

THE TERCIO EXPLOSION.

On October 28, 1904, an explosion occurred in No. 3 mine, Tercio, which caused the death of 19 men, whose names are given below in the order the bodies were recovered:

No.	Name of Person	Nationality	Occupation	Age	Married or Single
1	Trinidad Duran.....	Mexican	Driver.....	20	Single
2	Joe Baraga.....	Austrian	Miner.....	23	Single
3	John Baraga.....	Austrian	Miner.....	25	Married
4	John Opieka.....	Austrian	Miner.....	24	Single
5	John Urbas.....	Austrian	Miner.....	26	Single
6	John D. Camillo.....	Italian	Miner.....	36	Married
7	Thos. McEwen.....	Irish	Miner.....	28	Married
8	John Pilzer	Austrian	Miner.....	35	Single
9	Frank Salter.....	German	Fire boss.....	..	Single
10	Jim Riccie.....	Italian	Miner.....	17	Single
11	Leopold Lanotino.....	Italian	Miner.....	20	Single
12	Chas. Brandenburg.....	American	Miner.....	22	Single
13	Ed. Hatton.....	American	Miner.....	43	Married
14	Amigo Colichio.....	Italian	Miner.....	28	Married
15	Quirino Tonti.....	Italian	Miner.....	37	Married
16	Tony Tiht.....	Miner.....	45	Married
17	Sam Rosetti.....	Italian	Miner.....	17	Single
18	Rocco De Gregorio.....	Italian	Miner.....	51	Single
19	Mike De Giacomo.....	Italian	Miner.....	42	Single

Tercio is situated in the valley of the South Fork of the Purgatoire river, thirty-one miles westward from Trinidad, Las Animas county, and is the terminus of the southern division of the Colorado & Wyoming Railroad, extended to this point when the camp sprang into existence in the early part of 1902. It is owned and operated by the Colorado Fuel & Iron Co.

TOPOGRAPHICAL FEATURES, ETC.

At Tercio the Purgatoire valley emerges into an anticlinal basin formed into a natural park of an elliptical shape and about six miles long and from one and a half to two miles wide, which is the result of a deeply eroded anticlinal fold whose axes are longitudinally with the park. This basin has a general southeast and northwest course, and the mines are located in the elevated ridge forming its eastern side where the valley intersects the tilted coal measures as it passes into the park. The town, Tercio, occupies a central position in the southeastern

wing of the basin, and it rests on the shales underlying the basal coal measures at an altitude of 8,000 feet above sea level.

DESCRIPTION OF MINE AND MODE OF WORKING.

Briefly, the plant consists of six drift openings, two washeries of 1,000 tons capacity each and 600 coke ovens. Two veins are being operated and these are stratigraphically 235 feet apart. Mine No. 3 is working the upper seam of the two. It enters near the base of the hill on the north side of the canyon in a direct line and immediately at the end of the tippie trestle, whose double tracks extend 125 feet into the mine.

The measures are pitching $52\frac{1}{2}$ degrees eastwardly and the openings consist of a main entry driven on the strike of the vein and a parallel air-course 40 feet above. The entry is 8 feet wide and 7 feet high and is in 2,060 feet. Rooms are driven directly up the pitch, 20 feet wide, and 18-foot pillars and cross-cuts put through at distances varying from 60 to 75 feet apart. Room-necks or upraises are 35 and 8 feet wide; average thickness of seam is 65 inches, of the coking variety, having shale roof and floor. The mining is done by undercutting and blasting, black powder being generally used. Ventilation is effected by a natural current generated through the difference of elevation between inlet and outlet, and the inequality of temperature of the mine's atmosphere and that of the outside. At irregular intervals air-courses are driven to the surface. Three of these, viz., 1, 13 and 28, had been opened and used for some time and are respectively in the order given, 100, 333 and 434 feet long from the entry to the surface. No. 43, which is also an air-course, is up 318 feet and will connect with the surface at a total distance of 450 feet. Air measurements taken few days previous to the accident showed quantity of 11,760 cubic feet per minute to be entering the mine. At the foot of the room No. 27 this volume was divided into two splits, one entering 27 and traversing the rooms from there outward and escaping through air-course 13. The other division continuing along the main entry to the face and returning through the rooms to outlet No. 28. Attached is a map of the working made two days before the accident.

