



Report

Primero Mine
January 31, 1910

-- THE PRIMERO MINE EXPLOSION --

PRIMERO, LAS ANIMAS COUNTY, COLORADO.

JANUARY 31, 1910.

BY GEO. S. RICE.

LOCATION:

The "A" Primero Mine is one of several slope mines located at the town of Primero in Las Animas County, Colorado. It is about 21 miles west of the city of Trinidad on the Colorado and Wyoming Railroad, a subsidiary concern of the Colorado Fuel and Iron Company, which owns the Primero mines and others in the district. The town lies at an elevation of about 7000 feet above sea level.

GEOLOGY:

The coal worked at Primero is one of the upper seams in the Laramie series of the Cretaceous Age, and the mines are situated in the western part of what is commonly known as the Trinidad Coal Field, 10 miles or so from the extreme western rim of the basin where the coal measures turn up sharply against the foot hills of the Sangre de Cristo Range of mountains. The Primero seam outcrops at the town, and in the "A" mine dips northward on a three percent grade. The dip is fairly regular, except where disturbed by lateral folds or waves which have been accompanied by some faulting.

COAL SEAM:

The seam is from $6\frac{1}{2}$ to $7\frac{1}{2}$ feet in thickness. It has a columnar structure, though the face and butt cleavages are not as strongly developed as in some coals, like the Pittsburgh Seam of Pennsylvania. The faces run approximately east and west. The coal is bituminous and strongly coking.

ROOF:

The main roof is a strong sandstone, separated from the coal by black shale, short-grained and full of slips. To hold it up requires close timbering; the entries are cross-timbered and lagged.

Near the entrance of "A" mine, the sandstone comes down close to the coal, so that the one or two feet of shale intervening has been taken down, the sandstone requiring no timber for support. In going down the slope, the thickness of the shale gradually increases. In rooms off A-11, in certain of which the roof had fallen from 15 or so feet above the coal, the material exposed was all shale.

COAL SAMPLE:

A full section sample of the face coal was taken at the face of Room 2 off A-11 Entry. The measurements were as follows:

Roof - Black shale, slippery.

Coal, bright lustre, soft,.....	0'	4"	
Sulphur and slate band,.....	0'	1"	*
Coal, medium, soft,.....	0'	6"	
Black sulphur band,.....	0'	1"	*
Coal, pure, has small cubical fracture,...	1'	4"	
Slate band,.....	0'	3"	*
Coal, hard block,.....	0'	2"	
Coal, fine grained, hard,.....	1'	8"	
Coal, sulphurous,.....	0'	4"	
Coal, pure, slabby,.....	2'	0"	
<hr/>			
Floor, (Coal, 0' 2"			
(Hard shale			
Total.....	6'	9"	

* Note; Excluded from sample. -2-

The 3 inch slate band in the above section $2\frac{1}{2}$ feet from the top thickens to 12 inches at the face of the 7th and 8th West.

--:-- Proximate analysis of foregoing sample. --:--

Laboratory No. 10063-4 (average)

	<u>Sample as received.</u>	<u>Moisture and ash free</u>
Moisture	1.91	
Volatile matter	32.27	36.06
Fixed carbon	57.21	63.94
Ash	<u>8.61</u>	<u> </u>
	100.00	100.00
Sulphur53	.59

COAL WASHING:

The coal is mainly used to make coke. It is hauled in railroad cars to the town of Secundo which lies a few miles to the south in the valley of the Las Animas River, where it is crushed, washed and coked in bee-hive ovens. The coke is shipped to the company's steel plant at Pueblo, Colo.

MINE DEVELOPMENT:

The Primero mines have three main openings, called the West Mine, the "A" mine and the "B" or East mine, which are all slope openings. The "A" and "B" main slopes run parallel, nearly due north and about 2000 feet apart. They have been connected together by a number of cross entries but, except for one, the connection has been entirely cut off and the pillars between have been pulled. The one connection was through the 3-B Entry, turned off the "A" main slope about 2400 feet from the mouth on the right hand side. This had been sealed by a rock stopping which was not affected

by the explosion, but the first effort in recovering the mine was to blow out this stopping, from the "B" side, so as to ventilate by means of the "B" fan.

The "B" mine was not affected at all by the explosion and resumed work about one week later, after the connection had been temporarily sealed.

The West mine was not connected underground with the "A" mine and therefore was not affected.

The coal from the three mines was brought by trolley haulage to one tippie, which lay in a draw between the "A" mine and the West mine.

