

REPORT ON EXPLOSION  
PEERLESS COAL COMPANY  
NEW PEERLESS MINE  
LYNN, CARBON COUNTY, UTAH

March 8, 1930.

BY

D. J. PARKER  
SUPERVISING ENGINEER

INVESTIGATION BY  
D. J. PARKER  
AND  
JAMES WESTFIELD

DEPARTMENT OF COMMERCE  
BUREAU OF MINES

TABLE OF CONTENTS.

	Page
Mine Map	
Introduction . . . . .	1
General Information. . . . .	3
Location. . . . .	3
Company Officials . . . . .	3
Number of Employees and Production. . . . .	3
Mining Methods and Conditions. . . . .	3
Method of Opening . . . . .	3
Lighting. . . . .	4
Haulage . . . . .	5
Ventilation . . . . .	5
Gas . . . . .	7
Table 1, Air Analyses . . . . .	8
Explosive Practices . . . . .	10
Electrical Equipment. . . . .	11
Timbering . . . . .	11
Dust Conditions . . . . .	12
Mine Investigation . . . . .	12
Story of the Explosion. . . . .	12
Extent and Character of the Explosion . . . . .	14
Direction of Forces . . . . .	15
Summary and Conclusions . . . . .	15
Recommendations. . . . .	16
Acknowledgment . . . . .	17

APPENDIX.

Gas Analysis Reports.

REPORT ON EXPLOSION  
PEERLESS COAL COMPANY  
NEW PEERLESS MINE  
LYNN, CARBON COUNTY, UTAH

BY

D. J. PARKER  
SUPERVISING ENGINEER

INTRODUCTION.

On March 8, 1930, about 4:45 P.M., an explosion occurred in the New Peerless mine of the Peerless Coal Company at Lynn, Utah, resulting in the death of five men, and serious injury to two others due to burns. Of the thirteen men in the mine at the time of the explosion, six were uninjured. All survivors were hoisted to the surface in about one hour after the occurrence of the explosion, and all bodies were recovered and hoisted to the outside shortly thereafter.

Within one hour after the explosion, the Castlegate mine-rescue team of the Utah Fuel Company arrived at the mine, proceeded underground immediately to the fresh air base near the point where the rock slopes intersect the top bed, and while wearing apparatus recovered three bodies. The Spring Canyon mine-rescue station responded with a team which served as a reserve crew for the Castlegate team during its explorations.

The three bodies found in No. 2 raise crosscut were badly burned. The two men who were located near the face of the

main entry showed no evidence of violence or burns, and unquestionably came to their end due to asphyxiation.

The only manifestation of the explosion at the surface consisted of a cloud of dust or smoke which issued from the portal of the main hoisting slope. Apparently, there was no indication of the explosion at the portal of the main return slope or at the fan.

The fan drift intersects the main return rock slope about ~~4~~ <sup>5</sup> feet inby the portal. The two steel doors at the portal of the main return slope were open at the time of the explosion, as were the two steel doors on the fan.

The fan was not running at the time of the explosion, and was not damaged. However, the fan was run intermittently during the normal operation of the mine. Natural ventilation was relied upon when the fan was not in operation. Three-quarter-inch compressed air lines were used in an attempt to supply air to the faces whether or not the fan was operated. The primary purpose of the air lines was for the operation of the jack hammers with which the coal was drilled.

The fan was started in about fifteen minutes after the explosion by James Ungrich of Rolapp, which is only a short distance away. Electric power was shut off from the mine immediately after the explosion.

#### GENERAL INFORMATION.

##### Location:

The mine is located at Lynn, Carbon County, Utah, about two miles up Price Canyon from Castlegate, and on the opposite side of the canyon from the main line of the Denver and Rio Grande Western Railway, a branch line of which serves the mine.

##### Company Officials:

The officials of the company are:

James D. Murdock, President, Newhouse Building, Salt Lake City, Utah.

Lynn H. Thompson, Vice President and General Manager, Newhouse Building, Salt Lake City, Utah.