EXTENT OF DAMAGE TO BODIES AND MINE.

It was 12:55 p. m. Two distinct reports almost simultaneously, but sufficiently far apart to be distinguished, were heard, which shook the community for some distance. In the same instant volumes of smoke and dust were seen issuing violently from the main entrance and air-courses and quantities of earth and timber were hurled into the air. The force was terrific in its character, but the damage done to the mine was not as great as is usually wreaked under similar conditions. The minuteness with which every point in the workings was visited by the explosion's deathly influence, as demonstrated by numerous evi-

dences left on the bodies and the immediate surroundings where they were found, proved beyond doubt that no one in the mine lived but a very few minutes after it occurred. A majority of the bodies were severely burned and mutilated, and death was instantaneous, but there were a few who were neither burned nor badly bruised and who probably lived the limit life can be sustained without air. Of the forty-nine chutes, located one at the mouth of each room, thirty-four were blown out, and the remaining fifteen were left standing. Those left were from No. 24 to 40. The entry roof being of tenacious nature and requiring no timbering, was left practically intact for its entire length, except the double track portion at the entrance. About 100 feet at this point were driven through drift soil and disintegrated formation, and the double timbers supporting this part were blown out and a huge cave resulted. All rooms from 1 to 12 had been worked to their destination, pillars extracted and abandoned and the roof partially caved. The bulkheads of these old rooms were torn out by the force, and the hundreds of tons of rock confined above were liberated and rolled into the entry, completely filling it opposite the mouth of each. This made the work of rescuing difficult and hazardous. The entry was also nearly blocked at every one of the other rooms that had their chute and bulkheads blown out, but the debris, consisting principally of coal and timber, was here easier handled, and the danger incident to falls from above was less, and consequently a better progress was made in the reopening along this part. All the rooms operating were more or less damaged; some had nearly all their man-ways and props blown away, while in others the man-ways were left standing, but badly damaged. Considering the number of props displaced in these rooms, the fall of roof was exceedingly light.

Air-courses 13 and 28 have each an area of 8 feet by the thickness of the vein, and both were equipped with ladderways, nearly all of which, and the props securing them, were swept out or shattered.

RECOVERY OF BODIES, LOCATIONS WHERE FOUND AND THEIR CONDITION.

On the day the explosion occurred I was making a general inspection of the Chandler mine, Fremont county. I was notified by wire at 4 p. m. and took the midnight train, the first available one from Florence, and arrived at 9:30 next morning. Upon my arrival I hastened to the scene and found a force of men engaged at the mouth of the mine cleaning falls and re-timbering. One of the double tracks at the entrance had been cleaned and the entry re-opened as far as room 7, but was here blocked tight by rock and timber that had fallen from the room. A passage had been made over this fall and rescuers passed in and out, but it afterwards closed again. Here also a gang of men was loading and timbering. Bert Mattison, superintendent, was on the ground supervising the work, and all that skill and strength could do was being done towards expediting the work

