Reports

Dated
12/31/1907

Bernal Mine

TONY BOLA, being first sworn, testified as follows:-

Q. What is your name ?
A. Tony Bola.

Q. And your occupation ?
A. Miner in the Bernal Mine at Carthage.

Q. You were working in this mine on Tuesday 31st. December ?
A. Yes, sir.

Q. In this pillar ?
A. Yes, sir.

Q. Who drilled this hole that we are looking at now?
A. I did.

Q. To what depth was it drilled ?
A. Four feet or more; yes, more than four feet.

Q. How much powder did you put in that hole ?
A. Two and a half sticks.

Q. What powder did you use ?
A. Giant powder.

Q. Was any black powder put in that hole ?
A. No, sir.

Q. What condition was the giant powder in that you used, was it thawed or frozen ?
A. It was frozen.

Q. What shape was this ground in here before you fired that shot; the same as now ?
A. The same as now.

Q. Then this hole has not broken any coal ?
A. No, none at all.

Q. How much ~~powder~~ tamping did you have on your powder ? E.O.G.
A. Six or seven inches.

Q. Your partner who was working in here; what is his name ?
A. Joe Andriole.

Q. Did you light that fuse before you left ?
A. I lit that one in the upper place, but not that one.

Q. Did your partner come down when you came down ?
A. No, I left him there.

Q. What time did you leave the mine ?
A. Ten minutes to twelve.

Q. Did you hear the explosion when it occurred ?
A. No, sir, I was at home. I loaded it but my partner fired the shot. My partner and I were working together and helping each

other. We had fired shots along that rib the day before.

Q. What depth were the holes fired the day before ?
A. About the same; about four feet .

Q. Was the powder you used the day before thawed or frozen?
A. Thawed.

Tony Bola

Personally appeared before me the foregoing subscribed deponent, Tony Bola, who, being first duly sworn, made the above statements in response to questions asked by Jo E. Sheridan, U.S.Mine Inspector for New Mexico. The said statements were taken in shorthand by me and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon

Justice of the Peace, Precinct No. 29
Socorro County, New Mexico.

JAMES RICHARDSON, being first sworn, testified as follows:-

Q. What is your name ?
A. James Richardson.

Q. How long since you first worked in the Carthage field?
A. At least eighteen years, off and on.

Q. Did you ever work in the old mines in this field; the old mines belonging to the Santa Fe Railroad ?
A. Yes, sir.

Q. How long did you work in the mines then?
A. About six or seven years.

Q. What did you do at that time ?
A. I was driving what they called the main slope.

Q. Then you would be one of the men to enter the new ground first?
A. Yes.

Q. If there was any gas in the field, opening the new ground, you would be more likely to know it and find it first than anybody else ?
A. You bet you.

Q. Did you ever find any gas in any of the mines in the Carthage field ?
A. None was ever heard of.

Q. You have been through the Bernal Mine to-day?
A. Yes, sir.

Q. You are familiar with all the different parts of the Bernal ?
A. Pretty near all.

Q. What do you consider the cause of the explosion which occurred at noon on the 31st. of December ?
A. I think it was caused by the shot blowing out the other way.

Q. The same shot we examined this morning ?
A. Yes, sir. It caught hold of the dust at the other end, that is the flames did, and then as they travelled they grew. That is all I know that could cause it. There could have been no gas at all. It was a real dust explosion and nothing but dust.

Q. Do you consider the mine was dangerously dusty under normal conditions ?
A. No, sir.

Q. Do you consider that that was an extraordinarily strong shot?
A. No, it was not.

Jas. Richardson

Personally appeared before me the foregoing subscribed deponent, James Richardson, who, being first duly sworn, made the above statements in response to questions asked by Jo E. Sheridan, U.S. Mine Inspector for New Mexico. The said statements were taken by me in shorthand and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon
.....
Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

S. W. ELWOOD, being first sworn, testified as follows:-

Q. What is your name ?
A. S. W. Elwood.

Q. Your occupation ?
A. Mine foreman.

Q. Are you a practical coal-miner ?
A. Yes, sir, and have been for twenty years.

Q. Did you ever work in this field before this time ?
A. Not in this district; have been in this field twelve months to-day.

Q. During the time you have worked in this field, have you ever found any gas in any portion of the mine in which you were working ?
A. No trace of gas whatever.

Q. State what mine you are foreman of?
A. The Hilton Mine.

Q. The Hilton is on the same coal seams as the Bernal mine ?

A. Yes, sir.

Q. Have you ever known, or had any reason to believe that there was gas in the Bernal Mine, or in any other of the mines in this district ?
A. No, sir, I have never had any reason to think so.

Q. Were you with the Mine Inspector and party who inspected the Bernal mine this morning ?
A. Yes, sir.

Q. Did you see the shot which was picked out this morning ?
A. Yes, sir, I was present.

Q. What is your opinion as to the cause of the explosion which occurred in the Bernal Mine at noon of December 31st.?
A. Well, it is my opinion that the shot that we located as the cause of the explosion originated from the condition of the dynamite, and the flames, spewed out through the coal, ignited the dust on the outside.

Q. Did you see on the interior end of the shot a chamber made by the powder ?
A. Yes, sir.

Q. Was the coal around the walls of that chamber crushed to powder?
A. Yes,sir.

Q. What effect do you believe that powdered coal around that chamber would have on being blown out through the crevices you saw in that coal seam ?
A. That crushed or powdered coal in the chamber would contribute to the outside combustion attributed to the powdered coal being blown out.

Q. Then you believe it would help to initiate a dust explosion ?
A. Sure.

Q. Do you believe that that was the manner in which the explosion originated in the Bernal Mine on December 31st.?
A. Yes, sir, that is my honest conviction from what I saw.

Q. Do you consider the Bernal Mine, from what you saw of it, to be in a dangerously dusty condition under normal conditions ?
A. No, sir, not from what I saw of it under normal conditions.

Q. From what you saw of dust in the roads and entries and other places, would you call it more than ordinarily dusty for a well kept mine ?
A. No, sir, nothing out of the ~~axix~~ ordinary.

S W Elwood

Personally appeared before me the foregoing subscribed deponent, S. W. Elwood, who, being first duly sworn, made the above statements in response to questions asked by Jo W. Sheridan, U.S.Mine Inspector

for New Mexico. The said statements were taken in shorthand by me and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon
.....
Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

FRANK WILLIAMS, being first sworn, testified as follows:-

Q. What is your name ?
A. Frank Williams.

Q. What is your business ?
A. Mine Foreman.

Q. How long have you worked in coal mines ?
A. Ever since I was a boy I guess; about 25 to 27 years off and on.

Q. How long since you first worked in the Carthage field ?
A. I worked here four years ago for the Victor Fuel Company.

Q. What mine are you now employed in ?
A. The Government Mine, as Mine Foreman.

Q. Is the coal seam operated in the Government Mine the same as that worked in the Bernal Mine ?
A. Practically the same, to the best of my belief.

Q. Have you ever found any gas in the Government Mine ? When I say "gas" I mean Firedamp ?
A. No, sir.

Q. From what you have learned in this field in regard to the coal and the mines, do you believe, or have you any reason to think, that there is any gas present in the Bernal or in any other of the Carthage Mines ?
A. No, sir, I do not believe there is any gas; I never found any.

Q. Are you familiar with the workings of the Bernal Mine ?
A. No, I have never had any experience in the Bernal. I have been through it but have never worked in it.

Q. Did you go into the Bernal Mine on the day of the explosion ?
A. Yes, sir.

Q. Did you go through many of the workings ?
A. Yes, sir.

Q. Through what proportion of the workings did you go ?
A. Practically through all of them before the next morning. At twelve o'clock that night I was at the bottom of the back slope.

Q. You assisted then in opening up the Mine and freeing it from After-damp ?
A. Yes, sir.

Q. You went through all the portions of it which were practically in operation before the explosion took place ?
A. Yes, sir.

Q. Were you with the Mine Inspector and party who went through the Bernal Mine this morning ?
A. Yes, sir.

Q. Did you see the hole at the point where it was thought the explosion originated ?
A. Yes, sir.

Q. Now, speaking solely for yourself and giving your own opinion solely, as fully and plainly as possible and without any desire to coincide with anyone, do you really think the explosion did originate at that hole ?
A. Yes, sir, I do.

Q. Now, will you please state your opinion as to gas and how the explosion originated at that hole ?
A. I believe the explosion originated, from what I have seen of it, from frozen giant powder that crushed. It probably burned a little and partly exploded, blowing the dust through the crevices and igniting it on the outside. That, to the best of my belief, was the cause of the explosion.

Q. Do you consider that the mine was dangerously dusty under normal conditions from what you saw of the openings, roads and entries ?
A. No, sir, I do not. I do not think a powder explosion would have caused any trouble.

Q. Do you consider that that shot was in itself too strong or dangerous as a shot? Would you have condemned such a shot ?
A. I would not.

Frank Williams

Personally appeared before me the foregoing subscribed deponent, Frank Williams, who, being first duly sworn, made the above statements in response to questions asked by Jo M. Sheridan, U. S. Mine Inspector for New Mexico. The said statements were taken in shorthand by me and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon
Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

Statement of PABLO ESPINOZA and JOSE GUTIERREZ, two men employed in the Bernal Mine at Carthage on the day of the explosion - December 31st.'07.