Robert Howard, Superintendent, Lynn, Utah.

George Howard, Mine Foreman, Lynn, Utah.

##### Number of Employees and Production:

A total of 50 men are employed underground, working in three shifts. There are 20 men on the day shift, 15 on the afternoon shift, and 15 on the night shift. The daily average production is about 150 tons of coal. The surface force consists of 14 men.

#### MINING METHODS AND CONDITIONS.

##### Method of Opening:

The Peerless mine is in the initial stages of development. Parallel slopes have been sunk 60 feet apart through the rock on a 30 degree pitch. The slopes are connected at irregular intervals by 7 crosscuts. The right slope serves as a manway and the main return airway. The left slope, the portal of which is about 30 feet higher than that of the right slope, is the main

hoisting slope.

It is the purpose of the Company to develop two mines on separate beds. The upper bed was cut by the rock slopes at a distance of 1,917 feet. This bed is 16 feet, 3 inches, in thickness, and for the purposes of convenience, it is locally referred to as the top bed. The general opinion is that this is the Castlegate "D" bed. The development work in the "D" bed consists of a main entry some 600 feet in length, a back entry about 500 feet in length, and several crosscuts. The total lineal feet of development, including crosscuts, are approximately 1,600.

Both rock slopes have passed through the "D", or top bed. The right slope only has reached the "A", or bottom bed.

This bed is 25 feet thick and is believed to be the Castlegate "A" bed. The right slope intersected this bed at 2,301 feet.

No development work has been done on the "A" bed. The left, or main hoisting slope, is being raised and sunk, and has a total distance of 90 feet to go before completion to the "A" bed.

The distance between the two beds, measured at right angles to the dip, is 163 feet. Both beds are pitching N. 7° E., on approximately a 15 per cent grade.

#### Lighting:

Edison portable, permissible, electric cap lamps, equipped with the latest type head piece, are used exclusively for lighting.

Permissible flame safety lamps are used for gas inspection.

Haulage:

Small electric hoists of the non-permissible type, together with some hand tramming, convey the coal to the main side track near the foot of the main hoisting slope. From this point the coal is hoisted to the surface by a modern electric hoist.

Cars are constructed of steel, are roller bearing, equipped with BRAKES, and are of the drop bottom type. The cars are painted yellow to increase visibility.

The track gauge is 4 feet. The main slope is laid for the most part with 60-pound rail. Some 40-pound rail is used on the lower end of the slope, and on the main entry and air course.

The scraper working in the raise face of the left slope above No. 10 crosscut was operated by a small electric hoist of the non-permissible type.

Ventilation:

The mine is ventilated by a  $3\frac{1}{2}$  x 6-foot, multiblade, Jeffrey fan, with reversible setting, and belt driven by a 25 H.P., induction motor, compensator control, operating on 440 volts alternating current. Explosion doors are provided at the portal of the main return slope, and on either side of the fan. The fan operates normally exhausting. As previously stated in this report, the fan was operated intermittently prior to the explosion, and was not running at the time of the explosion, nor during the course

of this investigation. The fan is offset from the slope.

Apparently, dependence was placed largely on natural ventilation, and when the very limited difference in elevation of the portals of the two rock slopes is taken into consideration, the volume of air in circulation due to natural ventilation was surprisingly large. An air reading taken 75 feet inby the portal of the main return slope showed that there were 25,920 cubic feet of air per minute upcasting. The main hoisting slope serves as the intake. A reversal of the air currents can, of course, be expected with changes in the temperature of the outside air. There are no blower fans in the mine. Stoppings were constructed of boards and brattice cloth, supported on props, and were intended to serve only temporarily during the early stages of development.

Line brattice was not used to convey the air to the faces. Three-quarter-inch air lines were maintained in each working place, <sup>supposed to be</sup> and were/kept going, it is understood, during the entire shift.

The ventilation for those sections of the rock slopes between the two beds enters the left slope through a vertical breakthrough in the floor of the main entry just outby No. 1 raise crosscut, and on the opposite side therefrom.

