



# Report

**Eureka Mine**

EXPLOSION AT EUREKA MINE No. 37-C'

of the

BERWIND WHITE COAL MINING COMPANY

WINDBER, CAMBRIA COUNTY, PENNSYLVANIA.

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On April 9th, 1909, at 7:00 p.m., an explosion occurred at Eureka Mine No. 37-C' of the Berwind White Coal Mining Company, by which seven men were killed.

LOCATION OF MINE:

The mine is about 7 miles southeast of Johnstown and about 2 miles northwest of Windber, in Cambria County, Pennsylvania.

GEOLOGICAL AND GENERAL FEATURES:

The mine in question is developed on the Upper Kittanning or C' Seam. The Middle Kittanning Seam, about 60 feet below, is also developed by a mine known as Eureka No. 37-B. Both mines are drift mines, and the coal is hauled by electric tram about half a mile to the same tipple. The C' mine is dry; what little water it naturally makes is drained through drill holes which have been drilled down to the B mine.

#### THICKNESS AND CHARACTER OF SEAM:

The C' Seam in Mine 37-C' is 4 feet 6 inches to 5 feet 6 inches in thickness. The top portion, 1 foot 4 inches thick, is bony and is said to be rejected in loading. In the entries it is taken down but in the rooms, as a rule it is left up. The main roof consists of about 4 feet of slate or shale, above which there is said to be strong sandstone or sand shale 30 or more feet thick. The general character of the roof is excellent and requires no timbering in the entries.

The seam runs nearly level within the confines of the mine. There are only slight undulations. The coal has no noticeable cleat so that no attention is paid to it in laying out the workings.

#### PLAN OF THE MINE:

The mine is opened on a three-entry system; a main haulage way and two aircourses, one on either side. These run southeast from the outcrop, about a quarter of a mile, then turn north and a fourth parallel entry has been added.

Seven pairs of side entries have been turned to the right off the main haulage entry. Practically no work has been done to the left of the latter road. From the first, second and third rights, rooms have been turned. The system is to drive each pair either to the outcrop or boundary of the panel as the case may be and then turn rooms at the inner end first, pulling pillars as soon as the rooms are up. That is, the work proceeds from the inbye end toward the main entry.

The fourth right entries turn off the main haulage entry about 1500 feet from the entrance to the mine and just inbye the turn in the main entry. This fourth right serves as a main haulage road for four pairs of headings which are turned off to the right, at an angle of about 70 degrees; so these headings run approximately southeast. No rooms are turned off them, nor will be until the headings have been driven long distances ahead.

#### EXTENT OF EXPLOSION:

The explosion was practically confined to the fourth main right entries which are 2200 feet long. In letters dated April 20th and 30th from Mr. Eugene A. Delaney, Chief Engineer, it is stated that "Mr. Hunter, the foreman, who was taking an anemometer reading at the time of the explosion, was then standing at the first manhole near the pit mouth -- about 45 feet from pit mouth. He was overturned at this point but uninjured." At the time of the explosion, there was a locomotive in the third right off main entry. The motorman remained with his locomotive and the spragger, son of the rock man who was killed, went to the main entry and advanced along it to the mouth of the fourth right. He found it was impossible to go into this on account of smoke and afterdamp.

Three miners were working in the second right heading about 1000 feet from the mouth when the explosion occurred. They started out and got onto the main fourth right and had gone about 200 feet toward the main entry when they were overcome by the afterdamp, and lay unconscious. They were rescued and revived by the rescuing party an hour and a half after the explosion occurred.

## CAUSE OF EXPLOSION:

In this case, there is practically no question as to the origin of the explosion. The roof was being shot down at the junction of the fourth right heading and the main fourth right aircourse for the purpose of putting in an overcast at this point.

The blast had been prepared by the rock boss, Mr. Gibson. The mine foreman states that he knew that 14 holes had been drilled so it is presumed that these had all been charged. It appears that on the previous night they had been blasting to prepare an overcast at the third right heading and the shots at this point had not been charged heavy enough to accomplish what was wanted. The rock boss was heard to remark that he was going to make a sure thing of the shots at the fourth right heading. It was not positively known how much dynamite he put into the 14 holes, except that at the inquest, it was stated that 46 sticks of dynamite were used in the shots, which would be equivalent to about 23 pounds. Mr. Delaney expressed the belief that more than this amount was used, although he bases it upon the results. The dynamite employed was 40 percent nitro-glycerin.

Gross sections of the area thrown down by the blast were made by Mr. Delaney and furnished to the writer. These indicate that a volume of roof material was thrown down that the writer estimates averaged 4.6 feet in thickness, 10.5 feet wide, and 44 feet long, which corresponds with a weight of from 150 to 170 tons of rock. This mass was thrown down by the simultaneous discharge of the 14 shots by means of electric battery in the hands of the rock boss himself. So large a mass of rock falling an average distance of 6 feet would cause a great concussion of the air by itself and

throw any loose coal dust into suspension.

The officials of the company believe that the results of the explosion were merely those due to a very great overcharge of the holes and do not consider that the coal dust played any appreciable part. I think, however, from the evidences which will be referred to later, that coal dust did play an important part in the explosion, although it must be conceded, from experiments <sup>subsequently</sup> made in the gas and dust gallery No. 1, that the coal dust from this mine is not a sensitive dust.

#### LOCATION OF BODIES:

From information gathered on the ground and from a map subsequently furnished by Mr. Delaney, the location of the bodies of the seven men who were killed was as follows: Myernak, Catopitz and Cawotz were found outbye the third right heading. William Gibson and Steve Nemis were found at the mouth of the third right heading behind some cars. Michael Gibson, rock boss, was found 250 feet outbye from the mouth of the fourth right heading. Custer was found about 25 feet further inbye than Gibson. All these men were found dead by the rescue party. The writer was informed that the bodies of the four latter showed signs of burning.

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#### TRIP OF INVESTIGATION.

The explosion was reported in the morning newspapers of April 10th. The writer called up the General Superintendent, Mr. W. R. Calverley, but he

reported that the bodies had all been recovered and the mine had been completely inspected and there was no fire. It was therefore not necessary to proceed with helmets. Arrangements were made with Mr. Calverley to make an examination of the mine immediately after the inspection of the State Inspectors. On April 13th, the writer, accompanied by Messrs. Rutledge, Wolflin and Morris left Pittsburgh, and reaching Windber at noon, went into the mine early in the afternoon. The following evidences were observed:

#### EVIDENCES OF EXPLOSION:

The absence of timbering along the entries prevented getting valuable evidence of fires and of heating by this usual means. No violence was observed until the fourth main right entry was entered. An overcast crosses the fourth main right, about 50 feet from the main haulage entry. This overcast was built with masonry. The floor of the overcast, which would be the roof of the fourth right entry, was made of pipe plastered with concrete. The concrete had been broken and blown away and some pipes had been bent upwards.