OUTPUT:

The output of the three mines was about 1600 tons of coal per day at the time of the explosion, though the mechanical capacity was greater.

The output of the "A" mine was about 500 to 600 tons. About 110 men were employed in this mine on the day shift.

LAYOUT OF "A" MINE:

The main slope ran down the 2 to 3 percent dip straight north for about 4200 feet; then the direction of the dip changing to about North 35° West, the slope was turned in this direction. From the turn it ran in over 800 feet at the time of the explosion, and pairs of entries had been started; A-13 and A-14 to the left and B-9 and B-10 to the right. No rooms had been turned from these entries.

An air course ran parallel with the slope on the right or east side of same all the way in.

EAST OR "B" ENTRIES:

To the east of the slope and aircourse, only two pair of entries

were being worked; B-9 and B-10 just started, and B-7 and B-8. A few rooms were being worked in a stub pair of entries off the latter.

B-1 and B-6 inclusive were worked out and closed, except for the connection through B-3 referred to.

WEST OR "A" ENTRIES:

On the west side of the slope, besides the new entries A-13 and A-14, there were three pairs of entries working; A-7 and A-8, A-9 and A-10, A-11 and A-12, together with the stub entries off same.

A-1 and A-2 and A-3 and A-4 were worked out to the crop and abandoned. A-5 and A-6, as turned off the slope, were also abandoned, but a new A-5 and A-6 were turned off the 2-south stub, A-7, and were working.

HAULAGE:

The coal was handled in wood cars of two tons capacity, with 16 inch wheels. These were hauled on the slope by main-and-tail rope which ran as far as the A-12 entry. There were branch ropes in A-7 for about 1400 feet, and in A-9 for about 1200 feet. Elsewhere in the mine, the haulage was with mules.

LIGHTING - SAFETY LAMPS:

The only system of lighting employed underground was with magnetically locked Wolf safety lamps of standard shield pattern, using benzine.

The lamps were cleaned and filled by attendants in a lamp house a short distance from the mine.

The men were checked into the mine by the lamps, but on coming out, were not under supervision to see that their lamps were immediately returned.

No open lamps were permitted, and I was informed that men entering

had their lights examined at the entrance and were occasionally examined for matches.

However, so little gas had been reported by the mine examiners for months that the operating company was about to petition the State Mine Inspector to allow the use of open lights. The safety lamps had been put into the mine following the explosion of 1907.

-:- STORY OF THE EXPLOSION -:-

The following story of the explosion is extracted almost in its entirety from an article written by Mr. R. L. Herrick and published in the March issue of Mines and Minerals. The story is well told and with apparent accuracy so far as I may judge from the information received. I have changed the wording only in a few details where I had special knowledge of the facts.

Monday, January 31, 1910, the day of the explosion was said to have been a clear warm day. About 110 men were reported to have gone into the mine on the day shift, and about 4:00 p.m., the miners of this shift began to come out of the mine. It is said that the fans were running regularly and the only incident of note reported was that several cars of the empty trip were off the track at the mouth of the main haulage slope, and were being replaced on the track under the direction of outside-foreman D. D. Dodge. About this time, pit boss David Williams telephoned to the slope engineer, probably from the station at the mouth of A-12 on the main slope. The last loaded trip had been hoisted from A-12 entry about 3:30 p.m.,

and Williams noting the delay, inquired of the slope engineer what the trouble was. When informed that the cars were off the track, he ordered the next trip of empties into entry A-8 and the loaded trip pulled out from this point. As there were 26 loaded cars waiting on the A-8 parting, it was arranged to hoist 14 on the first trip and the balance on the second. The slope engineer, Lopez, was instructed to hoist the second loaded trip slowly as it passed into the main road from A-8 in order that Williams might get aboard. When the cars on the surface were replaced about 4:20 p.m., the branch tail-and-main ropes of A-8 had already been connected to the main slope ropes so that when the empty trip went down, it was all ready to run into A-8 as soon as the signal was received by the slope engineer. In five minutes more the empty trip, as shown by the engine indicator, had reached A-8 and, on receiving the signal to go ahead, the slope engineer ran the empty trip ahead about 300 feet into A-8 when the explosion occurred. On finding the ropes jammed, he shut off the engine.

