

# REPORTS

--ON--

## THE FERNIE COAL MINES EXPLOSION

--BY--

W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

--ALSO OF--

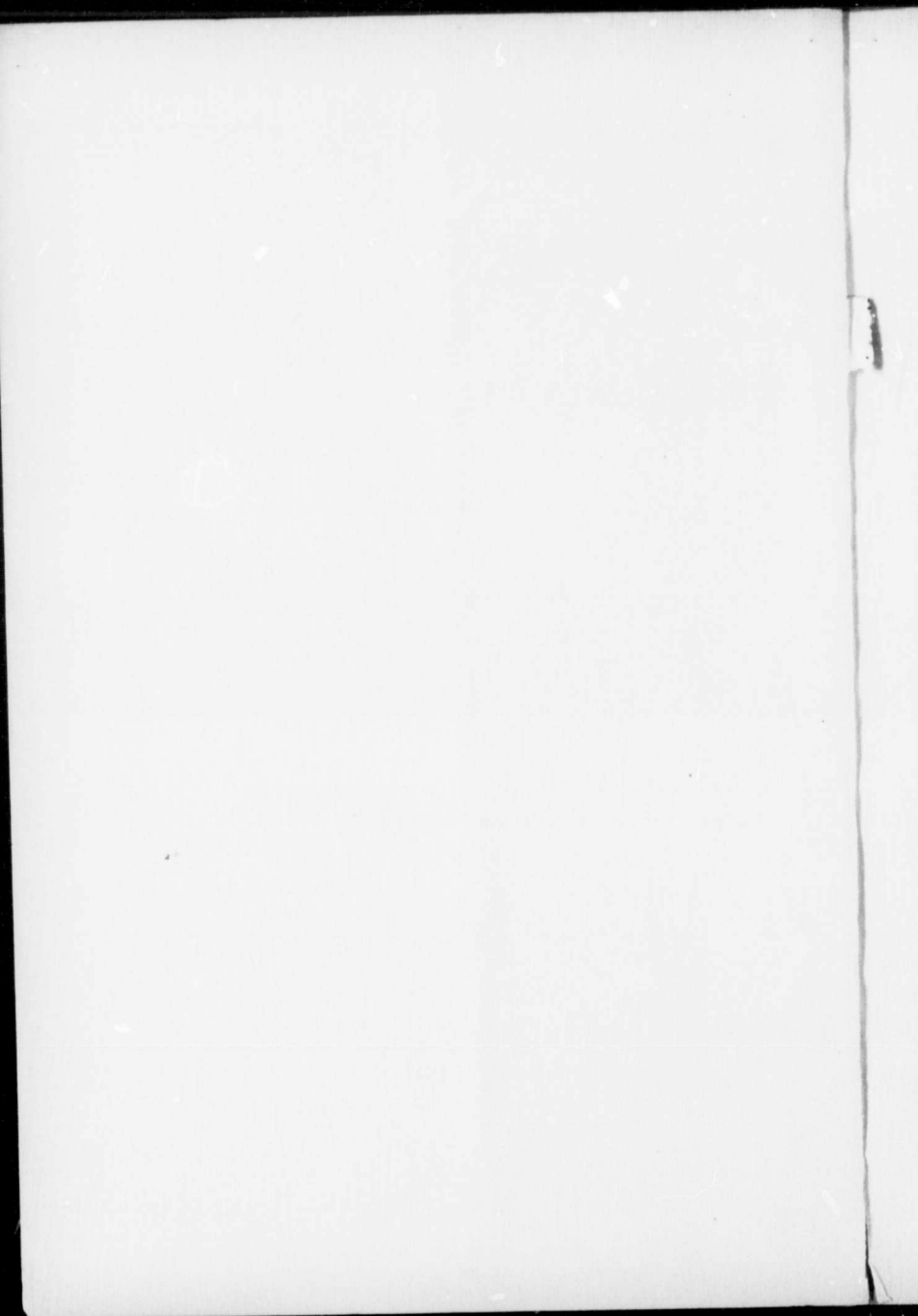
F. H. SHEPHERD AND A. FAULDS,  
Mining Engineers.



---

VICTORIA, B. C. :

Printed by RICHARD WOLFENDEN, Printer to the King's Most Excellent Majesty  
1902.



## REPORT OF PROVINCIAL MINERALOGIST.

— 0 —

Hon. E. G. Prior,  
Minister of Mines, Victoria, B. C.

*Re* FERNIE EXPLOSION.

SIR,—I beg to hand you herewith my report *re* explosion at the Coal Creek Mines of the Crow's Nest Pass Coal Company.

The explosion occurred on May 22nd, 1902, at about 7:25 p.m., and the news of the occurrence reached me, through private sources, at my house (it being a holiday in Victoria) at about 11 a.m. on the 23rd, when I at once telegraphed to Inspector Dick and the Management of the collieries requesting full particulars of the accident, and asking if any assistance was required.

I met you in town about noon, informing you of what had been done, at which time you proposed going up to the mines personally, but informed me later in the evening by 'phone that you could not get away and that I had better go up. I consequently left on the boat that same evening (Friday, May 23rd), arriving in Fernie on Monday evening (May 26), where I at once took a car up to the mines, 5 miles distant from Fernie.

The Coal Creek Mines of the Crow's Nest Pass Coal Co. are situated on Coal Creek, a stream flowing west and cutting across the strike of the coal measures, which are thus sectioned by the valley. The section of such measures is seen on either side of the valley, dipping to the east—that is, up-stream and into the main mountain range.

Workings exist on both sides of the creek, level entry tunnels having been driven in on the seams where they come to the surface, on either hillside, at points nearly opposite each other and about 30 feet above the creek valley, the entrances being connected by an overhead trestle and tippie.

The workings on the *south side* of the creek were all included in the area of the explosion, and are divided in Mines Nos. 2 and 3.

I found, after a brief examination of the mine, that the cause or source of the explosion was not as apparent as might be expected, and noting a good deal of excitement and irritation in the community over the accident, I thought it would be better to have, outside of my departmental report to you, an independent report from some other source. I, therefore, telegraphed you on May 29th, suggesting that the Manager of some Coast colliery be sent up to make such independent report.

On the 30th and 31st you made arrangements with Managers F. H. Shepherd and Alex. Faulds for such examinations and reports. These gentlemen reported to me in Fernie on the evening of June 2nd, bearing your instructions for independent reports from each one of us.

On Tuesday I took these gentlemen up to the mine, and as their conclusions would of necessity be based somewhat upon information given them by those who were on the relief parties, I thought it best that such information should not be derived solely from the officers of the Company. After due consideration, I decided to select two of the miners who were most actively engaged in the rescue work to accompany and be with the investigators in all their explorations. I selected, accordingly, Thomas Addison and A. D. Ferguson, both experienced miners with over 20 years' experience in Nova Scotia coal mines, being guided in such choice by the fact that at a recent election by ballot held to appoint representatives of the miners on the Board of Examiners for coal miners' Certificates of Competency, in which election those killed had also voted, these two men headed the polls and had also been two out of the four men selected in the month of May to examine the mine as a committee chosen by the men under General Rule 31, section 82, of the Act. These two miners accompanied Messrs. Shepherd and Faulds everywhere throughout their investigations and concurred in all information given, or so they stated on the spot.

## PLANS.

I hand you herewith a plan of the workings of Nos. 2 and 3 Mines (scale 100 feet to the inch), taken from the blue print kindly provided for me by the Company for the use of this Department. On this plan I have had the intake air-courses coloured red and the returns coloured yellow, each split forming a separate district. I have also indicated on this plan, by white dots, the position in which each body was found, as closely as possible. These positions have considerable influence in deciding the nature and source of origin of the explosion. I have also added red ink arrows at various points where the direction of force was particularly noticeable or traceable.

## FAN AND EXTERNAL EVIDENCE OF EXPLOSION.

The external evidences of explosion were exceedingly small, as compared with the widespread destruction inside of the mine.

*Fan.*—This is an exhaust fan of special make, very much of the Guibal type, 16 feet diameter and 8 feet blade, divided in the centre by an iron flange and said to have, at a speed of 200 revolutions per minute, a capacity of 200,000 cubic feet per minute, although reported as only being speeded up to 125 revolutions in the normal workings of the mines. This fan is driven by a belt from a horizontal engine of ample power and with suitable governor, and is supplied with steam from the general steam plant in properly protected pipes. The belt is provided with a "tightener" to prevent slip. While I was there the conditions were scarcely "normal," but I found the fan making 105 revolutions with a water gauge of about  $\frac{1}{8}$  inch of water. There was trouble from slipping of the belt, and it had to be taken up twice during my stay. The fan is "set off" from the top of the fan shaft, taking the air from this through a tunnel built up with stone walls and timber roof, and so situated that the explosion coming up the fan shaft only blew the roof off the tunnel and did not injure the fan. The damage done here was temporarily repaired in 20 minutes, when the fan was again in operation. The "fan shaft" is 10x10 feet square, is vertical, and is in the neighbourhood of 100 feet deep, connecting at the bottom with the workings at about the level of the main tunnel and coming out on the hillside about 80 feet above the tunnel level. From the evidence of eye-witnesses of the occurrence, it seems that the explosion blew the roof off this fan-shaft, cracking but not destroying the stone walls, and that from the top of the air-shaft there arose clouds of black dust or smoke, but no flame. The shaft was not injured, though I could not examine it, nor are the air-courses leading thereto choked, as is confirmed by the low reading of the water gauge.

## No. 3 SLOPE.

The force of the explosions found vent here, blowing out and taking off a section of the roof of the trestle (see plan) and a couple of posts, but not disturbing any of the permanent timbers in the slope. The trestle timbers are coated over with fine coal and mud, but, with the exception noted, no further damage was done to the slope or head works. No fire was shown here, nor did any evidence of fire appear in No. 3 Mine.

A second vent was found through a small drainage tunnel from No. 3 Slope (marked E1. 976 on plan) which had recently been cleared out. Here the blast blew small sticks, stones and mud across the creek, breaking a few windows in the wash-house, but doing no damage to the building otherwise, and here again not having sufficient force to blow out the mine timbers.

From *No. 2 Tunnel* there is said to have been a slight blast, and that it must have been slight only is evidenced by there being absolutely no destructive effects visible therefrom, either in the mouth of tunnel or on the roofed-in trestle which extends to and joins the tunnel. From this it must be evident that the force of the explosion had almost spent itself in the old workings before it reached the surface.

As I am able to hand you herewith detailed plans of these mines, I shall not describe the workings in detail, simply pointing out that in No. 3 Mine the haulage way and entry is a slope dipping to the east at a rather varying angle, somewhere about 8° on an average, and which is just about sufficient to permit the "empties" descending to haul after them the hoisting rope.

The air for the No. 3 Mine enters by the slope, a split being taken off to ventilate the workings to the north of this slope, and again comes back to the latter at the No. 1 level, continuing to the *deep* of this slope and returning by a counter slope to *No. 1 level south*. It circulates around the last-mentioned level and returns through the old workings to the fan, which is the common ventilating power for all the workings on this side of the creek.

In this mine the coal is low, about 4' 6", the roof good and the mine very wet. Naked lights have been used here and were properly permitted under the Act. The ventilation, according to the last report of the Inspector, was 27,000 cubic feet per minute, which amount was regulated by a "regulator" on the return air course. All the men working on the *north side* of this slope escaped, and horses were taken out alive from this slope the next day.

The stoppings were blown from *No. 2 Mine into No. 3*, and the force of the explosion vented itself merely through *No. 3 Tunnel* and the drainage tunnel from such mine. The blast up *No. 3 Tunnel* against the air blew the roof and siding off the trestle shed, 100 feet away, sending out clouds of fine coal but, from all accounts, *no flame*.

The old works of *No. 3 Mine* and of the *No. 3 District of No. 2 Mine* were separated by *dirt stoppings* (that is, a retaining stopping of inch boards with dirt piled up behind), from 4' to 8' thick. As already said, the force of the explosion blew these *into No. 3 Mine*, and the shock having at least stunned the men in the *south side* of this mine, the afterdamp following through the openings settled the matter.

In the evidence brought out at the inquest it appears that at the *No. 1 level*, just to the north of the slope, a bore-hole had been put down for a number of feet for the purpose of prospecting for a lower seam (this could not be seen by me owing to the flooding of that portion of the mine). I understand from the Manager that no such seam was struck by the bore-hole, but it is in evidence that this bore-hole gave off a constant flow of gas. To prevent the gas from getting into the airway this flow had been lighted and was kept burning all the time, as this was considered the best way of disposing of it. It was not in evidence what measures had been taken to try to stop up this gas flow.

All the men on the south side of the slope were killed, probably by shock and afterdamp, which latter, it is quite evident, came from the *No. 2 Mine*; a fact so apparent on the ground that it has never been questioned. So that, for the purposes of present investigation, *No. 3 Mine* may be dismissed as having, under no possibility, been either the locality or cause of the explosion, nor did it contribute in any way to such.

#### No. 2 MINE.

*No. 2 Mine* is divided into three districts, viz.:—

*No. 1 District, or High Line Workings.*

*No. 2 District, including Hoist Entry and Machine Section, which was formerly known as the Right-hand Workings, being to the right of main entry.*

*No. 3 District, or Beaver Deep, including all workings to the dip on Beaver Slope and certain machine rooms at the end of the Main or Straight Entry.*

Included in each of these districts are certain old workings in which the pillars are still standing, no "robbing of pillars" or letting down of roof having been started as yet anywhere in these mines.

The ventilation of this mine is on the "separate split" system, the main tunnel serving as a common intake for all, the air being subdivided and a separate split sent to each district, through which it circulates, returning by an independent return air-course to the fan, which also takes the air from *No. 3 Mine*.

#### No. 1 DISTRICT OF No. 2 MINE OR HIGH LINE WORKINGS

Some 350 feet in on the main entry is a split, the straight road going to this district while the *Straight entry* branches off to the left at about 40' and continues to Districts Nos. 2 and 3. In this *No. 1 District* the workings are all to the rise (west) and, as a fault had been struck some 200 or 300 feet to the west of the working level, the old workings are not very extensive and are limited to that width. From the split the present workings extend for about 2,000 feet along the under side of the fault, while at 1,200 feet in an incline had been put up for 600 feet and through the fault above, where workings and rooms had been laid out and where work was going on at the time of the explosion.

The rescue parties found 21 bodies—which accounted for all the men working in this district—on the level or near the bottom of the Incline, in the positions as indicated by white dots on the plan herewith.

These men had been led by Overman W. Brearly; he, followed by Fireboss Samuel Hand, was found just inside of the doors, while some 50 feet behind lay the rest, scattered along as far back as the Incline. Most of the bodies were found with lamps in their hands. Included in this bunch were the men who had been working in the extreme southerly workings and in

the rooms off No. 1 Level north up the Incline. The evidence is quite conclusive that, having felt and heard the explosion, they had started to escape by the usual travelling road and that they ran into a body of afterdamp on this lower level and dropped. A careful detailed examination of this district at a later date, as soon as it was opened, showed not the least effects of explosion, no sign of fire, the bratticing up the In-line all standing undisturbed and everything in order.

The only evidence of force was that several of the stoppings on the low side of the air intake, and separating it from the old workings of No. 2 District, had been blown from No. 2 into this No. 1 District, the force spending itself here and out of the entry. From these broken down stoppings it is evident the afterdamp poured in from No. 2 District, smothering the men, the condition in which they were found bearing this out in every respect.

On No. 1 level north, opposite No. 1 room, a horse was found. It had evidently come out from the inner part of the level with a full car, probably after the explosion. It had come against an empty car, and being attached to its load had gotten stuck there. That it had lived for some time is evidenced by its having cut up the end of its car by kicking it with its heels.

It may be said that, as found after the explosion, this district was *damp* all over and *wet* in places. In no place in this district was there seen any evidence of a shot having been recently fired, and every evidence to the contrary was noted. In No. 2 level south, off the incline in the face, there was found a "missed hole," in which dynamite and a burned fuse was noted, but across the level was a board marked "*Missed hole, May 22nd, 6.30 p. m.—S. H.,*" evidently placed by the fireboss.

The electric traction motor ran into this district, hauling the cars from the foot of the Incline. The Incline was operated by a compressed air hoist at the top, the coal being delivered to these main arteries by horses.

It may therefore be asserted with certainty, from the evidence found, that No. 1 District did not contribute in any way to the explosion and, for the purposes of this investigation, may be eliminated from the calculations, for which reason a detailed report of this district may be omitted herefrom.

#### NO. 2 DISTRICT OF NO. 2 MINE.

From the Split of No. 1 District the Straight Entry continues straight for about 2,600 feet, keeping the level for 700 feet, or to the *Electric Hoist*, where the entry drops for 600 feet to the *Pump*, then rises again to the *Air Hoist*, and continues about level to the face of entry.

The Air Split taken for No. 2 District is indicated in red on the plan, and travels around the faces of the *Machine Station*, thence down No. 7 Room, off *Hoist Entry*, to the working faces of rooms off such entry, returning from the face of the entry through the old workings of the District and crossing by an overcast over the Straight Entry at a point 325 feet in on such entry from the No. 1 Split and thence to the Fan Shaft, as indicated by the yellow lines on plan.

The explosion has, by this process of elimination, been thus far located in either District No. 2 or 3 of this Mine, so I shall proceed in some detail as to location of bodies and stoppings in these Districts.

Starting at the split off No. 1 District, along *Straight Entry*, most of the stoppings along this entry had been blown *west*, wholly or in part; those on the east side had been blown *west*, or towards the entry, and those on the west side had also been blown *west*, or *from* the entry. The force of this action increased inside of the *Pump Station*, and the only exception to this direction of force was found at the first cross-cut, on the west side of entry, outside of *Hoist Entry*, and this apparent contradiction to the general evidence is accounted for by the fact that there was no corresponding cross-cut in the east side to blow out, and the blast coming from the *Machine Entry* eddied into the crosscut, carrying the stopping to the *east*, on to the entry. Near this point was the only place on the *Straight Entry*, north of the *Machine Entry*, where any sign of coking or fire was observed, and here only slight coking on one post.

The bodies found here, and approximately in positions as indicated on plan, were (the numbers referring to the order in which they were received in the dead house) :—

- (2.) Joe Surgale, coupler.
- (1.) Steve Morgan, hoistman on electric hoist.
- (5.) John Leadbeater, rope-rider.
- (16.) Andrew Haven, switchboy.
- (39.) Edgar Reed, rope-rider.

(117.) Jas. Dickson, coupler, found after much search, on June 2nd, in crosscut near bottom of dip, where he may have run for shelter or he may have been caught in there by explosion. There was said to have been here previously a small hole in the stopping.

(46.) Rennie McMillan, switchboy.

(47.) Hy. Hawkins, trackcleaner.

(48.) F. A. Brown, hoistman, air hoist.

None of these men showed signs of burning, but all, more or less, the effects of concussion and violence. The men, as found, were all at their places of work, and the evidence is they had been stricken down where they stood.

Following in the Hoist Entry, all the stoppings were found to be blown north or into the old workings.

The following bodies were recovered from here:—

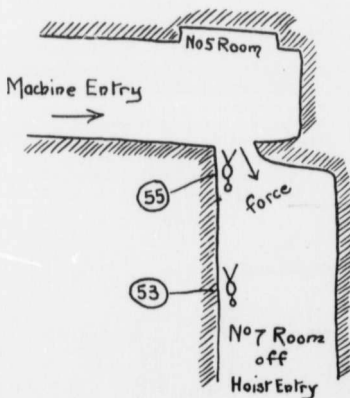
(44.) John Krautz, trapper boy, blown violently against a post in an *easterly* direction; leg blown off. The door he tended was also blown *east*, both contradictions to general course, but the stronger blast and through the more open course was probably down the rooms from Machine Section.

(45.) John Haley, driver, found near entrance of level.

(58.) Hy. Hartley (coloured), driver, near bottom of No. 7 room; blown to low side of level, here 20 feet wide. His horse and car showed evidence of having been blown *west*; there was here slight coking on east side of a post in level.

*Room No. 7 (See plan).*

This is the first room on this entry that was being worked, the previous ones having been finished for some time. This room had been holed through into the Machine Entry for some shifts, and this room would therefore have been on the main intake air course.

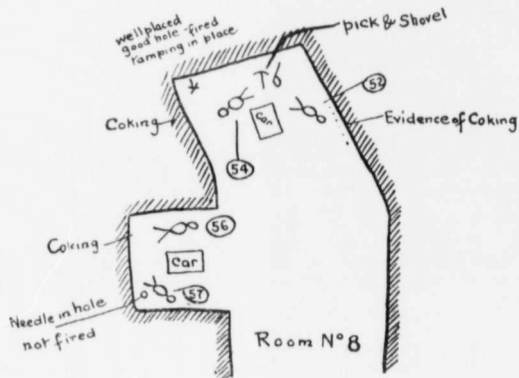


The men were found as indicated above, there being strong evidence of a down blast as indicated. The bodies were somewhat burned and clothing slightly charred; slight coking of dust noticeable.

The tools were in place and indications were such as to preclude the possibility of a shot having been fired here.

## Room 8.

This is first room on this entry where evidence of considerable burning was noted.



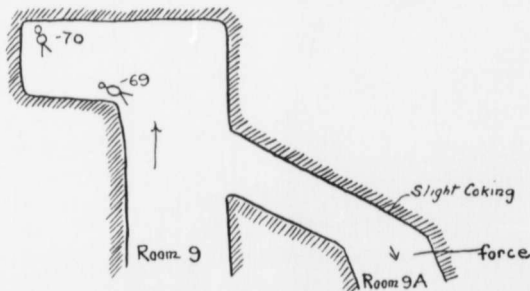
- (52.) Geo. Bernay, miner.  
 (54.) Joe Landry, miner.  
 (56.) Albert Kolke, miner.  
 (57.) — — Harbet.

In this room there was evidence of great heat and coking near face, the force being apparently back from face through recoil of blast; bodies badly singed and much clothing gone. Powder cans exploded and unsoldered.

In the face of room in the left side a shot had been fired on that shift, but was a good shot; tamping was intact. The fact that the men were loading this coal shows this shot was some time previous to explosion and had nothing to do with it.

In the cross-cut on top a hole had been bored in lower side, and was still loaded, the needle being found still in it. Tools and car still in face; no possible shot here.

## Room 9.





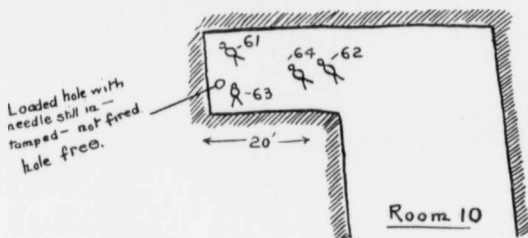
(69.) Geo. Tuka, miner; found at mouth of cross-cut, evidently eating lunch, as piece-can was open beside him.

(70.) Jas. Schelling, miner; near face and in centre of cross-cut.

Bodies not burned and no sign of coking noted; men killed by concussion; powder can exploded.

This cross-cut was about through—no indications of shot. A lamp, No. 308, was found here with keyhole filled with wood, which might have been jammed in by flying stick, but looked as though an attempt had been made to open it; it was still locked.

Room 10.



(61.) Jas. A. Mitchell, miner.

(63.) Thos. Barton, miner.

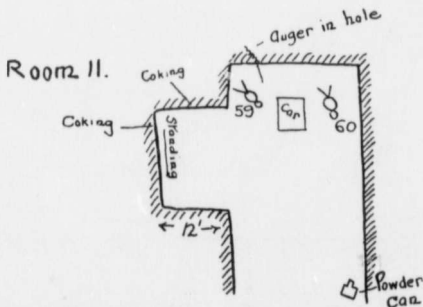
(62.) — Softsac, tracklayer.

(64.) Joe Hurbus, tracklayer.

These bodies were slightly burned but no sign of fire on walls was noted; force of explosion must have been severe here as one body had an arm blown off, and considerable roof had fallen in this room.

The position of men and a hole *still unfired*—evidently waiting for track to be fixed—precludes all possibility of shot having been fired.

Room 11.

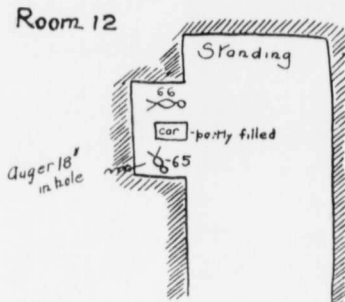


(59.) Peter Lekar, miner.

(60.) Thos. Lekar, miner.

Bodies slightly burned; no coking in room, but in the cross-cut, which was standing, there was considerable coking on the posts near the bottom, but extending to face of cross-cut only. An augur was found in a low hole—stem bent by falling rock. Some 53 feet down the room, on right side, an unexploded can of powder was found "cached" under dirt—belonged to other shift. No possibility of shot fired here.

Room 12.

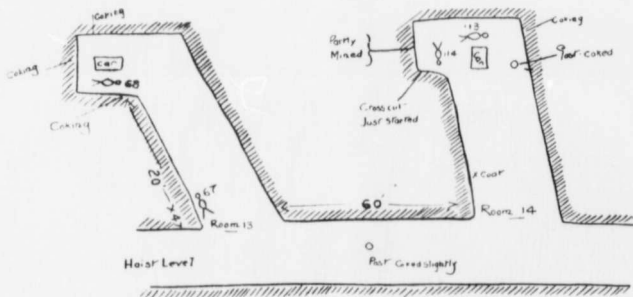


(65.) Wm. Morris, miner.

(66.) Jas. R. Wilson, Jr., miner.

Bodies found close to the face of cross-cut, slightly burned; slight coking of dust in cross-cut; car being loaded. No possibility of recent shot being fired here.

Rooms 13 and 14.



## Room 13.

(67.) Jas. Thorpe, miner; found wrapping paper shell for cartridge on pick handle, paper only singed, body not burned; no coking visible in room; if so, very slight.