In reply to questions put to them through the medium of an Interpreter these men made a statement to the following effect :-

They were starting out from the mine for their dinner when the explosion occurred. They were at once knocked down and their lights were blown out. They lay where they had fallen for about, to the best of their ability to judge, five minutes, when, recovering themselves, they started off again in the darkness to go home. The gas was very strong. Asked how far they were from their room when the explosion occurred, the men replied that they were somewhere near that place, but could not say just exactly what distance away from it. Coming out they felt or met the gas and decided to go in again, staying in about five minutes when they, on their way out, met the rescue party coming in.

These men were not put under oath, doubts existing as to their ability to understand the nature of an oath.

Personally appeared before me the foregoing Pablo Espinoza and Jose Gutierrez, who, being asked questions by Jo M. Sheridan, U. S. Mine Inspector for New Mexico, through the medium of an interpreter, made through the same interpreter a statement from which the above notes were taken by me in shorthand and afterwards transcribed by me upon a typewriter, and I declare these notes to be the sum and substance of the statements made by the two men in question.

E. Douglas Gordon
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Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

WALTER C. BOLLES, being first sworn, testified as follows :-

Q. What is your name ?
A. Walter C. Bolles.

Q. What is your occupation ?
A. Assistant clerk in the office of the Carthage Fuel Company at Carthage, New Mexico.

Q. Have you ever mined any ?
A. Yes.

Q. In a coal mine ?
A. Yes.

Q. Then you are familiar with coal mines ?
A. Yes, to some extent.

Q. What did you do ?
A. Worked with a tamper gang; machine gang; and other gangs.

Q. You were Foreman of the Coroner's Jury yesterday ?
A. Yes, sir.

Q. That Jury returned a verdict that the explosion was from causes unknown?
A. No, sir. The verdict was that the men sustained their injuries from a coal dust explosion which originated from causes unknown.

Q. Have you since learned anything that would inform you as to the cause of that dust explosion ?
A. Yes, I was one of the party which went through the mine to-day, and we saw what I would think might have been, and could have been, the cause of the explosion. We found a place where a blast had been prepared and where the tamping had not been blown out of the hole. The coal around where the blast was placed was coked, and many deep cracks and fissures were in it, which, considered with the statement of the man who made the shot, that he had loaded the hole with frozen dynamite, would lead to the supposition that only a part of that dynamite had exploded, and that the rest had burned, thereby igniting the dust.

Q. Was there any evidence on the outside of the coal that the flame had been projected through those fissures and cracks ?
A. Yes, sir. We found coal dust coked around the edges of the cracks which would lead to the supposition that the dust, coming from the inside, had ignited there and was deposited on the outside, in the form of coke.

Q. Were you with that party when they went and examined other shots which had been fired on the same day?
A. Yes.

Q. Did you see any of the same coked conditions on the outside from these other shots ?
A. I did not notice them.

Q. Do you think you would have noticed them if they had been on the outside ?
A. I think so.

Q. Would you, as a member of that Coroner's Jury, render the same verdict, that the explosion was from an unknown cause, if you had had the same information before you at the time of the inquest?
A. No, I would not. At that time the only expert investigation had been made by the Mine Inspector, and he had not been able to penetrate that far into the mine at that time. We rendered our verdict, of course, on such testimony as we had before us.

Walter C. Belles

Personally appeared before me the foregoing subscribed deponent, Walter C. Belles, who, being first duly sworn, made the above statements in response to questions asked by Jo E. Sheridan, U. S. Mine Inspector for New Mexico. The said statements were taken in shorthand by me and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon
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Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

ROBERT BERRY, being first sworn, testified as follows :-

Q. What is your name ?
A. Robert Berry.

Q. What is your occupation ?
A. Mine Foreman .

Q. Are you a practical coal miner ?
A. Yes, sir, and have worked in coal mines for fifteen years.

Q. How long have you worked in the Carthage field ?
A. About one year and five months.

Q. What mine are you employed in ?
A. In the Bernal just lately, but have been working in the Government mine three months ago.

Q. Do you believe that the Government and the Bernal Mines are on the same coal seam ?
A. Yes/ I do.

Q. Have you ever found any gas, commonly known as Firedamp, in either of these mines ?
A. No, sir.

Q. Were you working in the Bernal Mine on December 31st. 1907 ?
A. I was.

Q. What were you doing ?
A. I was Mine foreman on that date.

Q. Are you familiar with all the workings of the Bernal Mine ?
A. I am.

Q. Have you been in the mine, and how often have you been through the mine since the explosion occurred ?
A. That would be pretty hard to tell.

Q. You can say, I suppose, that you have been in the mine constantly, off and on, ever since the explosion occurred ?
A. Yes, sir.

Q. Have you examined the mine with a view to finding out the origin of that explosion ?
A. Yes, sir.

Q. Will you state what in your opinion originated that explosion ?
A. Well, I don't know; only a windyshot is all I can account for it.

Q. Where do you think the windy shot was that caused the explosion ?
A. In the pillar of number Three room.

Q. Did you examine that shot since that explosion ?
A. Yes, sir.

Q. Will you please state what you did and in what condition you found it ?
A. It was full of slits, well broke up, and the hole was shivered and cracked at the back end of it.

Q. Did you find evidence of flames having been projected from those fractures and fissures ?
A. Yes, sir.

Q. What evidence was there that flames had been projected through those fissures ?
A. The outside of the coal was coked.

Q. Do you consider that that mine was in a dangerously dusty condition under normal conditions ?
A. Yes, it was pretty dusty.

Q. Where were the dust accumulations principally in the mine ?
A. On the haulage way where the mules were working.

Q. On that level ?
A. Yes, sir. Not much coal dust but a great deal of rock dust.

Q. Not much coal dust, you say ?
A. No, only a little, most of the dust being rock dust.

Q. Is there much, and has there been much, coal dust stirred up in the haulage ways by the running of the trips ?
A. No, sir.

Q. Are there any places in the mine, where the dust comes up on the track, where coal dust is allowed to accumulate around in any quantities in any parts of the mine ?
A. No, sir, not that I know of.

Q. Have you worked in any other mines besides the Carthage Mines ?
A. Yes, sir, I have worked in quite a few.

Q. In what condition was this mine, compared as to its cleanliness and freedom from dust with any other mines that you have worked in ?
A. Just about the same. It is always pretty dusty on the roads where the traffic is in all mines.

Q. What kind of powder is used in the Bernal Mine ?
A. Giant.

Q. Do you allow your men to shoot with any other kind of powder in there than Giant powder ?

A. No, sir.

Q. Do the men generally shoot the coal ?
A. Yes, sir.

Q. Do you know in how many places shots were fired in the coal that day ?
A. Well, not exactly; I can't tell exactly. There were six that I know of.

Q. Six places that shots were fired that day ?
A. Yes, sir.

Q. Have you examined those places since the explosion ?
A. I have.

Q. Have you found any evidence that would tend to the belief that the explosion originated at any of the other points than the one you first named ?
A. No, sir. The old slope was sprinkled the day before, and therefore there was not much dust on it.

Robert Berry

Personally appeared before me the foregoing subscribed deponent, Robert Berry, who, being first duly sworn, made the above statements in response to questions asked by Jo B. Sheridan, U. S. Mine Inspector for New Mexico. The said statements were taken in shorthand by me and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon.
Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

T. L. Weber, being first sworn, testified as follows :-

My name is T. L. Weber, and I am the Mine Superintendent of the Mines at Carthage, New Mexico. On December 31st. 1907 about twelve o'clock, noon, there was a dust explosion in the Bernal Mine at this place. Upon examination of the Mine after the explosion, I found that the dust explosion was caused by a bad shot in one of the pillars in No. 3 room off the first right level, of the first right dip entry. I found that the shot had been fired and had fractured the coal, and, instead of the shot doing its work, it did not blow out the tamping but blow out through the crevices and fissures in the coal.

I learn from the man who put in the shot - by name Tony Bola, - that he had loaded this hole with frozen Giant Powder, and it is my

opinion that only a portion of this powder was discharged in the usual way, the balance of the powder blowing flames through the fissures. All indications in the mine show that the origin of the explosion was at this shot. On the outside of the coal, where the shot was placed, was found large quantities of coke, which is evidence of the flaming which took place when the shot was fired.

I have examined every working place in the mine thoroughly, and this is the only shot in the mine which shows any evidence of mis-firing. I do not consider that this mine was dusty to a dangerous degree, and some of the principal roads xxxxxx were wet. I have never encountered any gas in any of the three mines here at Carthage, and all of these mines are on the same coal seam. It is my opinion that the explosion was caused by this one bad shot.

W. L. Weber

Personally appeared before me the above subscribed deponent, W. L. Weber, who, being first duly sworn, made the above statement relative to the explosion in the Bernal Mine at Carthage, New Mexico, on December 31st. 1907. The said statement was taken by me in shorthand and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

E. Douglas Gordon

Justice of the Peace, Precinct No. 29,
Socorro County, New Mexico.

