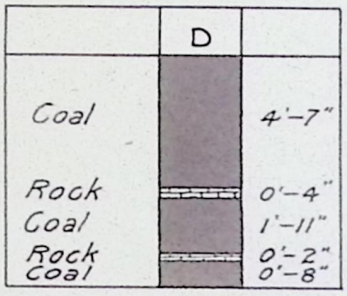
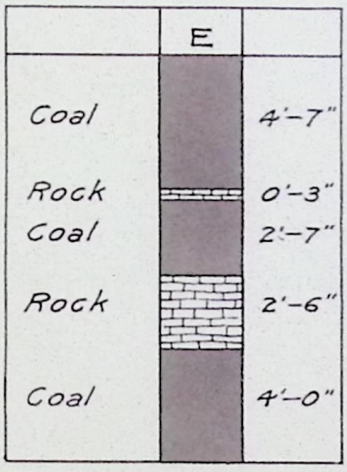
SHEET OF DIAGRAMS
SHOWING
SECTIONS OF COAL SEAMS
IN
Nº 2 MINE
"IDEAL SECTION" OF FULL COAL SEAMS
HANNA WYOMING

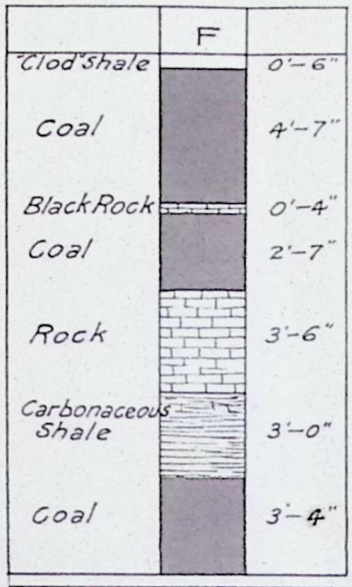


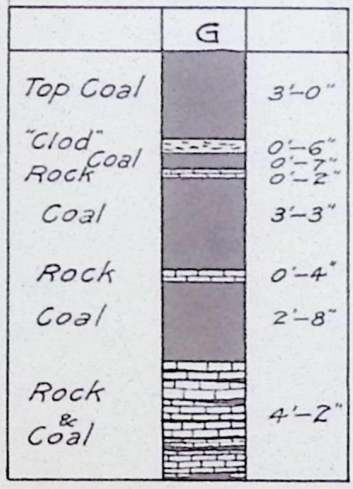


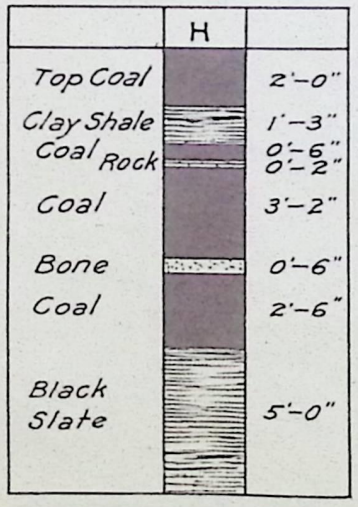


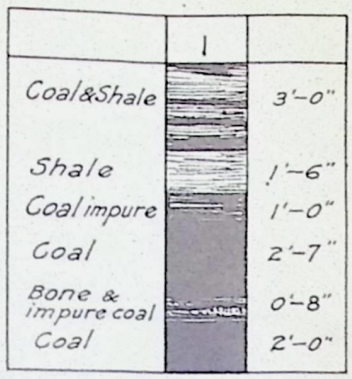


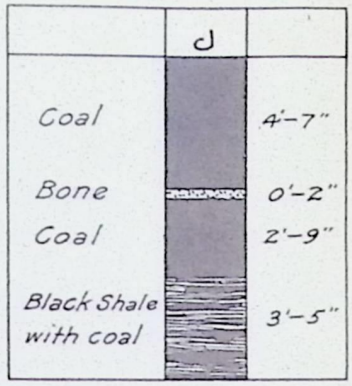


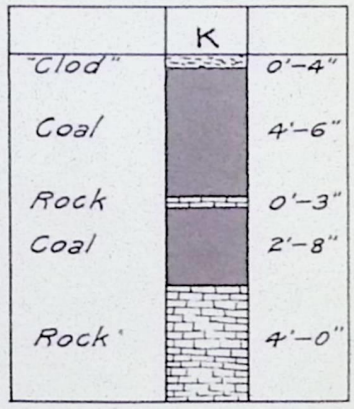


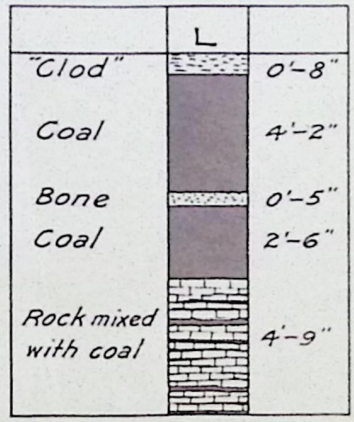




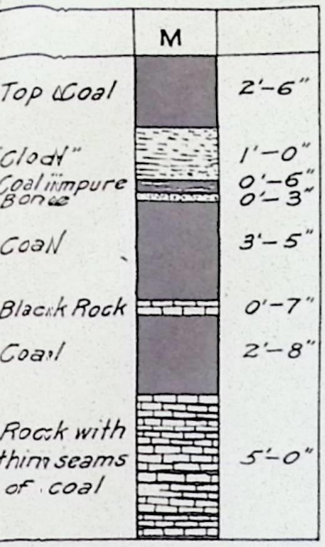


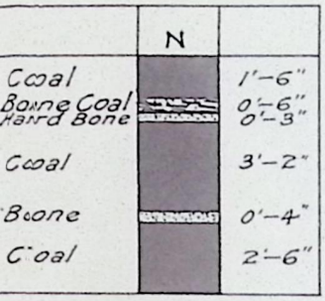


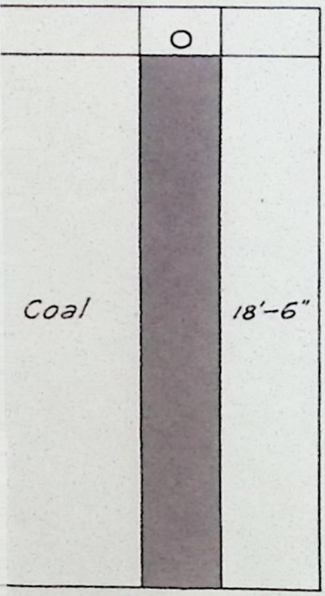


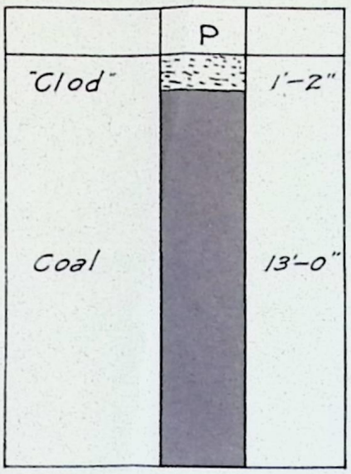


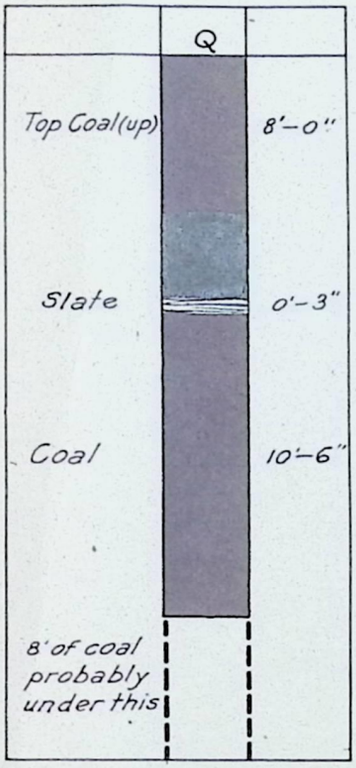
To illustrate Report of John McNeil

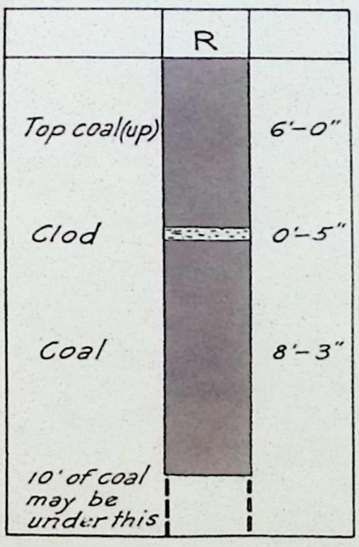