(68.) Wm. Thorpe, miner; loading car in cross-cut; body badly burned; very pronounced coking on face and sides of cross-cut.

## Room 14.

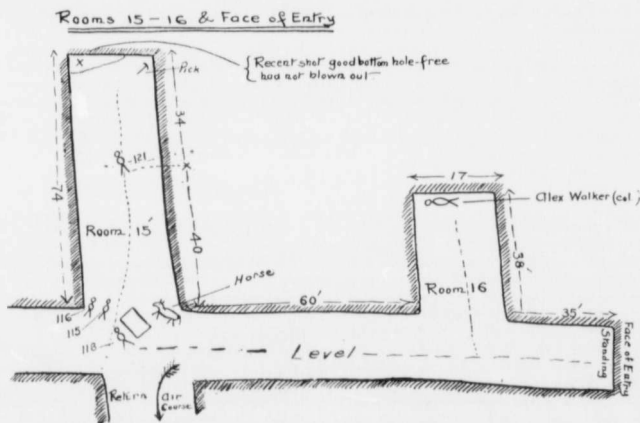
(113.) Ant. Stancheno, miner; found as though loading car; shovel near.

(114.) B. Stancheno, miner; found as though mining. The cut was only partly in.

Bodies only singed; clothing not burned; some slight coking on sides of place, and the fines from the mining in cross-cut was coked for an inch or more as though it had been ignited and had burned for some time. Two exploded powder cans found.

Some little distance down room coats were found intact with box of squibs under them, and watch pointing to 3:47, which when wound up went again, evidently running from 7:25 p.m. till it stopped. Evidently no shot fired here.

## Rooms 15, 16, and Face of Entry.



All the workings inside of Room 14 were badly and completely caved—more so than any other place in the mine.

## Room 15.

(115.) Jos. Hughes, miner.

(116.) Robt. Lamb, fireboss and shot-lighter,

(118.) Jesse Wheeler, driver.

(121.) — Fitzmaurice, miner.

All found under caved roof which extended *all over* level and rooms, so that it is impossible to say whether *much* coking was here or not; a little was noted in face of room. The room was always wet. At the face of the room a shot had been *recently* fired—it was a bottom hole, free, well placed and well judged,—it had *not* blown out, and was in every way a safe shot. The body of the shot-lighter being found at the bottom of this room, coupled with the fact that a shot had *just been fired there*, gave rise to the suspicion that this might have been the shot that started the explosion. The evidence does not bear out this theory.

A shot had just previously been fired here by a shot-lighter, but the shot was an *ideal safe shot* and did not blow out. The men, horse and car would not have been in the positions found while a shot was being fired, and no man in this level moved of his own volition after the explosion. The more probable theory is that the shot-lighter had just previously fired a shot and was waiting to see if all was safe, that he had allowed the driver and horse to proceed, and one of the miners was more than half-way up to the face when the explosion occurred. In my mind it is certain that this shot had *nothing to do* with the explosion.

#### Room 16

This was also a very wet room; it had been idle, but that shift Alex. Walker (col.) had taken it alone, as he had no partner. His body was found close to face, which was squared, and there was no evidence of any mining having been done there. Walker had evidently not started to mine, and was probably timbering and fixing up the place as the roof here was treacherous.

#### Face of Entry

Had not worked for some time; was standing idle and squared up.

#### MACHINE SECTION. (See sketch next page.)

The "Machine Section" was so called as therein the "*mining*" or "*under-cutting*" of the coal was done by an Ingersoll Sargeant coal cutting machine, operated by compressed air, and not by hand picking as in the rest of the mine.

This machine is practically a percussion air drill, mounted on two wheels, and, when in operation it stands on a "*board*" or inclined wooden plane slanting towards the coal face, which causes the cutter to always press against the face, the weight of the machine, 750 lbs., taking the recoil. The cutter is from 2' to 2½' across and cuts about 3' to 4' wide, owing to the movement of the machine. The machine will undercut 4 feet 6 inches or, if a clearance is made for the wheels, it will cut 5 feet. The "*under-cutting*" is about 18 inches high on the outside and 3 inches at the back.

#### Practice.

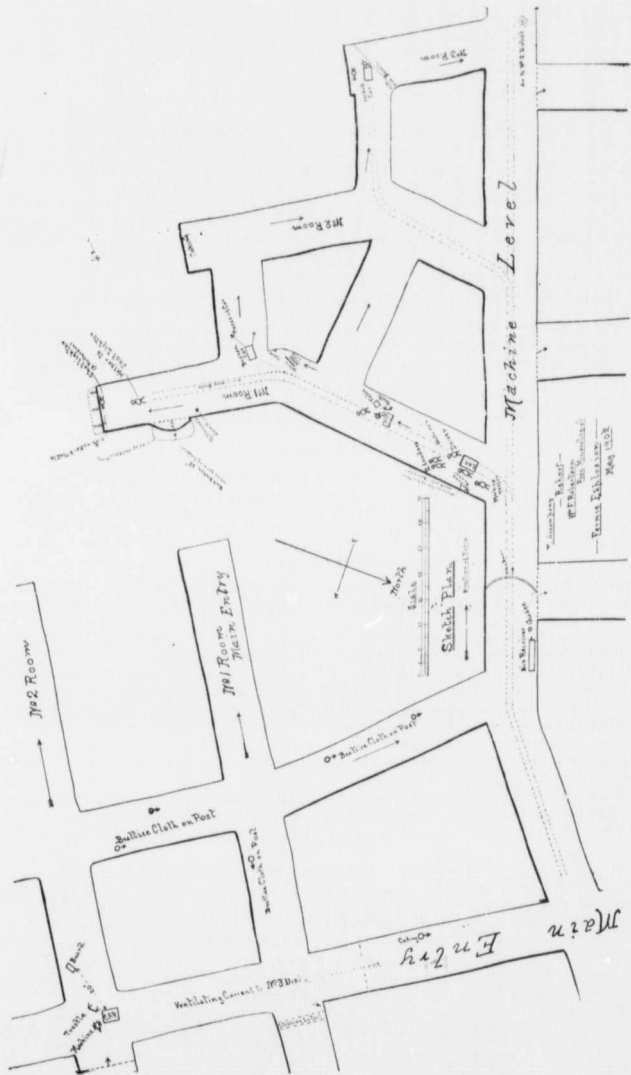
The practice was for the machine to thus undermine right across the whole face of a 20-foot room, being operated by two men on Company time. The machine was then moved to another place, cutting three or four places in a shift. After the machine came two loaders, also on Company time, who loaded up and removed in a car all the fine coal and dust made by the machine. When this was completely cleared away, the shot-lighter (a certificated man) came along with his helper, who bored 3 holes, each 2 inches in diameter and from 36 to 42 inches deep into the coal, or about 12 inches less than the under-cutting, and about 18 inches from the roof. One of these holes was in the centre of the face and the other two, one on either side, from 2 to 4 feet from the rib, the holes being bored in nearly horizontal. After the place had been duly sprinkled and wet down the centre hole was then loaded with black powder, tamped with wet coal dust and fired, the squib being lit by the fireboss from the safety lamp unscrewed. The centre hole broke down easily, as there was such a long under-cutting. After this was down and the coal therefrom cleared away and taken out, the other shots were fired, one at a time, by the shot-lighter, the breaking of the centre hole acting as "*side shearing*" for both these holes. In this way the coal is all cut and loaded on Company account, to a large extent doing away with the skilled labour of the coal miner. The practice as herein given is as reported to me by the overman, as no work was going on at the time to be seen personally. The measurements and position of holes and under-cutting are taken from No. 1 Room, which had not been fired, but was all ready, and which may be taken as fair evidence of how the deceased shot-lighter, And. Paterson, did his work.

#### MACHINE SECTION OF No. 2 DISTRICT.

In this section there are 5 Rooms and the Face of Entry.

#### Face of Entry.

No. 7 Room from Hoist Entry had just previously holed through here, and the face had not worked for some time. It was squared up and standing.



*Room 5*

Had just been broken off and was opposite the top of the No. 7 Room just mentioned. It was squared up and had not worked for some shifts.

*Room 4*

Was a blind room with no cross-cuts from it, up about 50 feet, 21 feet wide. This was cleared up and squared up ready for mining, and had not been worked for some shifts. The thickness of coal here was 5 feet 9 inches. This room was distinctly damp. There were slight indications of coking in the face.

Some 39 feet back from the face, on the right-hand side in the rib, an old "missed hole," not exploded, was noted, filled with wet powder, and directly opposite which was a post showing signs of coking. This was evidently an old hole made when the face of the room was at that point.

*Room 3.*

[Note.—For Rooms 3, 2 and 1, see enlarged sketch of this section herewith.]

The cross-cut from No. 2 Room had just been holed through into this room, hitting it about 4 foot 4 inches lower level. There had been no work going on in the room proper, as the cross-cut had cut it off, but in the cross-cut, where it was in the room and as indicated on the plan, two loaders—No. 71, Alex. Bodie, and 72, Steve Resko—were found beside a loaded car, evidently having been occupied in loading such. The bodies were protected by the bench, so they were not burned or mutilated. The evidence is conclusive that no shot was fired here.

*Room 2.*

This room was not being worked. It was squared up, and had been about half mined by the machine; but the machine had been ordered out, two shifts before, till some timbering was completed. It was evident no shot had been fired here for several shifts. There was some coking noted on the face of this room, but not very much.

*Room No. 1.*

As evidence by certain witnesses at the Coroner's Inquest—with which I can in no way agree—placed this room as the "*point of origin of the Explosion*," I shall go into the matter in considerable detail.

The enlarged sketch shows this room in detail, and shows the room to have two cross-cuts to right into No. 2 room. The face of the room and a cross-cut to left only were working at the time of the accident. There had been a line of props up the room just to the right of the track, of which I think only one was left standing. These had been blown out and the "*false roof*" of from 12 to 18 inches of shaly sandstone had fallen over practically all the room.

From the entrance of the room up to the first cross-cut right, the track was level, there being here about 12 to 18 inches of water always standing in the room. From this point the room had been turned more to the left or up the rise of the coal, and was consequently a rising grade from here to the face.

From this water-hole was obtained the water for "wetting down" the place, 20 yards back, previous to firing a shot, the water being carried up in old powder cans.

*Face of Room.*

The face of the room, 19 feet 3 inches (intended for 20 feet), had been undercut by machine (as shown in detailed sketch made from actual measurements taken by me) right across, and about 50 inches in. Above this, three holes were found bored in the positions shown. These holes were 41 inches, 36 inches, and 35 inches deep respectively. They were smooth on the inside and the bottom hard and rounded as from the augur. They were not "*funnelled*" at all at the mouth, and I am satisfied no powder had ever been ignited in them. There was no loose coal or coal dirt near the face. The hollow tamping rod, with the copper needle in it, as for carrying, were found on the floor within 3 feet of the face.

The body of the shot-lighter, No. 73, And. Paterson, was found at the face, against which he had been dashed by the force of the explosion, striking it 4 feet from the floor with such

violence that he was disembowelled and a leg blown off, while his lamp was found below the cross-cut as indicated on the plan. These facts, to my mind, are absolutely conclusive that no shot had been fired at this place on that shift.

*Cross-cut to Left.*

The sworn evidence of the overman was to the effect that one cut, and only one cut, of the machine had been made in this cross-cut previous to the fatal shift, which is borne out by the evidence of the ground as found, which further shows that this cut had not been squared up completely before the cut made on the last shift. The undercutting here was by measurement 4 feet in from the face of cross-cut, which was in 4 feet 6 inches from the room.

This cross-cut is running across the cleat of the coal, which is here very tender and friable, and in the face there was considerable coal down. This fall of coal is accounted for by the fact that the roof rock had fallen for 45 inches inside of the cross-cut, taking down an "overhanging" of coal adhering to the roof.

There was not a trace of a hole having been bored in the face of the cross-cut, while a wooden sprag was found under the coal in the under-cut holding up the brittle coal. This slight fall of coal was considered by some witnesses as indicating a shot fired, but it is hard to believe that any practical miner would fire a shot of less than 12 inches deep when he had still 4 feet of undercutting back of that. To my mind this theory is little less than absurd, and, furthermore, is not borne out by the position of bodies or direction of force as clearly indicated.

The evidence seems to me to show that the two machine men (50 and 51) had undercut the face of the room and then, moving to the cross-cut, had cut this and were on their way out of the room. The two loaders (74 and 75) had removed the fines from the undercutting at the face, with which the car was loaded when found. The driver and mule were taking out this car. The shot-lighter (73) and his helper (122) had bored the holes in the face and were waiting till the machine had finished the cross-cut. The machine had just started away, and they were just proceeding to load the centre hole at the face, their tools beside them, when the explosion occurred.

That the blast was up the room is shown,—

- 1st. By the position of men at the bottom of the room, having been blown back.
- 2nd. By the position of the shot-lighter.
- 3rd. By the position of lighter material blown off the car carrying the machine.
- 4th. By the position of props found and of debris against side.
- 5th. By the confirmatory evidence of force observed outside of the room.

The whole evidence seems to me quite clear and positive that no shot had been fired, immediately previous to the explosion, in the machine section and that the explosion had entered there from the east and gone out to the west, which is equally true for the whole of the No. 2 District.

No. 3 DISTRICT OF No. 2 MINE.

Following in the *Main or Straight Entry* from the point where No. 2 Split is taken off, this section of three or four working rooms was also given over to "*Machine Mining*," but owing to the fact that the "machine runner" had, a couple of days previously, hurt his foot and was unable to work, these rooms had not been "*mined*" for that time, and the only work going on in these was the loading of coal already mined, so that no shot could possibly have been fired here.

In the face of the Entry, two loaders—(78) And. Angelo and (77) F. Fredrico—were found loading coal, with their shovels, etc., with them. The remainder of the places were squared and standing. This section showed more coking than usually found elsewhere and was evidently very hot. The stoppings were all blown from *east to west* and the force here was very strong, taking the tops off the cars and hurling the board and trestle off the machine car as indicated.

Following the intake air-course along the faces of the abandoned rooms and old workings to the eastward, coking was observable for 300 feet or so to the east of Main Entry, indicating a force and blast from *east to west*. These old workings were very wet in places and in other parts dry. In these latter spots there was a considerable accumulation of fine impalpable dust, evidently having settled out of the air current.

## McDONALD'S LEVEL.

*Room 1.*

The cross-cut from this room is holed through into the old workings, and is here part of the main intake air-course for this District.

At the head of the room two bodies were found—(92) Gerardo Silla and (93) Lucian Silla, both miners—with lamps intact.

Car and tools were found at the face and there is evidence that no shot had been fired here.

The room was badly caved, all timbers were blown out and there is convincing evidence of a strong blast from this room into the old works. No sign of coking was noted.

*Room 2*

Was not working on day of accident. It was found badly caved.

In cross-cut between Rooms 2 and 3 there was coking on the posts and evidence of strong blast from 3 to 2 along the cross-cut.

*Room 3.*

In the face of room were found the bodies of the two miners working there—(94) Toney Angelo and (95) And. Camara—with their tools but no car. There was evidence that no shot had been fired. Just below the cross-cut were found two track-layers—(96) Joe McTaga and (97) Ignace Matalak.

*Room 4.*

In the face of the room was found (98) John Chingara, miner, together with car and tools; his partner, (99) Mike Lekar, was found in No. 5 Room, on track 20 feet below cross-cut. The room was badly caved; bodies not more than singed. There was evidence of a blast *north*.

*Room 5.*

Two miners—(100) Tom Kruper and (101) Joe Gabriel—were found in face with empty cars and tools, evidencing that a shot had not been fired. No burning and only slight evidence of coking.

*Room 6.*

The face of the room was not working on that shift, but showed coking on coal and considerable coking in room. In the cross-cut off this room to the right, two miners were found at the face—(102) Geo. Barber and (103) Philip Toba.

An empty car and tools were also found at the face, all evidencing that no shot had been fired. There was a considerable amount of coking on the face and sides of the cross-cut, while the car was broken by force of blast.

*Room 7.*

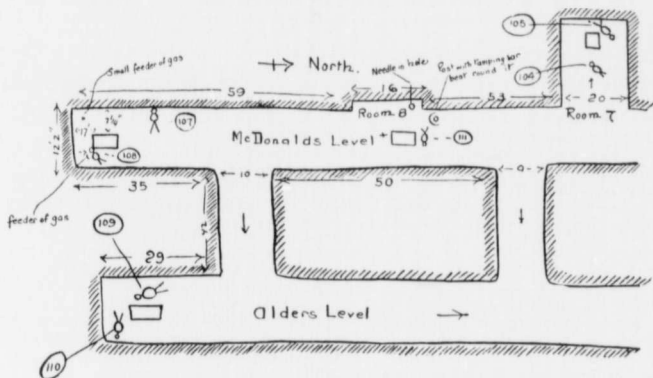
This was a blind room up 62 feet from the level. This room was running across the "*cleat*" of the coal which was here so tender that it did not require blasting at all, and the evidence was that no powder was used here, the face showing pick marks right across it.

One miner—(105) Joe Crump (col.)—was found at the face loading a car, his pick and shovel beside him, and the full car 12 feet from face. His partner—(104) Larkin Armstead (col.)—was found 35 feet down the room.

This room showed evidence of the hottest fire in the mine, the roof and side, also a prop and loaded car, were spattered with coke (which here was steel-grey colour) on the lower sides. The coking extended 38 feet down the room.

This room is reported as the driest and dustiest room in the mine, and from the nature of the coal must have made a lot of dust while loading was going on.





Room 8.

Had only started off the level, the car still being loaded on the level track.

The mining here had been cut and the hole bored and loaded but not fired, the needle being still in the hole and bent north. Near the room there was a prop standing, around which the tamping bar had been bent by force of the explosion north.

The ends had been blown out of the car to the north, and the evidence of great force acting northward is unmistakable. There was some coking in the mining, where the twisted bonnet of a lamp was also found.

The miners (106) Anthony Williams and (111) Ant. Cantazio were found as indicated. There was no sign of a shot having been fired here.

#### FACE OF McDONALD'S LEVEL.

The loaded car and tools were here in the face, and (108) Jas. Muir was found near the face with a pick, having evidently been mining here (the cut being only half done), and having dropped back 5 or 6 feet from the face. His partner, (107) Dougal Milroy, was found back from the face about 25 to 27 feet, evidently on the upper side of bratticing. He was found pitched forward head first against the upper rib, his skull being fractured, but showed evidence of not having been thrown far.

The condition of things here would preclude the possibility of a shot having been recently fired here.

There is evidence here of coking, noted on the top of the loaded car and elsewhere, but there is little or no evidence of force or blast.

Travelling out of McDonald's level the direction of force is northward, the stoppings, where noted, being driven east or towards Alder's level.

#### FACE OF ALDER'S LEVEL.

The two miners (109) Malcolm McLeod and (110) Aaron Celclough were found near face with tools and car, so a shot could not have been fired here. The end of this entry was six inches deep with water. The bratticing inside of the last cross-cut was partly standing, but opposite the cross-cut, and outside of it, it was thrown down, apparently by a force carrying down the cross-cut from McDonald's level, which then passed north out of the level, but with less violence than in McDonald's level.

Following along Alder's level, which was very wet, there was evidence of force northward, but nothing of special interest was noted until the slope was reached, and in the production of the Beaver slope below the Alder's Level, in a level to the north with a cross-cut to west, was

found (112) Willie Owen, boy, helper, floating on the water which had accumulated, while down the slope his father, John Owen and Willie McDonald, a coupler, were also found in the water.

The evidence here was destroyed by the water.

Following *Galloway's Level*, the line of direction of the blast was noted at various points as following the return air course here.

In the counter of *Galloway's level* the body of — Beach, the shot-lighter of the district, was found not near any working place, but on the travelling road.

In the face of this counter two bodies, Beaver and Stuart, were found, with car and tools, at face. No coking was noted here, but force in the direction of No. 3 Mine was apparent. No shot had been fired.

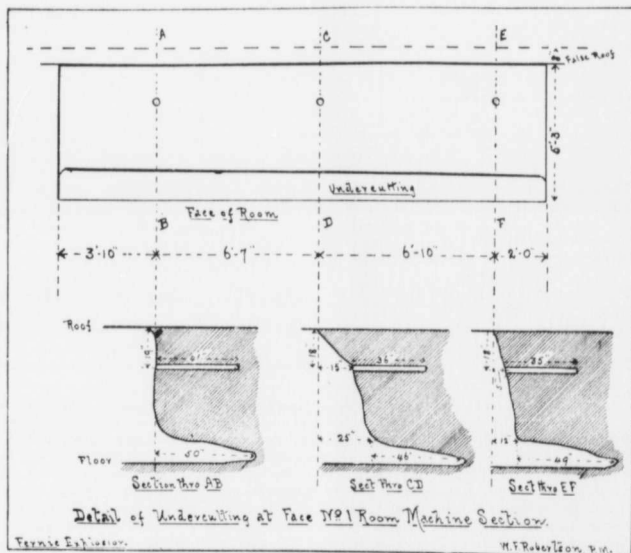
In the face of the level the bodies of Barron, Sr. and Jr., were found near the face. There was no sign of coking nor heat, and no shot had been fired.

#### DEDUCTIONS.

##### *Initial Point.*

As already pointed out, No. 3 Mine and No. 1 District of No. 2 Mine, although included in the area of the explosion, show from the facts found by examination that it was impossible for the explosion to have originated there, and they are consequently eliminated, leaving Nos. 2 and 3 Districts as the only possible points of origin.

The only two points of origin suggested by witnesses at the inquest were McDONALD'S LEVEL and No. 1 ROOM IN MACHINE SECTION, while, based on a preconceived idea that a *blown out shot* was the cause, suspicion was cast on ROOM 15 OF HOIST ENTRY.



*Room 15.*

As to the last-mentioned locality, as I have already pointed out, the facts observed do not bear this out. Undoubtedly the shot-lighter had recently let off a shot here and the hole was found, but it was a perfectly *safe shot* and had just done its work safely. The room was naturally very damp and there was no likelihood of any amount of gas so that there could have been no fire. The position of the men as found and the line of force as indicated, make it impossible that this point was the source.

*Room 1, Machine Section.*

There could have been no gas here as this was the first room on the main intake of the district.

There could have been no dust in suspension as there were no operations in progress to cause such, other than might have been brought in from the main entry with the air, and there is no reason to suppose this was abnormal. There was *no shot fired here* to raise the dust which might be lying on the ground or to ignite it.

The line and direction of the force, as far as found in No. 2 District, *would apply equally to this room or McDonald's level*, as this is the first point in No. 2 District in line from McDonald's level. So for guidance as to this indication of point of origin, we must look to the *eastward only*, and there we find undoubted evidence of the force *travelling westward and westward only*, that is *towards No. 1 Room*.

It was attempted to show at the inquest that the position of the men in this room indicated that a fire was in progress here, as had sometimes happened before after firing a shot, and it was shown that buckets were found near the two loaders; but these buckets were kept here always beside the water hole for sprinkling purposes and there is not a scrap of evidence pointing to either a fire or a shot.

*The source was not here but eastward.*

END OF McDONALD'S LEVEL.

From this point, radiating like a fan after it got out of the narrow neck, is found evidence of "direction of force" all of which can readily be accounted for on such theory.

Opposite Room 8 on this level the force was *intense and outward*, with the same outward direction on Alder's level, and there is only one place where this could come from, namely, *the end of this Entry*.

The general evidence as seen on the ground is so strong and so persistent that I have no doubt in my own mind but that *the initial point of the explosion was the face of McDonald's level*.

CAUSE OF EXPLOSION.

As far as this place in itself is concerned, it is a *winning working* and consequently damp, but for the same reason more inclined to make gas.

When first visited by me it was about a week after the explosion (and the overman and myself were the first in it), there were two distinct feeders of gas being given off here, which made sufficient noise to be heard 50 or 60 feet away and which, though noted by me, were not considered of sufficient volume to be especially dangerous.

The larger of these two feeders was directly over where Muir was "mining" and he could not have been ignorant of its existence. From its position it must have been struck on that or on the previous shift.

The evidence is that the bratticing was well up to the face and, being a narrow (12 ft. 2 in.) level workings, it is not conceivable that any large accumulation of gas could have occurred here.

The rescue party explored it without the necessity of bratticing as the current of air along the level cleared it.

The Reports of the Firebosses, of Overmen, of the Government Inspector, of the Committee of the men and of the Miners themselves, all go to prove that there was no abnormal amount of gas in the mine, that as far as gas was concerned there was no accumulation, that there was ventilation sufficient and that although gas was detected occasionally in certain places it was easily cleared by directing the air current.

The Barometer from May 20th until after the explosion was constant at 26.20.

The whole of *McDonald's level* was at least damp, and not dusty to a dangerous degree, but the coal in Rooms 6 and 7, and probably in 8, was *very tender and could usually be broken without blasting—No. 7 was entirely pick work*—making an excessive amount of fines, and, consequently, in the loading would raise up an unusual amount of dust in a very fine state of division, which would float off on the air current.

*All these rooms on this level were loading at the moment*, and all the air from them came to the end of the level and must have been heavily charged with dust.

Competent authorities agree that air with too small a percentage of gas in it to be dangerous, or even detectable with the ordinary lamp, becomes explosive when to this is added very fine coal dust in suspension.

It is even claimed by many that dust in the air, even without gas, is explosive, although this is questioned by other authorities unless its igniting is accompanied by a shock; but they all agree that an explosion, having once been started, can be transmitted through the medium of fine dust in suspension.

The most tenable theory as to the cause of the explosion is that an explosion of gas, or gas and dust, was started in McDonald's level (the igniting cause will be considered later), which in itself was probably not very great; that this initial explosion was conveyed against the air, being transmitted by the suspended coal dust, which the explosion rendered explosive, and which dust was put into the air by the act of loading; that at each loading place it received an augmentation; that the line of greatest force followed such links of augmentation until it came to the narrow neck at the entrance of this Section. Here it spread, fan-shaped, following the line of least resistance through the old workings. In these old workings the greatest force was still "against the air," with its greater amount of available oxygen, and also for the reason that along this line there was deposited by the incoming air current a considerable amount of impalpable dust carried from the Main Entry and its workings and dropped here under the decreased velocity of the air current caused by the increased area of the airway.