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Report upon Explosion in Bernal Mine, Carthage,
Socorro County, New Mexico, December 31, 1907.

At 4:45 p.m., December 31, 1907, I received the following telegram at my home at Silver City, N.Mex.

" San Antonio, N.M. Dec. 31

J.E. Sheridan, Silver
Dust explosion in Bernal mine at noon to-day, several killed and injured do not know number yet. W.L. Weber 330 "

Thirty-five minutes later, at 5:20 p.m., I left home in the omnibus for the depot. Left Silver City, N.M. 6 p.m., via A.T.& S.F.R.R. en route to Bernal mine at Carthage, N.M.; via San Antonio, N.M. Arr. San Antonio, N.M. 2:40 a.m., January 1, 1908. Left San Antonio, N.M. 3:30 a.m., via New Mexico Midland R.R., en route to Bernal mine. Arr. at Bernal mine 4:30 a.m. Immediately entered mine and proceeded with inspection of mine and investigation to determine location of origin, and cause of the dust explosion, from which resulted the immediate death of eight men; three others dying later from effects of their injuries, or eleven fatalities. The names of killed and injured are given herebelow, with location where found:

C.L. Wilcox; American; miner; age about 24 years; single. Relatives, brother, D.T. Wilcox, Marfa, Texas. Was found dead at foot of trestle, about 335 feet from mouth of new slope, whence he had been hurled by force of dust explosion. Instantly killed. Skull fractured and other severe injuries. In employment of company about 3 months.

Juan Renterilla; Mexican; age unknown; employed loading cars in mine; whether married or single, and residence of family or relatives, unknown. Was found dead on trestle 131 feet from mouth of old slope of Bernal mine, from whence he had been hurled by force of coal dust explosion; instantly killed. Skull fractured and other severe injuries. In employment of company 1 day.

Jo Canero, Slavonian; miner; age unknown; single, residence of nearest relatives, unknown. Instantly killed by coal dust explosion.

found dead on parting of 1st right level off 1st right dip. In employment of company 34 days.

Angelo Cogorno, Italian; miner; age unknown; single, residence of nearest relatives unknown. Instantly killed by coal dust explosion; found dead on parting of 1st right level off 1st right dip. In employment of company 2 months.

Giovanni Andrioli, Italian; miner, age unknown; single, residence of nearest relatives unknown. Instantly killed by coal dust explosion. Found dead between rooms 3 and 4 on 1st right level off 1st right dip of old slope.

Lorenzo Goretto, Italian; miner, age unknown; single, residence of nearest relative unknown. Instantly killed by coal dust explosion; found dead on parting of 1st right level off 1st right dip. In employment of company 1 month.

[redacted], Italian; miner, age unknown; whether married or single, and residence of family or relatives, unknown. Instantly killed by coal dust explosion; found dead between rooms 3 and 4 on 1st right level off 1st right dip. In employment of company about 1 month.

Z.T.Masterson, Ameridan; miner, age unknown; single, residence of nearest relative unknown. Injured by coal dust explosion; found alive on parting of the 2nd right entry of new slope of Bernal mine. Died within 10 minutes after being brought out of mine. In employment of company 1 day.

Grego Jackovich, Slav.; timberman; age about 45; married, wife and 6 children, residence of family unknown. Injured in Bernal mine Dec.31,1907, 12 M., by coal dust explosion, found unconscious on parting of 2nd right entry off new slope. Injuries were, face, neck hands and forearms very severely burned. Died Jan.5 of company 25 days.

Mack Walker, Ameridan; driver; age 19 years; single, father, J.F.Walker, resides at Coal Creek, Tennessee. Injured by coal dust explosion in Bernal mine, Dec.31,1907,12 M.,found unconscious on parting of 2nd right entry off new slope. Injuries were,face and back very severely burned, right are badly burned, right side of lower jaw broken and half of lower lip torn away. Died at 12:45 a.m.,Jan.7,1908. In employment of company 20 days.

Refugio Villanuera, Mexicanloading cars in mine; age 24 years; single, residence of family, Guanajuato,Mexico. Injured by coal dust explosion, at mouth of old slope of Bernal mine, Dec.31,1907, 12 M., Injuries were, right shoulder broken, left knee broken, three fingers broken, skull fractured, very severe scalp wound. Died Jan.15,1908, 1050 a.m. In employment of company 1 day.

Those injured in the explosion who will probably recover were:

Mat Brooks,American; miner; age 18 years; single. Found unconscious at 2nd right parting off new slope Bernal mine, after coal dust explosion, 12 M.,Dec.31,1907. Injuries were: face, neck and hands very seriously burned. In employment of company L day.

Benito Archuleta, Mexican; miner; age 27 years; married, number in family and residence unknown. Injured at mouth of old slope Bernal mine, by coal dust explosion, Dec.31,1907. Injuries were: Deep cut on right cheek requiring 5 stitches, cut under eye on same side, 2 stitches. Injuries not serious. In employment of company 1 month and 3 days.

Cornelio Wabaretta, Mexican; miner; age 32; married, number in family and residence unknown. Injured at mouth of old slope of Bernal mine, Dec.31,1907, by coal dust explosion. Injuries very slight,bruises on left shoulder and right side. In employment of company 3 days.

The dead and injured had been removed from the mine before my arrival. I am reliably informed that within 10 minutes after the explosion the mine superintendent, W.L.Weber, together with a coal-cutting machine runner, named T.W.Woods, at the imminent risk of their lives went into the new slope of the mine and proceeded with the rescue work. They were followed into the mine by W.C.Bolles and J.A.Webb, but Webb turned back after going a short distance down the slope, with the intention of securing help, and Bolles had no lamp and went back to procure a lamp, Dense smoke and foul atmosphere was encountered about 75 or 80 feet inside the mouth of slope. Proceeding down the slope, at a point about 190 feet from the mouth of the slope, the two rescuers met the two Mexican miners, Pablo Espinoza and Jose Guiterrez, making their way out of the mine. They were nearly overcome by the effects of foul air, but were otherwise absolutely uninjured. When discovered they were supporting themselves against the rib and moving along as best they could. The better air was travelling down the middle of the slope, and the rescuers put them into the better air and started them for the top which they reached in safety. After resting a few minutes one of them complained about the manner in which the sooty particles had penetrated his clothing and settled about his neak and body; Within an hour they joined the rescue party and returned to the mine.

These men are mexicans from Old Mexico, who do not understand anything said to them in English. They were questioned by the mine Inspector through an interpreter and their replies were transcribed as literally as possible and their relation of their experience is hereto appended. But little could be gained fromtheir recital of their experience although ~~a rare and thrilling one~~; they seemed to have had no opportunity to observe any phenomena connected with the explosion. They had been working at No.4 room, off 2nd right entry, off new slope. They had started out to dinner, and from the manner in which they described their actions they were on the entry, about 35

feet from their room, and about 200 feet from the slope, when the explosion occurred, knocking them down and extinguishing their lights. They lay where they had fallen for about, to the best of their ability to judge, five minutes, when recovering themselves they lighted their lamps and started out of the mine. The gas was very strong. Asked how far they were from their room when the explosion occurred, the men replied that they were somewhere near that place but could not say just exactly what distance they were away from it: Coming out they felt, or met the gas and decided to go in again, staying in about five minutes, when, having started out again, on their way out they met the rescue party coming in.

These two men, Espinoza and Guiterrez, in coming out of the 2nd right entry stepped over the bodies of Masterson, Walker, Jackovich and Brooks, who were lying near the mouth of 2nd right entry, very seriously injured and unconscious; the three first named having since died from the effects of their injuries. The four above named injured men were sitting eating their noon-day meal, at a point about 10 feet from the slope, and about 170 feet outside of where Espinoza and Guiterrez were when the explosion occurred. When Espinoza and Guiterrez met the rescue party they told them there was three or four men just below where they met.

When the mine inspector first entered the Bernal mine at 4:30 a.m. January 1,1908, the ventilation had not been restored, and considerable, mine dust, together with a fine feathery soot was in suspension in the air within the mine. Proceeding down the new slope, at a point about 60 feet below the mouth of the slope, a rock weighing about 25 pounds had been broken from the massive sandstone of the roof, by the force of the explosive wave and had been carried 20 feet up the slope and dropped. The rock surface in the roof, at the place from which the piece had been detached, exhibited a clean irregular fracture, not along a cleavage plane or jointing of the rock. The sandstone at this point exhibits concretionary structure, and it appeared as if a mass of rock had protruded downward from the roof, which at this point is 8 or 9 feet high, and that the force of the explosion had torn off a portion of the protruding

a portion of the protruding rock, with such violence as to indicate a detonating or explosion at this point. And this secondary explosion is quite probable, because the slope suddenly increases in height at this point; below this point the height is from 5 feet to 5 feet 6 inches, but suddenly rises to 8 or 9 feet in height. The explosive wave carrying an excessive quantity of coal dust in proper condition for an explosion, but lacking the necessary oxygen in the smaller area below, the sudden accession of an ample supply of oxygen at the larger area might produce another explosion as indicated by the fracturing of the rock protruding from the roof of the entry. Proceeding down the slope to the second right entry we found every evidence that the explosion had come from the second left entry off the new slope, which entry connects with the first right level off first right dip of the old slope. At this point props, timbers and debris were blown outward from interior of 2nd left entry toward the new slope. Going into the second rightentry, at the point where Masterson, Walker, Jackovich and Brooks were injured, we found the caps of two of the men, one of the caps being much bloodstained, we also found a shoe belonging to one of the men at the same place as well as their dinner buckets from which they had apparently been eating; the dinner buckets were not upset but the upper compartment of one dinner bucket was blown about 65 feet inward along the entry to the top of the shallow dip on lower side of entry between points markdd 1 and 2 on map. Opposite this point on the upper side,(marked A on map) a room has been driven up to a crosscut between second right entry and first right entry. At the upper end of this room,marked on map, a mule was found by the rescue party, alive, but died within an hour; the mule was badly burned on one side and the head cut and bruised. It is supposed that the mule was standing on the 2nd right entry,near the mouth of this room,and after being burned by the explosion ran up into the room, bruising and cutting its head by striking against the roof and timbers. It is thought probable it died from the effects of the

afterdamp as its injuries were otherwise not serious enough to have killed it unless it had drawn some flame into its lungs in the act of breathing just when the explosion reached it. The reason for these surmises is, that there was little, if any, violence exhibited at the mouth of the room below where the mule was found.