In the meantime, about 35 miners of the day shift had left the mine. One had gone home, changed his clothes, and come back, and at 4:30 p.m., stood directly in front of the haulage slope, taking with three miners who had just emerged from the slope. Outside-foreman Dodge, having finished directing the gang which placed the cars on the track, had just stepped 50 yards to the west of the slope, and J. C. Risher, assistant master mechanic, stood at the door of the machine shop 200 feet from the slope when the explosion took place. Therefore, both Dodge and Risher were close eye-witnesses of what happened. Just at the instant of the explosion, a loaded trip of cars from one of the east mines, drawn by an

electric locomotive, passed the mouth of the slope. The locomotive had barely passed when the explosion came out of the slope, striking the cars of the trip and throwing them from the track a short distance. According to Dodge and Risher, a vast volume of black smoke and dust shot out of the slope mouth, and catching the four men in its path, hurled three of them against and under the trip of cars, killing them. The fourth man, a negro, was thrown entirely over the cars and landed 100 feet south of the slope opening. Although terribly burned, at the time the article was written, it was thought he would recover. In the midst of the smoke and dust rolling from the slope mouth came a great flame which quickly subsided. The concussion of the explosion was said to have been quite great, but only a few windows were broken in the town, although in a number of houses plaster was hurled from the walls.

In a few moments, Dodge and Risher recovered from the shock and rushed to the fan, where they were soon joined by Superintendent William Kilpatrick and Dan Sullivan, boss carpenter. An inspection showed that although dirt and timbers had badly damaged the blades and blown out a portion of the casing, it could be repaired in a short time. The mouth of the main slope was blocked by a great fall, thus shutting off the normal intake. The fan at the "B" mine was not affected by the explosion and acting under instructions of Superintendent Kilpatrick, William Easton and Al Thompson ran to No. 1 east in "B" mine, accompanied by helpers and down the haulage road to a masonry air stop. Here Thompson and helpers started to tear down the masonry stopping while Easton and helpers erected a temporary stopping shutting off the "B" mine return a short distance away. The

temporary stopping had just been finished when those engaged at the masonry stopping blasted it down. Instantly the "B" fan began drawing the gases from the wrecked mine through the passage in which Easton and his helpers were traveling. Thompson and his party at once escaped into the neighboring intake while Easton and his helpers coming out the return had a race to keep ahead of the black-damp for a distance of 1700 feet to the outside. Thus the "B" fan began to draw after-damp from the wrecked mine in about 45 minutes. About three hours later, the main fan, having been hurriedly repaired, was reversed to blow fresh air down the aircourse upon which the rescuing party could advance. In other words, the "A" fan was forcing air in and the "B" fan, through the connection between the "A" and "B" mines, was pulling it out. The aircourse was free from large falls but the haulage slope was caved tight, for entrance purposes, for a distance of about 100 feet. The full efficiency of the fans was not obtained as the connections between the mines was restricted at a low point by the presence of water within a few feet of the roof.

RESCUE WORK:

In the meantime, the call for help had gone out to the neighboring mines, to which a prompt response was made. Division Superintendent James S. Thompson quickly organized a relief party at Trinidad and started for Primero on a special train, which picked up a number of expert mining men on the way. By the time the two fans had partially restored ventilation near the entrance to the mine, Superintendent Thompson had organized the first rescue party, consisting of Joseph Ball, Superintendent of the second division, Superintendent Chas. Chambers of Sopris, Superintendent Wm. Morgan of Piedmont, mine inspector for C. F. & I. Co J. B. Manley, Superintendent

Thomas Lee of Frederick; Superintendent Jas. Wilson, of Starkville; Bob McAlister, A. C. Larson and others. Shortly after the arrival of the first party from Trinidad, a party from the neighboring Cokedale mines of the American Smelting and Refining Co., arrived, led by Manager Baylis and Superintendent Burt Lloyd, bringing with them three Draeger helmets. The Trinidad party had brought four helmets with them and the following morning, two more arrived from the Stag Canon Fuel Co. of Dawson, New Mexico, in charge of Jas. B. Morrow, the company expert in rescue work with these helmets.

Shortly after 9:00 p.m., the fans had restored ventilation sufficiently to allow the first rescue party under Superintendent Thompson to start into the mine through the aircourse. The party advanced about 2400 feet down the aircourse to entry B-3 and B-4 on the right and on the opposite side of the main slope to A-7 and A-8 by 2:00 a.m. About 14 bodies were recovered up to this time, all found on the main slopes and all badly burned, indicating that the men were on their way out when killed by the explosion. Several of the rescue party were overcome by gas and carried out unconscious, among them being Superintendent Thompson. Division Superintendent Joseph Ball then assumed leadership and continued the work of exploration up entries A-7 and A-8. A-7 was found fairly clear of after-damp, and though there were many falls, it was not blocked as was the case in A-8. Rapid progress was made until near the diagonal haulage road leading from A-7 into A-8 rope road. Before reaching this point, there was a large amount of timber found strewn along the road, and at the haulage road, the standing timbers were found to be on fire. Portable

chemical extinguishers were sent for and the fire was soon put out.