This expanding force, meeting with some temporary resistance near the machine section, was halted for an instant, causing thereby coking, with consequent further production of gas.

The flame swept along through the *Machine Section* and *Hoist Entry*, this time with the air, receiving augmentation at each working room until finally it came to a "dead end" in the face of the Hoist Entry, where the greatest concussion was produced, as evidenced by the greatest amount of caving.

Between Beaver Slope and the No. 1 District there is a wet "sag" or swamp. No dust was here available to feed the flame. The same condition probably prevailed north of the Hoist Entry, which is reported as wet near the fault, so that, although No. 1 District got the shock, it was partly spent and devoid of flame.

#### IGNITING CAUSE.

The possible causes are:—

*Shots* or an *open flame*, including defective or misused lamp, with the remote possibility of a spark, from a pick hitting a stone.

#### *Shots.*

Every working place in the mine was carefully examined, as has been already explained, and the evidence is most conclusive that not a single shot had been fired in the affected districts immediately previous to the explosion, so that all questions as to "blown-out shots," or "badly-placed shots," or "quality of powder" may be dismissed as having nothing to do with this explosion, whatever else may be said of them.

If need be, this is further confirmed by the position in which the shot-lighter of the district, Beach, was found. He was away from all workings at the time, and as he alone was allowed to or did fire a shot, this in itself would almost prove that no shot was fired.

#### *Safety Lamps.*

The best safety lamp is only safe when handled properly. In this mine the "*Bonnetted Clanny*" was used exclusively. This is provided with a glass ring around the flame; if this glass is broken or defective, the lamp becomes an "*open light*," and would ignite any explosive

mixture. This might happen from a blow of the pick or, if the lamp was tilted on one side so that the flame heated one side of the glass unduly, it *might* crack, and certainly would if then hit by cold water.

This lamp is also said by authorities to be unsafe "in a strong current of explosive gas," as it is liable to pass the flame through the single gauze; but there is no evidence that this happened. The *Bonneted Clanny* is much less liable to this than the *unbonneted*.

The "lock" on these lamps is a screw in a keyhole, the key being a piece of  $\frac{3}{16}$ " round iron with a slot in the end. False keys for these lamps are easily made, and it is on record that a number of the miners had such false keys, in defiance of the law against it.

*Matches* were also found on several of the bodies recovered, and it is particularly stated in evidence before the Coroner that a box with matches and tobacco were found in the pocket of one of the men working in the face of McDonald's Level, the seat of the explosion.

The igniting cause will probably always remain a mystery, and is at best only a matter for speculation, although it is almost certain to have been a naked light of some sort which set fire to the gas.

In accordance with your instructions, Messrs. Shepherd, Faulds and myself appeared before the Coroner's jury and gave evidence, endeavouring to give the jury as much light on the subject as possible.

The shorthand notes of the evidence taken before the Coroner are now being typewritten, and should be soon available.

I have attempted to make this Report simply a statement of the investigation as to the cause of this explosion, omitting all criticisms of methods of working, thinking it best, if such report is desired, to make it a separate matter.

I have, etc.,

(Signed) WILLIAM FLEET ROBERTSON,  
*Provincial Mineralogist.*

## REPORT OF MR. SHEPHERD.

*The Hon. Edward Gawler Prior,  
Minister of Mines, Victoria, B. C.*

Sir,—In accordance with your instructions of May 31st, 1902, I proceeded to Fernie, B. C., to examine Tunnels Nos. 2 and 3, of the Coal Creek Mines, the property of the Crow's Nest Pass Company, Limited, with a view of ascertaining the cause of an explosion which took place in the aforesaid mines at 7.30 p. m. upon the 22nd day of May, 1902, and beg to report, under separate heads, as follows:—

1. The apparent condition of the mine, as evidenced by—
  - (a.) The Firebosses' reports:
  - (b.) The Inspectors' reports:
  - (c.) The Miners' Committee's report:
  - (d.) The Barometer and Ventilation.
2. The detailed examination of the mine.
3. Deductions as to location.
4. Deductions as to initial cause, augmentation and contributing causes.
5. Conclusion.

### THE FIREBOSSES' REPORTS.

Condensed extracts, showing all gas reported May 1st to May 19th, inclusive. May 20th to May 22nd are copied in full.

- May 1st.—Morning shift, No. 3 District, gas in McDonald's level.  
(Signed) R. PENGELLY.
- May 2nd.—All clear.
- May 3rd.—No. 3 Mine; gas in No. 5 Room on the left.  
(Signed) J. SULLIVAN.
- May 5th.—Night shift, old workings and roadway, No. 2 and 3 Districts, No. 2 Mine; examined and found clear by  
(Signed) D. McDONALD.
- Afternoon shift, No. 1 District, No. 2 Mine; missed shot third landing, south side of Incline  
(Signed) S. HAND.
- May 6th.—All clear.
- May 7th.—Morning shift, No. 3 District; a little gas in No. 7 stall, McDonald's Level.  
(Signed) HENRY McMILLAN.
- Afternoon shift; missed shot Cross-cut off No. 1 Room, Incline  
(Signed) S. HAND.
- No. 2 Mine, No. 3 District, gas in McDonald's and Alder's Levels.  
(Signed) R. PENGELLY.
- May 8th.—Morning, No. 2 Mine, No. 3 District; gas slightly in No. 3 Room, McDonald's Level  
(Signed) R. B. LAMB.
- Afternoon; gas in No. 7 Room, McDonald's Level.  
(Signed) R. PENGELLY.
- May 9th.—Morning; gas in No. 7 Room, McDonald's Level.  
(Signed) R. B. LAMB.
- Gas in No. 7 Room and McDonald's Level and Counter.  
(Signed) H. McMILLAN.
- Afternoon; gas in McDonald's Level.  
(Signed) R. PENGELLY.
- May 10th.—Morning; gas in McDonald's Level, No. 7 Room.  
(Signed) H. McMILLAN.
- Afternoon; gas in McDonald's Level.  
(Signed) R. PENGELLY.

- May 11th.—Working places and travelling roads clear.
- May 12th.—Night shift, No. 2 Mine, No. 1 District; gas on high side No. 1 West Level.  
(Signed) D. JAMES.  
Afternoon; gas in counter of McDonald's Level.  
(Signed) HENRY McMILLAN.
- May 13th.—Night shift, No. 2 Mine, No. 1 District; gas in cross-cut, in 1st Level, No. 1 Incline.  
(Signed) D. JAMES.
- May 14th.—7 a. m., No. 2 Mine, No. 3 District; gas in Alder's Level and Cross-cut.  
(Signed) R. PENGELLY.  
Afternoon, No. 2 Mine, No. 3 District; gas in Counter of McDonald's Level.  
(Signed) HENRY McMILLAN.
- May 15th.—7 a. m., No. 2 Mine, No. 3 District; gas in Alder's Level and Cross-cut.  
(Signed) R. PENGELLY.  
Morning shift, No. 2 Mine, No. 3 District; gas in Alder's Level.  
(Signed) R. B. LAMB.  
Afternoon shift, No. 2 Mine, No. 3 District; gas in counter of McDonald's Level.  
(Signed) HENRY McMILLAN.
- May 16th.—No. 2 Mine, No. 3 District; a little gas in Cross-cut off Alder's Level.  
(Signed) R. PENGELLY.  
Afternoon, No. 2 Mine, No. 3 District; gas in No. 7 Stall off McDonald's Level; gas in Cross-cut off Bever's Level.  
(Signed) HENRY McMILLAN.
- May 17th.—Clear.
- May 19th.—No. 2 Mine, No. 1 District; examined all old working places and districts and found them in safe condition. Found gas in Cross-cut off No. 1 Level off Incline.  
No. 3 Mine; examined all old workings and airways and found them in safe condition. Found gas in 13 Room off No. 1 South Level and Burrows' Level; all other places clear.  
(Signed) JOHN HUNT.
- May 19th, 7. a.m.—No. 2 Mine, No. 3 District; clear  
(Signed) R. PENGELLY.  
Morning shift, No. 2 Mine, No. 1 District; all working places clear.  
(Signed) R. PENGELLY.  
Morning shift, No. 2 Mine, No. 1 District; all working places clear.  
(Signed) F. LANDER.
- Following reports of the 20th, 21st and 22nd are copied in full:—
- May 20th, 1902—No. 1 District; all working places clear.  
No. 3 Mine; gas in 17 Room, First Level, South; all other working places clear.  
(Signed) JOHN DOBBIE.
- No. 3 Mine, May 20th, Morning shift, No. 1 District; all working places clear.  
(Signed) F. LANDER.
- No. 2 Mine, Morning shift, May 20th, Nos. 2 and 3 Districts; all working places clear.  
(Signed) R. PENGELLY.
- No. 3 Mine, May 20th; all working places clear.  
(Signed) JOHN DOBBIE.
- Afternoon shift, May 20th, 1902, No. 1 District, No. 2 Mine; clear of gas and in safe working order.  
(Signed) S. HAND.
- Afternoon shift, May 20th, No. 2 Mine, Nos. 2 and 3 Districts; all clear.  
(Signed) R. B. LAMB.
- Wednesday morning, May 21st, No. 2 Mine, Nos. 2 and 3 Districts; all clear.  
(Signed) R. B. LAMB.
- No. 2 Mine, May 21st, 1902, No. 1 District; all working places clear. No. 3 Mine; all working places clear.  
(Signed) JOHN DOBBIE.
- No. 3 Mine, Morning shift, May 21st, 1902; all working places clear.  
(Signed) JOHN HUNT.
- No. 2 Mine, Morning shift, May 21st, Nos. 2 and 3 Districts; all working places clear.  
(Signed) R. PENGELLY.

No. 2. Mine, Afternoon shift, May 21st, Nos. 2 and 3 Districts; found all clear.

(Signed) T. MORGAN,

No. 3 Mine, May 21st, 1902; all working places clear.

(Signed) JOHN DOBBIE.

Thursday morning, May 22nd, No. 2 Mine, Nos. 2 and 3 Districts; all clear.

(Signed) R. B. LAMB.

No. 3 Mine, Night shift, May 22nd; all working places clear.

(Signed) J. SULLIVAN.

No. 2 Mine, May 22nd, Morning shift, No. 1 District; all working places clear.

(Signed) F. LANDER.

No. 2 Mine, Morning shift, May 22nd; all working places clear.

(Signed) J. SULLIVAN.

No. 2 Mine, Morning shift, May 22nd, Nos. 2 and 3 Districts; all working places clear.

(Signed) R. PENGELLY.

(Signed) A. DICK.

10:15 p.m., May 22nd, 1902.

[MEMO.—The above is the Inspector's signature, after the explosion, sealing the reports up to the date and time stated.]

Barometer on the 22nd, 26.20.

### The Inspector's Report.

*(Extracts from Mr. Dick's Report to the Honourable the Minister of Mines, dated Fernie, June 2nd, 1902.)*

May 19th.—I went up this morning to the Coal Creek Mines, when I examined all about the outside, and then went down No. 3 Mine; I went down here to the level on the south side; I was in all the stalls as I went in and much of the old workings, examined them with a safety lamp and did not find a trace of gas; I saw the old workings were in good order. I came out of this level and went down the slope to where they were starting off other levels; as they are only in a short distance I came and went in the level to the north side of the slope. I was in most of the old works here, and all the present working places; they were in good order; hard, rock roof, plenty timbers, but very wet; ventilation good. I saw that there was 27,000 cubic feet of air passing per minute; this was at a place well down the slope; here there were 50 men employed a day. After coming out of No. 3 Tunnel I went to the No. 2 Mine, thence to what is known as the high level district. I was in all the working places of this division; examined them with a safety lamp to see if there was any gas, but failed to find even a trace of gas. All the working places were well timbered, and I saw the timbers on hand ready to put in when required. I also went into the old works on the return airway of this district, and saw that all was clear of gas, and the airway in good order; ventilation was good. There, only a short distance from the face, I saw that my instrument registered 12,000 cubic feet of air per minute, most of which was conducted to the face by brattice cloth or otherwise. Every part of the district was in good order. There were 30 men working in this division when I was there, all of whom were working by the light of safety lamps. I talked with the men and there were not any complaints of any kind.

No. 2 Mine.—May 20th. I again went into No. 2 Mine to-day. I went by the electric hoist and deep, then up the long incline to the level of what is known as the West Side or No. 2 District. I went in here to the face, and the stall at the back is known as No. 16. I was in all the old works between the level and face, and of the working stalls, of which there are 16. From here I went to what is known as the Machine District; in short, I was in all the working places of this incline, which is known on the plan as No. 2 District. I examined it very carefully with a safety lamp for gas, but did not see a trace of it anywhere. I also saw that all the places were properly timbered, and in most of the stalls I saw timbers lying that had not been used, and on the levels leading from the incline to No. 16 stall I saw large pools of water on the road. Ventilation was good. I saw by my instrument there was 72,000 cubic feet of air passing down the intake for the East and West Districts per minute for 60 men. Everything was in good order.

(Signed) A. DICK.



## The Miners' Committee Report.

FERNIE, B. C., May 8th, 1902.

*To the Management of the Coal Creek Mines:—*

We, the undersigned, appointed by the Gladstone Miners' Union No. 76, of Fernie, B. C., visited No. 2 and No. 3 Mines, as set apart by the Act, and found them clear of all gases and in good condition, with the exception of want of timber in Section 2, No. 2 Mine.

(Signed) THOMAS ADDISON,  
" THOS. STEVENS.

(Copied from Book at Coal Creek, 4th June, 1902.)

Barometer readings at the office of Coal Creek Mines for May (portion of):—

May 1st	25.98	May 14th	26.22
" 2nd		" 15th	26.32
" 3rd	26.44	" 16th	25.98
" 4th		" 17th	25.98
" 5th	26.42	" 18th—2 feet snow	25.75
" 6th	26.32	" 19th	25.96
" 7th	26.46	" 20th	26.20
" 8th	26.34	" 21st	26.18
" 9th	26.34	" 22nd	26.20
" 10th	26.22	" 23rd	
" 11th		" 24th	
" 12th	26.38	" 25th	25.26.50
" 13th	26.28		

The average for 19 days in May, inclusive of May 22nd, is 26.209 inches nearly; thus the barometer on this day was about the average. The altitude of the mines is 3,850 feet.

The ventilation, according to Mr. Dick's measurements of May 19th and 20th, was as follows:—

No. 3 Mine	27,000 c. f.
No. 2 Mine, No. 1 Division	12,000 c. f.
No. 2 Mine, No. 2 and 3 Divisions	72,000 c. f.
Total	111,000 c. f.

Average speed of fan, 106 to 108. No water gauge records appear to have been kept.

Apparent condition of the Mine previous to the explosion is evidenced by the reports of the Fire Bosses, the Inspector of Mines, and the Miners' Union Committee.

The inference to be drawn from the foregoing is that no gas was reported in McDonald's Level later than May 10th, and in Alder's Level not later than May 16th, and in Room 7, off McDonald's Level, not later than May 16th. These three places are contiguous to each other and may be considered winning drives, and are the most advanced faces in that section of the mine. Therefore the fact that these places were giving off gas could not be considered an unusual contingency. No gas was reported in these places or in this section of No. 2 Mine between the date given and the time of the explosion, and no gas had been reported by the fire bosses in any section of either No. 2 or 3 Mines later than May 20th.

This is corroborated by the Inspector's report on May 19th and 20th, therefore the inference to be drawn from the above is that there was no body of standing gas known to exist in either No. 2 or 3 Mines upon May 22nd, previous to the explosion.

The Inspector reports a wet condition in No. 3 Mine, and pools of water in the Hoist Level. To the above must be added the Gladstone Miners' Union Committee's report of May 7th, in which the two mines are reported clear of all gases, but complaining of a want of timber in Section 2 of Mine 2. This report, while not indicative of the condition of the mine immediately previous to the explosion, shows the general condition of the mine at the time to have been reasonably safe, and that no unusual conditions were then apparent. The apparent

condition, therefore, by the foregoing reports, is that mines Nos. 2 and 3 were reasonably safe on May 22nd, so far as deleterious gases were concerned. The solution, therefore, of the cause of the explosion must be looked for in some unusual contingency and combination of dangers not anticipated in the foregoing reports.

The problem, therefore, resolves itself into the following form:—

To ascertain, by general direction of force, the point of origin, and to then determine the initial cause, and the medium by which the initial explosion was augmented and intensified.

With this programme in view, the whole of the accessible working places were examined in detail as set forth under the following head:—

#### DETAILS OF EXAMINATION.

##### *Synopsis of each day's examination.*

Thursday, June 5th.—Examined fan, main openways, main entry to No. 2 Mine, Hoist Level, No. 2 Mine, and rooms 9, 9a, 10, 11, 12, 13, off the Hoist Level.

Friday, June 6.—Hoist Level, rooms 14, 9, 8, 7, which is Machine Level; rooms 4, 3, 2, Beaver's Dip, and rooms 1, 2, 3, 4, 5, 6, 7, and 8, off McDonald's Level; also McDonald's Level and Alder's Level, thence to Galloway's Level and counter.

Saturday, June 7th.—Main entry to No. 2 Mine, to face Machine Room No. 1; thence down intake to No. 3 District, to McDonald's Level (second inspection).

Monday, June 9th.—Room 15, Hoist Level; Machine Room No. 1; room No. 11, thence to No. 3 Mine, visiting No. 1 Level south.

Tuesday, June 10th.—No. 3 Mine; all workings not previously mentioned that are accessible, and return airway to fan house.

Wednesday, June 11th.—Face of Beaver's Dip, thence from face of Galloway's Level through to Hunter's Level; thence to head of Room 14, No. 3 Mine, Room 15, Hoist Level, No. 2 Mine, re-visited; also cross-cut to left of Machine Room No. 1.

Thursday, June 12th.—Went to High Level, No. 1 District, No. 2 Mine, to foot of incline, and found gas at first cross-cut. No further investigation this day.

Friday, June 13th.—Accident to Fan. No examination.

Saturday, June 14th.—Visited Room 16, Hoist Level.

Monday, June 16th.—Arranging notes, etc.

Tuesday, June 17th.—All High Level, No. 1 District workings.

Wednesday, June 18th.—Re-visited Hoist Level, Machine Room and Main Entry to face to re-examine direction of force. Mine examination finished.

Thursday, June 19th.—Testified at the inquest in the afternoon.

#### THE DETAILED EXAMINATION OF THE MINE.

Thursday, June 5th, 1902: Personnel of party: A. Dick, Inspector of Mines; W. F. Robertson, Provincial Mineralogist; R. Drinnan, Mine Manager; T. Graham, Mine Overman; T. Addison, Miner; A. Ferguson, Miner; A. Faulds, Government Examiner; F. H. Shepherd; Government Examiner.

Barometer 11 a.m., 26.32.

Details of Fan, Driver 7 feet diameter, 26 inches face.

Driver 4 feet " 26 "

Centre orifice of Fan, 15 feet.

Diameter of Fan.

Cylinder.

Stroke.

Speed of Engine, 60 revolutions.

" Fan, 105 "

Water gauge, .9 inches (0.9").

The only damage to the fan at the time of the explosion was that the fan connection was blown out. I am informed that repairs were effected immediately, and the rescue work commenced with little delay. Examined the drain drift from No. 3 Mine and noticed evidences of considerable force, timbers and other débris having been thrown violently against the side of the wash house. This, and the evidence of violent forces, are also shown at the mouth of No. 5 Slope, the roof of the pit head at this point being blown away. Mud from No. 3 Mine coming up the slope does not show coking or evidence of flame. While there is no

evidence of blast coming from the mouth of No. 2 Tunnel, smoke and dirt were seen issuing from the mouth by the motor man who was on the pit head at the time, but there is no evidence of violent force.

Proceeded in No. 2 Tunnel and measured Main Intake Section  $8' 4" \times 6' 0" = 50' \times 1,310$  velocity = 65,500 c. f. per minute.

Continuing along main entry: All the stoppings, with the exception of a few on the east side, were blown up from the east violently. Stoppings on the west side of the entry were blown to the west but not so violently, the force expending towards the mouth of the Entry.

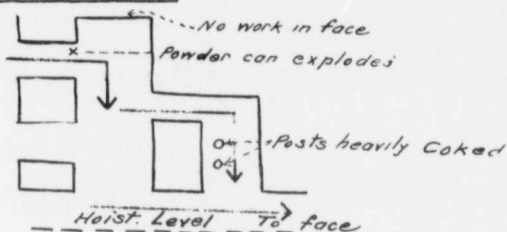
The entry consists of—

1. The Motor Section.
2. Electric Hoist.
3. Horse Section to face.

The condition of the road is alternately wet and dry, the outer portion being wet, with an accumulation of water at the foot of the two Hoists, where an air pump drains this to the surface. The Air Hoist section appeared to be the most dusty portion of the entry, but there were no evidences of coking or combustion on this portion of the entry, with the exception of the extreme portion, near to and at face and contiguous workings. The evidence of direction of force was outward towards the mouth of Main Entry and Hoist Level.

Evidence of force at main siding and door violent; body of boy found near here with leg blown off; direction for a short distance outward towards Main Entry, thence inward to face.

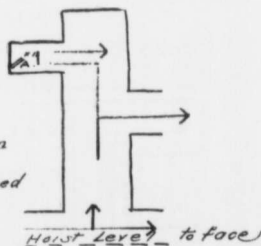
Room 9 a and 9. Hoist L.



Small cars near face, no evidence of blasting, no holes in face or cross-cut. Force going west.

Room 10.

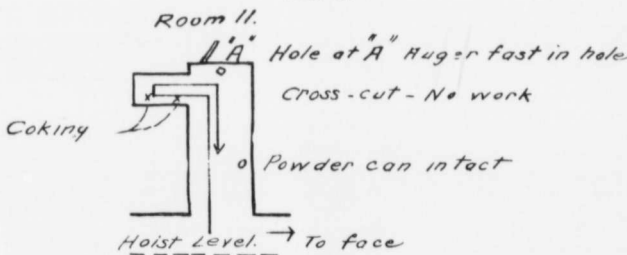
Room 10  
Bottom hole at "A" sheared on  
Left hand rib Face well mined



Bottom hole, needle in and tamped, shot free, face well mined, also sheared on left-hand rib. No sign of coking. No evidence of blasting immediately preceding the explosion. No evidence of dangerous conditions. Force violent. Leg and arm of one man blown off. Bodies

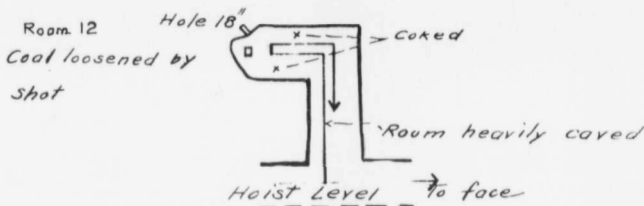
61 and 63 found in face of cross-cut. Bodies 62 and 64 were tracklayers, and were found 20 feet back from face.

## Room 11.



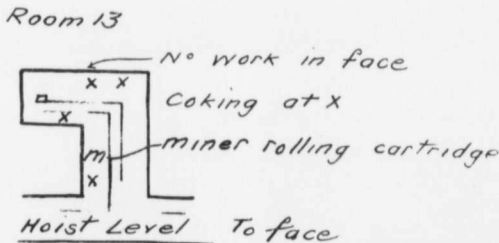
Bodies 59 and 60 were found in face; one man had been in the act of loading car. The auger is fast in hole at "A" and bent to floor by cave. Coking as shown; no coking in face of room. Room caved 1' 6". Powder can found complete as shown. No blasting of recent shot or dangerous condition.

## Room 12.



Remnant of hole as shown 18 inches, shot free, car in face, no evidence of dangerous blasting or that this shot was fired immediately preceding the explosion. Coking as shown in both cross-cut and road. Room heavily caved. Bodies of J. R. Wilson, jr., and W. Morris slightly burned.

## Room 13.



No evidence of dangerous blasting; one body found at face of cross-cut, and the other as indicated, in the act of rolling a cartridge. No work in face of room. Coking as shown.

Bodies of James and William Thorp, the latter burned. Car in face of cross-cut. No dangerous condition in evidence, or anything that might have contributed to the explosion.

*Room 14.*

Some gas; inaccessible at present.

*Room 15.*

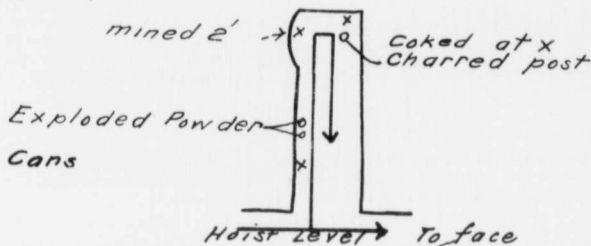
Some gas; inaccessible at present.

The Level heavily caved at inside rib of 15; no signs of coking to any extent. Probably slight indications between Rooms 13 and 15. Evidences of dust on Level not great, say 1 to 1½ inches in places. Water pool, the only one at foot of Room 7.

Friday, June 6th.—Personnel of Party: A. Dick, W. F. Robertson, R. G. Drinnan, T. Graham, A. Ferguson, T. Addison, A. Faulds, F. H. Shepherd.