It was quite apparent that the explosion had come out of the 2nd left entry and had turned up the slope following the intake air, and that only a very small proportion of the force, directed by a tangential impulse, crossed the slope into the second right entry. There was a comparitively light deposit of soot throughout the room where the mule was found and in the crosscut to the slope. While this sooty deposit was much less than in other parts of the mine where the explosion had travelled, yet it was much greater than at any point on the entry or rooms farther in from the slope, and indicated that a lesser branch of the explosion had crossed the slope and had found egress to the slope and air again through this room and crosscut.

It will be noticed that this room and crosscut is the last connected circuit for air to travel through on the second right entry. The action of the explosion and the effects produced at this point and beyond to the face of the 2nd right entry is well worthy of mature consideration.

It is evident that the force of the explosion cushioned against the air in the dead end of the entry, this is indicated by the concussion which knocked down Espinoza and Guiterrez. But if it not probable that if there had been a brattice or curtain down the middle of the entry carrying a fresher current of air to the face, that a part of the explosive wave, and the flame, would have followed to the face of the entry and have killed Espinosa and Guiterrez, as the mule was killed in the room as before cited. The dead ends of the entry and rooms would be there just the same, but the better supply of oxygen would be there to encourage the invasion of that section by

the explosion. (In this connection might be considered the slowing of the fan at shot firing time, in non-gaseous mines.) We proceeded to examine all workings along the 2nd right entry, inside of room where mule was found, but beyond this point there was no evidence of violence in the entry or rooms, everything being undisturbed. In No.2 room, where Masterson worked, his bottle of oil and some loose cartridge paper, was lying, apparently as he had left it, undisturbed by a shot he had fired in the pillar, starting a crosscut. This shot had done good work and broke clean. In the face of this roomwas found a bad stump of a hole fired on the solid a day or two before but it had been cleaned up and could not have been fired that day. The man who fired this shot had been discharged the day before for negligence in shooting and timbering, and Masterson had worked his first shift that day in the place of the man discharged.

Coked dust was found in small quantity on the inner side of the cap timbers between the slope and first room on 2nd right entry, but none beyond. On some of these timbers the coked dust would pass without detection by the eye, but was easily recognized by sense of touch, the aggregation of granular particles being distinctly different from the sensation given by feeling of charred timbers. Leaving 2nd right entry and following down the slope, there was little evidence of an explosion on the slope between the 2nd and 3rd entries, only a very slight deposit of soot, which would scarcely be noticeable under ordinary conditions. A board brattice, with a regulator door in it,to distribute the air to the new slope and to the balance of the mine, which had been erected at mouth of the third left entry, was blown across into the 3rd right entry and a little debris was blown inward on the 3rd right entry. At the mouth of the 3rd left entry off new slope, which corresponds and connects with 2nd righ level off 1st right dip of old slope, a more disturbed condition was found but nothing indicating much flame, nor extreme violence; debris, chips, timber,etc.,being blown outward toward the new slope.

Proceeding to the bottom of the new slope, there was no indication whatever below the 3rd entries that any disturbance had occurred.

Retracing our way back to 3rd left entry and proceeding toward the old slope we found a seriously disturbed condition, indicating recent violence but with little heat or flame. Timbers were blown out and hurled toward the new slope; the bark blown off and shredded, the debris gathered in bunches here and there. Fine particles of soot and dust were thickly suspended in the air at this time, about 18 hours after the explosion. Yet withal there was little evidence of heat of flame; the dry shredded cottonwood bark from the timbers was not burned nor singed, nor was there any heavy deposit of coke at any point along this entry. All the conditio indicated that there was little, if any, additional impetus given to the explosion along the entry, and that the major part of its energy and heat was developed soon after leaving the initial point. There is good and sufficient reason for this: it will be noticed that a fault crosses the entry about 200 feet from the new slope; to carry the proper grade it was necessary to run the entry in rock for a considerable distance, the crushed white sandstone producing a fine white dust which covered the flo of the entry for a considerable length. Every foot-step could be distinct traced by the white groundwork showing through the deposit of soot along the floor of the entry, demonstrating that there was not sufficient coal dust in the mixture to render it black in color. This entry has only recently been connected with the new slope and enough coal has not been transported through it to produce a very perceptable deposit of coal dust on the floors of the rock sections. Hence it is probable that there was little explosive dust in the rock sections. Again the rock dust was fine and would be thrown in suspension along with the coal dust and would serve to obstruct the communication of heat and flame between the particles of coal dust thrown into the air along with it. At this time, about 6 a.m., there was yet considerable after-damp in the mine openings, and as ventilation was not restored I did not consider it advisable to explore the lateral workings off the main entries, where the atmosphere seemed to be quite foul and where continued breathing of an atmosphere containing CO might produce injurious or even fatal results upon one or

all of the party. Traversing 3rd left entry to the slant to 2nd right entry, between rooms 3 and 4, we went up the slant to 2nd right entry nea the place where the bodies of Giovanni Andrioli, Lorenzo Goretto and Mike Lekich were found. Examined this locality and second right entry towards new slope. No dinner buckets were found and it is probable from the position in which the bodies were found that the men had just fired the shots which produced the explosion and were travelling outward toward the new slope when killed by the explosion. That they were travelling out is indicated by the position in which the bodies were found. The bodies were 4 or 5 feet apart, lying with heads toward new slope and bodi pretty well extended. As the level is scarcely high enough for an ordinary man, of 5½ feet in height, to stand erect in, they would naturally have their bodies bent forward causing them to fall in about the position they were found in. On the other hand, had they been sitting down, they would have probably been sitting closer together and would have fallen over on their sides or backs, and not in an extended position as found. From this point we proceeded along the 2nd right entry off new slope, or 1st right level off 1st right level off old slope, as it will be called in the section of the mine tributary to the old slope. At the 2nd crosscut from 1st right dip entry, the stopping was blown out between the 1st and 2nd right levels. At the first crosscut from 1st right dip, the board stopping had a hole about 4 inches in diameter, blown through it near the top, as if a rock were driven through it.

Following the 1st right level onward toward 1st right dip entry, on the parting about 40 feet before reaching the junction of the 1st right level with 1st right dip entry, the bodies of Joe Canero and Angelo Corono were found. Between the parting and the 3rd crosscut above mentioned, it was difficult to determine which direction the explosion was travelling for a distance of about 120 feet. While there was no excessive violence exhibited, yet timbers and debris were strewn in either direction. Near the junction of the 1st right level with the old slope, a door on the level was found open, but the board brattice alongsid

the door had three boards broken and blown out toward the slope. I was informed that the last trip had gone out of the slope a few minutes before noon and that the rope rider had requested the two men, whose bodies were found on the parting, to close the door after the trip would leave. It is almost certain the door was open at the time of the explosion, as it was not injured in the least; if it were closed it would probably have been broken or torn from the hinges. At the parting where the last named two victims were found, an unused door, which had been standing against the rib, was broken in two, exhibiting the presence of great violence, and one-half thrown upright against a post in the middle of the parting. A car standing on the parting had debris thrown and collected upon the bumpers on the end next the slope and next the 1st right dip. Going down the 1st right dip we found indications of greater violence than at any other part of the mine, and the force was exerted from below upward toward 1st right level. Cars standing on the parting had heavy accumulations of debris on the bumpers at the lower end, and timbers were blown upward toward the levels above. There was however, but little violence shown in the old slope below the 1st right level. At the 2nd right crosscut from the the bottom, a miners toolbox, belonging to James Richardson, was standing a few feet from the slope in the crosscut. James Richardson stated that the box was locked. In this box was 10 sticks of dynamite (3 pounds), also a cap box containing 6 or 7 giant caps. The powder and caps in this box exploded, totally destroying the tool box. At other points along the route of the explosion tool boxes, with powder in them, were undisturbed. In this locality, outside of the immediate vicinity of the destroyed tool box, there was no indication of the exertion of great violence.