Opposite the first crosscut there were some dinner pails setting upright. These evidently belonged to the three men who had come out after the explosion and had been overcome at this point, but who were subsequently rescued. Opposite the second crosscut about 100 feet outbye, the second right heading, two cars were found. These were said to have been blown off the track, although they were not injured. They had been placed back on the track at the time of the inspection. They showed no signs of coking. From

the overcast near the mouth of the fourth main right inbye, there was much dry coal dust along the track. It was stated by the management that the roads had not appeared dusty before the explosion. The roads were ballasted with slack coal and when the explosion occurred, this was more or less blown into the air.

The first crosscut stopping inbye the second right heading was intact, but between this point and the face, all the stoppings were blown down except three. These stoppings were built of concrete, coal or slate being used instead of crushed stone; hence, they were light. The stoppings were from 6 to 9 inches thick. Some of these stoppings were blown toward the aircourse and others toward the entry. In a few cases, pieces were blown each way.

The second crosscut stopping inbye the second right was blown toward the aircourse, the pieces being thrown 20 to 30 feet.

About 100 feet outbye the third right, a pool of blood was noted. At this point, the body of one of a group of three men had been found with clothes blown more or less off the body.

A lamp was noted in a refuge hole close at hand. Just inbye this point, a bucket, with the cover gone but otherwise uninjured, was found.

Opposite the third right is a refuge hole which contained paper unburned, and on it was found after the explosion 50 sticks of dynamite untouched. Close by, there was found a dinner pail with cover off and bread in same.

In the curved crosscut leading into the third right heading, there were three cars which had been blown off the track. The bodies of William



Gibson and Steve Nemis were said to have been found between these cars and the rib, and they were said to have been burned. These cars had been partly filled with rock, shot down on the previous night in order to make the overcast near by this point. These two men had probably been loading the cars when the explosion occurred.

In the third right just inbye the cars, there had been a curtain across the road. This had been blown out.

The stopping in the first crosscut inbye the third right was blown toward the haulage entry.

The shattered wood box of the blasting battery was found on the haulage entry just inbye the corner of the crosscut.

A brass lamp was found in a refuge hole opposite the crosscut.

The body of the rock boss, Michael Gibson, was said to have been found about 90 feet inbye this crosscut. The mustache and eyebrows were burned. The skull was crushed.

The mechanism of the battery was found nearby this point.

Forty feet inbye, the body of the rock bosses' helper had been found with face toward the rib, and with mustache burned off and skull crushed. A pool of blood was noted at this point. It was opposite the second crosscut inbye the third right.

The stopping of the second crosscut had been blown partly toward the entry and partly toward the aircourse; more toward the latter. Behind the inbye corner of this crosscut, the first positive signs of caking were noticed, very fine and dry.

In the third crosscut behind the inner corner, there were indica-

tions of flaming. The stopping in this crosscut was intact.

At the mouth of the fourth right heading, the lead wires of the blasting batteries had been carried toward the face of the fourth main entry evidently by a piece of slate which the wire had doubled around. There are also three ties close to the rib and entangled in the wire which may or may not have been there previous to the explosion.

The stopping of the first crosscut inbye the fourth right heading had been blown toward the entry.

The stopping in the second and third crosscuts inbye the fourth right heading were intact.

The stoppings in the fourth and fifth and sixth crosscuts were blown toward the haulage entry.

The seventh and last crosscut was, of course, open.

Seven cars, which before the explosion were said to have been placed just inbye the fourth right heading, had been blown in toward the face, favored by a grade, and had run off the track about 400 feet from the fourth right, also about that distance from the face.

Inbye this trip, the trolley wire was down.

For a distance of about 200 feet back from the face, the track rails had been lifted by the force of the explosion, and the ties displaced.

A box opposite the last crosscut had been broken into splinters.

At the face of the entry, tests were made for gas with a Wolf safety lamp. No cap was found. The same was true in the face of the aircourse. A sample of the mine air was taken at the face which was 60 to 70 feet ahead of the last crosscut. This analysis shows only .03 percent of methane and .07 percent of carbon dioxide.

A sample taken in the main return of the mine showed .02 percent methane and .05 percent carbon dioxide. Except for the insignificant showing of methane, these samples showed nearly normal air.

In the aircourse from the last crosscut to the face, the track had been disturbed. A short piece of rail had been blown to the face and on it there was some coal dust. When examined under a microscope, the dust showed fused edges. It is a question if the flame actually reached the face, but the slightly caked dust may have been projected ahead. Mr. Delaney, Chief Engineer, in a letter written on April 30, 1909, states: "In cleaning up, our men found a can of powder at this point. The can was severely damaged and indented, but the powder was not exploded, so that the heat, I should say, was probably instantaneous and not sufficient to produce heat which would raise the powder to the igniting temperature."

COAL SAMPLE:

A full section sample of the face was made in the main fourth right. There were 17 inches of bone coal at the top, which was rejected. There were 54 inches of coal, clean except for a 3/4 inch black sulphur band 6 inches above the bottom. All of the 54 inches were included in the sample. The analysis of the coal as received is as follows:

Moisture	...	...	...	1.08
Volatile combustible	...	...	...	13.35
Fixed carbon	.	...	...	77.24
Ash	...	...	...	8.33
Total	.	...	...	100.00
Sulphur	.	...	...	1.88

A sample of fine coal dust was gathered from the overcast near the mouth of the main fourth right entry and beyond the point where it is probable that the flame from the explosion extended. This dust analyzed as received:

Moisture	...	...	...	2.13
Volatile combustible	...	...	...	12.70
Fixed carbon	.	...	...	75.79
Ash	...	...	...	9.38
Total				100.00
Sulphur	.	...	...	1.62

In the first case, the volatile combustible-fixed carbon ratio is as 14.74 to 85.26. In the case of the dust, this ratio is as 14.36 to 85.64. It is therefore evident that the float dust in this case is practically the same as the fresh coal at the face. It is also probable that the dust has such a low volatile combustible percentage that conditions would have to be very unusual to start an ignition and to continue propagation.

In this case, the mine was dry all the way to the mouth, and there was abundant coal dust along the roadways for a flame to feed upon. There was no apparent reason why the propagation should not continue to the mouth of the mine except, as the dust itself was not of a sensitive character.

#### COURSE OF EXPLOSION:

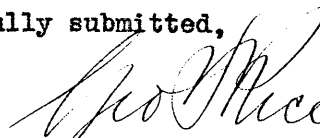
It is probable that when the shots to prepare the overcast were discharged by Gibson, the rock boss, there was an excess of energy and the dust used in ballasting the tracks, together with the lighter float dust along the ribs, was thrown into suspension and ignited by the flame of the dynamite. It is probable that the flame at once spread in three directions,

i.e., toward the face of the aircourse, outward, and to the main fourth right. The flame of the explosion traveling toward the face probably died away before reaching it, but blew some of the stoppings toward the entry. Almost at the same time, a flame ran up the parallel or main fourth right toward the face and blew some of the material from the stoppings back again toward the aircourse. The explosive wave going out the aircourse from the fourth right heading blew the stoppings toward the haulage road. The parallel wave in the haulage road or main fourth right threw parts of the stoppings back toward the aircourse, killed the seven men and burned at least four of them. It does not seem probable that the flame travelled more than 600 feet either way from the point of origin at the fourth right heading, and owing to the insensitiveness of the dust, the flame died away.