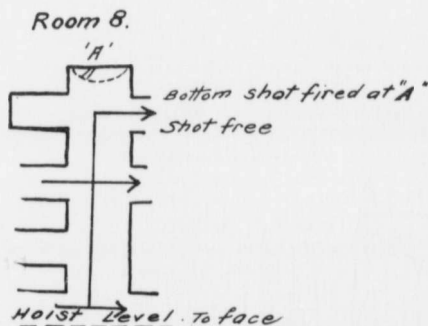
*Room 14.*

*Room 14*



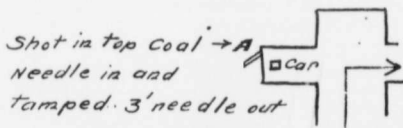
One miner holding and one loading. Two exploded powder cans. No holes in face. Cross-cut just commenced. Roof caved about 1 foot 6 inches thick. Post in this room much charred and covered with coke. Face free from blasting; indications as to recent shots. Dust from mining much coked. Coal partly mined. Coked as shown.

*Room 8.*



Coke in face. Bottom shot fired at "A." Tools in face. Bodies found in face. Miners had evidently been back in face after shot had been fired. Bodies burned and naked. Powder

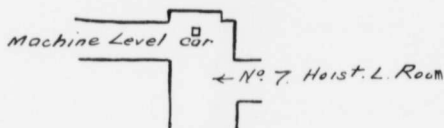
can exploded. Shot referred to free. No evidence of badly planted shot, or that it had been fired immediately preceding the explosion. Cross-cut from Room 8 left-hand side.



Small feeder in face. Small shot in top coal with needle in and tamped. Three feet of needle outside hole. Coke in face. Tools and car in face. No dangerous conditions in evidence.

Room 7.

Room 7. No 5 Machine Room

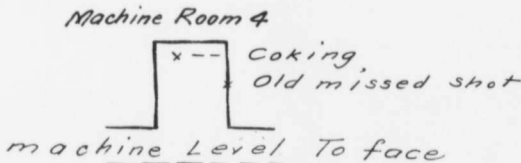


Bodies 53 and 55 found near face, slightly burned. No shot fired. Car and tools in face. Cross-cut to left enlarged some since explosion. This cross-cut leads to face of Machine Level. No dangerous condition in evidence.

No. 5 Machine Room.

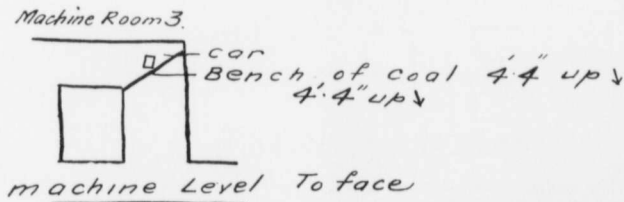
The first cutting only taken out of this, but no work was in progress on the second shift of May 22nd.

Machine Room 4.



No work in this room on the afternoon shift. Coal 5' 9". Small feeder. Coking in face. Nine inches of old rib hole remaining. Force of blast went west as indicated.

Machine Room 3.



Evidently loading in cross-cut. Car blown west to bench as shown. Coal 9' 02 including 4' 4" of bench. No mining or blasting being done. No dangerous conditions in evidence.

*Machine Room No. 2.*

No work after 20th. Roof bad.

*Machine Room 1.*

Inaccessible on account of gas. This room to be re-visited.

District along these machine rooms damp. Faces sweating. Coking noticed on Hoist Level between rooms 14 and 15, and on hewn set of timbers between rooms 7 and 8, outside face of timbers indicating westward direction of force.

BEAVER'S DIP, NO. 3 DISTRICT.

Coke on post near junction with Hunter's Level and post near Galloway's Level, similar on inside face in both cases, showing direction of force to have been outward toward Main Entry. Stoppings at west of Beaver's Dip blown west from old workings showing trend of blast towards No. 3 Mine.

About 50 feet of water in face of dip. This to be re-visited. Body of boy Owen found floating in water, not burned.

No sign of coking at lower part of dip. No sign of combustion on this Hauling Road, with the exception of two instances noted. Dip operated by Air Hoist and drained by Air Pump.

*Rooms off McDonald's Level—Room No. 1.*

Heavy cave in face. Third cross-cut in face holed to old workings and Main Intake. Car and tools in face. Bodies 92 and 93 found near face. Lamps also found. No sign of coking. No evidence of dangerous blasting.

*Room No. 2.*

Standing and heavily caved. No work on afternoon of May 22nd.

*Room No. 3.*

Clear evidence of coking in cross-cut between rooms 2 and 3 on inside of cap, showing course of explosion to have been outward in a northerly direction towards Main Intake. Two bodies, 94 and 95, found at face and bodies of tracklayers found near. No car in face. Tools in face. Evidence would indicate that there was no blasting immediately preceding the explosion. No coking in face.

*Room No. 4.*

Body found (one) close to loaded car on outward end. Car loaded and tools in face. No coking. Signs of force outward. No evidence of recent or dangerous blasting.

*Room No. 5.*

Three bodies found in this room, two in face and one down room. Some sign of coking. Car and tools in face. No hole in sight, and no evidence of recent blasting or dangerous conditions. Bodies 99, 100, 101.

*Cross-cut to right of Room 6.*

Bodies of 102 and 103 found in face. Empty car in face, also tools. No holes. Considerable coking. No signs of recent blasting or dangerous conditions.

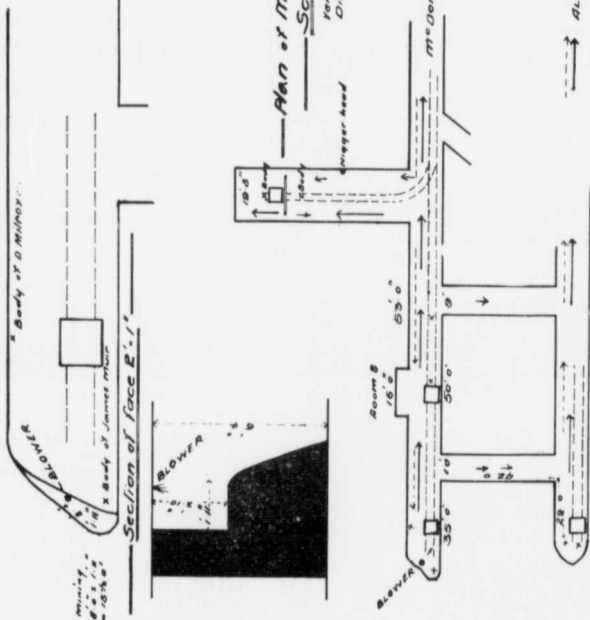
*Room No. 6.*

No work in face on the afternoon of the explosion. Coking in face.

*Room No. 7.*

Strongest evidence of coking yet encountered. Coked on car and roof and sides. The coking found here was bright steel grey, showing complete combustion. Indications would suggest more flame than force in face. Loaded car and tools in face. Bodies, one at face end of car and one down at nigger head (see later sketch on outside rib near bottom of room). No evidence of recent or dangerous blasting. Bodies 104 and 105.

Enlarged plan of Mc Donald's Level  
Scale 6" = 1'



ALOKAS LEVEL



*Room No. 8.*

This room is just turned away. Hole charged and tamped with needle in. The hole appears to be short; is a bottom hole, well mined and free. One body found near car and the other further out (bodies 106 and 111). Much force apparent here—going out, as indicated previously. No sign of recent blasting. Car standing opposite room had been loaded, but contents had been blown out endways. A drill was in evidence, partly wrapped round post by force. A needle also very much twisted.

## MCDONALD'S LEVEL,

Twelve feet wide. Car loaded. Coked on top. Tools in face. Said to have been bratticed up and reported free from gas. Face 35 feet in advance of last cross-cut. One body found in face and one a little way out, bruised against upper rib. No shot in face or any evidence of dangerous blasting. Much force immediately near face, increasing outwardly.

## ALDER'S LEVEL.

Face standing in water about 12 inches deep. Car in face loaded. Bodies found near face. Coal about all loaded up. Brattice said to have been up to 12 feet from face. Two lengths of brattice removed after the explosion. Small feeders of gas. Width of place, 12 feet; height, 5 feet 6 inches. Evidence of coking. Bodies 109 and 111.

## COUNTER TO GALLOWAY'S LEVEL.

Car in face. Face wet. Tools near face. No coking. Body of Shotlighter found at bottom of second cross-cut from Incline. Force inward. No recent blasting.

## GALLOWAY'S LEVEL.

No dangerous conditions in evidence. No coking or signs of recent blasting. Force inward and evidently going towards No. 3 Mine.

Saturday, June 7th.—Personnel of party: W. F. Robertson, T. Addison, A. Ferguson, T. Graham, A. Faulds, F. H. Shepherd.

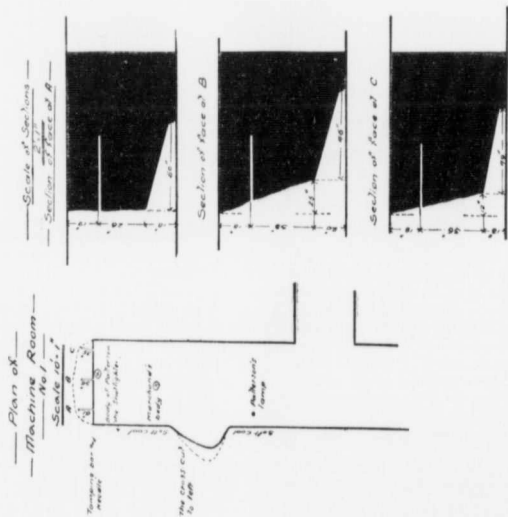
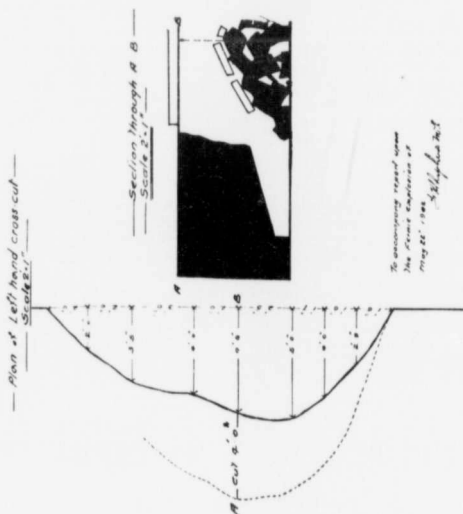
Went up Main Entry to Air Hoist. A stopping to left, opposite Air Hoist, blown outward, and a stopping to right, on Main Entry above Hoist Level, blown to Main Entry.

## NO. 1 MACHINE ROOM, MACHINE LEVEL.

Bodies found at mouth of room: A. Carlson, Machine Cutter; G. Rutledge, Driver; W. Love, Machine Helper; Antono Peters, Nate Rossivario. Found going up stall, bodies 74, 75, 51, 49, 50. Face caved back to cross-cut on left 4 feet thick. Tamping bar and needle in face, partly under mining. Car out at mouth of room loaded with cuttings. Machine not found, but probably on track being taken to some other place. One cut and shot said to have been taken out of cross-cut to left, but not fired during afternoon of May 22nd. Coal friable and no evidence of shot visible. The lamp of the Shotlighter found 3 feet in room, 38 feet 3 inches from face. The body of the Shotlighter (Patterson), one leg off and disembowelled, found to right of centre hole in face of room. All evidences would show that blast came up this room with great force. Signs of coking near left-hand cross-cut. Carefully measured machine cutting and hole in face of room, also plan and section of left-hand cross-cut (*See* accompanying plan and sections). The custom is to fire the centre hole first and load it out, and then load and fire the two side holes separately.

## ROOM 4, SOUTH FROM MACHINE ENTRY ON MAIN ENTRY.

Face standing square. No machine setting and no holes. Not working on May 22nd. Heavily coked 50 feet from face, but coking then ceases.



He  
on after

No  
found in  
The  
Machin  
great vi  
tioned.

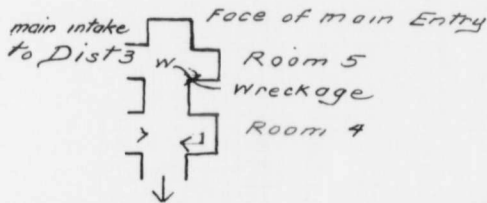
Cor  
McDona  
route at  
Directio  
Clear ev  
through  
connects  
in the sa  
Main In  
water w  
in fine p  
and subs  
to the "  
towards  
working  
that com  
a large p  
carrying

A s  
the many  
(See stor  
to face.  
little dov  
found in  
have bee  
dust thar  
sary. O  
Crump a

Disc  
from fac

## ROOM 5, SOUTH OF MACHINE LEVEL.

Heavy coking in face back to corner of rib at Main Entry. Face straight; no work here on afternoon of May 22nd.



FACE OF MAIN ENTRY.

No blasting on afternoon of May 22nd. Face fairly square and no holes. The two bodies found in place were loaders. Tools in face.

The main intake to District No. 3 leaves Main Entry opposite the 5th room south of Machine Entry, and at this point blast appears to have come up from McDonald's Level with great violence, smashing two cars and hurling a piece of one car to face of the 5th room mentioned. (See plan of Mine.)

## MAIN INTAKE TO DISTRICT NO. 3.

Commenced to go down to Main Intake to Beaver's Dip workings. This includes McDonald's Level and workings. Found heavy cave about 50 feet down air-way. Took back route and joined Main Intake two pillars from Main Entry. Coking on posts this far. Direction of force towards Main Entry. Coking continues for 200 or 300 feet further down. Clear evidence that force of explosion passed up towards Main Entry after spreading north through old workings lying between Main Entry and Beaver's Incline, where the Main Intake connects with cross-cut from Room No. 1, McDonald's Level. There is much evidence of force in the same direction as previously mentioned, timbers having been blown from cross-cut into Main Intake. The general condition of this Intake appeared to be dry, though large pools of water were passed on the way. The old workings contiguous to this air-course contained dust in fine particles; dust which had floated in the air and precipitated at points of low velocity and subsequent to the discontinuance of these workings. Crossed through the old workings to the "knuckle" on Beaver's Incline, and found evidence that direction of force had been towards the Incline and trending in the direction of No. 3 Mine. Found charred post in old workings indicating this, also stopping blown towards Incline. The blast here would meet that coming from McDonald's and Alder's Level, and the combined force seems to have divided, a large portion going into Galloway's Level and Counter, and the remainder going up Incline, carrying out two trap doors towards Main Entry.

## ROOM NO. 7 OFF McDONALD'S LEVEL RE-VISITED.

A set in face not blown out. Made search for powder cans but could not find any. From the many pick marks in the face it would suggest the improbability of powder being used here. (See store account.) The coking commenced 4 feet or so from the Nigger-head and continued to face. Tools in face, fallen timber in front of car in face, room not caved in face, and very little down the room, coal in face drawn and friable. The quantity of coke does not equal that found in Main Entry Machine Room No. 5, but, by its bright lustre, combustion appears to have been more complete. This method of mining (cutting with pick) would produce more dust than blasting, but owing to the ease with which it could be mined blasting was not necessary. One body found in front of car and the other about 20 feet below the car. Bodies, Crump and Armstead.

## McDONALD'S LEVEL RE-VISITED.

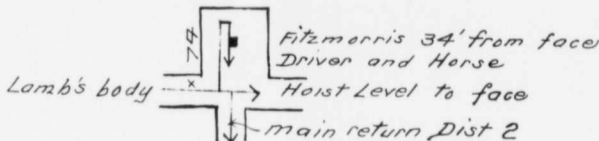
Discovered blower in roof near face, 5 feet 6 inches from lower rib and 1 foot 6 inches from face. Some mining on the top bench had been done, but the inference is that this blower

was uncovered during the afternoon shift of May 22nd; the blower is a "silent" blower, but it can be distinctly felt with the hand, and this 16 days after it was uncovered. The loaded car in face was off the track—front wheels—and the coal was coked on top. James Muir's body was found in face as if he had been in the act of mining. Dugal Milroy's body was blown against upper rib with violence.

Room 8 re-examined but no further evidence could be discovered than heretofore noted.

*Room 15, Hoist Level.*

Room 15 Hoist Level.



Monday, June 9th.—Face very heavily caved. As the body of R. B. Lamb was found at the foot of this room it is suggested that the face be cleared and carefully examined for shot. No sign of coking, but a little soot in face. Horse found on right-hand rib and had evidently been going up the room, car behind; 40 feet from where Fitzmaurice's body was found to corner of room. This room to be re-visited. Went down the Main Return opposite Room 15, and found evidence that direction of force was down the return to the north. Found post standing with soot or dust on front, well defined.

*Machine Room Re-visited, No. 1.*

Body found inside machine room, 50 feet from corner. Machine knocked off track, inward; truck 5 feet back. Lamp found to right of body, (62) A. Frederico. W. Marchand's body found last night 15 feet back from the face of the room; he was the driller. The position of the mule and car near mouth of room, the position of the machine and truck, and the broken machine board all confirm evidence of previous visit, *i. e.*, that direction of force is up this room to face, spreading west through both cross-cuts.

*Re-visited Room 2, Hoist Level.*

No new evidence.

**NO. 3 MINE. NAKED LIGHT SECTION.**

Barometer, 26.18; fan,  $108\frac{1}{2}$  revolutions; ingress 8 feet by 5 feet 6 inches by 690; velocity = 30,360 cubic feet per minute; W. G. .9 in.

The Main Incline of this mine shows evidence of force of explosion going upward to surface. At the time of the explosion rope-rider W. R. Henderson was going down with an eight-car trip, and the explosion occurred when the trip was about half way down between the surface and No. 1 South Landing. The trip was stopped and became uncoupled in three places. Henderson was stunned and, as soon as he realised that something unusual had happened, made for the surface, which he reached in safety; he says he did not see any flame. His description of the sensation experienced is interesting as bearing upon the physical change which takes place upon the unfortunate victims of an explosion. He experienced a drumming pain in the ears and a stoppage of the nasal passage, indicating an outward pressure of the containing membranes and tympanum due to a partial vacuum of the surrounding altered atmosphere. This would suggest that, under severe conditions, membranous rupture occurs and instantaneous unconsciousness precedes death.

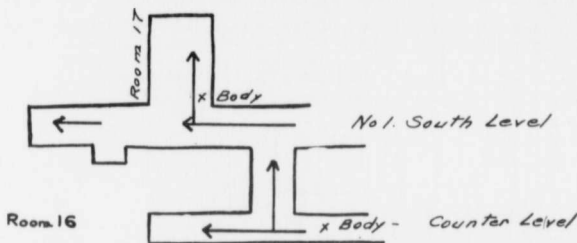
**NO. 1 LEVEL, SOUTH**

Door blown outward. The body of the Trapper boy was the first body taken out. A trip of loaded cars was standing on the siding, and was blown violently against the north rib of the incline, showing direction of force to have come from the inside. Posts on this level show

soot on inward side. Level damp and muddy; wreckage between rooms 9 and 10; charring on post just at the Counter Level. Body of driver and horse found on Main Level. In going along the Counter Level other charred posts were found, and some wreckage, though the general evidence is that there was not much violence here. At the face of Counter Level there were no dangerous conditions in evidence. Tools were in face, and face cleaned up. Coal 5.12 feet thick and 1.12 feet bottom brushing. No evidence of blasting.

Face of Main Level 13 feet 3 inches wide; coal and bone 8 feet 1 inch thick; canvas brattice standing; coked on inside; open lamp hung on prop; some clothing burned. Direction of force appears to have come up cross-cut from Counter Level, which probably received blast from Room 14, the present innermost connection with Hunter's Level and No. 2 Mine. No dangerous conditions or evidence of recent blasting.

*Room 16.*



No evidence of recent blasting; shotlighter's lamp and hatchet found near face; props coked on face side; car in face; upward throw in face; coal thin; a little gas in right-hand corner; brattice all standing; evidence of flame but not much shock; dry and dusty in these faces. J. Hunt is present Fire-boss.

*Room 15.*

Gas: to be re-visited.

Timbers along the Main Level are covered with fungus, indicating a damp condition.

Personnel.—A. Ferguson until 10 a.m.; T. Addison, A. Dick, T. Graham, Wetherby, between 10 a.m. and noon; A. Faulds, F. H. Shepherd. Hunt accompanied party in afternoon.

Tuesday, June 10th.—Personnel of party: T. Graham, T. Hunt, T. Addison, A. Dick, A. Faulds, F. H. Shepherd.

*No. 3 MINE.*

*Room 15, No. 1 South Level.*

Room, 19 feet wide; coal, 5 feet 6 inches—2 feet 6 inches brushing; original brattice standing; no blasting done here; coked post at front of room; force of explosion light. Thomas Fairfax and son found at face of level; they had left the room and were making out when caught, probably by afterdamp. Car and tools in face; car loaded; no dangerous conditions in evidence.

*Room 14.*

This room is the innermost connection with Hunter's Level referred to. This room was only connected by bore-holes with Hunter's Level, a thin pillar of 3 feet in thickness being left. This pillar was blown down towards No. 1 South Level, leaving a hole 11 feet 6 inches wide.

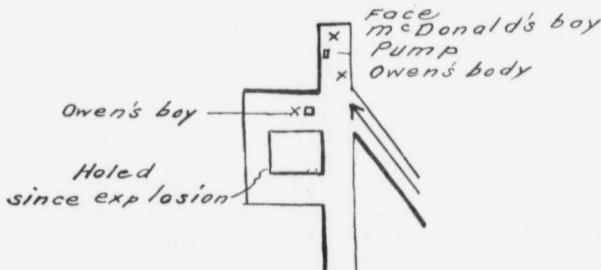
*Room 13.*

Conditions exactly similar to Room 14, but blown through 10 feet wide. Rooms 12, 11, 10 and 9 all connected through to Hunter's Level.

*Room 8.*

This room has crossed Hunter's Level and is going up towards old workings. Two bodies got in face, James Flood and Philip Chordy, and at entrance of cross-cut A. Pestick and George Frederico. Advanced hole kept in face on account of supposed accumulation of water in old workings. Two cars in face, one of which was blown up from the cross-cut. One body found at foot of No. 8 on Main Level, viz., Driver Victor Johnston; one at bottom of No. 9, Frank Salter; one body found between Rooms 7 and 8, George Alterbetter. This miner belonged to Room 17, and was presumably on his way out to get timber. No evidence of recent blasting, either in face of Room 8 or in face of cross-cut going to Room 9. Travelled return air course to Fan Shaft, North Side Workings, No. 3 Mine. No. 1 Room and cross-cut, also Room No. 2, all in good order. No evidence of the explosion reaching this point of the mine. Eight miners, one driver and one brattice-man got out alive; two horses in No. 1 Level were got out alive. Lower levels inaccessible on account of water. Total escaped, 23.

Wednesday, June 11th.—Personnel: T. Graham, A. Dick, T. Addison, John Hunt, Charles Dunlap, A. Faulds, F. H. Shepherd.

*Beaver's Dip.*

Boring machine and shovel in face of cross-cut; pump thrown on end from blast from above this point; face of dip just visible above water. From end of Galloway's Level went through to Hunter's Level, thence to head of Room 13, No. 1 South Level, No. 3 Mine. Water pools and damp condition of course of explosion; posts plastered with mud; evidences of violence at point of commencement of return air course; at face of Galloway's Level, cars turned up and timbers blown in a direction towards Hunter's Level; winrows of dust on floor in places of return air course with Hunter's Level; found strong evidences of force coming in; brattice cloth torn and wrapped around posts; course of force split near outside end of Hunter's Level, one portion going out towards Main Entry and the other going inwards towards Mine No. 3. Evidence fully establishes that course of explosion was from Mine No. 2 to Mine No. 3. Room 15, Hoist Level, No. 2 Mine, re-visited. Coal cleared out on right hand half of face. No clear evidence of shot, and, even admitting a bottom shot, it would appear to have been free from dangerous conditions. Room said to have been damp, and is now dropping from broken roof.

*Cross-cut to left of Machine Room.*

Room No. 1, Machine Level, re-visited, but no further evidence obtained.

Thursday, June 12th.—Went to High Level to Incline. Gas up to first cut through to left; no further investigation possible this day here.

Room 15, Hoist Level, re-visited. Probable shot on left-hand rib; pick in face; some coking on left-hand rib where shot had been mined in top coal; debris cleared to floor across the face.

Saturday, June 14th.—Visited Room 16, Hoist Level. Face square; heavily caved; no sign of blasting or dangerous conditions. Body of A. W. Walker was found in face. Room, 38 feet up, 16 feet 9 inches wide. Slight signs of coking; room wet and dripping.

Tuesday, June 17th.

*High Level Workings, No. 1 District, No. 2 Mine.*

No. 1 Level off Incline straight face not working; cross-cut to right working; blowers both in right and straight from floor; brattice standing; tools and powder cans in face undisturbed; one man working only, and found on Level in front of Incline; more gas making here than from blower in McDonald's Level; no recent blasting; no evidence of explosive force.

*No. 2 Level, South.*

Cross-cut to right, no work in face; tools and wheelbarrow down near Level; missed shot in Level face; danger notice, "Missed Shot, 6:30 p.m., May 22nd—S. H.," and the unfortunate men here were lost, though they had no further duty in the mine after the time mentioned. Badly planted shot and very little sheared; supposed to be charged with giant powder. All workings here so far wet; fungus on timbers; no evidence of explosive force.

*No. 3 Level, South.*

Face full of coal; tools in face; car off track, which fact caused these two men to leave the mine about 30 minutes before the explosion, and they were thus saved.

Visited the hoist.

*No. 1 North Level.*

Horse found between full and empty car; evidently came from inside alone after the miners had all retreated to the Motor road; end of full car is splintered by kicks from the horse, showing that it had lived some time after the explosion. This fact is mentioned to show that the atmosphere remained pure for some time after the explosion, and it is suggested that if these men had placed stoppings in the only two airways connecting these workings with the lower workings, there might have been some hope of their being rescued.

No. 1 Room off No. 1 North Level.—No sign of any disturbance. Coal in face. Miners were evidently loading.

Cross to left.—Tools in face, rib holes not fired.

No. 2 Room.—Coal in face. Miners were evidently loading.

Room No. 3.—No work.

Room No. 4.—Working.

Room No. 5.—No work.