The main siding was located on A-8 just outside the haulage crosscut. As it was probable that men would be on this double parting prior to the explosion, the party went through the crosscut and turned back east. Here were found the largest group of bodies recovered. The rescuers passed over the bodies of a number of mules and six men; an electric flash light was turned on the face of each body as it was passed. As the light was flashed on the face of the seventh body, the man's eyes opened, and he sat up and spoke. This was Leonardo Virgen, a Mexican, beyond whom lay eight bodies, and beside him his dead Mexican buddy, with whom Virgen said he had conversed but a short time before. The body of this man was still warm at the time. Virgen walked part of the way out, but then was overcome, and was carried out the greater part of the way to the entrance. He was the only man recovered alive.

By Tuesday morning, the workings off A-7 and A-8 had been thoroughly explored and in all, about 28 bodies recovered. That morning, E. H. Weitzel, Manager, Fuel Department, of the C. F. & I. Co. arrived from Pueblo, together with State Mine Inspector John D. Jones and Deputy Inspector Griffiths, also Superintendent David Griffith of the Fremont County mines, and Thomas Jolley, pit boss of the Victor Fuel Co.'s mine at Delagua.

The drainage of the black-damp from the lower portion of the mine progressed slowly. The ventilation was not on one current of air and the exit was restricted in the passageway between the "B" mine and the "A" mine, which as previously stated, was said to be half full of water. The temporary brattices put up hastily, leaked badly under the heavy pressure put on

them by the fans. Not until Wednesday morning, February 2d, had the brattices been erected as far as the mouth of B-4 and B-5 and of the opposite A entries, 9 and 10. By this time, about 40 bodies had been recovered and all hope of rescuing any living had been abandoned, although the exploratory work was continued with unabated energy. Before this time, the work had been thoroughly organized into three eight-hour shifts and a record of all persons entering the mine was kept, together with the number of the safety lamp carried in by each individual. Up to Thursday morning, about 50 bodies had been recovered from the mine. A house to house canvas by the company established the total loss at 75, not including Virgen and the negro who was burned at the slope entrance.

THE SURVIVOR'S STORY:

Virgen's story told at the inquest is that he and his partner and nine Koreans had been at work in the rooms off the second south blind entry off A-7. They were on their way out of the mine and had reached A-7 entry and possibly a little beyond it, going east toward the haulage crosscut, when the explosion occurred. Picking themselves up in a dazed condition, Virgen said the entire party retreated to some room he cannot locate, where the air was good—probably close to his own working place, if the dinner buckets dropped at intervals along the blind No. 3 south are any indication. Virgen said that after a wait of a number of hours, the Koreans become impatient to get out and at intervals made several sallies forth but were driven back. Finally, a little after midnight, so he estimated, five of the Koreans made a final sally from which they did not return. After waiting about an hour, the two Mexicans and four Koreans assumed that the five

Koreans had succeeded in their effort to escape and decided to follow them. "Taking the same route as before, they probably reached A-8 through one of the crosscuts above the diagonal haulage crosscut, which must have been impassible, owing to the small fire there." (The foregoing statement is made by Herrick. It is by no means certain that the fire would have prevented their running through quickly, inasmuch as the fire was in the standing timber and arose from the red-hot coke thrown against the timber. If the ventilation was destroyed by the explosion, it is quite probable that this merely smouldered and did not burst into flame until fresh air was forced in when the ventilation was partially restored.) Outbye the haulage crosscut in A-8 on the double parting, Virgen and his party came upon the bodies of the Koreans who had preceded them, and becoming suddenly overcome by afterdamp, they fell down. This was close upon 2:00 a.m. Virgen fell upon his back, his buddy upon his face. Virgen was picked up about 2:30 a.m., so he had probably not been in the noxious atmosphere of this place more than 30 minutes, and as before stated, his buddy had probably expired only a few moments before his own rescue.

RESCUE APPARATUS:

Nine sets of Draeger helmets were on the scene of the disaster by Tuesday morning, the day after the explosion. At this time, the exploration work was being pressed forward along the main haulage slope toward A-9 and A-10, and owing to the slowness with which the afterdamp was cleared, progress was halted. The C. F. & I. Co. and the Cokedale Co. had only recently received their apparatus and it had never been unpacked until it arrived at Primero, where there was no one conversant with its proper assembly and use.