On this first inspection it was not possible to reach the bottom of the slope below the last crosscut. An attempt to reach the bottom was made by the mine inspector but the air was too foul with after-damp to allow of going to the bottom of the slope or to the bottom of the 3rd and 4th left dip entries, without taking unnecessary risk of danger from presence of CO in small percentage. I instructed that a canvas brattice be extended to the bottom of the slope and to the bottom of 3rd and 4th left dip entries, to carry the air to the ends of these workings.

Proceeding toward the surface through the old slope of the Bernal mine we found little evidence of great violence until the mouth of the slope was reached, where the greatest violence was exhibited on the outside by the distances objects had been hurled; the body of Juan Renterilla being thrown 131 feet from the mouth of the slope and instantly killed, and Refugio Villanueva being hurled 110 feet from the mouth of the slope in the same direction, receiving injuries from the

effects of which he died fifteen days after.

Left the mine 8:30 a.m.; awaiting better ventilation for farther investigation of lateral openings. After coming from the mine made inquiries from those who had been in the mine during the forenoon preceding the explosion and immediately after the explosion, preceding my arrival. I attended as a witness before the Coroner's Jury, but could not at this time impart any information in regard to the cause of the explosion, as I had as yet discovered nothing to indicate the cause of the explosion.

At this time I thought the explosion had originated near the face of the 3rd left dip entry off the old slope, where the machine had been cutting the day previous, and where two holes had been drilled by James Richardson and his mexican helper, to remove the block of coal cut by the machine. Although Richardson said he had not fired the holes, and and said he had the dynamite and fuse and caps locked in his tool box and had the key himself, so that his helper could not have fired the holes, yet it was the most probable place to look for it, as the quantity of drillings from the machine would furnish the most favorable condition, and the most violence being shown at the new slope at the farther side of the mine would indicate the explosion had travelled some distance, hence both W.L.Weber, the superintendent of the mine, and I were of the opinion it originated at the point mentioned, in the 3rd left dip entry off the old slope; and that Mr.Richardson was mistaken and that his helper had fired the holes that produced the explosion. This opinion, however, was proven to be wrong, as we afterwards found the holes had not been loaded.

At 1 p.m., same day, Jan. 7th, 1908, after being informed that the brattices had been constructed and ventilation improved, in company with W.L.Weber, superintendent Carthage Fuel Co. I again went to the new slope of the Bernal mine. Many things worthy of notice were found, which I did not see at my first visit, before daylight in the morning. par

greater indications of violence were to be seen outside of the mine than inside, and there is good reason to believe that a violent explosion of coal dust occurred at,or near, the mouth of the slope where the accession of a larger body of fresh air lent the oxygen necessary to the combustion.

Within the mine men fell over where they were sitting when the explosion occurred; small objects were only moved short distances and timbers in some instances were only pushed out of place. But outside greater force seemed to be exerted; the bodies of the killed and injured were blown from 25 to 335 feet; timbers were blown from the mouth of the slope 25 feet to 360 feet. Poles upon which the bell wire was strung, were peppered with indentations of coarse coal dust or smaller gravel on the side next the mouth of the slope, but were blown clean of coked dust or soot, while on the side opposite from the mouth of the slope,and the opposite side from whence the force came, was covered with a thick deposit of soot for a distance of 250 feet from the mouth of the slope, while the ground outside was covered with soot for a distance of 375 feet from the mouth of the slope and 20 feet on either side of the middle of the line of force.

I would here state that in following the course of the explosion through the mine, we found the coked dust on the opposite side of the timber to that from whence the explosion came; and in instances where no great degree of violence was shown, I found that it was of considerable assistance in tracing the course of the explosion, by feeling on either side of the crossbars or cap timbers, the finely powdered coke could be felt when it could not be distinguished by sight upon the surfaces blackened by soot. This was something I had learned in former explosions and which served well on this occassion.

Going down the new slope as before we traversed all of the workings upon the right of the slope, then to the bottom and back to third left, through third left entry,as before, up through crosscut between rooms

3 and 4 on second right entry to point where 3 men were killed, then up No.3 room to pillar between No.3 and No.4 room. At this point we discovered a hole which had been loaded and fired, the burned fuse still protruding from the hole. The hole had not broken any coal and the coal was compact and firm around the muzzle of the hole, but very much fissured from 2 to 5 feet back from the mouth of the hole. The hole was laid along the lower end of the pillar taking a skip off the pillar, similar shots having been fired the day before, leaving an offset where the mouth of the hole was placed. The fissures were opened from the bottom of the hole outward through the coal and upward through the coal, where a piece had been broken out half way up the face leaving a bench like block for the first 3 feet. In these fissures in the coal and over the top surface of the bench, and the lower side of the pillar, next the entry, was covered with coarse particles of coke, a large proportion of itbeing fully as large as grains of wheat and some of it twice as large. The surface of the coal appeared as if flame had issued from these fissures and extended over the faces of the coal. Upon observing the general appearance of the coal at this point I remarked that the hole had been charged with frozen powder, part of which explodedand part of which had burned. It was not a blown-out shot as the tamping and fuse were still in place in the hole, but it had evidently flamed through the fissures at the rear end of the hole. The hole was not a strong one and if the dynamite had been in proper condition would undoubtedly have displaced the block of coal. Across No.3 room along the same entry and in front of the hole, a strong wooden brattice was blown down. The face of No.3 room was notyet clear of afterdamp and not clear enough to explore.

Proceeding along 2nd left entry in the same course followed in the morning, we went into bottom of old slopeand the dip entries on left of old slope, the brattice having been put up and air turned down to the faces. Near the mouth of the second crosscut from the bottom, we

examined the places where James Richardson's tool box had stood. Inside this box there had been 10 sticks of dynamite and part of a box of caps, which had exploded and destroyed the box entirely. The floor was torn up but the roof and sides of the crosscut were uninjured. Near the face of the 3rd left dip off the old slope we found the block of coal undercut, and the holes drilled by Richardson, which we had anticipated caused the explosion,but had not been loaded nor fired. Proceeding up the slope as before we returned to the surface at 5 p.m.

On January 2,1908,I again went into the new slopein the Bernal mine to make farther investigations. I was accompanied by W.P.Thompson, Gen.Mgr.Carthage Fuel Co.; W.L.Weber,Supt.; Robert Berry, pit boss Bernal mine; Sam Ellwood, pit boss, Hilton mine; Frank Williams,pit boss, Goverment mine; James Richardson, a miner, familiar with the mines of this field for 18 years past; Walter C.Belles, Asst.Clerk for the Carthage Fuel Co., also has worked in mines; and E.D.Gordon, Justice of the Peace, who is also a stenographer. Shortly before going into the mine I sent for Tony Bella, whom I was informed had worked with Giovanni Andrioli in the room where the defective shot was fired. I sent for him last that I might be with him from the time he was called until he gave his testimony when I would question him in the mine. I had not, nor have I now,the most remote idea nor suspicion that anyone would try to coach him, but I wished to preclude the possibility of it being done,or giving any evil minded person the opportunity to have a shadow of truth in the assertion that it was done, hence I did not let it be known I wanted him as a witness underground until about to go into the mine, and from the time of his appearance until he gave his testimony in the mine, I was close to him constantly. The other witnesses whose testimony I transmit herewith were examined in the office.

I took the three pit bosses along to let themobserve and study the actions and results of the explosion as I explained, to the best of my ability what had occurred, and warned them of the danger to guard against.

I thought it well afterwards to have their testimony taken to accompany this report. After calling the attention of the pit bosses and miners to the particular incidents which occurred outside, and also directing their attention as to how coke, soot and dust collected on the opposite side from whence the explosion came, as here demonstrated, we went down the new slope, pursuing the same course as upon my two former investigations, until we reached the defective shot in the pillar as heretofore described.

Arriving at this point I called Tony Bola and explained to him that no harm would come to him, that I only wanted to get an accurate and truthful statement as to the conditions at that particular place regarding depth of hole, quantity of powder used, etc. That this investigation was being made for the purpose of obtaining information that would aid in avoiding such accidents in the future.

Tony Bola is an Italian of apparently more than ordinary intelligence and speaks English quite fluently. He said he would answer questions put to him without reluctance or hesitation and was willing to be sworn; his testimony here follows:

Q. What is your name?
A. Tony Bola.

Q. And your occupation?
A. Miner in the Bernal mine at Carthage.

Q. You were working in this mine on Tuesday 31st December?
A. Yes sir.

Q. In this pillar?
A. Yes sir.

Q. Who drilled this hole that we are looking at now?
A. I did.

Q. To what depth was it drilled?
A. Four feet or more;yes more than four feet.

Q. How much powder did you put in the hole?
A. Two and a half sticks.

Q. What powder did you use?
A. Giant powder.

Q. Was any black powder put in the hole?
A. No sir.

Q. What condition was the giant powder in that you used,was it thawed or frozen?
A. It was frozen.

Q. What shape was this ground in here before you fired that shot; the same as now?
A. The same as now.

Q. Then this hole has not broken any coal?
A. No,none at all.

Q. How much tamping did you have on your powder?
A. Six or seven inches.

Q. Your partner who was working in here; what is his name?
A. Joe Andriole.

Q. Did you light that fuse before you left?
A. I lit that one in the upper place, but not that one.

Q. Did your partner come down when you came down?
A. No,I left him there.

Q. What time did you leave the mine?
A. Ten minutes to twelve.

Q. Did you hear the explosion when it occurred?
A. No sir, I was at home. I loaded it but my partner fired the shot. My partner and I were working together and helping each other. We had fired shots along that rib the day before.