GENERAL CONDITION OF MINE:

With the exception of the presence of a very large amount of coal dust, which was used in ballasting the roads and was dry, the mine was in excellent shape and well administered. The management had felt that the dust was not explosive and had not considered that it was essential to systematically sprinkle or otherwise try to eliminate dry dust.

Respectfully submitted,

  
Mining Engineer.

Pittsburgh, Pa.,  
April 11, 1910.

DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

TECHNOLOGIC BRANCH.

REFER TO FILE NO.

E X P L O S I O N

at Eureka Mine No. 37-C

BERWIND-WHITE COAL MINING COMPANY,

Winber, Cambria County, Pennsylvania.

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Pittsburg, Pa., Apr. 15, 1909.  
Dr. J. A. Holmes, Expert in Charge,  
Washington, D.C.

My dear Dr. Holmes:

On April 9th, 1909, at 7mo'clock P.M., an explosion occurred at Eureka Mine No. 37-C of the Berwind-White Coal Mining Company. The location is about nine miles southeast of Johnstown. The developement is on the upper Kittanning or "C" seam. It is a comparatively new mine. It is a drift opening. The coal is hauled by electric tram about one-half mile to the same tippie on which the coal is loaded from the Eureka Mine in the middle Kittanning. The mine is also known as No. 37-B.

The "C" mine is dry. Holes drilled to the middle seam drain what little water is made. The mine is opened by a three entry system, two air courses and the main haulage way in the center. The main entries run north/<sup>east</sup> for a quarter mile, then turn due north.

Just beyond the turn the fourth entry starts and the fourth entries run northwest for a little over a quarter mile to the present terminus. The development is

## Winber Explosion #2

wholly on the east side of the mine. The system is to turn off side entries in pairs at intervals of 400 feet. After each pair of side entries has gone as far as the plan calls for, the rooms are turned, starting at the inner end of the entry, worked up their distance, leaving a barrier pillar of about 30 feet between them and the next pair of entries. There is no noticeable cleat in the coal. The seam runs quite level within the confines of the mine. The thickness is from 4 feet 6 inches to 5 feet 6 inches, and the top portion is one foot to one foot four inches thick and is rejected as it is bony. In the entries this is taken down, but in the rooms it is left up as a roof. The main roof consists of about four feet of strong slate or shale above which there is said to be a mass of sandstone 30 or more feet thick.

AREA OF EXPLOSION: The explosion was confined to the 4th right entries. These turn off the main haulage way 1500 feet from the entries. The main 4th right entry and air course are about 2200 feet long. Off these are turned four pairs of headings on the right side. The 1st right and 2nd right are in a considerable distance. They did not feel the effect of the explosion. The 3rd right and the 4th right and their air courses are each about 250 feet in length.

The explosion was practically confined to the two main right entries. The extreme limits of force were at the face on the one side and the mouth of the main entry on the other. A man stood near the overcast of

Winber Explosion #3

the main air course at the mouth of the main 4th right and was blown down, but was not injured; he was able to get up and go out. At the face of the main entries, some men were working who did not know until long after the explosion that anything had occurred.

Three miners, who had been working in the 2nd right entry were coming out after the explosion, but were overcome on the main 4th right at a point halfway between the 1st right and 2nd right. These men were saved by the rescue party.

CAUSE OF EXPLOSION: In this instance there is practically no question as to the origin of the explosion. The roof was being shot down at the junction of the 4th right and the main air course, preparatory to putting in an overcast over the 4th right. The blast had been prepared by the rock boss. The Mine Foreman knew that 14 holes had been drilled. It appears on the previous night, they had been blasting to prepare an overcast at the 3rd right entry and the shots had not accomplished their work. The rock boss was heard to say that he was going to make a sure thing of the shots at the 4th right. It is not known how much dynamite he put into the 14 holes. It is surmized that the <sup>holes were</sup> /charged heavily. Instead of relieving the main shots with preliminary ones, the whole 14 were discharged at once by means of an electric battery in the hands of the rock boss himself. The shots broke out about 4 feet of roof breaking up to the sandstone an area of about 30 feet long and 10 feet wide. The fall



Windber Explosion #4.

of this mass in itself must have set up a considerable wave of concussion, but there was, in addition, an overcharge of dynamite, the rock breaking short at either end and the flame travelling a considerable distance on either side of the center of the explosion.

EVIDENCES OBSERVED: Entering the main 4th right entry, the overcast across the mouth of same was slightly damaged. It was at or near this point that a man was blown down, but recovered himself. The bottom of the overcast was constructed with pipes covered with a cement plaster. The cement plaster had been blown upwards, leaving the pipes bare. A few of the pipes had also been sprung upwards.

From the overcast inward, there was a great deal of fine dust coating the roof ribs, as well as the floor and the entries. In some cases, the dust was heaped up over the rail. A sample of the fine float dust was gathered on the rails used as beams to support the walls of the overcast. This was submitted for analysis. The result will be given in a supplemental report.

At a bend, just outside of the first crosscut, three men were said to have been found alive by the rescue party. They had come out of the 2nd right entries after the explosion and had been overcome by the afterdamp. Their dinner pails were setting upright. Provided the afterdamp did not back up into the 2nd right, they were able to travel only 200 feet from the mouth of the 2nd right to the bend where they were overcome.

INVESTIGATION OF EUREKA MINE NO. 37 - C' AT WINDBER,  
PENNSYLVANIA. of the BERWIND WHITE COMPANY.

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The following party went to Windber, Pa., <sup>on April 13</sup> on an investigating trip in regard to an explosion which <sup>had</sup> occurred at the Eureka Mine No. 37-C', of the Berwind White Company, on <sup>the evening of</sup> April ~~13~~<sup>9</sup>, 1909:

G. S. Rice,  
J. J. Rutledge,  
W. W. Wolflin,  
F. F. Morris.

The party arrived at Windber shortly before noon <sup>and</sup> met Mr. Calverly, the superintendent of the Berwind White Company mines, located in this vicinity. After a short conversation with him in regard to the general nature of the explosion the party started for the mine with him and one of two others in authority to investigate the entries which had been affected by the explosion. ~~With the above named party were~~ Edward Jones, pit boss of Eureka Mine No. 37-C', D. G. Thomas, assistant general superintendent, and Charles Severn, second assistant general superintendent, constitut<sup>ed</sup>~~ing~~ the balance of the party which entered the mine.

The general lay-out of Eureka Mine No. 37-C' is as follows:  
Three entries used as mains, extending <sup>in</sup> ~~ing~~ to the hill, with side entries running off these at angles less than 90 degrees. At a point in the hill where the 4th set of these side entries turn off, the mains are turned at an angle of about 30 degrees.