Room No. 6.—Working.

Room No. 7.—Shot had been fired, and miners had been loading. Tools in face.

Face of No. 1 Level, North.—Shot fired (probably two) and miners had been loading. Tools in face.

All these workings may be considered damp and safe. No evidence of explosion whatever, original brattice standing. There does not appear to have been sufficient concussion to extinguish the lamps, for where the bodies were found on the motor line nearly all the lamps were found, therefore this district does not appear to have contributed either in cause or effect to the explosion in any way. Visited Return Airway, also Rock Tunnel. Air drill in face in position and ten holes drilled in face and not fired. The air supply pipe near overcast, and these men retreated and the bodies were found with the miners from the upper workings.

Personnel.—A. Dick, W. F. Robertson, T. Graham, T. Addison, A. Faulds, F. H. Shepherd.

Wednesday, June 18th.—Went to mouth of Hoist Level and carefully observed direction of force. Door evidently blown out. Fire boss reported gas from Room 9 outward, so decided to visit Motor Level face No. 1 District. Lamp found standing in centre of track by rescue party. These men also went out to near foot of Incline and bodies found with others. No sign of force whatever.

Afternoon: Machine Level District now clear. Final examination of Machine Room No. 1. Measured in detail the face of the cross-cut to the left.

[See large plan and sections.]

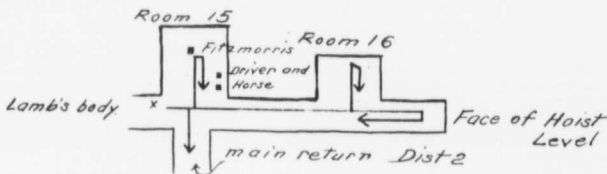
Coal in face and for 6 to 8 feet on rib both up and down room, and friable.

The details and observations of this final visit to this District are shown on accompanying plan with explanatory notes, but will add that no further evidence was discovered to in any way alter the first deduction that the explosion came up from No. 3 District and across faces of rooms in Machine and Hoist Levels, and down Main Entry to mouth.

#### DEDUCTION AS TO POINT OF ORIGIN.

The deduction to be made from the above careful examinations, embracing as they did all accessible working places of Mines 2 and 3 and some portions of the old workings and air courses, shows the direction of force as emanating from McDonald's Level and radiating to every portion of No. 2 and No. 3 Mines, with the exception of the isolated districts referred to, viz., No. 1 District, No. 2 Mine, and north side No. 3 Mine. The zone of greatest violence appears to have been along the faces of the rooms off McDonald's Level, and off the Machine and Hoist Levels. These faces are for the most part dry and dusty, and at the time of the explosion, and about the middle of the shift, the atmosphere must have been heavily charged with dust in suspension. The operation of mining, getting and loading coal under dry conditions cannot fail to produce the conditions suggested. This surcharged atmosphere under favourable conditions becomes dangerous, either from a blown out or badly planted shot, or the admixture of a small percentage of carburetted hydrogen (C. H. 4).

The result of the examination and the position of the bodies of the shotlighters would suggest the theory that the only shots which may have been fired simultaneously, or immediately preceding the explosion, were in Room 15, Hoist Level, and left-hand cross-cut off Machine Room No. 1. The body of the shotlighter, R. B. Lamb, was found as shown in sketch.



The evidence is not conclusive that even this shot had been fired at the precise moment indicated, but, admitting that it had been, the conditions as found are such as to preclude the suggestion of dangerous conditions attending it. Then add the evident fact, as shown by the direction of force, that this room is a point upon the course of a well-defined route of explosion, and there is nothing to suggest initial conditions. The shot, which is a bottom shot, has done its work well. The horse and car look as if going up the room, and the body of Fitzmaurice was found 34 feet from the face of the room. It has been suggested that the explosion may have originated in the left-hand cross-cut of Machine Room No. 1. The lamp and body of the Machine District shotlighter, Patterson, were found in Machine Room No. 1 as indicated on accompanying plan. The face of the room is mined and drilled, as shown in plan and sections; the tamping bar and needle were found in the face and partly under the mining. There is no evidence that a shot had been fired in the left-hand cross-cut. The machine and machine corps were on their way down the room to commence work elsewhere, and the inference to be drawn is that the shotlighter was about to charge and fire the holes in the face of the room, and the same deduction as to Room 15, being a point on the well-defined route of this explosion, applies equally well to this room. The repeated visits made to this room and the district intervening between this room and the face of the Main Entry were made to establish beyond any reasonable doubt the fact of the direction of force being from McDonald's Level towards the Machine Level. The general evidence of the direction of force is clear, and the deduction to be drawn therefrom is that the point of origin of the explosion is at or near the face of McDonald's Level, No. 3 District, No. 2 Mine.



## DEDUCTIONS AS TO INITIAL CAUSE, AUGMENTATION AND CONTRIBUTING CAUSES.

The danger of coal dust extending fire-damp explosions was first demonstrated by Messrs. Faraday and Lyell in 1844, and has been the subject of very extended experiments by a British Royal Commission, and it is conceded that coal dust plays the principal part in colliery explosions. It is asserted that coal dust, even in the total absence of fire-damp, may by reason of a blown-out shot give rise to violent explosions, but the presence of even a low percentage of fire-damp will render the atmosphere in a dusty coal mine extremely sensitive and dangerous. A blown-out shot or other source of violent concussion is generally considered the prolific cause of many colliery explosions, but a small explosion of fire-damp would, if the conditions were ripe, be sufficient cause to account for the initial explosion, and if the percentage of fire-damp and admixture of coal dust were such as to render the immediate atmosphere inflammable to an exposed naked light the initial explosion might occur from this cause. Coal dust alone has been known to ignite at an open torch where no gas could be present—to wit, the coal hopper at Brancepeth Colliery, Durham, where several men were severely burned and three lost their lives. The combination of dangers which appear to have caused the initial explosion in McDonald's Level are:—

1. The dry and dusty condition of the rooms off McDonald's Level, and particularly Room 7.
2. The uncovering of a blower of gas in the roof of McDonald's Level, near the face, on the afternoon of May 22nd.

As there is no evidence of a blown-out shot, or of any shot being fired in that district immediately preceding the explosion, the only inference that can be reasonably drawn is that a gas explosion, or a combined gas and dust explosion under ripe conditions, took place by coming in contact with a naked light. What this naked light was there is no evidence to show, and probably the truth may never be known, but the fact given in evidence at the Inquest remains, that a body taken from McDonald's Level was found with matches upon it. The primary igniting act is therefore a question of conjecture only, but the theory as to the point of origin and probably initial cause are herein submitted as the result of a most searching examination.

The contributing agency was no doubt dust, and the zone of greatest violence, as previously stated, the working line of faces of Districts 2 and 3. The haulage roads, while apparently dusty in places, seem to have escaped the full force of the explosion. The explosion was fully spent upon reaching the mouth of the Entry, No. 2 Mine, and though greater violence was in evidence in No. 3 Mine Incline, this road does not show much wreckage. Extending over 100 acres (approximately) of rooms and pillars, the explosion found expansion enough to spend much of its strength and establish the fact that explosive conditions were not as ripe at the front of the outcrop side of the mine as they were at the working face.

In reference to the dust on the hauling roads, this appears to have been periodically loaded out, but a contributing cause to the dusty condition of these roads is the loose condition of the rolling stock, especially the end doors of the cars, which appear to be loose and ill fitting.

A word as to the style of safety lamps used at the time of the explosion. This was the Bonnetted Clanny. This lamp is considered safe in moderate currents of gas, and would be perfectly safe under conditions usually met with, but in view of the fact that it is not safe in gas at a high velocity it cannot be considered as safe as more modern lamps. At the time of the explosion the Company were installing the Wolf lamp in all their mines, and were awaiting a shipment for Mines No. 2 and 3; still there is no evidence to show that the lamp in use in these two mines was responsible or otherwise for this explosion.

It has been suggested that if a delicate gas-tester had been in use that this explosion might have been averted.

The ordinary safety lamp will indicate about  $2\frac{1}{2}$  per cent. of C. H. 4, and while there are lamps and instruments which will indicate as low as  $\frac{1}{4}$  of 1 per cent, they are so delicately constructed as to be of no practical use to the ordinary miner.

Probably the cause that has contributed more largely than any other to the explosive condition of the mine as a whole, is the fact that these mines were working a double shift. The explosion took place about the middle of the second shift, and the dusty condition naturally had increased all day, and no cooling or settling interval had intervened, and instances are on record which go to show that the second shift followed immediately upon the first produces conditions in a dusty mine which are dangerous.

---

---

CONCLUSION.

The inference to be drawn from the evidence of force, direction, and zone of greatest violence is, that the greatest danger lay not in the hauling road, or old workings, but in the newly created dust of the working faces. The atmosphere passing the faces is no doubt charged to some extent with a low percentage of C. H. 4, and while this may be to some extent dangerous in itself, it is much more likely to become so under some sudden exciting cause, similar to that which probably caused the explosion, viz.: an explosion of fire-damp, or fire-damp and dust combined.

The fact that dust may be created as freely where blasting conditions do not obtain, to wit, where coal is soft and friable as in Room 7 off McDonald's Level, suggests that watering precautions may be necessary, irrespective of those provided for in the Mining Act, governing blasting conditions.

Some practical method or appliance is much needed to determine the condition of mine atmospheres, both with regard to low percentage of fire-damp and dangerous conditions as to the presence of dust.

The installation of a thoroughly efficient watering appliance in dry and dusty mines should be made imperative.

While the use of ordinary blasting powder does not appear to have contributed to this explosion, its continued use under conditions prevailing in portions of No. 2 Mine will always be a source of danger, and the substitution of more modern and safer explosives is suggested.

In conclusion it should be stated that the management used every effort to assist your examiners to make the examination thorough.

I have, etc.,

(Signed) FRANCIS HENRY SHEPHERD, M. E.

*Nanaimo, July 11th, 1902.*

---

## REPORT OF MR. FAULDS.

— 0 —

ALEXANDRIA MINES,  
SOUTH WELLINGTON, B. C.,

14th July, 1902.

*The Hon. Eduard Gawler Prior, Minister of Mines,  
Department of Mines, Victoria, B. C.*

SIR,—In compliance with your request, and in pursuance of your instructions, along with my colleague, Mr. F. H. Shepherd, I proceeded to Fernie to ascertain the cause (if possible) of the explosion in No. 2 Mine, Coal Creek, owned and worked by The Crow's Nest Pass Coal Co., Ltd., which occurred on Thursday, 22nd May, 1902, about 7:30 p.m., when there were about 150 men employed on that shift, underground, of whom only 23 escaped, and the remainder, 127, or thereabouts, were lost.

I have now the honour to submit to you my report thereon.

Wednesday 4th June.—Went up to mines by train leaving Fernie at 6 a.m., reaching mines at 6:30 a.m.

Had a walk round, taking a general examination of surface arrangements, and copying firemen's and other reports from Colliery Report Books, accompanied by W. F. Robertson, Provincial Mineralogist, T. R. Stockett, Superintendent, R. G. Drinnan, Certificated Manager, A. Dick, Inspector of Mines, two of the miners' representatives, A. D. Ferguson and T. Addison, and my colleague, F. H. Shepherd.

Thursday, 5th June.—Inspected the accessible parts of Hoist Level, off Air Hoist Plane, in No. 2 District, in No. 2 Mine, accompanied by W. F. Robertson, A. Dick, T. R. Stockett, R. G. Drinnan, T. Graham, Overman, A. D. Ferguson, T. Addison and colleague.

Friday, 6th June.—Inspected a few more accessible parts of Hoist Level, and nearly all the Machine Section in No. 2 District; McDonald's Level, Galloway's and Beaver's Levels, and Beaver's Dip, on Slope down to water, all in No. 3 District, in No. 2 Mine, accompanied by W. F. Robertson, A. Dick, R. G. Drinnan, T. Graham, A. D. Ferguson, T. Addison and colleague.

Saturday, 7th June.—Inspected Allan Kerr's section at end of Main Entry, part of Machine Section in No. 2 District, the old workings from No. 2 District to McDonald's Level, and along Middle Run to Beaver's Slope, in No. 3 District, in No. 2 Mine, accompanied by W. F. Robertson, R. G. Drinnan, T. Graham, A. D. Ferguson, T. Addison and colleague.

Monday, 9th June.—Inspected a few more accessible parts of Hoist Level, and No. 1 Room of Machine Section, and face of Main Entry in No. 2 District, and face of Beaver's Slope or Dip in No. 3 District of No. 2 Mine, and the accessible parts of 1st South Level off Slope in No. 3 Mine, accompanied by A. Dick, T. Graham, A. D. Ferguson, until 10 a.m.; T. Addison, T. Weatherby, 10 a.m. to 12 noon; John Hunt, fireman in No. 3 Mine in the afternoon, and colleague.

Tuesday, 10th June.—Inspected the remaining parts of 1st South Level off Slope in No. 3 Mine, Hunter's Old Level to face of same, and from thence through waste workings to Fan Shaft and accessible portion of North Section in No. 3 Mine, accompanied by A. Dick, W. F. Robertson, T. Graham, T. Addison, John Hunt, Chas. Dunlop and colleague.

Wednesday, 11th June.—Inspected in Beaver's Slope, Galloway's Level, through waste workings to Hunter's Level, along Hunter's Level to Stopping, between Nos. 2 and 3 Mines, and back along Hunter's Level to Beaver's Slope in No. 3 District; also Room No. 1 in Machine Section, and Room No. 15 off Hoist Level in No. 2 District of No. 2 Mine, accompanied by W. F. Robertson, A. Dick, T. Graham and colleague.

Thursday, 12th June.—Inspected in Hoist Level to within 16 feet of entrance to No. 16 Room, where gas was found in No. 2 District, and High Level, or Line, up incline, and in 1st

place to left about 20 feet, where we found gas in No. 1 District of No. 2 Mine, accompanied by W. F. Robertson, A. Dick, T. Graham, T. Addison and colleague.

Friday, 13th June.—Inspector A. Dick went to mines to-day, and colleague and self revised notes and attended inquest, while gas was being cleared out of High Level, or Line, in No. 1 District of No. 2 Mine.

Saturday, 14th June.—Inspected Room 16 off Hoist Level, and face of Hoist Level, and part of Return Airway therefrom, all in No. 2 Mine, accompanied by W. F. Robertson, A. Dick, T. Graham, T. Addison and colleague.

Monday, 16th June.—Inspector Dick at mines to-day. Colleague and self revising notes and awaiting High Level being cleared of gas.

Tuesday, 17th June.—Inspected all the places up Incline, in High Level, or Line, Rock Tunnel and Main Entry beyond foot of Incline to where Entry makes a steep ascent, and where we found gas in No. 1 District of No. 2 Mine, accompanied by W. F. Robertson, A. Dick, T. Graham, J. Colville, T. Weatherby, T. Addison and colleague.

Wednesday, 18th June.—Inspected Machine Room No. 1, and other places at end of Main Entry, in No. 2 District of No. 2 Mine,—could not get into these parts in the afternoon for gas,—and to within 20 feet of face of High Level, or Line, Main Entry, in No. 1 District, and while clearing gas from No. 2 District, in No. 2 Mine, inspected Williams' Slope, or Dip, and Old No. 16 Entry, and No. 1 Room off it, in No. 1 Mine, to the rise, accompanied in No. 2 Mine by W. F. Robertson, A. Dick, T. Graham, J. Colville, T. Weatherby, T. Addison and colleague, and in No. 1 Mine by W. F. Robertson, T. Addison, Fireboss Powell, Contractor Williams and colleague, to Williams' Slope, and T. Addison and self to Rise Workings.

Thursday, 19th June.—Went up to mine to again visit cross-cut, off Machine Room No. 1, as to Sprag underneath loose coal, accompanied by T. Graham. Could not get in for gas, so put stopping in level, and only moved gas 10 feet, when we abandoned it as being too risky for two, with two lamps only. Also abandoned contemplated visit to McDonald's Level.

Friday, 20th June.—Attended inquest, hearing Counsels' addresses to jury, and awaited their verdict, given at 10.30 p. m.

Saturday, 21st June.—Left per 10.20 a. m. train from Fernie for the Coast, reaching home on Monday, 23rd June, 1902, at 8 p. m.

#### LOCATION OF COAL CREEK MINES, NEAR FERNIE, B. C.

Coal Creek Mines are situated in the foothills, on the west side of the Rocky Mountains, in a deep ravine about 5 miles east, and rather in a southerly direction from the town of Fernie.

Barometer and thermometer registered respectively on 21st November, 1900, 26.10 inches and 10 degrees below zero, and on 20th June, 1902, 26.62 inches and 68 degrees.

Elevation of Fernie 3,300 feet; timber line 7,000 feet. Elevation at entrance to No. 2 Mine, or Tunnel, 3,800 feet.

#### VENTILATION.

*District No. 1* is ventilated by one split.

*District No. 2* is ventilated by one split.

*District No. 3* is ventilated by one split; and

*Districts North and South sides of No. 3 Mine* are ventilated by one continuous circuit, which should be made into two splits.

The Old Workings are ventilated by intentional leakages, through stoppings, to keep them clear of gas, the air returning direct to fan.

The ventilation is produced by an exhausting Capell Fan 16 feet by 8 feet, as already described.

Total cubic feet of air passing in No. 2 Mine, 80,000; total cubic feet of air passing in No. 3 Mine, 30,360; total cubic feet of air passing per minute, 110,360, with a W. G.  $\frac{3}{4}$  in., for 150 men and 21 horses and the Old Workings, which is quite adequate.

#### COKE AND DUST.

*District No. 2, Air Hoist Level.*—Room No. 8: Cross-cut off this room; coking in it. Rooms Nos. 7 and 8: Coking on set of timbers which were not blown out on this level between these rooms. Room No. 11: In cross-cut off this room, 12 feet in, coking on inside of props.

Room No. 12: In cross-cut off this room the bodies of James Wilson, jr., and William Marrs were found, slightly burned; coking on floor and sides but not on roof. Room No. 13: In cross-cut off this room the body of James Thorpe (No. 67) found with cartridge paper in hand, not burned, about 4 feet up this room from Level. Coking at this point within 1 foot of roof. His partner, William Thorpe (No. 68), found at face near car; coking on roof and sides only in cross-cut. Room No. 14: In cross-cut off this room mining or holing coked; posts near face of room well-defined with coke, and resin run out of prop with heat; coking on two sets of timbers between Rooms Nos. 14 and 15, on Hoist Level. Room No. 15: A little coking on timbers near face. Room No. 16: Some coking at face; dust on post about 60 feet down return airway here.

*District No. 2, Machine Section.*—Room No. 1: Cross-cut off this room; coking very distinct. Room No. 1: Deposits of dirt at bend of this room at junction with second cross-cut to right. Room No. 4: Coking at face well-defined, slightly on roof; hardest coke got on top of prop, beside cap or lid, 39 feet back from face, and 5½ feet from right-hand rib.

*Main Entry, other Machine Section.*—Coking very pronounced on left-hand rib; not so distinct on right rib, and not so much on roof or sides. Fifth cross-cut off this entry, up from Machine entry: Coking very distinct here. Fourth cross-cut: Coked from face back 60 feet. Face of Sharp's Slant: Two pillars to left of this entry coked slightly on several posts. Numerous posts standing here.

*District No. 3, Beaver's Slope.*—Coke on post east of entrance to Galloway's Level; dust at level face; post charred, and coke on upper or west side of post in 1st cross-cut off Beaver's Level. Prop with coke and coal dust thereon near entrance to Hunter's Level.

*District No. 3, McDonald's Level.*—No evidence of any coking where explosive blast entered the Old Workings from Room No. 1 off this level; Old Workings damp. Room No. 1: Coke in 2nd Cross-cut to left off this room. Room No. 5: Coking at face. Room No. 6: Coking on face at roof, and coking at face in cross-cut off this room. Room No. 7: Coking very pronounced here on roof, sides, props and bratticing; heat was evidently very great here. Two coloured men worked here, Joe Crimp and Larkin Armstead; Armstead found at car near face, and Crimp found about 30 feet down from face. McDonald's Level: Coking very pronounced on roof and sides; this place is damp, with feeders of gas from roof, sides and floor. Two bodies found here, James Muir near face, and another man near car with his head badly damaged and matches in his pockets. Counter or Alder's Level: Coking very pronounced; water at face; makes water regularly, with feeders of gas from roof, sides and floor.

*District No. 1.*—No evidence, beyond blast expending itself, along the two intakes and tunnel to the surface. Dust on motor road consists of sand from motor; dust from roof and sides as well as from the coal in cars; dust on other haulage roads similar, excepting the sand.

*No. 3 Mine.*—Post charred in Hunter's Old Level in Old Workings, a little to the north of Room No. 14 off 1st South Level. Room No. 15, off 1st South Level: coke on post at north corner and entrance to this room. Coking on post in slant off 1st South Level inside of Room No. 10.

No other evidence of coking in this section, but dust in direction of blast. This section wet.

Remaining area in this mine wet, and no evidence beyond explosive blast expending itself through Main Slope and Old Workings to the surface.

*Dust.*—The dry and dusty portions in Mines Nos. 2 and 3 are chiefly at the working faces, and for about 60 feet back therefrom. In the Machine Section, dusty at the end of the Main Entry in District No. 2, and more or less in the haulage roads.

Mines Nos. 2 and 3 are not dry and dusty throughout. District No. 1 is moist; District No. 2 damp; District No. 3 damp; Beaver's Slope wet; and north and south sides of No. 3 Mine rather wet. Dust loaded frequently into cars on night shift and sent out to surface.

#### WATERING.

*Watering.*—Water leaking purposely, to moisten air, from roof of No. 2 Mine Tunnel for a considerable distance in.

Watering was done, practically by hand, with water car and powder kegs between 11 p.m. and 7 a.m., whereas on the two shifts, 7 a.m. to 3 p.m. and 3 p.m. to 11 p.m., the only watering apparently done on these two shifts was at working faces previous to firing of shots, and then inadequately.

## BLASTING.

*District No. 2, Air-Hoist Level.*—Room No. 8: Cross-cut off this room, shot-hole at face not fired; on left-hand rib at face, in Room No. 8, a shot was fired, leaving needle, 2 feet long, in the remaining tamping; powder can exploded. Room No. 10: In cross-cut off this room a shot-hole at face, in bottom coal, tamped, with needle in it, was ready for firing but was not fired. Room No. 11: Shot-hole, with drill in it, on left-hand rib in bottom coal partly mined on top; 53 feet down from face in this room powder can was got intact. Room No. 14: In cross-cut off this room, just starting to left, holing or mining coked; two bodies found here. No. 113, Antonoi Malta, burned on the arms only, and found in the act of mining, and No. 114, R. Stranghrino, clothing not burned, was loading car; post near face of room well defined with coke and resin; box of squibs in tin case, a little dusty but not exploded; two powder cans exploded; heat greater here than Room No. 14; squibs and other paper not burned; burst lamp found in this room, and the tinning or solder of lunch cans was melted; watch found run down at 3.57, and on being wound went away all right. Room No. 15: Coal just lifted by bottom shot, the shot having done its work well, being mined on top and well placed; fall from roof cleared away from face. This is the room at face that was cleared up for special inspection, after consultation with and consent of Mr. Harvey, your Government Agent, and your deputy, Mr. William F. Robertson, Provincial Mineralogist, to discover any dangerous blasting. The roof was moist before explosion, but now damp. The miners were under the impression that a shot had been fired here. The bodies of Fireman R. B. Lamb, Driver Joe Hughes and horse were found at entrance to this room; the body, No. 121, of Michael Fitzmaurice was found, 34 feet back from face, under huge block of stone from roof. Room No. 16: Heavily caved; Alex. Walker (coloured) found here; no evidence of recent blasting.

*District No. 2, Machine Section.*—Room No. 1: Face of this room mined or holed by machine, with three holes drilled in face of coal ready for being charged; holes empty; no evidence of blasting here. Shot-firer Andrew Patterson was thrown up against coal face to right of centre hole, his leg being blown off and his body disembowelled; his lamp, No. 22, got 38½ feet back from face and 3 feet from left-hand rib. Seven men and one mule found in this room, and machine blown off car towards face; the bodies were not badly burned. Car also loaded with dust, or mining, on way to surface. A. Patterson, Shot-firer, reported coal on fire in this room on \_\_\_\_\_, and put it out; 1 to 6 buckets of water generally put out these fires. Cause of fires, ignition of dust from powder blast from shot when taking down coal at face with two shots; since three shots have been adopted no such fires have been reported.

In cross-cut to left off this room, 18 feet 8 inches back from face of room, the coal was mined or holed 41 inches and gibbed or spragged, being the second cut or holing, and being very friable, and the working facing the cleat of the coal, it did not require to be blasted, and there is no evidence of recent or any blasting. The miners were under the impression that a shot was fired here which caused the explosion. Room No. 2: Not working on afternoon shift of 22nd May, 1902. Room No. 3: Cross-cut to right off this room not working; bodies Nos. 74 and 75 found here, not burned; tobacco found in one of their pockets. Room No. 4: Shot-hole 2½ feet back from face on right-hand rib, 9 inches deep, and apparently had been a missed shot; this room was not working on the shift on which explosion occurred. Room No. 5: Shot-hole 2 feet deep, and fired on evening of 21st May, 1902, the day before explosion; this room and level were not working on afternoon shift of 22nd May, 1902.

*Main Entry, other Machine Section.*—No evidence of any blasting having taken place, as no work had been done in this section after 21st May, 1902.

*No. 3 District, Beaver's Slupe.*—No evidence of any recent blasting having occurred in this section. Shotfirer's body, George Beach, and driver's body, found in Stewart's Level at second cross-cut.

*No. 3 District, McDonald's Level.*—No evidence of recent or any blasting in Rooms Nos. 1 to 6. Room No. 7: Tools at face and no evidence of any blasting; two coloured men, Joe Crimp and Larkin Armstead, were working here about a month without explosives; they are not recorded in the Company's books as having received any explosives. Room No. 8: Shot-hole tamped and ready for firing, but not fired; tamping bar found outside of this room on level, bent round post towards outside.