The air travels through No. 9\* crosscut to the right slope, which is the return. The upper dip face of the left rock slope is only a few feet inby this crosscut. The raise face of this slope is 80 feet outby No. 10 crosscut, and the lower dip face

---

\*Not to be confused with correspondingly numbered crosscuts in the "D" bed.

is about 5 feet inby. Line canvas was not used in any of these places, nor was it used in the right-hand slope, which had just cut the "A" bed 60 feet inby No. 10\* crosscut.

An air reading taken during the investigation in the last open crosscut (No. 10) gave 16,380 cubic feet of air per minute. As previously stated, the fan was shut down during the investigation. This reading was taken at 10:30 A.M.

Inasmuch as natural ventilation is influenced and controlled by the difference of inside and outside temperatures, barometric pressure and the direction of surface air currents, it is quite probable that at the time of the explosion (4:45 P.M.) the inside and outside air temperatures became fairly well balanced with resultant interruption of ventilation.

Gas:

The mine is rated as gassy by the State Inspection Department.

Fire bosses are employed, whose duties require them to make inspections for gas prior to the shifts going on duty.

Oil seepages have been encountered, which increase the hazard due to possible gas explosions. This, coupled with the considerable amount of methane given off, will make careful handling of the ventilation all the more imperative.

Eight air samples were taken, the results of which are shown in table No. 1. The bottle numbers are shown on the attached

---

\*Not to be confused with correspondingly numbered crosscuts in the "D" bed.

Table 1.

AIR ANALYSES  
NEW PEERLESS MINE  
PEERLESS COAL COMPANY

Collectors:

Parker and Westfield

March 12, 1930.

Bottle	No.	LOCATION IN MINE	Carbon Dioxide Percent	Oxygen Percent	Methane Percent	Volume cu.ft. per min.	Volume 24 hours	Methane Volume
		: 75' from portal main return	:	:	:	:	:	:
13		: rock slope	: .03	: 20.80	: .17	: 25,920	: 63,452	
		: 75' from portal main return	:	:	:	:	:	
975		: rock slope	: .04	: 20.86	: .17	: 25,920	: 63,452	
		: Face 2nd left raise crosscut	:	:	:	:	:	
14		: off main entry	: .28	: 20.55	: .97	: -	: -	
		: Face main slope (raise) 80'	:	:	:	:	:	
37		: above No. 10 crosscut	: .19	: 20.17	: .33	: -	: -	
		: Intersection of right slope	:	:	:	:	:	
48		: with "A" bed 30' from face	: .13	: 20.75	: .40	: -	: -	
		:	:	:	:	:	:	
57		: Face of main entry	: .13	: 20.78	: .33	: -	: -	
		: 2nd left raise crosscut off	:	:	:	:	:	
918		: main entry 12' from face	: .26	: 20.74	: .95	: -	: -	
		: Face 1st left crosscut off	:	:	:	:	:	
930		: main entry	: .10	: 20.80	: .13	: -	: -	

may at the points sampled. The fan was not running at the time the samples were taken. Duplicate samples were taken in the main return (bottles No. 13 and 975) 75 feet from the portal of the right slope, and the methane content was 0.17 per cent in a volume of 25,920 cubic feet of air per minute. On this basis the mine was producing 83,452 cubic feet of pure methane every 24 hours.

Two samples (bottles No. 14 and 918) were taken in No. 2 left raise crosscut, one at the face and the other 12 feet from the face, and showed a methane content of .97 and .95 per cent, respectively. The  $\frac{3}{8}$ -inch compressed air line was blowing at the time these two samples were taken, and inasmuch as these samples showed a decidedly higher methane content than any of the others, this might, in a measure, tend to indicate the origin of the explosion.

Sample No. 37 was taken in the face of the main haulage slope raise 60 feet above No. 10 crosscut. This slope is being both raised and sunk from No. 10 crosscut. The above sample was taken between the two beds, and shows 0.33 per cent methane. Inasmuch as the ventilation from the "D" bed does not reach that part of the main haulage slope between the two beds, the methane in this sample was unquestionably given off by the intervening rock strata. 