There is no *face* or butt to the coal in this seam, and no particular attention has therefore been paid to the direction in which rooms are driven. At the point where the 4th set of side entries run off the mains another main entry starts, making 4 in all, two of these being air courses, the third, a *mainway*, and last a haul-way. It was <sup>in</sup> ~~the~~ the 4th set of these side entries that the explosion occurred. Off these side entries run also secondary side ~~entries~~. The system used by the engineers in naming these entries is as follows: First, Second, Third or Fourth, Rights off the Mains, in indicating the entries branching off the main entries; First, Second, etc. <sup>Rights or Lefts</sup> ~~entries~~ off the First, Second or Third Rights, <sup>or Lefts as the case may be,</sup> so that when a particular entry is described, it is somewhat as follows: Second Rights off the Third Rights, or Third Lefts off the Fifth Rights, etc. The entries in which the explosion occurred were then - the 4th Rights off the mains, and it was a shot <sup>for</sup> ~~off~~ an overcast at the 4th Rights off the 4th Rights which caused the explosion.

A barometer reading was taken at the pit mouth, showing 28.105 inches. The elevation given by the local engineers was 1817 feet above sea level at the pit mouth. Hygrometer reading of outside air as follows:

Wet Bulb, 35 degrees, F.,

Dry Bulb, 57 degrees, F.,

Relative Humidity, 88%.

A sample of air was taken about 50 feet in from the mouth on the return <sup>air</sup> (Sample Bottle No. 8856) *This sample was later analyzed at this station with results as follows:*

~~The party started into the mine at 2:10 P. M. going first~~

Hygrometer reading in pit mouth on the return air;

Wet Bulb, 47 degree, F.,

Dry Bulb, 48 degrees, F.,

Relative Humidity, 93%

~~The party started into the mine at 2:10 P. M. going first to this air course or intake~~

~~Anemometer reading, taken on main intake, about 300 feet from the fan, as follows:~~

Time

~~Revolutions~~  
per  
min

1. (by Rutledge)

60 seconds

550

30 "

330

60 "

620

2. (by Morris)

60 seconds

560

30 "

338

Average

60 seconds

533

Measurement of air way:

Height 6 ft. 10 inches,  
Breadth, 11 feet, 2 inches.

Section area, 76.3 square feet.

Air travel per minute through main intake, 40,670 cu. ft.

~~Air analysis, as follows:~~

The party then returned to the haulage-way, where <sup>a</sup> sample of dust was taken by Mr. Rice from both sides of an overcast crossing the 4th Right entry on the main intake (Can No. 2,003)

<sup>?</sup> Sample analyzed as follows:

.....

The party then advanced up the 4th Right entry near the face of which the explosion occurred. Three men had been found by the rescuers at the first cross-cut on the 4th Right off the mains. These men recovered, ~~but may die~~ <sup>and were all right by Sunday.</sup> A man was knocked

down by the force of the explosion at the overcast on the 4th Rights ~~off the~~ and mains; the assistant pit boss, standing near the pit mouth, was also knocked down.

Considerable dust was found along the 4th Right haulage way at the first man-hole above the first break-through from the mains. At this man-hole also some small indications of char were found along the rib and roof. Two cars were found off the track opposite the second break-through on the 4th Rights. A great deal of dust was found along the haulage-way near the Second Right ~~haulage-way~~ entries off the Fourth Rights, which was said to have been brought largely by the explosion. Three bodies were found at the intersection of the 4th Right haulage-way and the ~~xx~~ 2nd Rights off the 4th Right. Two of these were said to have been found close to the right rib between the track and the rib; the third just below the man-hole opposite the entry from the 2nd Rights. A pool of blood was found at ~~in~~ a point about 100 feet below the 3d Rights on the 4th Right ~~of~~ haulage-way near <sup>two</sup> ~~the~~ refuge holes. A lamp was found in the ~~haulage-way~~ refuge hole.

In the refuge hole opposite the 3rd Rights were found exploders in a box, untouched. The mine foreman claimed that 40 or 50 sticks of dynamite had laid undisturbed after the explosion on a piece of paper in ~~this~~ <sup>the</sup> refuge hole. At the time of the investigation by the Government engineers this dynamite had been removed, although the paper on which ~~that~~ <sup>it</sup> had laid remained untouched. An empty squib-box was also ~~found~~ <sup>found</sup> at this point battered and empty. Three cars were lying along the entry of the 3d Rights off the 4th Right haulage-way, The one nearest the haulage-way was turned up on its side, the next one was thrown off

the track; the third was still setting on the track. These cars had been used for removing slate from the overcast shot that had been fired on the 8th instant <sup>about 24 hours previous to the fatal shot.</sup> The bodies of the two men who had been engaged in loading slate on these cars were found between the right rib and the cars, one ~~xxxxxx~~ body opposite the second car ~~and~~, the other body opposite the third car. These bodies were found lying on their backs. Their eye-brows were said to have been burned and their hands blistered. Little indications could be found of any charred dust at this point.

Part of the battery box which had been used in firing the fatal charge was found at the first break-through above the 3d Rights. A broken Monongahela lamp was found by Mr. Rutledge on the left entry opposite this break-through. Ninety feet above this break-through was found ~~xxxxxx~~ the rest of the firing battery near another body which ~~had been found~~. This body was said to have been lying face down. The skull was crushed and <sup>che</sup> mustach and eyebrows burned. This man was the <sup>rock</sup> ~~pit~~-boss who had had charge of firing the fatal shot. About 35 feet above this point the body of his helper had been found. Another part of the battery was ~~xxxxxx~~ lying nearby, near the rib. This man had been found on his side, with face toward the rib. His cap was found within a few feet. His head was said to have been crushed and his face and hands burned. This body was opposite the second break-through by ~~the~~ ~~xxxx~~ 3d Rights.

Brattices in this mine ~~had been~~ <sup>are</sup> made of <sup>coal</sup> concrete, ~~xxxxxx~~ ~~using coal dust in place of sand~~. Stoppings were intended to be 6 inches thick, but were measured in one or two places seven and eight inches. All brattices on the 4th Right entries below the

outbye

second set of side entries were ~~found~~ <sup>intact</sup>. All brattices above the Second ~~side entries~~ <sup>Rights</sup> ~~were~~ off the 4th Rights ~~were~~ out except two, one being the first one ~~inside~~ <sup>off the 4th Rights</sup> of the Second ~~Rights side entries~~ <sup>off the 4th Rights</sup>, the other being the first one outside of the 4th Right ~~side entries~~. Some of the brattices which had been blown down were blown toward the air course, others were blown toward the haulage-way, while still others were scattered in both directions. The one at the second break ~~above~~ <sup>above</sup> the 3rd Rights <sup>off the 4th Rights</sup>, where the body of the firing boss's helper was found had been blown both ways.

At the third break <sup>above</sup> the 3rd Rights there were strong ~~indications~~ indications of flaming, both on the roof and the ribs; all such char being found on the inside rib of the break. Here too was found a great deal of dust along the entry; in fact, the dust off the haulage-way of the 4th Right Entry was exceptionally thick.