*McDonald's Level.*—James Muir found near face, where he was mining on top coal, and his partner found near car, 17 feet back from face, behind braticing, with his head badly

damaged and tobacco and matches found in his pocket; Muir was mining; no evidence of recent or any blasting.

*Alder's Level, or Counter.*—Car at face standing loaded; two men found here, one between wheels of car, and the other a little further out; lamp found intact on left-hand rib or low side of place; no evidence of recent, or any, blasting.

*No. 3 Mine, South side, 1st South Level.*—No evidence of recent, or any, blasting in this section. Rooms Nos. 13 and 14 were not put through to old workings, but had drill holes 3 feet through, before explosion. These ribs of coal, 3 feet thick, were blown upwards into old workings by explosion. Room No. 16: Shotfirer's lamp, No. 16, got hanging on post near face. Room No. 8 had a leading bore-hole in face while approaching a small quantity of water; this hole was 20 inches deep; this room, and cross-cut off room, were working; car being loaded at cross-cut in room was blown to room face, and other car at face of room was being loaded also; no evidence of recent, or any, blasting in either of these places; two men found at entrance to cross-cut in, and two at face of room.

Remaining area wet; and no evidence beyond blast expending through Main Slope and old workings to the surface.

*District No. 1.*—No evidence of recent, or any, blasting; missed shot in 2nd South Level, off Incline, at 6.30 p.m., about one hour before explosion occurred. This notice was marked so on wooden bar across the entrance to this place and the cross-cut off it, by S. Hand, shotfirer. The men from this place went home and escaped the disaster. No other evidence in this section beyond the blast expending itself along the two intakes and the tunnel to the surface.

The usual grade of black powder was in general use; also dynamite or giant powder. The partial watering at working faces may have led to occasional fires, which generally occurred in the machine section, and instead of resorting also to efficient watering, a third hole was introduced for blasting the coal at face, in place of two holes. Since the introduction of the extra, or third, hole no fires from powder blasting have occurred. Found several shot-holes empty and ready for charging; several charged but not fired; and no evidence whatever of recent blasting, or immediate blasting, preceding the explosion.

Dynamite or giant powder was used in wet places, and is not a desirable explosive for use in a mine such as this. Wetted dust used for tamping; miners did not dry out holes.

—o—

### Extracts from Reports of Government Inspectors of Mines, from August 12th, 1900, to April 23rd, 1902.

#### FROM JAMES MCGREGOR'S REPORTS.

August 12th, 1900.—Non-inflammable bratticing now being used. Evidence of creep opening up floor and giving off large quantities of gas, owing to smallness of pillars and softness of coal.

September 15th, 1900.—Timbering been much improved. Gas plainly visible in safety lamp on the main haulage road. I removed all the workmen until ventilation was increased. This increase of gas escaping from seam below.

November 12th, 1900.—Creep taking place in No. 1 Mine. Now stone stoppings and more bratticing used in No. 2 Mine. This mine shows plainly that a great creep is taking place, and the Management has decided to leave 100 foot pillars (instead of 60 feet as before), which might possibly check the creep. Requested another Fireman to look over the Old Workings at night. Mine gives off large quantities of gas at times.

December 1st, 1900.—Gas can be detected in the safety lamps in the return airways, proving conclusively that an explosion is possible by a heavy charged blown-out shot, which frequently happens, as the mine is naturally dusty. Ventilation gradually decreasing, owing to works extending.

December 21st, 1900.—55,425 c. f. of air per minute passing in. Large body of gas at face of Main Tunnel, but clear by night. Use of mixed lights.

## FROM ARCHIBALD DICK'S REPORTS.

November 21st, 1900.—Barometer 26.10 inches, and Thermometer 10 degrees below zero.

December 8th, 1900.—*No. 3 Mine*: Brattice 18 yards from face; working pillars 12 yards square without brattice; *roof and floor* wet; airways small.

December 8th, 1900.—*No. 1 Tunnel*: Gas flashing in safety lamp in all the working places, and a cap 2 inches long in lamp. In last place ventilation fairly passable. Upper division clear of gas. Negligent with brattice. Twelve yards away from face ventilation 20,000 c. f. Inadequate.

*No. 2 Mine*.—Old Workings dry with considerable dust. *No. 1 Room* (dip) shows fully 2" cap on flame of lamp. In return airway found blue cap, and while there some person came into airway with open light. On calling on him to keep back he disappeared, and I could not find out who he was. Shows bad discipline. Motor trips 10 cars. Fan (Murphy) 8 feet diameter; 27,500, previously 37,000 and 40,000, c. f., showing leakage. 106 men and boys; 56 in one split and 50 in another. Better class of stoppings.

There are a great many foreigners in this mine, who seem to think that if they have a safety lamp in their hand everything is all right, whether they understand it or not. In this much danger lies, but this may be overcome soon.

No gas found when mine is stopped one day. Complaints from the men as to bad light from lamps with reference to oil. Candle-power of Clanny lamp 0.20.

Mr. Wilson, General Manager, says new fan ordered, with capacity of 220,000 c. f. per minute.

Chief danger, *dryness and dustiness*; gives off much gas when working, and being in connection with 3 any serious explosion going off in 2 might affect 3, although it is wet. However, by proper use of a ventilating fan now in use, enlargement of its airways, keeping the brattice close into the face, and continuing to put good stoppings when required, and maintaining good discipline in the several mines, there should result a fair exemption from danger; and if what I have pointed out be complied with, I cannot see where there would, ordinarily, be any danger from any serious accident of any kind, provided, as I have said, that the Management and workmen carry out the above suggestions on their respective parts, and comply with the "Coal Mines Regulation Act" and the special rules of the mines.

February 7th, 1901.—Bratticing too far back in *No. 2 Mine*; 16,000 c. f. for 73 men. No gas. *Much water on floor*; saw that there were 8,550 c. f. for 40 men. Was not much danger from dust.

February 11th, 1901.—If notice *re* Improving Ventilation is disregarded, may prosecute Manager, Robinson Pearson.

March 5th, 1901.—Must get Certificated Manager.

March 27th, 1901.—Improvements made.

March 18th, 1901.—John McDougal, miner, fired shot without shotfirer; convicted and fined \$5 and costs.

April 12th, 1901.—R. G. Drinnan, Manager. In *No. 1 District*: Flame shows blue cap. *Dry and dusty*, giving off considerable gas. No shot firing to be allowed. 8,500 c. f. for 37 men. *No. 2 District*: Generally very wet. No gas. 6,600 c. f. for 32 men. Intake, 39,500; 15,100 accounted for. Intake requires improving.

Fan Upcast Shaft about 100 feet by 10 feet by 10 feet.

April 13th, 1901.—Emile Mergouxm, miner, convicted and fined \$5 and costs for smoking.

June 1st, 1901.—Manager's instructions to overman and firemen that only locked safety lamps to be used in *No. 2 Mine*.

June 4th, 1901.—Two men burned in *District No. 2*, going into their place after firing a shot. Place, 17 feet by 5 feet, and bratticed 9 feet from face. Open lights. Coal blasted came down in a large block, relieving gas and leaving a space between this block and fresh face, which had evidently filled with gas.

*No. 2 District*.—*Now damp but not very wet*. Went through Old Workings, only found a trace of gas, which was weak. No gas found in *No. 3 Mine* for a long time.

June 4th, 1901.—Steve Rowans, miner, was burned in 14 Stall of *No. 1 Mine* from his own carelessness in going into his stall after being told by the night and day firemen that he was not to go in, as there was gas in it. This was on 20th May, and he died on 22nd May, 1901.

June 15th, 1901.—*No. 4 Mine*: — Michel, miner, caught smoking, with matches in his possession, where safety lamps were used. Convicted and fined \$5 and costs.



June 15th, 1901.—No. 2 Mine: Air escaping into return airway keeps the mixture there from being explosive, and thereby prevents gas accumulating in wastes.

July 30th, 1901.—No. 2 District: *Usually dry, but now getting damp throughout, and in some places very wet.* Examined all the places; *no dust here, much of the work being very wet.* 10,000 c. f. for 32 men

No. 3 Mine: *Very wet, and no dust at all and no gas.* 5,000 c. f. for 18 men.

October 11th, 1901.—Old Workings: No gas in No. 1 District inside stall. 10,800 c. f. for 34 men. Old Workings: No gas in No. 2 District, and in Intake near face. 5,425 c. f. of air per minute for 34 men. *Used to be dry, is now damp and much of it very wet.* No gas reported for quite a time.

No. 3 Mine, Old Workings: 12,000 c. f. for 15 men. *Wet on floor, much water from roof.* New Capell fan started and running slowly; men complaining of too much wind. Got over the most dangerous time. All the Fernie, or Coal Creek, Mines, which *at one time were very dry, are now damp in all the parts of the mine, and some places very wet.* Much improved of late.

November 14th, 1901.—No. 3 Mine: Miners thought air was too strong with new fan. No. 2 Mine: Compressed air used in place of steam. No gas. Roof in many of the stalls had and full of slips. *Men all instructed any time short of timber and roof bad, must leave face until made secure.* Last stall 13,300 c. f. for 30 men.

A few men attending motor and Main Intake. Open lights. Intake 11,300 c. f. for 30 men. Total, 120,000 c. f. at 100 revolutions. Can speed up to 200 revolutions per minute.

I look upon the old workings of a mine that gives off much gas, as being the place where the greatest danger lies for a serious accident; but with the usual good management which is now being carried out, as well as the great care being used by the workmen, I think we should be free from any serious calamity. Mine used to be dry, and had to be sprinkled, but now they are wet and attend to dust themselves.

February 28th, 1902.—District No. 1: No gas. 22,400 c. f. for 40 men. Stalls bad. District No. 2: No gas. 21,140 c. f. for 40 men. Slippery roof. No. 3 Mine: Coal harder. Very little gas seen here. *No dust.* 29,680 c. f. for 39 men.

Nos. 2 and 3 Mines: Large blocks of ice near faces, icicles. 116,220 c. f. With fan at half speed it is guaranteed to run at 94,340 c. f. In the splits 21,880 circulating through the Old Workings, and which is the means of carrying off what gas may be given off, and this will be increased from time to time, as they are making great improvements in the airway; the Manager, together with his Overman, using all means to avoid an accident, or anything that might cause delay to the works.

In No. 1 Mine in West District on trial, sending most of air around the Faces; the old workings filled with gas.

March 26th, 1902.—“Matches or apparatus of any kind for striking a light.” Five persons found with matches; 9 had pipes and tobacco in mine worked with safety lamps. Warrants were issued for those who had matches, but the Magistrate, Mr. Armstrong, said he could not find anything in the “Coal Mines Regulation Act” to prevent any person having pipes or tobacco in their possession; *see Sp. Rules, No. 75.*

April 1st, 1902.—I interviewed the Minister of Mines and stated that owing to the excessive quantity of gas in the mine in question, such practices are extremely dangerous, and may, at any time, be the cause of loss of life.

The Minister of Mines is fully aware that the Company desires to carry out the provisions of the Act to the fullest extent and render the mines as safe as possible.

April 23rd, 1902.—Barometer 25.85.

April 24th, 1902.—Could find no trace of gas. All the places now well timbered. Put in much of my time in Old Workings to see if there was any accumulation of gas. Neither there, nor at the working places, was there a trace of gas to be seen. Brattice close up, in many cases too close to be convenient; 20,000 c. f. for 35 men. I failed to find any gas in No. 2 Mine, while at one time it would show in the lamp nearly every place you could go; 12,400 c. f. near Face. Main Intake 80,800 c. f.; 31,400 c. f. going into Old Workings, where it is much required to carry off the gas which is given off there.

No. 3 Mine.—All the working places were in good order. Brattice close up and well timbered. No sign of any gas. Examined all this mine and but few places of Old Workings I was not in; 31,800 c. f. for 35 men.

Nos. 2 and 3 Mines.—112,200 c. f. per min. at 120 revs. per min. of fan.

[COPY]

## INSPECTION OF MINES ON BEHALF OF WORKMEN.

FERNIE, B. C., May 7th, 1902.

*To the Management of Coal Creek Mines:*

Sirs,—We, the undersigned, appointed by the Gladstone Miners' Union, No. 76, of Fernie, B. C., visited Nos. 2 and 3 Mines, as set apart by the Act, and found them clear of all gases and in good condition, with the exception of the excessive want of timber in Section 2, No. 2 Mine.

(Signed) THOS. ADDISON.  
" THOS. STEVENS.

[COPY.]

*To the Management of Coal Creek Mines:*

Sirs,—We, the undersigned committee, appointed by Gladstone Miners' Union to examine No. 1 Mine, beg leave to submit the following report:—

Entered mine at 7.30 a.m. and in company with fireboss Powell, who acted as guide, we proceeded to visit all roads, working places and airways in the seams now working, also all old workings in said seams, and found them free of gas and in good condition, with the exception of three places, which require attention, viz.:—Roof over switch entering No. 2 Lift, big hoist, and roof above small hoist; also loose rock, about 100 feet from bottom of big hoist, which Mr. Powell said would be attended to at once.

We are pleased to state that we did not hear any complaints as regards ventilation, which shows painstaking effort on the part of those conducting, in many places under unfavourable conditions.

There were a number of complaints for want of timber, and not without cause, in thirteen places visited. We only saw three loose pieces. With the exception mentioned, we found everything in very good condition, but would suggest that the manholes in motor road be cleaned, as in many places to step off road means to go over one foot in water.

Thanking the management of No. 1 for courtesy shown and facilities offered, to make our examination thorough, we remain,

Respectfully yours,  
(Signed) CHARLES BURROWS,  
" A. D. FERGUSON,  
Committee.

*Coal Creek Mines, May 8th, 1902.*

## Government Inspector's Report.

## CROW'S NEST COLLIERY.

May 19th, 1902.—I went up this morning to the Coal Creek Mines, where I examined all about the outside then went down No. 3 Mine. I went down here to the level on the south side. I was in all the stalls as I went in and most of the old works. Examined them with a safety lamp; did not find any trace of gas. I saw that the works were in good order. I came out of this level and went down the slope to where they are starting off other levels. As they are in only a short distance I came out and went in the level to the north side of the slope. I was in most of the old works here and all the present working places. They were in good order, hard rock roof, plenty timber, but very wet. Ventilation good. I saw that there were 27,000 cubic feet of air passing per minute; this was at a place well down the slope where there are 50 men employed. After coming out of No. 3 tunnel I went to No. 2 Mine; thence into what is known as the high level district. I was in all the working places of this division, examining them with a safety lamp to see if there were any gas, but I failed to find even a trace of gas. All the working places were well timbered and I saw other timber on hand ready to put in when required. I also went into the old works on the return airway of this district and saw that all was clear of gas and the airway in good order. Ventilation was good. Here, only a short distance from the face, I saw that my instrument registered 12,000 cubic feet of air passing per minute, most of which was conducted into face by brattice (cloth) or otherwise. Every part in this district was in good order; there were 30 men working in this division when I was there, all of whom were working by light of safety lamps. I talked with the men and there were no complaints of any kind.

May 20th.—I again went into No. 2 Mine. To-day I went by the electric hoist and deep, thence up the long incline to the level of what is known as the west side or No. 2 District. I went in here to the face and the stall at the back, which is known as No. 16. I was in all the old works between the level and the face of the working stalls, of which there are 16. From here I went to what is known as the Machine District. In short, I was in all the working places up this incline, which is known on the plan as No. 2 District. I examined it very carefully with a safety lamp for gas, but did not see a trace of it anywhere. I also saw that all the places were properly timbered, and in most of the stalls I saw the timbers lying that had not been used, and on the level leading from the incline to No. 16 stall I saw large pools of water on the road. Ventilation good. I saw by my instrument that there were 72,000 cubic feet of air passing down the intake, for the east and west districts, per minute for 60 men. Everything was in good order.

May 21st.—I went to-day to examine No. 1 Mine. I found that the mines were not at work except men in Barton's entry fixing the road, making it higher. After going in the tunnel I went up the west district. In going in here I saw that there were two men working fixing air stopping. I went through all the working places of this district. I saw that they were in good order; all of them had been reported clear of gas. When I was in there was gas of different quantity to show in my lamp in the No. 16 stall and the three other adjoining stalls. The overman was along with me. He said there must be a derangement somewhere, so he left me and went to investigate, when he found an air stopping had been broken so that the air escaped. This was soon made right and in a short time the gas above mentioned was carried away. Ventilation good. In this west district there were 32,000 cubic feet of air passing per minute where in the usual workings there are 50 men. All of the above 32,000 feet does not get to the face of the working as they have to let a large quantity get into the old works to keep them clear of gas. I then went to the east district. I went through this division. There was not any work being done, but I saw that everything was in good order. Examined all the place with a safety lamp; did not find any gas. I also saw considerable timber on hand for use. Ventilation was good. In this division (by my instrument) I saw that there were 42,000 cubic feet of air passing per minute. This was well in. In this division, on the usual working days, there are 46 men working.

I have, etc.,

(Signed)

ARCHIBALD DICK,

*Inspector of Mines,*

*Cranbrook, B. C.*

*Hon. E. G. Prior,*

*Minister of Mines,*

*Victoria, B. C.*

The following Firemen's Reports are copied from Colliery Report Books :—

1902.

May 1st.—Mine No. 2, District No. 3, morning shift: Gas in McDonald's Level.

(Signed) R. PENGELLY.

" 3rd.—Mine No. 3, South Side, night shift: Gas in No. 5 Room.

(Signed) J. SULLIVAN.

(Overman's Report says 5 Room off I. N.)

" 5th.—Mine No. 2, Districts Nos. 2 and 3, night shift: All clear and the old workings.

(Signed) D. McDONALD.

" 7th.—Mine No. 2, District No. 3, morning shift: Gas in McDonald's Level and a little gas in No. 11 Stall.

(Signed) H. McMILLAN.

" 7th.—Mine No. 2, District No. 1, afternoon shift: Missed shot in cross-cut off No. 1 Room Incline.

(Signed) S. HAND.

" 7th.—Mine No. 2, District No. 3, afternoon shift: Gas in McDonald's and Alder's Levels.

(Signed) R. PENGELLY.

" 8th.—Mine No. 2, District No. 3, morning shift: Gas slightly in No. 3 Room, McDonald's Level.

(Signed) R. B. LAMB.

" 8th.—Mine No. 2, District No. 3, morning shift: Gas in No. 7 Room and McDonald's Level.

(Signed) H. McMILLAN.

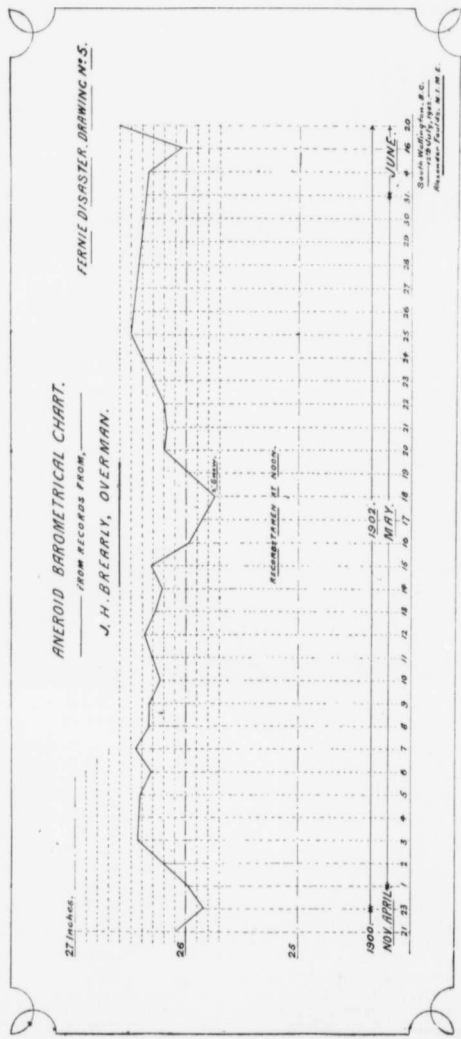
" 8th.—Mine No. 2, District No. 3, afternoon shift: Gas in No. 7 Room, and McDonald's Level.

(Signed) R. PENGELLY.

" 9th.—Mine No. 2, District No. 3, morning shift: Gas in McDonald's Level and No. 7 Room.

(Signed) R. B. LAMB.

- May 9th.—Mine No. 2, District No. 3, morning shift : Gas in No. 7 Room and McDonald's Level and Counter. (Signed) H. McMILLAN.
- " 9th.—Mine No. 2, District No. 3, afternoon shift : Gas in McDonald's Level. (Signed) R. PENGELLY.
- " 10th.—Mine No. 2, District No. 3, morning shift : Gas in No. 8 Room in McDonald's Level ; gas in Counter. (Signed) H. McMILLAN.
- " 10th.—Mine No. 2, District No. 3, afternoon shift : Gas in McDonald's Level. (Signed) R. PENGELLY.
- " 12th.—Mine No. 2, District No. 1, night shift : Examined all old workings ; gas on high side in No. 1, S.W. Level. (Signed) D. JAMES.
- " 12th.—Mine No. 2, District No. 3, afternoon shift : Gas in Counter off McDonald's Level. (Signed) H. McMILLAN.
- " 13th.—Mine No. 2, District No. 1, night shift : Gas in cross-cut in 1st Level off No. 1 Incline. (Signed) D. JAMES.
- " 13th.—Mine No. 3, South Side, night shift : Gas in No. 1 Room off No. 2 South Level, and cross-cut off No. 14 Room to right. (Signed) D. JAMES.
- " 13th.—Mine No. 2, District No. 3, morning shift : Gas in cross-cut off Alder's Level, 7 a.m. (Signed) R. PENGELLY.
- " 13th.—Mine No. 2, District No. 3, morning shift : Gas in cross-cut off Alder's Level. (Signed) R. B. LAMB.
- " 13th.—Mine No. 2, District No. 3, afternoon shift : Gas in Counter off McDonald's Level. (Signed) H. McMILLAN.
- " 14th.—Mine No. 2, District No. 1, night shift : Gas in 1st Level off No. 1 Incline. (Signed) D. JAMES.
- 14th.—Mine No. 2, District No. 3, morning shift : Gas in Alder's Level and Cross-cut, 7 a.m. (Signed) R. PENGELLY.
- " 14th.—Mine No. 2, District No. 3, afternoon shift : Gas in Counter off McDonald's Level. (Signed) H. McMILLAN.
- " 15th.—Mine No. 2, District No. 3, morning shift : Gas in Alder's Level and Cross-cut, 7 a.m. (Signed) R. PENGELLY.
- " 15th.—Mine No. 2, District No. 3, morning shift : Gas in Alder's Level. (Signed) R. B. LAMB.
- " 15th.—Mine No. 2, District No. 3, afternoon shift : Gas in Counter off McDonald's Level. (Signed) H. McMILLAN.
- " 16th.—Mine No. 2, District No. 3, morning shift : A little gass in cross-cut off Alder's Level, 7 a.m. (Signed) R. PENGELLY.
- " 16th.—Mine No. 2, District No. 3, afternoon shift : Gas in No. 7 Stall off McDonald's Level ; gas in cross-cut off Beaver's Level. (Signed) H. McMILLAN.
- " 19th.—Mine No. 2, District No. 1, night shift : Examined all old workings and airways, and found them in safe condition ; found gas in cross-cut off No. 1 Level off Incline ; all other working places clear.
- " 19th.—Mine No. 3, night shift : Examined all old workings and airways, and found them in safe condition ; found gas in 13 Room off No. 1 South Level, and Beaver's Level ; all other working places clear. (Signed) JOHN HUNT.
- " 19th.—Mine No. 2, Districts Nos. 2 and 3, morning shift : All working places and roads leading thereto, and found all clear, 7 a.m. (Signed) R. PENGELLY.
- " 20th.—Mine No. 3, morning shift : Gas in 17 Room off 1st Level South ; all other working places clear. (Signed) JOHN DOBBIE.  
(Overman's Report says 16 Room.)
- " 19th.—Examined 1, 3 and part of 2nd Districts, No. 2 Mine, and found a little gas in No. 7 Room off McDonald's Level, 3rd District ; all other places clear.
- Examined parts of No. 3 Mine and found all places clear and well ventilated (Morning Fireboss's Report : All clear), and No. 3 fireboss reports all clear. (Signed) W. H. BREARLY, *Overman*.



- May 22nd.—Mine No. 2, District Nos. 2 and 3, morning: All clear.  
(Signed) R. B. LAMB.
- " 22nd.—Mine No. 3, night shift: All working places clear.  
(Signed) J. SULLIVAN.
- " 22nd.—Mine No. 2, District No. 1, night shift: All working places clear.  
(Signed) J. SULLIVAN.
- " 22nd.—Mine No. 2, District No. 1, morning shift: All working places clear.  
(Signed) F. LANDER.
- " 22nd.—Mine No. 3, morning shift: All working places clear.  
(Signed) J. SULLIVAN.
- " 22nd.—Mine No. 2, morning shift, Districts Nos. 2 and 3: All working places clear.  
(Signed) R. PENGELLY.