Q. What depth were the holes fired the day before?
A. About the same; about four feet.

Q. Was the powder you used the day before thawed or frozen?
A. Thawed.

(Signed) Tony Bola

Personally appeared before me the foregoing subscribed deponent, Tont Bola,Who, being first duly sworn, made the above statements in response to questions asked by Jo S.Sheridan, U.S.Mine Inspector for New Mexico. The said statements were taken in shorthand by me and thereafter transcribed by me upon a typewriter, and the typewritten copy of the said notes was read by me to the said deponent, and he declared same to be correct before signing same.

(Signed) E.Douglas Gordon,
Justice of the Peace,precinct No.29
Socorro County,New Mexico.

(I would here state that it was my intention to have the hole dug out,but had not informed any person of my intention to do so, consequently Tony Bola could not have suspected that I intended to do so, yet conditionsof the hole verified his statements.)

After Tony Bola had testified,I again measured the depth of the hole above the tamping, (as I had also done when I found the hole the day before) I found the length of hole above the tamping to be 22½ inches;

I then had the hole carefully dug out, removing the block of coal, which was on the shot, with a pick; Messrs. Berry, Ellwood and and Williams doing the work. The block of coal over the anterior part of the hole was quite compact and solid as if no shot had been fired, but the coal upon the rear end of the hole was fissured, drummy and loose, being easily detached in large pieces, parting along the lines of the fissures and cracks, which apparently had been opened by the force of the exploded and burning dynamite. After the hole was exposed its full length I then made complete measurements of it, as follows:

Total length of hole.....		4' 9"
Length of hole outside of tamping.....	1' 10½"	
Length of hole tamped.....	7"	
Length of powder chamber	2' 10½"	4' 9"

Diameter of powder chamber after explosion	4"
Diameter of hole drilled, as taken outside of tamping	1¼"
Grip of hole at muzzle of hole.....	2' 7"
Grip of hole at back.....	3' 6"
Heighth of hole from floor.....	11"
Thickness of skip being taken from pillar.....	3' 0"

From these measurements it can readily be seen that the hole was not a strong one and that a comparitively small charge of a mine explosive should have removed the block of coal. There were two loose ends to the block of coal, the face of the skip where the hole was drilled from, the skip or slab being 3 feet in thickness on that face, and the other loose end being the lower face of the pillar which extended to the rear end of the hole and 15 feet still farther back to the other side of the pillar.

Had it not been for the considerable deposit of coarse particles of coal dust on the face of this block of coal and also along the cracks

and fissures shown, evidence of greater duration of flame at this point, than elsewhere in the mine; I would not have connected this hole with the explosion but the point where this evidence of continued flame was shown was the most favorable point for the ignition of dust, because dynamite, however unreliable as to constancy of habit, must be given credit for short duration of flame when ordinary or proper charges of the material are exploded. At other places in the mine evidences of great violence, and considerable flame were presented, but at no place was coked coal nor coal dust found in any appreciable quantity on the faces of the coal, nor was it found more than 6 feet distant from the defective shot in that locality.

The party then proceeded to the face of No.3 left crosscut off No.3 room. Here were found the two shots to which was primarily due the cause of the explosion. These two shots were located close together in the right hand corner of the face of 3rd left crosscut, on the two inner sides of a triangular block of coal. This block of coal, taking the face and rib for base, and perpendicular, would form a right-angled triangle while the diagonal line from the outer end of each of those sides would make the hypotenuse.

On the right rib a hole 4 ft. 8 ins. deep had been drilled, the grip on the back end being about 7 ft.; this hole had blown the tamping without breaking any coal other than what came from the shot hole. The hol against the face, which was evidently intended to make a portion of the out-burden, from the other shot, had been drilled 5 ft. 2 ins., bottoming within about 18 ins. of the other hole, and to the rear of it. This hole had broken 2 ft. of the outer part of the hole, leaving a stump 3 ft. 2 ins. in depth. It was evident that this latter hole was intended to go off first and relieve the hole against the rib. Whether it did or not cannot be ascertained with absolute certainty, but the probability is that it did not go off as intended for, if it had, the hole against the rib would have had only a 2½ ft. burden, at most, to break if the outer hole had broken the bottom.

The location of the origin and course of the Explosion in the Bernal Mine at Carthage, Socorro County, New Mexico, which occurred on December 31, 1907:-

Three shots in two localities about sixty feet apart, contributed to the cause of the explosion; one shot being located in the 2nd left crosscut in room No.3, off what is known as the 1st right level off the old slope; the other two shots were located in the 3rd left crosscut off room No.3. The two last named shots were located close together in a V shaped corner filled with a triangular block of coal. This block of coal, taking the face and rib for base, and perpendicular, would form a right angled triangle while the diagonal line from the outer end of each of those sides would make the hypotenuse.

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Even as it was, leaving a long stump of the hole, had this hole gone off first it is probable that the rib hole would have cleared itself and broken all that was on it. The miners who drilled and fired the hole probably did not take into consideration the length of fuse when they were cutting it, and, instead of leaving an extra piece of fuse on the rib shot, cut it off proper length for the 4 ft. 8 ins. hole and did likewise with the 5 ft. 2 in. hole in the face, with the result that the rib shot went off first and was a blown-out shot because it was over-burdened.

The hole ### drilled and fired in the second left crosscut off No.3 room is also supposed to have contributed to, and in fact to have ignited the dust to produce the explosion. This was laid along the lower end of a pillar, and was not by any means defective as a hole. This hole, as dug out was 4 ft. 9 in. in depth; the length of the hole unfilled, outside of the tamping, was 1 ft. 10½ ins.; the length of the part of the hole filled with tamping was 7 ins.; the length of the powder chamber, after the powder was fired, was 2 ft. 3½ ins.; total 4 ft. 9 ins.

As dug out after the explosion the diameter of the hole outside of the tamping was 1¼ ins., where tamped 1½ ins., except next to the powder chamber where compression had enlarged it, the diameter of the powder chamber after the explosion being 4 ins. The evidence of Tony Bola, who drilled and loaded this hole, is appended to this report. In addition to what is contained in his sworn statement, the mine inspector further examined him as to how the powder was put in the hole, whether it was broken or in full sticks. He said that each stick was broken in two and the halves were placed side by side and pushed into the hole. The length of the powder chamber would lead to the supposition that Tony Bola was mistaken as to his only having put in 2½ sticks of powder into the hole, the sticks being only 8 ins. in length, and two and a half sticks, broken and placed side by side, would only make 10 ins. in length. It is not probable that the powder would have chambered in either, or both, ends to the length as shown when the hole was dug out. It is probable that his powder jabbed in the hole when being put in, and yet it does not seem probable that even then it would have made a chamber 15 ins. longer than the powder charge. Further investigation by the mine inspector shows however, that Probably Bola had only used the quantity of powder that he claims to have used in the hole; this was ascertained by making inquiry at the Company's office where the powder was sold, as to how much powder Bola and his partner had purchased recently.

On December 30th. Giovanni Andreola, Bola's partner, purchased 5 lbs. of Giant Powder at the Company's store; a previous purchase of 5 lbs of

powder had been made by Bola on the 28th of December, making in all 10 lbs. which had been recently purchased by the two men who were working in partnership. In Tony Bola's box the mine inspector found 10 sticks of giant powder and more than half a box of 3X Dupont Caps. In two other holes that are known to have been fired by them within the twenty-four hours about two more pounds of the powder are accounted for. This would leave the work of December 28th and 29th, together with the powder used in this shot to account for the other five pounds of this powder.

As these men were shooting their coal every day, and accounting for holes fired it is not probable that they could have had more than the quantity of powder Bola claimed in the hole nor that there was any excessive charge in this hole, and in fact all the circumstances tend to show that the charge was a right one, and would seem to corroborate Bola's statement regardless of the powder chamber in the hole.

The powder used in all of these holes was issued to these men within the week previous. An examination of the powder house discloses the following facts in regard to the powder which was being issued. The powder was branded on the end of the box:-

Hercules Powder
40% Strength
No. 2

On top of the box it was branded as follows:-

E.I.Dupont de Nemours Powder Co.
Wilmington,Delaware.
Oct. 5th, 1907.

It is evident from this that the powder was not old and defective and such as would be liable to ignite and burn instead of exploding, as old powders sometimes do. From the tenor of Bola's testimony it will be seen the two men had left their powder exposed to the cold weather and night before, and that the powder he put in the hole was frozen.

