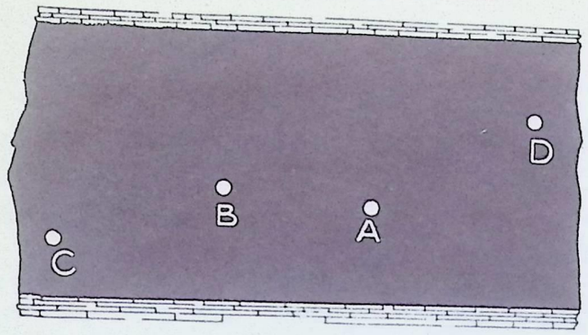
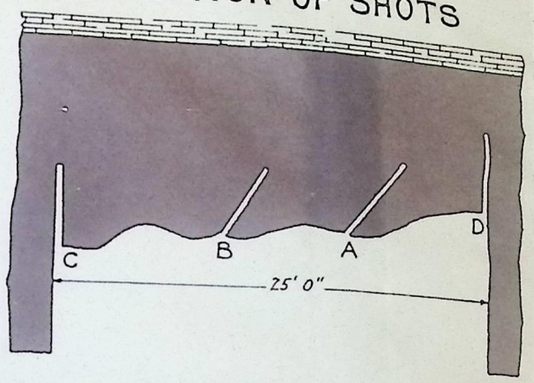
PLEASANT VALLEY MINE
SCOFIELD UTAH

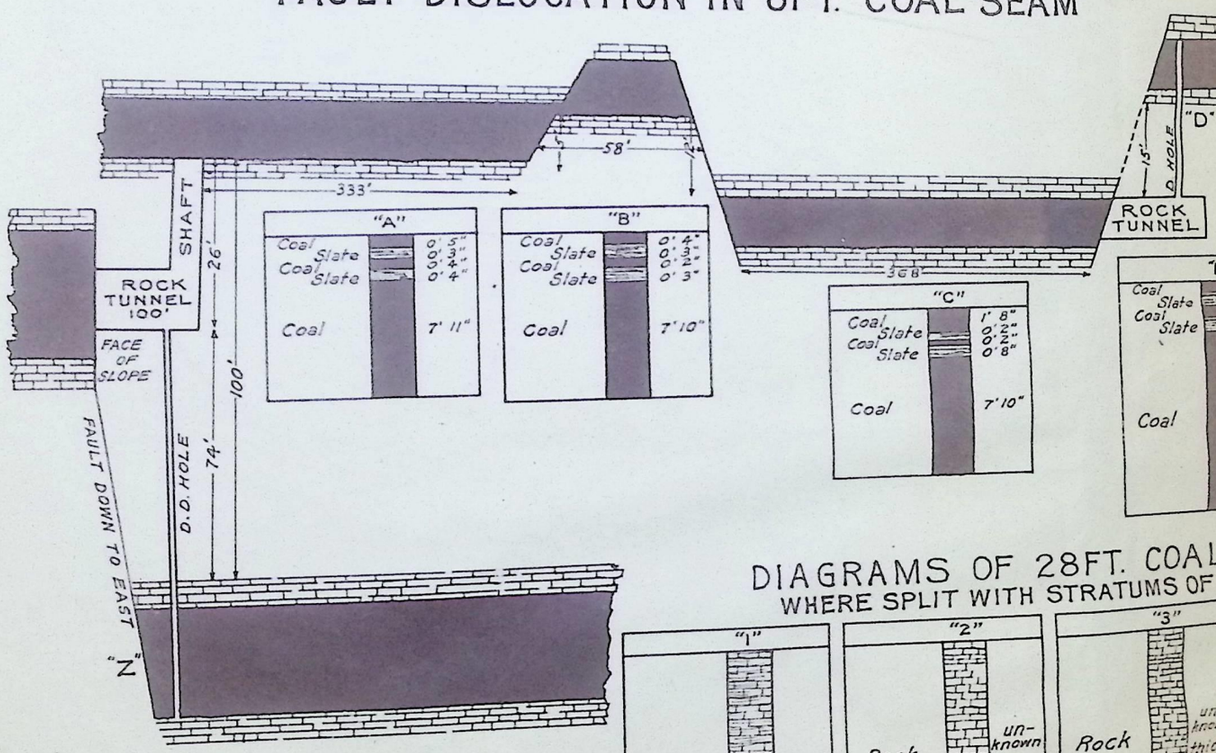
VERTICAL SECTION OF ROOM SHOWING POSITION OF SHOTS



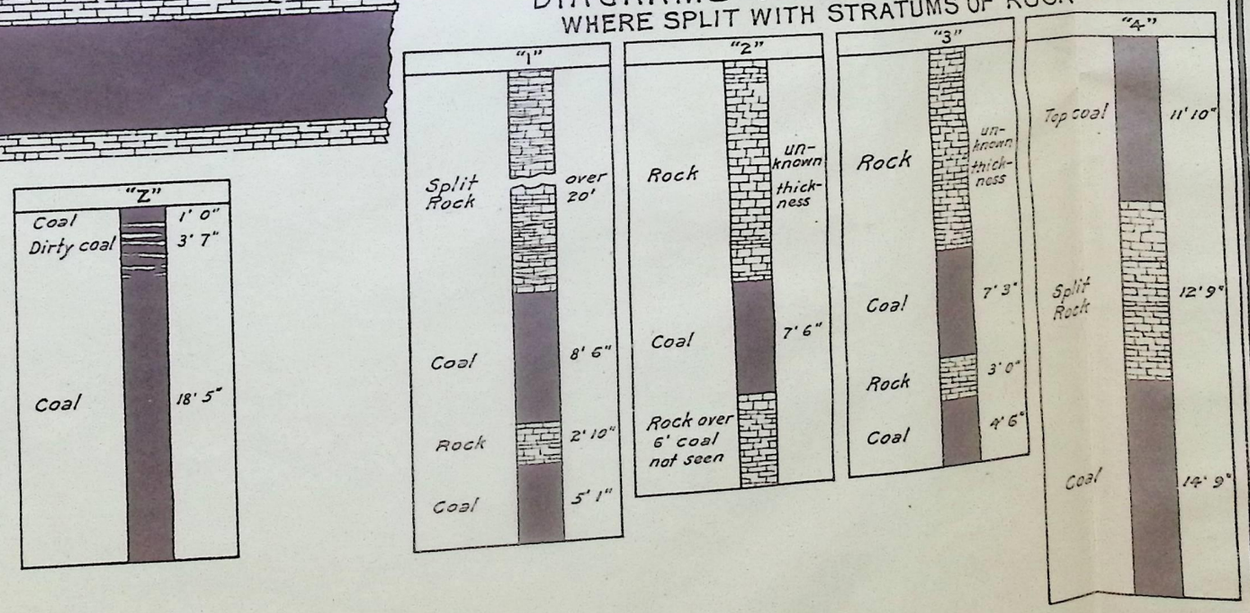
HORIZONTAL SECTION OF ROOM SHOWING POSITION OF SHOTS



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.

J. McNeil, M.E.
Consulting Engineer
EQUITABLE BUILDING.
DENVER, COLO.
MINE 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 88 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 eject their dangerous tongues of fire.

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.

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