*Readings of Aneroid Barometer in Office at 12 noon daily in May, 1902.*

		Barometer.		Thermometer.
May	1.....	25.98"	June 1, at 8 a.m. ....	.....
"	2.....	.....	" 2.....	.....
"	3.....	26.44	" 3.....	.....
"	4.....	.....	" 4, 7 a.m. ....	26.34"
"	5.....	26.42	" 5.....	26.30" 26.34
"	6.....	26.32	" 6.....	26.35
"	7.....	26.46	" 7.....	26.37
"	8.....	26.34	" 8.....	.....
"	9.....	26.34	" 9.....	26.15
"	10.....	26.22	" 10.....	26.20
"	11.....	.....	" 11.....	26.15
"	12.....	26.38	" 12.....	26.15
"	13.....	26.28	" 13.....	26.05
"	14.....	26.22	" 14, 8 a.m. ....	26.30
"	15.....	26.32	" 15, 11:30....	26.33
"	16.....	25.98	" 16.....	26.04
"	17.....	25.86	" 17.....	26.23
"	18 (2' snow) ..	25.75	" 18.....	26.30
"	19.....	25.96	" 19.....	.....
"	20.....	26.20	" 20.....	26.62
"	21.....	26.18		
"	22 (Explosion) ..	26.20		
"	23.....	.....		
"	24.....	.....		
"	25.....	26.50		

COURSE AND DIRECTION OF EXPLOSIVE BLASTS.

*Blast No. 1* originated in District No. 3, and came from face of McDonald's Level (1st South Level or Entry), down first cross-cut, along Alder's Level, up cross-cut, outside of slant to McDonald's Level, joining other force which traversed along this level and all the working places there, blowing out the stoppings between this and Alder's Levels towards the latter.

At the same time blast passed from McDonald's Level out through Room No. 1 to old workings, which we will call Blast No. 2. Blast No. 1 continuing its course along the faces of, and part of, the waste of the old workings, blowing stoppings out towards Main Entry; *the first recoil* occurring very severely at face of Sharp's Slant before entering District No. 2 Machine sections, eddying or returning through cross-cut on to Main Entry, where two loaded cars were blown up against east rib about 100 feet above entrance to Hoist Level.

This eddy, or altered direction of force of blast, was no doubt due to its being throttled, or retarded, by the small connection in coal between Machine Level Face and Room No. 7 off Hoist Level, which was at that time only 2 feet by 2 feet (4 square feet), causing a partial or *second recoil* not so severely as the first recoil.

From Machine Level it traversed down through Rooms No. 1, 2, and 7 (5) to Hoist Level, continuing its career along this Level, coursing throughout all the remaining rooms, Nos. 8 to 16, more or less, to Level Face, blowing out all the stoppings towards the old workings, and

recoiling (*third recoil*) at Level Face slightly, taking along return airway and partly through old workings; from old workings through the passages with doors therein, to the two intakes of Main Entry, to High Line or Level in District No. 1, displacing slightly one stopping and blowing part of dirt stopping outside of incline upwards, and destroying air crossing; continuing out Main Entry and original tunnel to surface. Blast did not traverse any of the working places in District No. 1, simply recoiling slightly on main intake (*fourth recoil*). The resultant here being after damp, precipitated, which is generally composed of carbonic acid gas, or carbon dioxide (CO<sub>2</sub>), steam (H<sub>2</sub>O), and nitrogen (N), and when coal dust is present carbonic oxide, or carbon monoxide (CO), the effect or product of incomplete combustion.

*Blast No. 1.*—Four recoils.

*Blast No. 2.*, divided in District No. 3 from Blast No. 1, where Room No. 1, off McDonald's Level enters old workings, going along Middle Run (Level), through these old workings to Beaver's Slope, blowing stoppings all out from old workings towards this slope and stoppings partially to Main Entry.

From Beaver's Slope up, and across slope into part of Hunter's Level, and out again (another eddy), blowing out three doors and air crossing, finding an exit along Main Entry and original tunnel to surface.

*Blast No. 2.*—No recoils.

*Blast No. 3.*, divided in District No. 3 from Blast No. 1 at entrance to Room No. 1 in McDonald's Level, going along this Level to Beaver's Slope, recoiling slightly in this slope (*first recoil*), coursing along Beaver's and Galloway's Levels (counter and 1st North Level or Entry), to faces of these Levels, where it again recoiled very severely (*second recoil*) before entering the old workings, careering through these, allowing volume to expand greatly, entering 1st South Level, off No. 3 Mine Slope through Rooms Nos. 11 and 12, recoiling strongly (*third recoil*) in Level, blowing down about 20 feet of bratticing at entrance to Room No. 15, going up Rooms Nos. 13 and 14 off this Level, which were within 3 feet of being through. This rib of coal was blown out by the blast towards Hunter's Level and old workings, and also a wooden stopping between Rooms Nos. 4 and 5, on this level, dividing Mines Nos. 2 and 3, was blown southward towards No. 2 Mine.

The area of old workings on the south side of No. 3 Mine saved that mine to a considerable extent through explosive blast expanding voluminously there.

This blast finally coursed throughout these old workings, more or less, making its exit through fan shaft about 100 feet by 10 feet by 10 feet, Main Slope, and partly through 1st Cross-cut to left off Main Slope to surface.

*Blast No. 3.*—Three recoils.

*Blast No. 4* divided from Blast No. 3 in south side district of No. 3 Mine on 1st South Level, at entrance to No. 11 Room, traversing this level to main slope of No. 3 Mine. On this slope the blast recoiled not very strongly (*first recoil*), going up slope, meeting trip of eight empty cars accompanied by the rider, W. R. Henderson, at or near the 7th Cross-cut to right off slope, derailing trip into three portions. He felt the blast distinctly but saw no flame, and got out to surface as best he could.

This blast, which traversed the wettest portion of the whole area, expended itself at mouth of slope to surface.

*Blast No. 4.*—One recoil.

*Main Entry, Hoist Plans.*—The east stoppings were violently blown westwardly, west stoppings not so violently, evidence that dust in these locations did not intensify or increase the force of the blast. One load car only, of five-car trip being derailed at foot of Electric Hoist Plane.

The explosion in these four blasts made its exit to surface at five different places, viz. :—

1. From Main Entry of No. 2 Mine. } Blowing part of Tipple Trestle roofing off.
2. " Slope " 3 " } "
3. From Fan-drift, blowing off roof of drift, but not injuring fan.
4. From Original Tunnel, doing little damage.
5. From first drift to left off No. 3 Mine Slope, blowing props and debris against wash-house, fracturing windows and damaging house, not severely.

LOCATION AND CAUSE OF EXPLOSION.

*Location of explosion* was in District No. 3 at or near the face of McDonald's Level, or 1st South Level or entry, which was being driven as a winning out or development and leading

places  
1 (1st  
slant  
rking  
r.  
o old  
faces  
ntry;  
No. 2  
aded  
ttled,  
7 off  
ial or  
level,  
. 8 to  
, and

place 12½ feet by 6½ feet high in the coal only; followed parallel by a counter or lower level named Alder's Level 12 feet by 5½ feet high in the coal seam also.

Alder's Level being 4½ feet, or thereby, in advance of McDonald's Level, with a cross-cut 10 feet wide between levels, forming a pillar 41 feet thick. Face of Alder's Level 29 feet in from corner of cross-cut, and face of McDonald's Level in 35 feet from other or upper corner of cross-cut, which at time of explosion had bratticing within 12 feet of face.

On visiting these levels on Friday, 6th June, and making a very careful examination, we found a feeder or blower of gas in roof 18 inches from coal face and 5 feet from lowside rib of coal in McDonald's Level. The blower was audible about 10 feet back, and on putting my hand to it found gas still occluding freely, but not very strongly, this being 15 days after explosion. Confirmed by colleague on again visiting this location the following day.

There were also several small blowers quite audible, issuing gas from roof and floor and sides in both levels; and from the Colliery Report Books we find gas reported in McDonald's Level on May 1st and 7th; in No. 3 Room, off Level, on May 8th; in No. 7 Room off Level, and Level, on May 8th, 9th and 10th; in Alder's Level, on May 12th; and in same level and Cross-cut, off same, on May 13th, 14th and 15th; on May 16th, a little gas in Cross-cut off Alder's Level, and gas in No. 7 Room; and on May 19th, a little gas in No. 7 Room.

During the period in which this gas was found I understand that while connecting Alder's Level back, or northwards from slant off McDonald's Level, the workings of Alder's and McDonald's Levels were continued south, and No. 7 Room, which was a very injudicious and dangerous practice in such a location.

On the morning of the day of the explosion, May 22nd, Colliery Report Books declare all the working places clear in Districts Nos. 1, 2 and 3, of No. 2 Mine, and also all the working places clear in No. 3 Mine.

Alder's and McDonald's Levels being development places were, excepting South Main Entry, penetrating further into solid and fresh coal, bleeding the gas freely from coal, roof and floor; and more freely through the numerous feeders or blowers which are very characteristic of, and no doubt due to, the stratification of the formation of this field.

These blowers or feeders, when suddenly tapped, give off sometimes large quantities of gas, and without precautionary measures are very dangerous through coming in contact with flame, leading to disastrous results.

At the time of the explosion, about 7.30 p.m., on May 22nd, the atmosphere in this location was liable to be in an explosive condition, because of receiving all the return air from Main Entry, throughout part of the old workings, and from Rooms Nos. 1 to 8; and as the evidence distinctly shows, through position of bodies got and contents of cars, besides the position of the working faces in the two levels, and Rooms Nos. 7 and 8, that excepting Room No. 3, a car was at each face being loaded, and as there were no evidences of blasting at these working faces, or any windy or blown out shots, the presence of coal dust thrown into suspension in the air would be caused by the ordinary working here.

Alder's Level was wet, and McDonald's slightly damp, and very distinct and strong evidence of force from face of McDonald's Level outwards (northerly), by the way the cars were blown and also the position of the bodies, besides a very striking illustration in a tamping bar bent northerly, or outwards, around a post in McDonald's level about 10' beyond north corner or entrance to No. 8 Room.

*Cause of Explosion* was attributable to a flame, by some means or other, coming into contact with gas during the explosive condition that prevailed in McDonald's Level, at or about 7.30 p.m. on Thursday, May 22nd, 1902.

Nos. 104 and 105 were miners (Joe Crimp and Larkin Armstead), working in No. 7 Room without powder, whose bodies were found burned in their room.

Nos. 106 and 111 were miners (Anthony Williams and Antonio Cantazio), working in No. 8 Room with powder, whose bodies were found on level opposite their working place, burned.

Nos. 109 and 110 were miners (Malcolm McLeod and Aaron Colclough), working in Alder's Level with powder, whose bodies were found near face of level burned, and a lamp on low side intact.

Nos. 107 and 108 were miners (Dougal Milroy and James Muir), working in McDonald's Level. James Muir had evidently been in the act of mining or holing; and his partner, Dougal Milroy, in the act of loading a car. Matches were found upon the body of Milroy, but nothing of that class found upon Muir.



A blower, or feeder of gas, in roof had been recently exposed 18" from coal face and 5' from lower rib, and when tapped must have been distinctly audible, as it was quite audible 15 days thereafter.

Muir had mined an area of about 5' x 23" x 0" and 34" thick (see drawing No. 1), in top coal, and when working his lamp probably was adjacent to blower and may have got damaged or flame passed from lamp in some way to explosive mixture. A more probable and likely way is that a man whose head was badly smashed may have been in the act of smoking by drawing his flame through lamp gauze or lighting a match.

These two men were said to be fairly good, or average, workmen.

I have no hesitation in saying, and have distinctly decided, that the explosion occurred through a blower of gas in roof tapped on May 22nd, 1902, in McDonald's Level, in either of the two ways mentioned.

#### SAFETY LAMPS.

Safety lamps may be divided into two classes, according to the uses to which they are put:

- (1.) Those for working at the face;
- (2.) Those intended for testing purposes.

The first class comprises all lamps which are to be placed in the hands of the workmen for general use throughout the mine; hence they should conform to three very important requirements:

- (a.) Safety in strong currents;
- (b.) Give the best light;
- (c.) Sensitive to gas to only a moderate degree.

All lamps should possess the first two essential features, but the last one should belong only to the lamps used by the workman. The lamp he uses should, therefore, be so constructed that it will detect gas only when it begins to approach the danger point, which is sufficient warning for him to retreat to a place of safety.

The first requirement, safety in strong currents, is fulfilled in various ways. In the Davy lamp, for example, a metallic shield, passing two-thirds around the lamp, is placed upon the standards. The most effective way of shielding the flame is by placing bonnets over those parts where the flame is exposed in any way.

These bonnets are made of various kinds of metal and also of glass.

The second requirement, giving the best light, is fulfilled by obstructing the flame as little as possible with any materials that will shut off the light. Generally, glass is placed around the flame, and by making it conical in form the rays of light are thrown upwards. Reflectors are also used, but though they brighten the light in one direction they obstruct it in another.

The second-class comprises all lamps which are to be used for testing purposes. The requirements to which lamps of this class should conform are as follows:—

- (a.) Safe in strong currents;
- (b.) Give the best light;
- (c.) Detect a very small percentage of gas.

Safety lamps should be simple in construction for thorough and rapid cleaning, and easy to handle, take apart and put together again after being cleaned. Securely locked so as not to permit of any tampering on the part of the miner without its being detected in the lamp room. Free admission of air below the flame. No reflecting surface behind the flame. Good illuminating power. Freedom from flaming. Security against accident.

*The Davy lamp* has a wire gauze cylinder about 5 inches in height and 1½ inches in diameter, surmounted by a gauze 2 inches deep, the gauze having 784 apertures to the square inch, fastened to a brass standard, which secures it to the oil cup or lamp below.

*The Geordie lamp* was a combination of the original Stephenson lamp and the gauze of the Davy lamp.

*The Clanny lamp*, bonneted, is an improved design to secure greater protection for the flame, combined with a better light, than was provided in the Geordie lamp. The air, instead of being admitted below the flame, as in the Geordie lamp, is admitted through the lower portion of the gauze cylinder just above the glass, and descends, within the lamp, to the flame.

The lamp is constructed according to the same principles as the Davy lamp, differing only in the fact that the lower part of the wire gauze (which is slightly conical, whereas the Davy lamp is parallel) surrounding the flame is replaced by a strong glass or chimney. The purpose of this is to increase the illuminating power of the lamp. The lamp, when clean, gives a good light, but the entrance of the air at a point above the flame, and its descent

within the lamp to the flame, causes the lamp to smoke, due to the conflict of the ascending and descending air currents within the lamp.

The smoke becomes deposited on the glass chimney, which interferes greatly with the light. This lamp is not a good one for gas-testing, and in fact cannot be used for that purpose to any advantage. The unbonneted Clanny is not safe in an air-current having a velocity greater than 8' per second. The bonneted Clanny obviates this difficulty to a large extent, but increases the tendency of the lamp to smoke.

The *Mueseler lamp* resembles the Clanny lamp, except that it has a central conical wrought-iron tube within the gauze, which overcomes the tendency to smoke as in the Clanny. It is a better lamp for illuminating purposes than the Clanny, and presents more security, when bonneted, against explosions within the lamp. This lamp is reported to be safe in a current having a velocity of 100' per second. It is not good for gas-testing, and does not flame as quickly as the Clanny lamp.

The *Marsaut lamp* is built after the Clanny in every respect, but is supplied with multiple gauze chimneys (two or three), one within the other, the effect of which is to increase security against explosion of gas within the lamp. In this respect it is a peculiarly strong lamp, and is often extinguished in an explosive mixture by the force of the explosion within itself. It gives a good light, and is a good lamp for general work; it is not, however, good for testing for gas.

The *Ashworth-Hepplewhite-Gray lamp* combines a number of characteristic features. It is designed for general work as well as for testing gas. The four standards of this lamp are tubes down through which the air passes into the lamp below the flame. When testing for gas layers on roof, and when not used for testing purposes, the air can be allowed in at the lower parts of these standards. This lamp is essentially a bonneted Clanny. The glass chimney and gauze are conical, for the purpose of diffusing the light upward for examination of roofs. The conical form of gauze strengthens the lamp against explosions of gas within. This lamp is a very good all-round lamp, and possesses good illuminating power.

The *Wolf lamp* is rapidly growing in popularity, having been already introduced in a large number of mines in America and England and on the Continent. This lamp is essentially a Clanny lamp with a free admission of air. It is compact and efficient, and has good illuminating power, and is also constructed in different form, combining, as desired, all or any of the features of previous lamps. Two of its characteristic features, however, consist in a self-lighting arrangement accomplished by means of a percussive device, which ignites a wax paper within the lamp, and a locking device which can be opened only with a powerful magnet. This re-lighting device is an important feature in any safety lamp for general use, inasmuch as the most dangerous conditions immediately exist after an explosion, and the miners are always left to grope their way in the dark. A large number of lives are lost owing to the confusion that ensues, the men becoming bewildered and losing their way, whereby they are shortly overcome by the afterdamp of the explosion. This lamp permits of immediate re-lighting with safety to the men.

Name of Lamp.	Vel. in ft. per sec. to pass flame.	Apertures per sq. in.	Illuminating power in candles.
Davy .....	6	784	0.16
Geordie (George Stephenson) .....	6	784	0.10
Clanny (unbonneted) .....	8		
Clanny (bonneted) .....	80	784	0.20
Mueseler .....	100	928	0.35
Evan Thomas .....	100	928	0.45
Marsaut, 3 gauzes .....	100	934	0.45
Marsaut, 2 " .....	100	934	0.55
Marsaut, with Howat's deflector .....	100	934	0.65
Ashworth-Hepplewhite-Gray .....	100	928	0.65
Wolf .....	100	928	0.90
Pieler .....	6	784	0.16

All these lamps can detect at least three per cent. of gas, and the Pieler lamp one-quarter per cent. Diameter of wire gauzes, about .013 inches.

---

---

**LOCKING LAMPS.**

1. The ordinary lock consists of an ordinary turn-bolt or screw-pin, in a socket, operated by a peculiar key.

2. Other locks consist of a lead plug which, when inserted in the lamp, will show the least tampering on the part of the miners.

3. Magnetic locks allow of the opening of the lamp only by means of a strong magnet kept in the lamp room.

No complaints as to defective lamps, unless when James Dick, miner, was lamp cleaner. On several occasions lamps were returned to him by man inspecting lamps at entrance to No. 2 Mine, because of some of them having fractured glasses and improperly put together after cleaning. This ceased after dispensing with his services. He had no experience of safety lamps, and was a man who could not realise the responsibility of such work.

The lamps in every day use in Nos. 1 and 2 Mines are safety lamps, and those in use in No. 3 Mine open lights. The safety lamps placed in the hands of the workmen at the working faces, and for general use throughout the mine, are the bonneted Clanny (same as used on Vancouver Island), and those for testing for gas in the hands of Overmen, Firemen and shot-firers the usual Davy lamp with glass surrounding the flame.

**COAL DUST.**

The Royal Commission on "Explosions from Coal Dust in Mines" of Great Britain have recently published their second (final) report, their conclusions being based upon all data available up to the time of the completion of their labours. The lines of their investigations were based upon what is known as "The Coal Dust Theory," which may be summarised as follows:—

I. The circumstances of many explosions, and especially of explosions on a very large scale, and covering a great length of the workings, cannot be fully explained by reference to fire damp or gas alone.

II. The presence of coal dust, and especially of fine dust, may be the sole cause of an explosion.

III. If the coal dust is in sufficient quantities it will certainly extend the effect and increase the intensity of an explosion caused by any other means.

IV. Fire damp in small quantities (so small as not to be dangerous in itself), may be highly dangerous in the presence of coal dust.

From the testimony submitted by all the experienced mining men of the Kingdom, who gave evidence before the Commission, the following summary of conclusions resulted:—

1. The danger of explosion in a mine in which gas exists, even in very small quantities, is greatly increased by the presence of coal dust.

2. A gas explosion in a fiery mine may be intensified, and carried on indefinitely, by coal dust raised by the explosion itself.

3. Coal dust alone, without the presence of any gas at all, may cause a dangerous explosion if ignited by a blown-out shot or other violent inflammation. To produce such a result, however, the conditions must be exceptional, and are likely to be produced only on rare occasions.

4. Different dusts are inflammable, and, consequently, dangerous in varying degrees; but it cannot be said with absolute certainty that any dust is entirely free from risk.

5. There appears to be no probability that a dangerous explosion of coal dust alone could ever be produced in a mine by a naked light or ordinary flame.

The necessary precautions to avoid explosions from various sources were carefully considered, the matter of blasting having received particular attention. Evidence was submitted in reference to the use of gunpowder, flameless explosives, high explosives, and various safety cartridges, from which the conclusions were reached that general employment of high explosives would greatly limit the risk of explosion in dry and dusty and in fiery mines. Also, that a considerable advance in the direction of the abolition of the use of gunpowder in dry and dusty mines is justified unless a sufficient and effectual means of watering the dust be systematically carried out.

The formation of the dust and the proper treatment of it was also considered. To prevent the formation of dust, cars which are dust-tight should be used. Overloading the cars is also a great source of this evil.

The removal of the dust was advocated by various witnesses, although nearly all agreed that this is not an effectual remedy.

The best way of dealing with the dust is to water and thoroughly wet it. Of the various methods of watering mines, the following are the most important:—

1. Watering by means of cars.
2. Watering by means of pipes laid in main haulage and air roads.
3. Watering by the spray system.

By the first method there is the disadvantage of a possible interruption in the coal traffic, and the necessity of maintaining a car track in the return air roads. There is also an item of expense in conveying the water car about the workings. The most approved form of water car is one with a centrifugal sprayer on the end of the car, which is made to revolve when the car is in motion by an arrangement of gearing attached to the wheels of the car.

The method of watering by pipes laid along the roadside has the advantage of a good pressure if laid in connection with surface water, and saves the need of maintaining car tracks in return airways, by having valves placed at convenient points along the pipe tracks, to which a flexible hose can be attached for the purpose of laying the dust. It will also supply a means of extinguishing any fire which may occur. The disadvantages are:—

1. Heavy cost for pipes.
2. Danger of the pipes being broken by fall of roof and sides.

The spray system is similar to the preceding, except that the water issues from the pipes in jets under a pressure sufficiently great to secure a thorough division of the water. In the intake and the return airways the sprays are kept going continually, but in the working places, where thorough saturation of the air would render it unpleasant for the men to work, the sprays are turned on for a few hours at a time.

### Summary.

The abolition of powder would give greater security.

*Ventilation.*—The ventilation is thoroughly adequate in quantity, 80,000 c. f. passing in No. 2 Mine and 30,360 c. f. per minute passing in No. 3 Mine; total quantity 110,360 c. f. passing per minute for 150 men and 21 horses, and the old waste workings, with a water gauge of  $\frac{1}{4}$  inches. This was well kept up to working faces, in compliance with "Coal Mines Regulation Act."

Too much ventilation in dry and dusty mines is also a danger. The velocity of air going into No. 2 Mine is 1,600 feet per minute, or about 18 miles per hour. This is a high velocity, and would be safer if reduced one-half—about 9 miles an hour,—a more general velocity, by having more intakes.

An improved and more safe method of ventilation would be in *District No. 1*, with two splits splitting at foot of Incline, the Incline split returning as it is, and the other split from foot of Incline to face of South Entry, to return back along counter, joining split in return from District No. 2, and from there to fan. *District No. 3* ought to be ventilated from Beaver's Slope by south split into Alder's Level, and along all the working places there, passing through Old Workings, crossing over air crossing in Beaver's Slope (thereby doing away with doors on that Slope) into Hunter's Level, joining other north split from Beaver's Slope *via* Hunter's Level in Hunter's Level, and from thence to fan, making altogether five splits instead of three, as at present in No. 2 Mine.

No. 3 Mine, north and south sides, should have three distinct and separate splits in place of one, as at present, splitting at first north and south entries for these areas, and the other split to slope with air crossing, across first south entries for slope return to fan, and other air crossing over Main Slope at extreme rise place on north side for return to fan, also making altogether three splits in place of one.

By this method gas is always returned from last working places through old workings or return airway to fan, in place of being carried throughout the working areas as it was being done before the explosion in District No. 3, in No. 2 Mine and in north and south sides of No. 3 Mine. In the latter case this was a breach of the "Coal Mines Regulation Act," General Rule No. 8, which is intended to abolish such practices as a strong blower of gas at

neck or entrance to No. 1 Room, off 1st North Entry, the gas from which traverses through Nos. 1 and 2 North and 2 and 1 South Entries before going into the return.

In the case of McDonald's Level, in place of getting the air after going through Beaver's Slope of small area, it got it last; practically from Old Workings between there and Main Entry, besides all the working places.

All these respective splits of course are subject to the necessary quantities passing through them, being controlled by regulators in their returns respectively. The ventilating of old workings to keep them clear of gas is a good method.

*Coke.*—The coke formed in the workings was chiefly caused by the explosion.

*Dust.*—The dust was no doubt due to accumulation on main haulage and other ways, to some extent through high velocities, and also to a very great extent from the cars not being dust tight. Other accumulations at the working faces due to the ordinary course of working, such as mining, blasting and loading. The dust was loaded out (which is not an effective remedy) to some extent, particularly from the main haulage and other roads, and also from the sections in which the machines were working between 11 p. m. and 7 a. m., and on idle days.

Mr. Archibald Dick, Government Inspector, Report of October 11th, 1902, says:—"Coal Creek Mines, which at one time were very dry, are now damp in all the parts of the mine, and some places very wet." And from the same gentleman's Report of November 14th, 1902, he says:—"Mines used to be dry and had to be sprinkled, but now they are wet and attend to the dust themselves."

This dust, to some extent, augmented and intensified the explosion, it being very pronounced in Room No. 7 off McDonald's Level. To eliminate this dust adequately, the use of dust-tight cars would greatly minimise it, supplemented by thorough watering, which prevents the settling of dust upon walls and timbering, which if once allowed to accumulate there renders watering of roadways alone of but little effect.

*Watering.*—We have the evidence at inquest in Fernie of one of the shotlighters, Michael Finnan, in the Machine Section (who worked under my management in Scotland), who said that before firing shots and after making his inspection for gas, he watered the mining floor and sides (but not the roof) for a distance from the face of about 12 feet (and had plenty of water), instead of 20 yards as the Act demands. The watering he did with powder kegs, so that probably this partial watering of floor and sides only (not roof or timber) may have been the cause of coal fires, but certainly not the cause of the explosion. This mode of watering the dust, as usually practiced at the faces, did not thoroughly wet it, and certainly was inadequate.