of recovering the bodies. As soon as the after-damp had sufficiently cleared a rescuing party, consisting of Billie Morgan, superintendent Cuatro mine; George Ward, foreman Vega mine; John Coan, contractor; Ralph Prukop, foreman, entered air-course 13, and after a long and arduous effort succeeded in reaching the entry at 7:30 a. m., 29th. The entry opposite room 14, which was next inside, was filled and impassable. Discovering that they could not go any further towards the face, the men started outward through the entry, plowing their way over the falls, and in this manner they successfully reached the mouth at 8 a. m., but did not find any bodies. Immediately afterwards a second party, consisting of Robert O'Neil, division superintendent; Ed. Sutton, engineer; Coan and Ward, went down air-course 28. The air ascending here was yet to some extent impregnated with after-damp. Arriving in the entry below, the men went towards the outside and found two bodies, who were afterwards identified as those of McEwen and Pilzer, lying on the entry between rooms 27 and 28. Opposite room 20 the entry was blocked with fallen rock and coal. Finding this to be impassable, the rescuers returned and went in as far as room 30, which is about 75 feet inside the air-course. The after-damp was so thick that they were compelled to make a hasty retreat, and some of the men almost collapsed when they returned through 28 to the open air, and all hope of any one being alive was then abandoned, and it was decided to concentrate all force and attention to the re-opening of the main entry. The work was done by 8-hour shifts, and all men that could be utilized to an advantage were employed.

Trinidad Duran was killed at the mouth of the mine by flying rocks and his body was found 50 feet outside immediately after the explosion. The bodies of those killed inside were recovered from November 2d to November 9th and at locations designated by the numbers on the map. Each number represents the name opposite the corresponding number in the list of victims.

Quirno Tonti and Amigo Colichi were the only ones that showed any evidence of having lived after the explosion. Tonti's body was found in a sitting position at the head of the manway, a few feet from the face of his room, No. 41, and was neither bruised nor burned. But in the cross-cut, a few feet below, evidence of intense heat and force having existed were manifest, so he could have lived but a very short time.

Colichi's body also was not burned nor bruised, but his coat, which was found hanging on a prop near the cross-cut to room 22, had been scorched by the heat, and quantities of dust coke were in abundance on the props. He might have lived a short time.

CAUSE OF EXPLOSION AND HOW ORIGINATED.

The mine may be termed as absolutely non-gaseous, as no trace of fire-damp has ever been found in its workings. If it was a generator of CH_4 I would have discovered it while investigating the inner workings, as at this time the ventilation in the said parts had not been restored and the air current was entirely cut off. The miners carried their powder in 5-pound tin cans and no one was allowed to store any in the mine. Therefore it was neither a gas nor an exclusive powder explosion, and the only element remaining, that we know of, to which it can be attributed, is coal dust, which was no doubt the main cause, and I am of the opinion that the explosion started in room 27. As there was no one left alive, the only guidance upon which conclusions could be based as to what point and how the explosion originated, were the impressions left along its path, indicating the direction the forces issued from, and the condition the working faces and their surroundings were left in. From the fact that there were so many outlets, the forces conflicted considerably, and the task of tracing their paths to the initial point was thus rendered very complicated, although distinct proof of an outward force all the way along the entry from the neighborhood of room 27 was apparent. From here to the face of entry there were 13 chutes left intact, while the others of the same district were blown out and the contents of the rooms fallen into the entry in large heaps that left no mark to indicate which side they had been attacked from. Yet the dust cokings deposited on the chutes and rib corners along the greatest portion of the latter distance indicated an inward initial force. The strongest proof, showing that 27 was the source of the explosion, were two blow-out shots found, one at each rib in the face of the room. Either of these could initiate an explosion in the presence of a sufficiently dust-saturated atmosphere. The bodies of the two men working in room 27 were found on the entry between 27 and 28, to which point they would naturally withdraw, to get out of the way, while the shots were being fired. The hole in the left side was drilled nearly parallel with the rib. Length remaining on solid, 1 foot 9 inches. The one in right side was gripping into rib at an angle of about 15 degrees and had 3 feet 4 inches remaining on the solid. The faces of all other rooms in operation on the day of the explosion were found in normal condition. The thickest coke deposits in the rooms were found on the upper side of props between the last cross-cuts and the faces. Evidence of intense heat having existed was noticeable in nearly every room.

RULES GOVERNING BLASTING IN THE MINE.

Firing of shots by any one other than the "shot lighters" was forbidden, and all shots were to be fired after half-past 5 p. m., when all except the said shot lighters were supposed to be