The lead wires of the battery were found at the intersection of the 4th Right haulage-way and the 4th Right side entries. Under a piece of slate about 18 inches in diameter and tangled up in three ties ~~it~~ <sup>It</sup> appeared that the piece of slate had been the propelling force in throwing the ~~wires~~ wires back the entry; and although the wires were more or less entangled with the ties the latter were almost ~~about~~ <sup>too</sup> uniformly placed to have indicated that they had been thrown by the explosion. The mine foreman ~~assured~~ <sup>assured</sup> the investigating party that everything had remained ~~untouched~~ <sup>untouched</sup> since the explosion.

Rutledge and Morris ~~inspected~~ inspected the shot for the

overcast which had caused the explosion. The shot had produced a smooth place at the top and of considerable length, estimated at about 50 feet. The mine foreman claimed that the ~~regular~~ rock had never broken to a level before as this one had, but ~~it~~ <sup>always hollowed</sup> had ~~hailed~~ out more. He also explained that the shot on the 8th instant for the overcast to the 3d Right side entries had not been as successful as the shot boss had desired, ~~it~~ <sup>not</sup> taking out as much slate as he wanted to at one ~~xxxx~~ shot. Consequently, he loaded the hole for the shot which proved disastrous heavier than he had ever ~~xxxx~~ loaded before.

Five cars were found, some 400 feet <sup>above</sup> ~~at~~ the 4th right side entries. These were badly wrecked. They were ~~said~~ <sup>in by</sup> to have been standing just above the 4th Rights ~~side entries~~ <sup>off the 4th Rights</sup> previous to the shot, and had been sent in to ~~this point~~ <sup>at</sup> this point ~~xxxx~~ not only by the force of the explosion, but by a favorable grade. Two more were found 15 feet further ~~out the entry~~ <sup>toward the face</sup>, one being turned over and the other setting right, but off the track. These cars were standing opposite the first cross-cut inside the 5th Rights.

About 150 feet from the face the track was found raised and ties thrown back along the rail, produced by the reaction ~~at~~ <sup>from</sup> the explosion. A tool box was in splinters at the last cross-cut.

A sample <sup>section the strata</sup> of coal <sup>of the 4th Right haulageway</sup> was taken from the face (Can No. 8005) <sup>of which</sup> Analysis <sup>as follows:</sup>

.....

Measurements of strata were also taken. The following are the sections:

40 ft. of grey slate <sup>roof</sup> (Figure given by Mr. Calverly)



17 in. of sulphury coal, or bone coal; *at top of seam*  
 4 ft. 6 in. of clean coal, which separates easily from  
 the bone coal;

Cement float.

Mr. Calverly explained <sup>that</sup> ~~that~~ the <sup>including</sup> whole section ~~including~~ the  
 bone coal <sup>is customarily</sup> ~~was~~ removed in the entries, but that only the 4-1/2  
 ft. in the lower part of the seam <sup>is</sup> ~~was~~ taken out in ~~rooms~~ the  
 rooms. The upper 17" in the entry ~~of the~~ work is used for  
 balasting track and as gob.

Readings were ~~taken~~ taken in the 4th Right haulage-way  
 at the last break: Time 4.45 P. M.

Hygrometer (by Rutledge)

Wet Bulb: 49-1/2 degrees, F.,

Dry Bulb: 51-1/2 degrees, F.,

Relative Humidity, 87 %.

(by Morris)

49° F

51 1/2° F

84

~~Barometer, 28.08 inches.~~

~~Anemometer (by Morris)~~

Hygrometer (by Morris)

Wet Bulb: 49 degrees, F.,

Dry Bulb: 51-1/2 degrees, F.,

~~Relative Humidity, 84 %.~~

Barometer, 28.08 ~~inches~~ inches

~~Anemometer~~ Anemometer: (by Morris)

Time	Revolutions
60	47
60	48
(by Rutledge) 60	60
60	60
<sup>Taken average</sup> 60	54

A sample of air was ~~taken~~ <sup>Taken average</sup> by Mr. Rice at the face of the \*

4th Right air course, about 60 ft. ahead of the air. (Bottle

No. 8857)  
Analysis as follows:

.....

No cap could be seen at this point on the Wolff lamp.

Mr. Rice in returning from the face checked over the condition of the break-throughs. The party were out of the pit at 6:10 P. M. <sup>P</sup> Mr. <sup>I</sup> Caverly joined the party when they arrived at the ~~third~~ <sup>3<sup>rd</sup></sup> Right ~~Entries~~ <sup>Rights</sup> off the 4th ~~right~~ <sup>right</sup> ~~haulage~~ way, and accompanied it during the balance of the trip.

Messrs. Rice, Rutledge, Wolflin and Morris returned to Johnstown in the evening and arrived at the Testing Station on the 14th instant at 10 o'clock.

Respectfully subkitted:

*F. F. Morris*

\* measurement of entry  
Height 5' 8"  
Breadth 16' 3"

Section area 92 1/4 sq ft.  
Air travelling in minute 4980



# Correspondence

GSR/ACS

40th & Butler Sts., Pittsburgh, Pa.

April 10, 1909.

Dr. J. A. Holmes, Expert in Charge,

Washington, D.C.

My dear Dr. Holmes:

In this morning's paper there was an account of an explosion at Mine No. 37 of the Berwind-White Coal Mining Co., at Winber, Pa, at 7 o'clock last night. Seven men were reported killed.

I called up the General Superintendent, Mr. W. R. Calverly, early this morning to inquire if we could render assistance. He stated that they had gotten out all the bodies by 4 or 5 o'clock and that the mine had been completely inspected so that there was no fire. The papers reported that the management had denied that it was a dust explosion, claiming that it was a dynamite explosion. I did not attempt to discuss this point with Mr. Calverly over the 'phone, but I inquired when the State Inspectors would investigate and he thought they might do so on Monday. I then asked him if we could make some investigations on Tuesday before they cleaned up, to which he assented. I will, therefore, go there, taking with me Rutledge, Wolflin and probably Morris.

Yours very truly,

  
Mining Engineer.

GSR/ACS

40th & Butler Sts., Pittsburgh, Pa.

April 14th, 1909.

Dr. J. A. Holmes, Expert in Charge,  
Washington, D.C.

My dear Dr. Holmes:

Early yesterday morning, Mr. Rutledge, Mr. Wolflin, Mr. Morris, and myself went to the No. 37, Berwind-White Mine to make examination there. Mr. Ramsay started with us, but receiving word that it was necessary for him to have his papers in by the 15th, I believe, and there having been some delay, I advised him to see at once about them and he therefore left us at Greensburg, expecting to join us later. However, we found the area covered by the explosion much smaller than anticipated, and having been assisted by Mr. Walter Calverly, General Manager, in every way in getting to the scene, we were able to finish by working late in the day. I will have a report prepared on same shortly.

Yours very truly,



Mining Engineer.

40th & Butler Sts., Pittsburgh, Pa.

April 16, 1909.

Mr. W. R. Calverley, Gen. Supt.,  
The Berwind-White Coal Mining Co.,  
Windber, Pa.

My dear Mr. Calverley:

In going over my notes of the explosion at Eureka Mine No. 37-C, I find there are a number of points about which I failed to make inquiry, and I will be very glad if you will be kind enough to let me know about them.