My theory as to the origin of the explosion is as follows:

The shot on the lower side of the pillar in No.2 crosscut off No.3 room was fired first, the anterior portion of the hole and the coal around it, was unbroken and undisturbed, as was developed in digging out

the shot, but in the rear of the hole several loose fissures were found which extended to the exterior of the block of coal next to the crosscut. Along these fissures and upon the face of the coal was some very course coke. This coke or sinter was not of the same character nor deposited in the same manner as coke deposited on coal faces or on timbers by the blast of an explosion, the coal dust coked and deposited in other places in the mine, and as I have seen it after other explosions, shows a semi-coherent layer on the face of the coal and the timbers. The deposit of coke or sinter along the fissures, and on the face of the coal, in the rear of this shot, was in coarser segregated particles and would indicate the result of slower combustion and greater duration of flame than would occur during explosion. The conditions give every indication of flame having issued from the fissures in the coal at the rear of the powder chamber and along its entire length. Hence I believe the shot to have been a flaming one, that is, projecting flames from the burning powder through the fissures in the coal.

Immediately after the flaming of this shot, and while it still continued to project flame, the holes heretofore mentioned in the face of the 3rd crosscut were fired. The blown-out shot against the rib at that point projected dust in great quantities into the atmosphere, which was ignited by the flames issuing from the shot-hole in No.2 crosscut. There are further conditions in evidence to demonstrate that the dust was ignited at the point where the flaming shot was in No.2 crosscut, by the direction in which the explosive wave travelled. As will be seen by the accompanying Blue-print, the force was projected across No.3 room, blowing out the strong board stopping in the crosscut opposite, and was projected up No.3 room towards the face of No.3 crosscut as was shown by the depositing of coke-dust on the opposite side of the timbers from which the explosion came, as also by timbers between the 3rd and 2nd crosscut being blown toward the 3rd crosscut, and the cap piece from a set of timbers was blown out and towards No.3 crosscut. Then again, outside the 2nd crosscut in No.3 room, the timbers were blown towards the 1st right level, indicating that the

forces was directed East, North and South from the junction of No.3 room.

These conditions would indicate that the explosion started at that junction of No.2 crosscut with No.3 room, but as there was nothing in that particular point to ignite an explosion or initiate one, we must seek for it at the nearest point where evidence of such origin may be found, that is at about 15 feet distant, at the flaming shot mentioned hereinbefore, as in the lower side of the pillar at this point.

Another blown-out shot in the same vicinity, is deserving of some consideration in connection with the explosion, that is, the shot in the lower end of the pillar in No.3 right crosscut off No.2 room. This shot was laid across a corner of the pillar, and was placed about 18 inches from the roof and about 4½ feet from the floor. This hole was not a strong one; it was 4 ft. 8 ins. in depth, the block of coal was open on two sides, and the shot was laid across the third side of the triangular corner of the pillar.

Tony Bola said he loaded this hole with the remaining 2½ sticks of frozen powder, of the 5 sticks of powder he had brought into the mine the morning the explosion occurred. This shot had blown tamping also and was a blown-out shot, not any of the hole had broken off from the point or muzzle of the hole. A large fissure downward to the floor and out into the crosscut had given vent to the energies developed by the charge of powder. This powder, in all probability, burned as the charge in the other hole, loaded by Tony Bola, had done; but in this instance the flame was projected downward along the fissure below the shot. This hole while being a perfect blown-out shot, was decidedly different from the blown-out shot in the face of the 3rd left crosscut off No.3 room. The shot last mentioned gave evidence of full detonation, shown by the rending force displayed along the entire length of the hole, which enlarged the hole to a diameter of four inches, the comminuted coal from the sides of the hole being blown into the surrounding atmosphere charging it to the explosive point. On the contrary with the hole loaded and ignited by Bola before he left the mine, the hole was not enlarged in diameter to any extent that could be perceived, and as far as could be determined by inserting the

needle and moving it about, the hole was not enlarged at any part of its length except at the inner end where the powder chamber was. Hence the dus from this hole would consist of what was in the tamping. This hole may have contributed to the origin of the explosion to a slight extent by the dust from the tamping projected into the atmosphere. But the part played by this hole in the immediate causing of the explosion I do not believe to be worthy of great consideration. The hole was too high from the floor and lying at a parellel line therewith, hence would not probably stir up much dust from the floor. The shot was ignited by Bola before he left the mine and as it was more than ten minutes afterwards when the explosion occurred, it is not probable the other shots were fired until after this shot had exploded. It cannot be connected with the explosion, except in so far as the coal dust from the blown-out tamping would contribute to it by pre-charging the atmosphere to a slight extent with coal dust before the other shots were fired. There was no evidence of explosive violence, no coking, no blown out timbers, and tools were undisturbed in the vicinity of the blown-out shot just described. A very slight deposit of soot was the only indication at this point that an explosion had occurred in the mine.

From a consideration of the foregoing facts and conditions, I am of the opinion that the dust was projected into the atmosphere of the mine by and from the blown-out shot, and the shot which I have designated as a "strong shot" but which is a partly blown-out shot, both at the face of 3rd left crosscut off No.3 room off 1st right level of old slope of the Bernal mine. These shots may possibly have ignited the dust, but from the direction in which the force of the explosion travelled I believe the dust was ignited by flame from a hole charged with frozen dynamite, said hole being located on the lower side of the pillar above No.2 left crosscut off No.3 room off 1st right level of old slope of the Bernal mine.

It may be asked "Why did not the explosion continue through No.2 left crosscut along 1st left entry off the new slope" said No.2 left cross-cut and 1st left entry being on the same line and one a continuation of the other.

The reason why the explosion did not take that course, the nearest route to the main intake, was that the entry had been driven through a rock fault for about 30 feet and had just holed through a small opening, only large enough for, a man-hole and not in direct line but to the raise from No.2 crosscut. The explosion was estopped from travelling in that direction by the obstruction of the rock wall with only a small man-hole near the roof and large pieces of broken rock obstructing its course on either side of the man-hole.

The route, or routes, travelled by the explosion are marked on the accompanying blue-print and described here as follows:

Starting at the junction of Room No.3 with the 3rd left crosscut off No.3, this being the point from which the energies of the explosion were apparently exerted in three diverging directions, North, South and East, we found the greatest exhibition of force displayed to the south toward the mouth of the room. Following this to the first right level we found the evidence of violence distinctly developed along the 1st right level to the parting and thence to the old slope; except between the parting and the second crosscut inside the parting, where debris and timbers were thrown in both directions from their places. This may have been due to a second explosion when the explosive wave may have come up through the 2nd crosscut upon its return up the air course from the bottom of the old slope. At the door near the junction of the 1st right level with the old slope the boards on the brattice, alongside the door, were blown off and blown towards the old slope. There is a strong probability the door was open against the rib as it was uninjured.

In the section of the mine just passed through, it was also found that the force projected across room No.3 at the initial point, and which blew out the board stopping in the crosscut opposite, continued on through the old workings and vented through onto the parting at the tool house where Joe Canero and Angelo Corgone were killed.

The reason I assign for the explosion going along 1st right level to the old slope is because entries Nos.1 and 2 left off new slope were obstructed at the mouth of No.2 by a board stopping, and No.1 by a rock

fault through which there was only a small man-hole, and loose rock obstructing either side of the man-hole, Again, Nos.1, 2 and 3 left entries off the new slope, on the end adjacent to the new slope, were through rock faults which had covered the floors with rock dust; and there was little coal dust on the portions of the entries mentioned as they were not being used as haulage ways, the coal being mostly hoisted from the other end of these entries through the old slope. The new slope was being used only for haulage for developments on the right of it and at the bottom.

The 1st right level off the old slope, which is the east extension of 2nd left entry off new slope, was being used as a haulage way and the dust along the roadway furnished fuel for the explosion. It is probable that the rock dust on the floors of the entries toward the new slope effectively stopped its progress in that direction while in the initial or incipient stage, as I have often seen dust explosions, in the earlier stages, extinguished by some trivial obstacle.

The indications in the mine are positive that the explosion went out through the first right level to the old slope, the main part of the explosive force going down the old slope against the air, while a lesser force was shown going up the old slope to the mouth of the slope. After leaving the junction of the 1st right level with the old slope, the main part of the explosion followed, against the intake, down the old slope to 2nd and 3rd right entries and a portion of it to the crosscut where Richardson's tool box stood. It crossed from the old slope through the three openings last named, to the 1st right dip entry against the intake air current through the last crosscut and up the intake air course back on to 2nd right level of old slope or 3rd left entry of new slope, along this entry to the west to the new slope. But portions of it also crossed back into the 1st right level of old slope through open crosscuts, that the stoppings had been blown out of when the explosion first started; thence along the 2nd and 3rd left entries into the new slope and out to surface. It must be remembered that there was much more energy accumulated by the explosive wave after it left the old slope to return via the intake air

course to the 2nd right level, than was exhibited along the route first travelled.

It is evident that the explosion, emitted from the mouth of the new slope, had travelled the longer route, just described above, because had it gone directly out of the 2nd and 3rd left entries into the new slope, it would have emitted through the mouth of the new slope first, the distanc being equal from the point where the explosion first reached the entry, at mouth of No.3 room, to the mouth of either slope; but the rapidity of motion would be accelerated toward the new slope by the purer intake air.

Several eye witnesses, who had just come out of the mine, declare the explosion emitted from the old slope two or three seconds before it came out of the new slope.