M
Top Coal
2'-6"
"Clod"
1'-0"
Coal impure
0'-6"
Bone
0'-3"
Coal
3'-5"
Black Rock
0'-7"
Coal
2'-8"
Rock with thin seams of coal
5'-0"

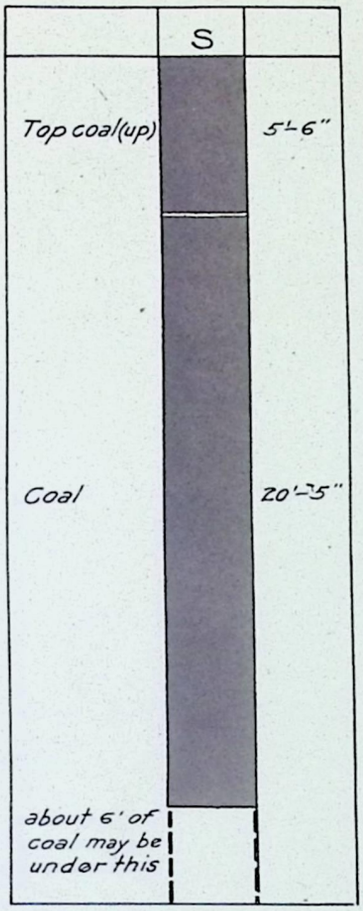

N
Coal
1'-6"
Bone Coal
0'-6"
Hard Bone
0'-3"
Coal
3'-2"
Bone
0'-4"
Coal
2'-6"

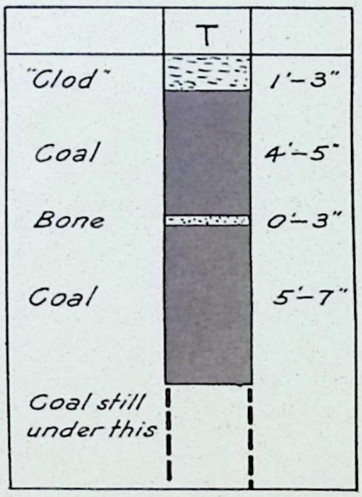

O
Coal
18'-6"


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

INDEX.

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

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

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

REPORT

On

THE 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 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 impertance 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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