1st. What was the grade of dynamite, that is, the percentage of nitro-glycerine contained, that was the cause of the explosion?

2nd. Can you find out from the night foreman the total amount used in the fourteen holes?

3rd. If not asking too much, will you have cross sections taken of the area excavated by the shots in the roof, so that an estimate can be made of the number of cubic feet blown down, and a few sketches which would show the shape of the area? If this will be putting you to too much trouble, I will be glad to send an Engineer to make the measurements, but I thought that you might have them in connection with your own investigations.

4th: Regarding the men found dead, there is some discrepancy in the statements as taken down by several of

Mr. Calverley #2.

us. Will it be possible for your Engineer, Mr. Delaney, to send us a little sketch showing, on same scale as the mine map, the position of the bodies with reference to the cross cuts and entries, designating them by their last name. There are four positions which I think we have not right; namely, the rock boss and his assistant near the 2nd cross cut inside of the 3rd right entry and two more were found between cars in the rib near the mouth of the 3rd right. One hundred feet outside of the 3rd right, near the north rib where a lamp was found in a refuse hold, there was a place where, I understand, a body had been found, and I saw what I thought was a pool of blood. Mr. Morris said that he was told that no one was found there. He has record of three men just outside of the 2nd right. If this is correct, were these three men all working in the 2nd right; that is, immediately prior to the explosion? Were they bruised and were they burned? In other words, did they come out of the 2nd right after the explosion or prior to it?

5th. Regarding the three men who were recovered alive at the 1st crosscut inside of the mouth of the 4th right, what was their report as to the sound of the explosion? Did they have far to travel before they reached the 4th right? Did they see any flame in the distance before they were overcome? Finally, how long after the explosion before they were found?

6th: I understand that the assistant night boss was knocked down at the entrance of the mine. Is this the case?

Mr. Calverley      #3

7th:            Regarding the man who was knocked down near the mouth of the 4th right, how close was he to the over-cast which was slightly damaged?

                Regarding the proposed exhibit we will make for your men on some Saturday, I think it would be very desirable if you would send us some of the pure dust from the 4th right entry.      Mr. Hall suggests sending a couple of barrels so as to make very thorough tests.      I believe there has been no assignment made for May 1st, so if that will be very convenient for your plans, we will be very glad to have the exhibit made on that day.

                We will be pleased to test any explosives that you send, or any safety lamps that you bring.

                I enclose herewith sheet for filling in when you send in the coal dust.

                                Yours very truly,

                                Mining Engineer.

Encl.



EUREKA BITUMINOUS COAL.

BERWIND-WHITE COAL MINING COMPANY.

HILA--BETZ BUILDING.  
NEW YORK--1 BROADWAY.

WINDBER, PA., April 20, 1909

Mr. George S. Rice, M.E.,  
U.S.G.S., 40th & Butler Sts.,  
Pittsburg, Penn'a;

My dear Sir:

In reply to your inquiry of April 16th, please find herewith a sketch to scale showing dimensions of overcast, at 4th Right off 4th Right in our Eureka No. 37 C Prime Mine. Sketch is drawn to scale from dimensions gotten as closely as could be arrived at.

Please find also newspaper report of finding of the Coroner's inquest.

The grade of dynamite used in our mine work is what is known to the trade as 40% Dynamite.

The inquest brought out information leading to the belief that there were 46 sticks of dynamite used in shooting the overcast. This amount of explosive is probably not correct, because 46 sticks of dynamite would certainly not cause the results that proved so fatal on Good Friday night.

We have also prepared for you a print showing the location of the bodies as they were found; also showing where the three rescued men were taken from. These men walked from the point indicated in Second Right off 4th Right and arrived at 4th Right Heading when this heading was contaminated by the poisonous gas. The men themselves were not clear as to time,

location, and distance; but it is probable that they were taken from the mine  $1\frac{1}{2}$  hours after the explosion. You must not infer from this, of course, that they were in the gas for this length of time, because they were far in the Second Right and away from the immediate scene and zone of the explosion at the time of the explosion.

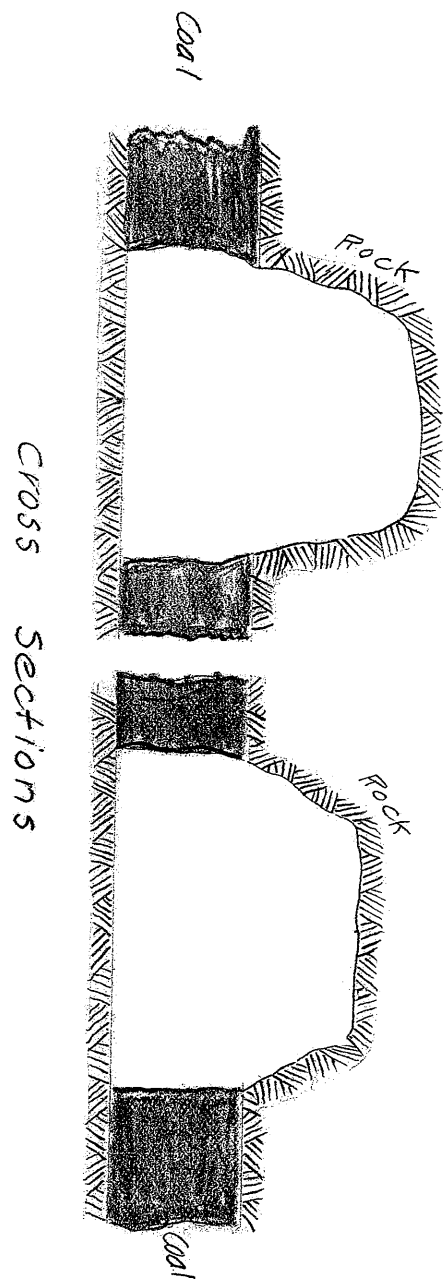
You ask regarding the man who was said to have fallen in the mouth of 4th Right Heading. We think you must be mistaken in this instance, and have probably confused the location of Mr. Hunter, the Foreman who was taking an anemometer reading at the time of the explosion, and who was then standing at the 1st Man Hole near the pit mouth--about 45 feet from the pit mouth and not near the mouth of No. 4 Right Heading.

There was a motor in the 3rd Right Heading off Main at the time of the explosion, and the spragger (another son of Mr. Gibson) went almost immediately to the mouth of 4th Right Heading where he discovered smoke and fumes but saw no indications of fire. From all the information that we can gather, we find no one who has seen fire. The persons of the men rescued alive from 4th Right, were not in any way damaged, neither by fire nor by any other force. The only detonation reported by survivors or witnesses seems to be described as a sudden rush of air in one direction, and then a return.

In reference to your proposed exhibit on some Saturday, I think Mr. Calverley will correspond with your Department. It is altogether likely that May 1st will be convenient, although I am not in a position to give you definite information.