The best and most important way of dealing with dust is to water and thoroughly wet it by means of the spray system, with pipes laid in main haulage and airways. This method has the advantage of a good pressure, if laid so in connection with surface water, and saves the need of maintaining car tracks in return airways, by having valves or cocks placed at convenient points along the pipe tracks, to which a flexible hose can be attached, with a sprinkler or sprayer thereon, for the purpose of laying the dust, through the water issuing from the hose in jets under a pressure sufficiently great to secure a thorough division of the water.

This arrangement would supply a means of extinguishing any fire which might occur.

In the intake and the return airways the sprays should be kept going continually, but in the working places, where thorough saturation of the air would render it unpleasant for the men to work, the sprays should be turned on for a few hours at a time.

The Crewe Coal and Iron Company, Limited, Madeley, North Staffordshire, in their collieries, which I visited about twenty-six years ago, had a system of watering the dust from cars with coarse rock salt which was very effectual, being a good equivalent. At that time Mr. Miles Settle, Managing Director, invented a water cartridge for safe blasting in fiery mines, which gave good results.

On October 12th, 1877, at about 8 a. m., a severe explosion occurred in a very dry and dusty mine at Blantyre, Scotland, owned and worked by William Dixon, Limited, whereby over 213 lives were lost, caused by a leakage of gas coming from an accumulation in waste workings on to main haulage road and being ignited by an open light there; the explosion, which was intensified by the presence of the dust, was carried through the whole mine. Scotch gauze lamps were in use there, but afterwards abolished as being unsafe.

Ten years later Udston Colliery, Scotland, immediately to the rise of Blantyre, the same seam, splint coal for blast furnace purposes, exploded on May 28th, 1887, at 9:30 a. m.; also a very dry and dusty mine—in fact I never saw a drier, before or after—whereby 73 lives were lost, caused by a blown-out shot in one of the extreme rise rooms of the workings.

A Government Commission of Inquiry was held, composed of Joseph Dickenson, H. M. Chief Inspector of Mines, and a very popular advocate from the Edinburgh Supreme Courts.

I was one of the chief explorers at both of these accidents and was one of those selected along with Mr. Dickenson and his colleague, the late Mr. Ralph Moore, H. M. Inspector of Mines for the district.

At Udston a system of watering, such as suggested for Fernie, has been in use since 1887, with no explosions since its introduction.

*Blasting.*—The usual grade of black blasting powder was in general use where the workings were not wet, and where the working places were wet dynamite or giant powder was used.

Dynamite, like other explosives of the nitro-glycerine class, such as blasting gelatine and carbonite, the products of combustion, is inflammable and dangerous.

A better and safer explosive would be one used with water or other contrivance, so as to prevent it from inflaming gas or dust, or of such a nature that it cannot inflame gas or dust, such as the Miles Settle or similar cartridge or permitted explosives.

There are well-known brands of explosives whose chemical composition is comparatively reassuring and whose character and references from employees seemed generally satisfactory.

From the nature of this seam, blasting could be abolished altogether in the coal, by adopting machines for shearing the coal as well as mining it, and for stone work permitted explosives only should be used where the minimum number of men are in the mine.

For further information on this subject I could not do better than refer you to an article on mining explosives, written for *Mines and Minerals*, by James Tonge, Jr., F. G. S., M. I. M. E., Westhoughton, Lancashire, England, on page 538 of number for July, 1902.

*Safety lamps* in general use were the bonneted Clanny, giving an illuminating power of 0.20 sperm candles, and in the lamp room where they are cleaned, trimmed and repaired they appear to be in the hands of competent persons, which is an absolute necessity.

There are a great many foreigners in these mines who seem to think that if they have a safety lamp in their hand everything is all right, whether they understand it or not. In this much danger lies, but this may be overcome soon.

In fiery and dusty mines so long as we have employed those workmen who do not seem to realise the responsibility of practising or adopting at all times extreme carefulness in handling even the best and most modern safety lamps, besides abolishing the practice of having matches, or pipes and tobacco in their possession, whereby they frequently risk lives by the exposing of open lights for smoking or other purposes, and which practices are very dangerous when executed in explosive mixtures, we will always have the danger of explosions occurring and recording disastrous events.

The Wolf lamp is the latest, most modern and best made. It is practically self-lighting without exposing the light. It gives the maximum light, 0.90 sperm candles (Clanny 0.20 c. p.); is securely locked and can only be unlocked by a powerful magnet. It is in use at the Company's Morrissey Colliery and various other collieries in Britain and America.

I have examined thoroughly the construction and principle of the Wolf lamp and have pleasure in saying that a better and safer lamp is not in the market, and would advise and recommend the general adoption of the Wolf safety lamp throughout all fiery and dusty mines.

#### REPORTS OF INSPECTIONS OF MINES BY WORKMEN, STATUTE OFFICIALS AND INSPECTORS OF MINES.

1. Inspection of Mines Nos. 2, 3, and No. 1 Mine, were made by workmen on behalf of themselves on May 7th and 8th respectively, and a report of same entered in book at mines, kept for the purpose. The only exceptions taken in No. 2 and No. 3 Mines were excessive want of timber in District in No. 2, at the same time stating that they "found them clear of all gases and in good condition."

In No. 1 Mine they reported "all roads, working places and airways, in seams now working, also all old workings in said seams, and found them free of gas and in good condition, excepting three bad portions of roof in 13 places visited (three loose places only seen). No complaints as to ventilation. We find everything in very good condition, but suggest cleaning of man holes on motor road."

2. Then we have the usual inspections for the Company by firemen and overmen, reporting more or less gas throughout the mines, and frequently in District No. 2, in McDonald's Level

and adjoining places, and also the spotlights occasionally reporting missed shots, mostly in District No. 1, all of which reports were entered in a book kept at the mine for the purpose.

3. Besides the preceding reports we have frequent and thorough inspections of all the working places, old workings, haulage ways, and the intake and return airways, as to gas, ventilating, fan, dust, watering, blasting, safety lamps and timbering by the Government Inspectors of Mines, Messrs. James McGregor and Archibald Dick.

Taking these inspections in this order—

1. We have no report from the workmen as to any impalpable dust in the ventilation or at the working faces as to Special Rule No. 52, as to "impurity in the air of the mine" nor as to lighting the gas blower from bore-hole in No. 3 Mine, which is a dangerous practice, and which was frequently done sometimes for the purpose of warming the workmen, in breach of Special Rule No. 54. The common but highly dangerous practice among the miners of testing the quantity of fire-damp escaping from a "blower" by igniting it with their lamps, is peremptorily prohibited.

As to want of timber, in Inspector Dick's Report of November, 15th, 1901, he says:—"The men are all instructed that if at any time they should be short of timber and the roof bad, they must leave the face until it is made secure. This was additional warning to the following Special Rule No. 5, which they to some extent, if not altogether, neglected to observe: "If from accident or any other cause miners are at any time unable to find a sufficient supply of prop wood, at the place appointed, when it is unsafe to continue their work without it, they are expressly forbidden to remain at their working places."

The workmen in general, also, more or less failed to observe Special Rules Nos. 62 and 75 as to dangerous places, and as to smoking and matches. "If, in proceeding to their working places, or in travelling along any formed road or other part of the works (the maintenance of which, under these Regulations, devolves on the owner or manager), miners or other workmen shall meet with or see any fall from the roofs, or shall observe any dangerous place in the roofs, walls or elsewhere in their progress, they shall not pass the same, but shall instantly report the occurrence to the manager or roadman, or other person known to have the maintenance of such places under his charge; and miners or other workmen shall not return past the fall or dangerous place until the same shall have been made secure, which it shall be imperative on the manager, overman or other person having the charge forthwith to do."

Special Rule No. 75.—"Wherever explosive gas is known to exist, and safety lamps are used, no person shall be allowed to smoke tobacco in such part of the mine, or to have in his possession any lucifer match or other material intended for lighting tobacco."

2. The daily reports by firemen and overmen are nearly as complete as practicable with, I might say, one exception, viz. that of not thoroughly recognising the importance of recording in Report Book the withdrawal of workmen in any occasion whatever.

The overmen and firemen were certificated and competent officials.

3. The various and frequent inspections reported to the Government by their Inspectors, Messrs. James McGregor and Archibald Dick, from November 9th, 1898, up to date of explosion, May 22nd, 1902, show the history of these mines very clearly.

These inspections, general and special, were made by specific instructions from the Hon. the Minister of Mines, in order to have the provisions of the Coal Mines Regulation Act and Special Rules pertaining thereto clearly and safely carried out.

More thorough inspections beyond examining all the accessible parts of a mine and the surface arrangements, such as boilers, ventilating fans, and engines, haulage, electric and air compressing plants, workshops, stables, offices, lamp and wash houses, cannot be had.

Such inspections were generally made by Messrs. McGregor and Dick, and specially by Mr. Dick, and show a marked and gradual improvement in these mines, by way of discipline, bratticing, ventilating and blasting, towards safety.

This is no doubt attributable to the Company's acquiescence and the unflagging vigilance of the Department of Mines, Victoria, B. C., whose Minister was extremely desirous that the provisions of the Act should be carried out to the fullest extent, so as to render the mines as safe as possible.

There is still room for improvement by Company, as previously referred to in ventilation, haulage, watering of dust and blasting, and safety lamps and discipline, but I do not see where there could be any improvement on the inspections made by the Government Inspector of Mines, and particularly those inspections of old workings for accumulations of gas therein.

He found, mostly on every occasion, these areas, with only a few exceptions, free from gas, which was due to their being ventilated, which is a good and safe method.

The Company no doubt improved matters through the vigilance of the Government Inspector. Two of these were marked, viz.: Installations of new Capell Ventilating Fan with new engine complete, and compressing plant for the substituting of air for steam underground.

On behalf of the Company, I cannot do better than quote Inspector Dick, from his report of November 15th, 1901: "With the usual good management which is now being carried out, as well as the great care being used by the workmen, I think we should be free from any serious calamity."

Sub-section (2) of section 69 of the "Coal Mines Regulation Act," and section 3 of chapter 47, 1899, the Act amending the same, gives the Inspector full power to deal with any person who, in his opinion, is not able to read or does not understand the Special Rules made under authority of the "Coal Mines Regulation Act." I have not dealt with this provision, as the cause of the accident was not contributed to by it in any way.

This is a provision of the Act which requires attention generally throughout the mines, and might be met by posting up Act, General and Special Rules, in the language of one or more nationalities.

This is now to some extent covered by Part IV. of the "Coal Mines Regulation Act," in Examination (*see* page 1,518, "Examination of Coal Miners, Firebosses, Overmen and Shot-lighters").

*Explosive Condition of Mines.*—This was contributed to in a marked degree by the ventilation in District No. 2 traversing from Main Entry through old workings to the working places in McDonald's Level, Beaver's Slope and Beaver's Level, in place of going direct from Main Entry down Beaver's Slope, splitting to north side Beaver's Level, east and south to Beaver's Slope and McDonald's Level, returning in both cases through old workings to fan.

The impalpable dust at working faces, and not so much on haulage roads as the return airways, also contributed to this condition to a more moderate degree than the ventilation.

All return air from old workings should not pass working faces.

The sudden cause of explosive condition would be chiefly contributed by striking or exposing blower of gas near face of McDonald's Level.

*Course and Direction of Explosive Blasts.*—The direction and course of blasts were followed by the evidences of coke and dust deposits, displacement of bratticing and timber, shattering and blowing out doors, stoppings and air crossings, derailing and overturning cars, mining machines, position of bodies, etc., and very distinctly in locations where the respective recoils occurred. The course and direction of these blasts were very carefully examined.

*Location and Cause of Explosion.*—The local indications in McDonald's Level in District No. 2 were distinctly clear from the evidences of force from, at or near the face of that level; and the cause through a flame firing or exploding the explosive mixture in that location, formed, no doubt, by the presence of the blower of gas near face, the flame causing the explosion being either from miner James Muir's safety lamp in some way, or more probable from another miner who had matches in his possession, by his either striking a match or drawing the flame of his safety lamp through the gauze for a smoke.

#### CONCLUDING REMARKS WITH SUGGESTIONS.

*No. 1 Mine.*—In concluding, permit me to say that in visiting No. 1 Mine, while the explorers or rescue parties were clearing gas out of High Level or Line in No. 1 District, and part of No. 2 District, I took very careful observations as to mode of working and haulage in the Company's new Slope, named Williams' Slope, marked "A" on No. 1 Map.

While in this Slope a flash of flame occurred on face of upper portion of coal near roof, which, at a distance, resembled a shot, but there was no powder used in this section. I found one man at face with the light of lamp burning, but his partner had his light out. His partner's lamp was the lamp probably that caused the explosion. On coming back to cross-cut off Slope, which was distant from Slope face about 200 feet, I could not get into cross-cut for gas, and the two men who worked in cross-cut, along with man from Slope, had all their lights out. They were foreigners, and appeared to be attempting to open their lamps, particularly the man from Slope. Probably they re-lighted their lamps at cross-cut, but surely they would never risk such a thing here in face of Slope, being down from Motor Level about 400 feet without a pillar being turned for a return airway, in such a section as this, which gives off gas



very freely. Williams is the contractor for this Slope, and although we were accompanied by the fireman, Powell, I am afraid Williams acts as deputy fireman in Powell's absence, and being the contractor perhaps neglects safety for finance. If he at all acts as fireman while contractor he does not carry out the provisions of the Coal Mines Regulation Act and special rules thereto.

A dangerous practice exists in this mine on Haulage Motor Road, by working motor in the return airway from old workings to the dip and east of motor. The air ought to enter that area at the north end of Motor Road and return from south end by an air crossing over Motor Road direct to old workings and to fan taking off doors on Motor Road, which are undesirable.

Similar ought to be done with Williams' Slope by the air entering slope off Motor Road and returning by counter on south side of slope by air crossing over Motor Road to old workings and thence to fan.

The east and west districts are ventilated by a split each, and by the introduction of these other two splits which are absolutely necessary for the safety of the mine, proper ventilation would be secured.

When visiting a few working places at part marked "B," on Map No. 1, an impalpable dust prevailed in these places in suspension in the air in the ordinary working.

The rooms here were being driven too wide and pillars too small, with the result that too much timbering was necessary and the timber was not strong enough; these workings showed signs of creep. I presume the air hoists for letting down output is to avoid double track by gravity because of avoiding the heavy maintenance in keeping and supporting a double track.

This system of wide rooms and small pillars does not only exist at these mines but I regret to say that it is very glaring throughout the State of Washington, U.S.A., and the Province of British Columbia, for the purpose of rushing a large output at the risk of losing the mine altogether.

*Nos. 2 and 3 Mines.*—The suggestions I referred to previously in ventilation, haulage, watering of dust, with dust-tight cars, blasting and safety lamps, are imperative, and ought to be adopted for the safety of the mines. Good discipline, which seems to be generally lax in all the mines more or less, and more particularly by the foreign workmen, whose interpretation of instructions from the Statute Officials is far from what it ought to be. Dangers in many ways arise through this difficulty of imparting instructions to workmen, and can be improved upon by the Inspector of Mines, who is empowered by the Act, in section 69, sub-section (2), as to "any person unable to clearly understand instructions conveyed to him."

There can be no doubt as to the explosive condition in McDonald's Level, where the explosion occurred, and would have happened there, but probably would not have gone throughout the whole mine had the best system of watering been adopted, or other treatment equivalent to watering, in all parts where dust is lodged, whether on roof, floor, sides or timbers, and if the other feeders of gas had been absent.

The blast traversed the return airways as well as the intakes, doing as much, if not more, havoc in the working places and return airways than in the intakes and haulage ways. On some of the haulage ways the havoc was moderate, excepting the air crossings, proving that it was not a dry and dusty mine throughout; whereas, in the accident which occurred last year at the Universal Mine in Wales, with an almost equal loss of life, according to a report to the Home Office on this explosion, Professor Galloway, who is one of our greatest authorities of the day on explosions, says:—"The Union Pit was a new one, the colliery was well laid out, the ventilation good, and the engines and equipment generally were of a first-class description. The system of watering was probably superior to that to be found in many mines. Pipes were laid along the main haulage roads for an aggregate distance of 1,450 yards at each side of the shaft, in which water-cocks were inserted every 40 yards, from which roads were sprayed by means of hoses. In spite of these appliances, it is generally agreed that the whole of the workings at the Universal were dry and dusty when the explosion occurred."

On an exhaustive examination of the workings, two circumstances are clear—first, that the explosion followed the course of the intake workings used for haulage, where there was dust and no fireclamp, scarcely touching the return airways; and, second, that the explosion failed to affect those parts of the workings which were permanently wet from natural causes.

The use of dust-tight cars would greatly minimise it, and, supplemented by thorough watering, would no doubt be adequate. As the result of long experience in the South Wales Collieries, that thorough watering suffices to prevent the settling of the dust upon walls, roof

---

and timbering, which if once allowed to accumulate there renders watering of the roadways alone of but little effect, as the present case shows. The main difficulty lies in insuring that the wetting is done regularly, though a more systematic inspection for dust on the roof and sides of the workings might correct slackness in this regard. If it were generally recognised by the miners themselves that the real danger of explosion, at any rate on a large scale, is due to dust, and not to firedamp, greater progress would be made towards the fulfilment of the hope that, with a better understanding of their cause, great colliery explosions will soon disappear from the record of disastrous events.

Verdict of jury is not consistent with our location and cause of explosion, as given in our evidence at the inquest at Fernie.

While making our examination, I cannot conclude without heartily thanking the Provincial Mineralogist, William F. Robertson; and also the Crow's Nest Pass Coal Co., Ltd.; Elias Rogers, of Toronto, their Managing Director; John H. Tonkin, General Manager; T. R. Stockett, General Superintendent; and R. G. Drinnan, Certificated Manager; besides the overmen, firemen and rescue parties for the kind courtesy shown, the many facilities willingly given, and also much information, to my colleague, F. H. Shepherd, and myself.

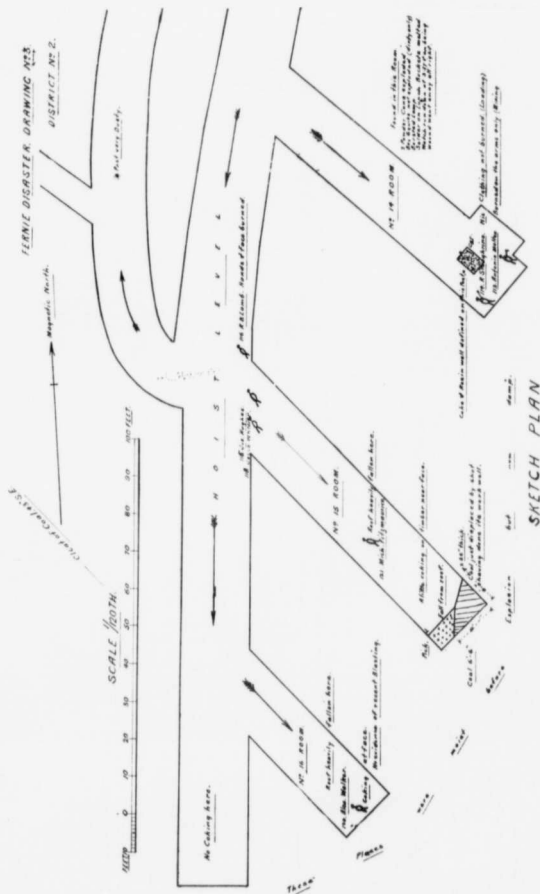
I have, etc.,

ALEXANDER FAULDS,

*Civil and Mining Engineer, Certificated Colliery Manager,*

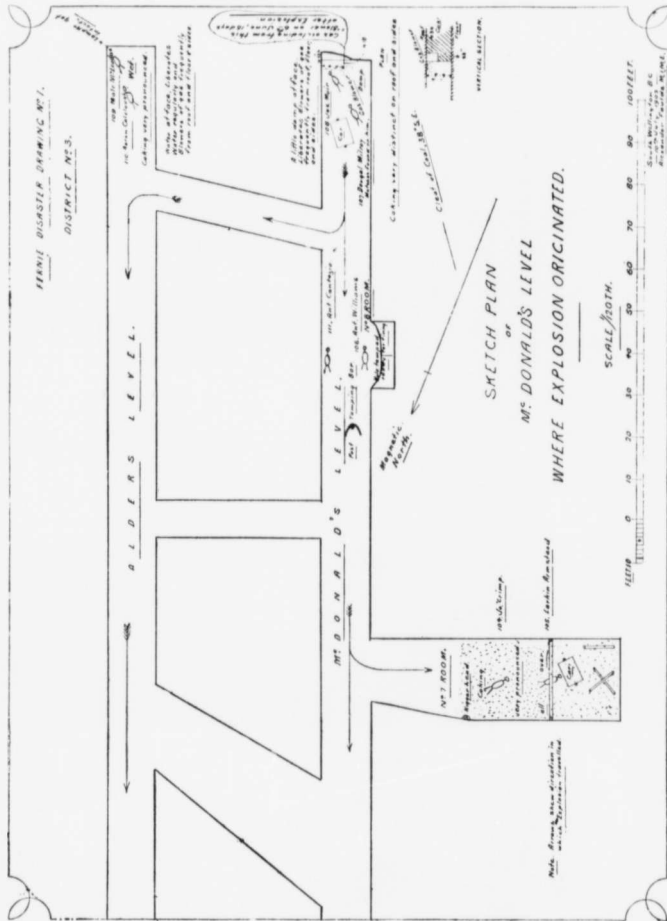
*Member of Mining Institute of Scotland,*

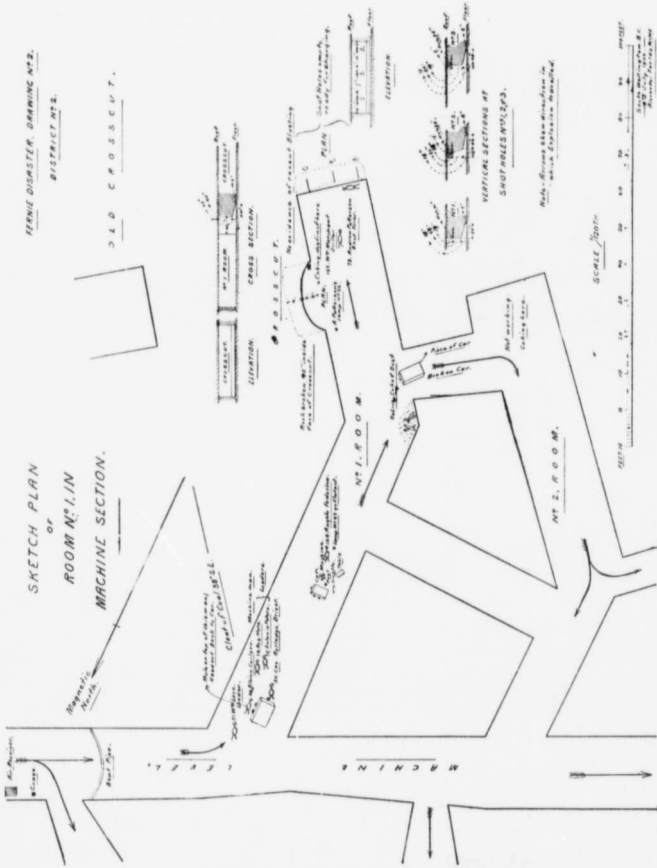
*Member of Federated Institute of Mining Engineers, Newcastle-on-Tyne, England.*



NOTE: Rooms are indicated in sketch with explosion direction.

Scale: 1/1000  
 Author: J. H. B. B. B.





FERNIE DISTRICT, DARRINGTON DISTRICT

SKETCH PLAN OF ROOM NO. 1 IN MACHINE SECTION.

340 CROSS CUT.

MACHINE

MT. 1. ROOM

MT. 2. ROOM

SCALE 1/320th

Note: Rooms show direction in which explosion traveled.

## FERNIE DISASTER, DRAWING NO. 9.

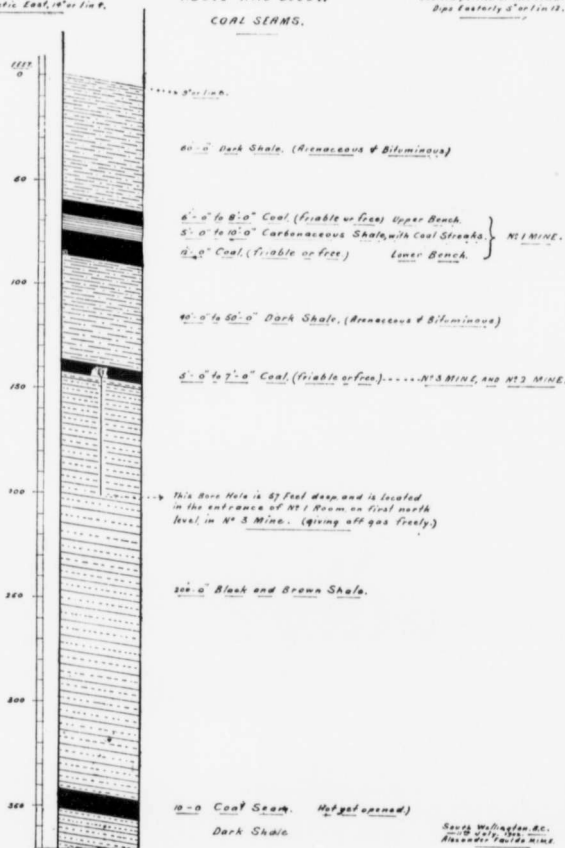
## VERTICAL SECTION OF STRATA

ALL THE DISTRICTS.

ABOVE AND BELOW

Eastern portion of this Field.  
Dips eastward 5° or less.

COAL SEAMS.

Western portion of this Field.  
Dips Magnetic East, 10° or less.

VICTORIA B. C.:

Printed by RICHARD WOLFENDEK, Printer to the King's Most Excellent Majesty.

1902.

