



# 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 tippie. 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 <sup>subsequently</sup> 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:

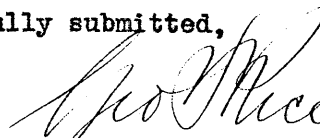
It is probable that when the shots to prepare the overcast were discharged by Gibson, the rock boss, there was an excess of energy and the dust used in ballasting the tracks, together with the lighter float dust along the ribs, was thrown into suspension and ignited by the flame of the dynamite. It is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

GSR/ACS

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 tippel 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 developement 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