We have now traced the course of the explosion as well as it can be traced without consulting a diagram or map of the mine, which enclose herewith, with all locations and incidents marked in detail.

A few details in regard to the distribution of the ventilating current: The air intake was down through the new slope to the 3rd left entry, the air going through a regulator door into the 3rd left entry, just inside this door the two first crosscuts up to the 2nd left entry were open and a part of a curtain deflected a portion of the air up to the 2nd left entry from whence it was directed upward through the rooms and crosscuts above by means of curtains hung wherever needed, and thence to the air shaft. The balance of the air amounting to about one-fourth of the total intake went on through 3rd left entry and down through air course, as shown on the blue-print, to the bottom of the old slope and up the old slope to the surface.

It was found that the more violent effects were shown where the explosion went against the intake air, which course it took through the greater part of its route.

Respectfully submitted
by Your most obedient servant
Jos. E. Sheridan
U.S. Mine Inspector for New Mex.

To Geo. Otis Smith
Director U.S. Geological Survey
Washington D.C.

Copy

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Silverlity New Mexico
Feby 9, 1908

Facts in regard to Dust Explosions, demonstrated by action of explosion at Bernal Mine, Carthage, Socorro County, N.Mex., Dec. 31, 1907.

So little is known of actual conditions within a coal mine immediately after, or at the time, of an explosion, because the mine cannot usually be entered at the time; that I have considered it well to record the exact details in this instance, as far as observed.

We have in the Bernal mine explosion positive proof of a coal dust explosion, pure and simple, without the least reasonable possibility of there being any CH_4 present in any quantity whatever.

For more than seven years past I have inspected the mines of this district; I have been in all sorts of places in these mines, which were most favorable to the exhibition of gas if it were present at all: in numerous faults of greater of lesser magnitude, the work of cutting these faults often being done hundreds of feet ahead of the air; some of the faults far below the water level and where water was constantly flowing from top, bottom and sides, every thing favorable for presence of CH_4, yet no trace found. I have travelled through old workings where the air had been shut off for years, and in caved in old workings and gobs, yet no trace of CH_4 has ever been found. I have the testimony of reliable men who have worked for 20 years in all of the different mines of the field and who testify that no trace of CH_4, or fire-damp or other combustible gas has ever been known or heard of in this field.

The same is true of the Gallup field in which the Weaver explosion occurred, described in accompanying paper on dust explosions in New Mexico.

I consider the evidence presented in these papers absolutely conclusive that coal dust, without any trace whatever of CH_4, is a very dangerous explosive within a mine, and also a dangerous explosive in the open air if thrown into suspension in the atmosphere in sufficient quantity.

The greatest violence was exhibited outside, and at the larger areas inside, vide: between curtains on parting on 1st right dip entry off

old slope, where there was little air moving but large air space filled with comparitively pure air. Along this parting, especially at the lower e great violence was shown.

The explosion within the mine was one of minimum violence. Two reaso may be assigned for the slight degree of violence:first the scant supply of oxygen furnished by weak ventilating current and small area of air courses; and second, the considerable distances travelled by the explosion through rock drifts which furnished no fuel (coal dust) for the explosion to feed upon, and which also tended to lower the temperature by absorption of heat. As indicating little violence, cars on the partings were not moved, timbers were not blown very far from their places, few timbers were broken, although the timbers were light timbers, and many light articles were undisturbed near the lines the explosion travelled.

The coked coal dust in every instance was deposited on the outbye side of the timbers or on the opposite side from whence the explosion came.

That the after-damp was not as heavily charged with CO_2 as usual afte coal mine explosions. This was demonstrated by Espinoza and Guiterrez, the two Mexicans, who were in second right entry off new slope and who came out unharmed, lighting their lamps within five minutes after the explosion and maintaining their lights all the way out of the mine. It is true their lights appeared like dim glowing bulbs to the rescue party, giving the impression that the lights were farther away than they really were. In fact, the rescuers seeing the men moving outward went toward them to assist them, but the appearance of the lights were so deceiving as to distance between the Mexicans coming out and the rescue party, that the two parties came into personal contact, and bumped against each other while they thought they were yet considerable distance apart.

Where the expression "great violence" is used, it is only used in a comparitive sense, meaning that greater violence was exhibited in that particular locality than in the areas adjacent. In fact the energy develope was little above the minimum necessary to maintain an explosive condition: only in the larger areas was any great violence exhibited. On the parting on the 1st right dip off old slope, where the area was large, there was considerable force shown, and it will be noticed that the stoppings, in the two crosscuts from this parting to the old slope, were blown outward toward the old slope, while all other stoppings along the slope were blown in the opposite direction, except at 1st right entry where similar large area is shown at the parting nearby. Yet empty cars on the partings were not disturbed, comparitively few timbers were broken and tools and other light articles were moved but short distances. A study of the places where greater violence was exhibited would lead to the conclusion that lack of oxygen, (air) rather than lack of fuel (coal dust) was responsible for the light degree of energy shown by the explosion within the mine. At every point where there was an accession of air, either on account of larger area or concentration and greater velocity of air current, there was found evidence of increased violence, even when the explosive wave passed from areas in which the floor was covered with coal debris, where no great violence developed, into rock sections where there was very little coal dust but which had greater area, where greater force was exhibited.

While great violence was exhibited outside of the mine, this energy must have developed within the mouth of the mine or instantaneously upon the explosive wave leaving the mine, as there was no evidence of flame outside of the mine and the men injured outside were not burned.

The body of C.L.Wilcox was found 240 feet from the mouth of the new slope. From the best information obtainable it is probable he was coming out of the mine, and was inside near the mouth of the slope, when overtaken by the explosion and hurled to the point where found. This would also be indicated by the fact that a portion of his brain, and his pit

were found about 120 feet distant from the mouth of the slope and at an oblique angle from the slope.

So also in the instances of Refugio Vallenueva and Juan Renterilla, found 120 and 135 feet from mouth of old slope; the former fatally injured and the latter killed instantly. These bodies were burned about the face and hands.

The flame was evidently extinguished immediately upon reaching the large body of cooler air on the outside, as men who were looking at the mouth of the old slope, claim that there was no flame visable,only a heavy cloud of smoke and dust,when the explosion issued therefrom. But, being midday it would not have been easy to discern the flame unless it were a very pronounced flame. There is but little flame seen amid the smoke of a burning building in day time, but much more flame can be discerned at night.

The mules killed in the mine were singed upon one side,indicating that the flame of the explosion was a vertical sheet in front of the explosive wave along the contact with the fresh supply of air as it p ceeded.

All of the men in the mine were badly burned, hair, eyebrows, and mustaches being singed,but clothing was not ignited, indicating short duration of flame.A paper upon which a notice was written was tacked to the outside of the outermost set of timbers at the exact point where the slope started under cover; this paper projected out into the slope about three-fourths of an inch; the projecting portion was burned off on a true line with the post to which it was attached, as clean as if cut with a scissors, but the balance of the sheet of paper, and another narrower sheet above it on the post, was not even singed. This too would indicate a vertical sheet of flame without bulk or volume.

Mat Brooks,the only survivor of those injured inside the mine, described the sensation produced as or a sudden shock as if something had struck him on the side of the head and then a feeling that he was floating away into space, as he lost consciousness.

Report upon Explosion in Bernal Mine, Carthage,

Socorro County, New Mexico, December 31, 1907.

At 4:45 p.m., December 31, 1907, I received the following telegram at my home at Silver City, N.Mex.

" San Antonio, N.M. Dec. 31

J.E. Sheridan, Silver

Dust explosion in Bernal mine at noon to-day, several killed and injured do not know number yet. W.L. Weber 350 "

Thirty-five minutes later, at 5:20 p.m., I left home in the omnibus for the depot. Left Silver City, N.M. 6 p.m., via A.T.& S.F.R.R. en route to Bernal mine at Carthage, N.M.; via San Antonio, N.M. Arr. San Antonio, N.M. 2:40 a.m., January 1, 1908. Left San Antonio, N.M. 3:30 a.m., via New Mexico Midland R.R., en route to Bernal mine. Arr. at Bernal mine 4:30 a.m. Immediately entered mine and proceeded with inspection of mine and investigation to determine location of origin, and cause of the dust explosion, from which resulted the immediate death of eight men; three others dying later from effects of their injuries, or eleven fatalities. The names of killed and injured are given herebelow, with location where found:

C.L. Wilcox; American; miner age about 24 years; single. Relatives, brother, D.T. Wilcox, Marfa, Texas. Was found dead at foot of trestle, about 335 feet from mouth of new slope, whence he had been hurled by force of dust explosion. Instantly killed. Skull fractured and other severe injuries. In employment of company about 5 months.

Juan Renterilla; Mexican; age unknown; employed loading cars in mine; whether married or single, and residence of family or relatives, unknown. Was found dead on trestle 131 feet from mouth of new slope of Bernal mine, from whence he had been hurled by force of dust explosion; instantly killed. Skull fractured and other severe injuries. In employment of company 1 day.

Jo Canero, Slavonian; miner; age unknown; single, residence of nearest relatives, unknown. Instantly killed by coal dust explosion.

Maps Not Scanned