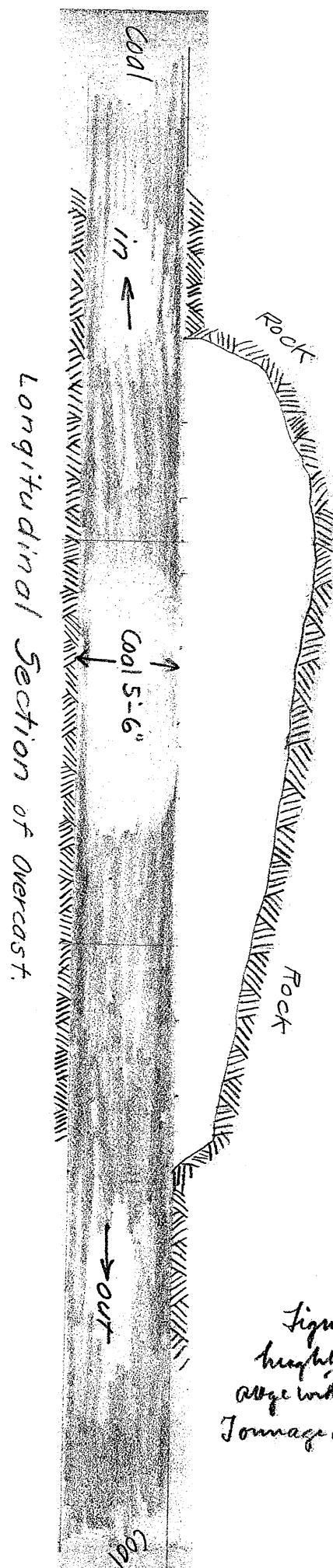
Yours truly,

*Ernest A. Delaney* Chief Eng'r



Scale  $\frac{1}{8}$ " = 1'

Berwind-White Coal Mining Co.  
 Windber, Pa.  
 Apr 20-1909.  
 Eureka #37-C  
 Overcast at \*4 ft off \*4 ft



Figures are  
 height 4.6  
 average width 10 or 15  
 Tonnage 150 to 168

40th & Butler Sts., Pittsburgh, Pa.

April 24, 1909.

Mr. Eugene E. Delaney, Chief Engr.,  
The Berwind-White Coal Mining Co.,  
Windber, Penna.

My dear Sir:-

I received your letter of April 20th about the points connected with the recent explosion at Eureka No. 37 C., Mine. The enclosed sketch and map is of greatest interest.

There is one point I am not at all clear about. You state "there was a motor in the third right heading off main at the time of explosion, the spragger went almost immediately to the mouth of the fourth right heading where he discovered smoke and fumes, but he saw no indications of fire." Presumably the motorman must have been in the third right. Did he go out? Second, the spragger was evidently inside of where William Gibson and Steve Nemis were found dead, as otherwise he would have been caught, and to go into the fourth right it would seem as if he must have passed through so much afterdamp that it hardly seems possible. Do you have any positive information that he actually went to the mouth of the fourth right? Unless he went by the main air course, in which quite probably was fresh air, I do not see how he got there. The two men found at the

Mr. Delaney. #2.

mouth of the third right were reported to be burned, so the flame would appear to have traveled this far at least.

Another point about which I would like to make inquiry is regarding Mr. Hunter. Was he knocked down by the explosion? Someone gave this information to Mr. Morris.

It may interest you to know that I examined under a microscope, some dust collected at the face of the fourth right main air course and it showed unmistakable signs of coking on the edges of the small particles; still, on the whole, there was nothing like the amount of ignition of dust that one would expect from the tremendous charge of dynamite that was fired.

There is still one more point that I should like to know. What is the weight of the dynamite sticks?

Very truly yours,



Mining Engineers.

P. S. Were the cross sections of the excavation in the roof for the overcast at the fourth right made from actual measurements so they can be relied on to figure the quantity and weight of rock displaced?

# BERWIND-WHITE COAL MINING COMPANY.

WILSON-BETZ BUILDING.  
NEW YORK--1 BROADWAY.

WINDBER, PA., April 30, 1909

Mr. Geo. S. Rice, M. E.,

United States Geological Survey,

40th & Butler Sts., Pittsburg, Penn'a;

My dear Sir:

I beg to say that this reply to your letter of the 24th instant has been unavoidably delayed.

You ask regarding the movements of the motorman and spragger who were in 3rd Right Heading off Main. As the result of the explosion, the power wire of course was grounded. In an instance of this kind it is customary for the motorman to remain with his locomotive and it is the spragger's duty to investigate with a view to finding the trouble. This is what was done in this particular instance. The motorman remained with his locomotive and the spragger, (one of the Gibson boys), went to the Main Heading and advanced along the Main to where 4th Right turns off the Main. It was at this point that the young man found it impossible to go into 4th Right Heading; thus he did not see any of the injured or dead men who were in the heading. The young man Gibson made a statement similar to this under oath. He, of course, traveled up the Main Heading, and not in the Air Course.

Mr. Hunter was overturned at the point which I indicated in my last letter to you.

Please note also that the weight of a stick of dynamite is approximately eight ounces. The dynamite as a commer-

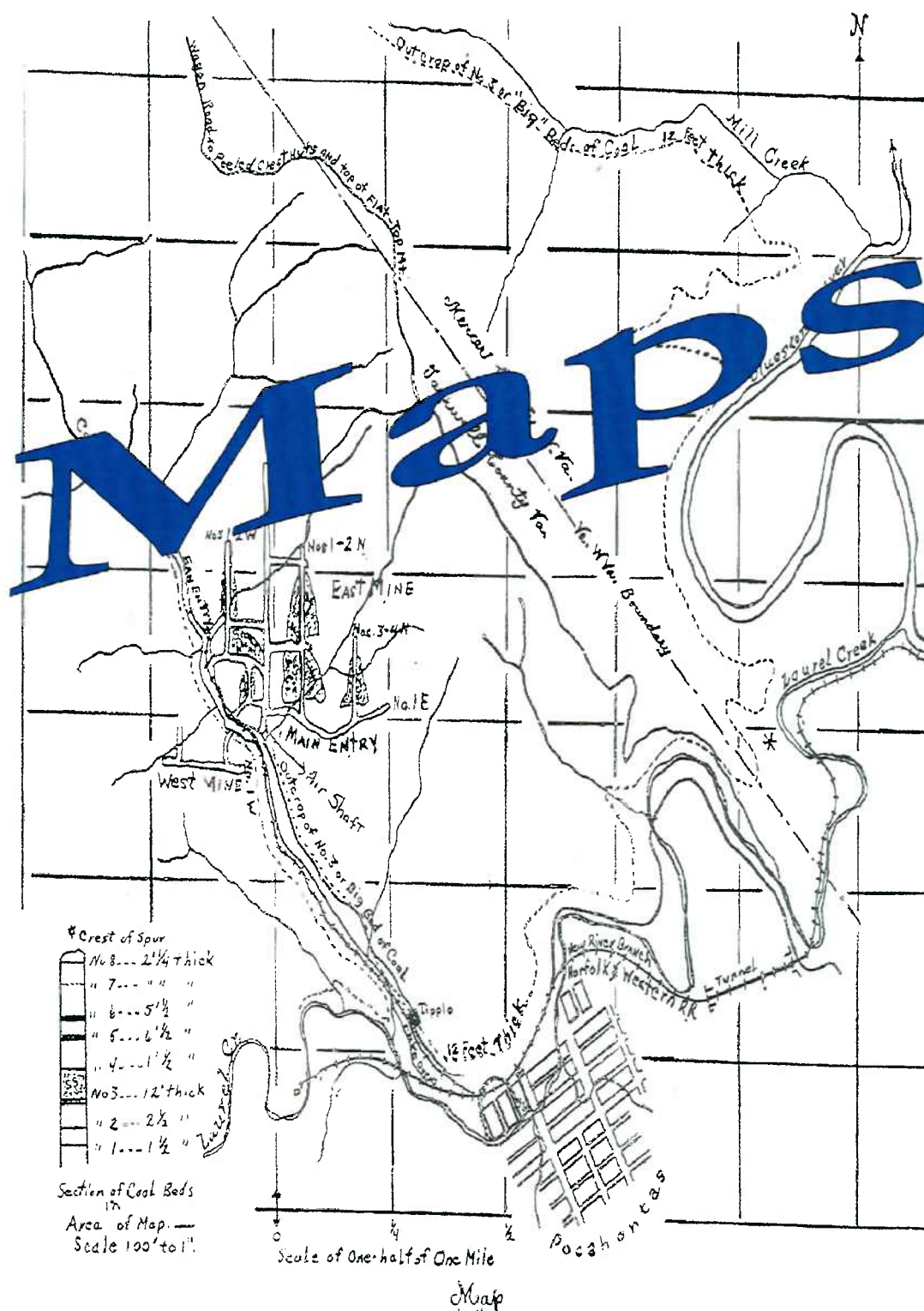
cial product is calculated to be sold in 50-lb. boxes of 100 sticks to the box. This sometimes varies slightly, but for all practical purposes you may consider one stick of dynamite to be of one-half pound weight.

I note with interest what you say in regard to the microscopic appearance of the dust collected at the face of the 4th Right Main Air Course, and in return will say that the fire at this point must necessarily have been exceedingly light, because in cleaning up the heading our men found a can of powder at this point. The can was severely damaged and dented but the powder was not exploded, so that the heat I should say, was probably instantaneous and not sufficient to produce heat that would raise this powder to the igniting temperature.

The cross sections that I supplied to you were taken from actual measurements so far as it was practical to get them. The rock from the overcasts at the time of my measurements was still in the mine, but was being hauled out, and the workmen were also remodeling the 4th Right Overcast by barring down loose pieces, thus slightly changing the cross-sectional areas; but you may regard the information given by these sections as correct.

Yours truly,

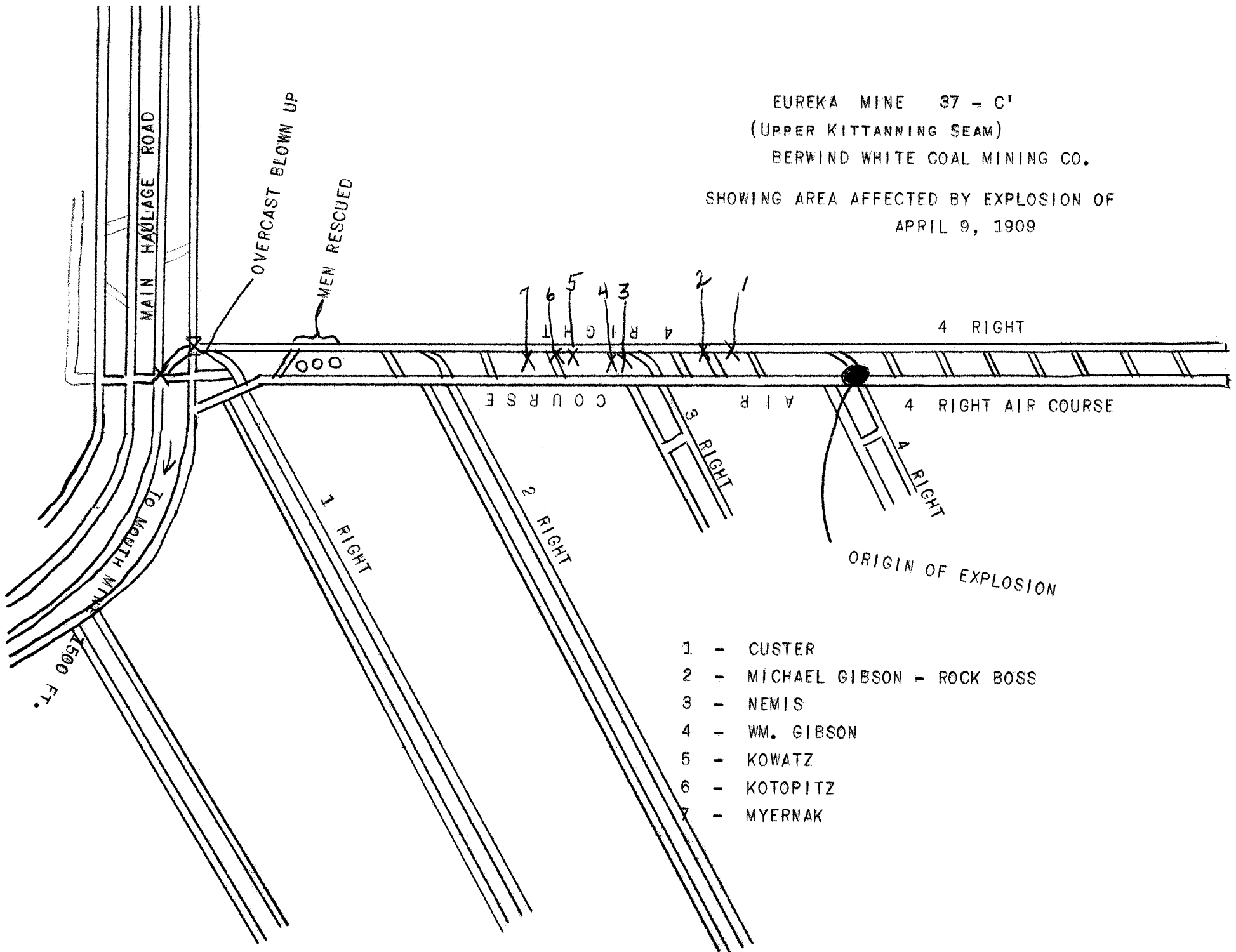
*Eugene A. Delaney,*  
Chief Engineer.





EUREKA MINE 37 - C'  
(UPPER KITTANNING SEAM)  
BERWIND WHITE COAL MINING CO.

SHOWING AREA AFFECTED BY EXPLOSION OF  
APRIL 9, 1909



- 1 - CUSTER
- 2 - MICHAEL GIBSON - ROCK BOSS
- 3 - NEMIS
- 4 - WM. GIBSON
- 5 - KOWATZ
- 6 - KOTOPITZ
- 7 - MYERNAK