As a matter of fact, gas was encountered on several occasions prior to the slopes reaching the upper, or "D", bed.

The valve on the compressed air line was closed for a minute or two while this sample was being taken.

As evidence of the probable gassy condition of No. 2 left raise crosscut at the time of the explosion, gas was found with the flame safety lamp 62 feet from the face of this crosscut 11 hours after the explosion.

Explosive Practices:

Permissible explosive, Red H, CLF, is used in the coal, and 40 per cent strength dynamite is used in rock. All shots are fired electrically from the outside when all men are out of the mine. No. 6 detonators are used. The firing lines, carrying 220 volts alternating current, are independent of all other electric circuits.

A gap is maintained in the firing circuit near the portal of the main return slope when the shift is underground. The gap is made by simply disconnecting the wires and turning them back for a distance of 4 or 5 feet. The gap is closed by twisting the wires together.

A 2-pole master shot firing switch is located in the compressor house. The switch box is not kept locked, but a man is on duty in the compressor house at all times.

It would be decidedly advantageous from a safety standpoint if the switch were kept securely locked when not in actual use.

Prior to blasting, the coal is undercut with 2 non-

permissible, flameproof (so-called), O.E.7, Sullivan shortwall mining machines. Water is used on the cutter bars. This is effectively accomplished by permanently securing a  $\frac{3}{4}$ -inch pipe to the frame of the machine, with the discharge end of the pipe so located that a liberal supply of water is directed on the cutter chain at all times.

Non-combustible stemming, tamped with a wooden bar, is used. The faces are inspected for the presence of gas immediately prior to and after blasting.

The coal is drilled by jack hammers, operated from  $\frac{3}{4}$ -inch air lines.

#### Electrical Equipment:

The maximum voltage used underground is 220 volts alternating current. The power lines and firing circuit are carried down the main return slope at the present time. These will be removed and installed in the main hoisting slope when the development work has been completed. The signal wires in the main hoisting slope carry 110 volts alternating current. This voltage should by all means be reduced to 35 volts or less.

The electrical equipment underground consists of 2 mining machines, 2 small hoists and pumps, all of the non-permissible type.

#### Timbering:

At the present time about 7 feet of top coal is left in place. This makes an excellent roof, and obviates the necessity

for extensive timbering at the present time.

Dust Conditions:

So far, no rock-dusting has been done. Water is used on the cutter bars, and coal piles at the face are sprinkled. With the exception of the face regions, the mine is somewhat dry with consequent fine, dry, coal dust accumulations. No rock-dust barriers have been installed.

MINE INVESTIGATION.

Story of the Explosion:

The afternoon shift of the thirteen men went in <sup>to</sup> the mine the day of the explosion shortly after 3:00 P.M., with Alvin Ross in charge. A statement by Ross subsequent to the explosion was to the effect that he had examined the No. 2 left raise crosscut for gas at 3:25 P.M., and found the place clear. This was shortly before William Curtis, machine runner, and James Jensen, helper, began to cut this place. Ross made an inspection of the other places and found them clear of gas also.

About 4:00 P.M. Ross, the Shift Boss, and R. S. King, the rope rider, both of whom were severely burned, but survived, went to No. 1 left raise crosscut, which is driven in about 40 feet, and were preparing to cut the place when the explosion occurred. Ross was blown down by the force of the explosion and did not remember anything further. King was holding the jack pipe and facing the main entry, while Ross was operating the machine, when the former saw the flame come into their place from the main entry.

The machine was just beginning to sump in, and the controller was found open and on the first contact. Ross and King were found at the outby corner of No. 1 left raise crosscut. The attached map shows the location of the 5 bodies and 8 live men.

When the rescue crews reached Ross and King, Kanrinker and Bane, who were uninjured, had made their way from the back heading and were endeavoring to assist them up the slope.

Four men, Hall, Hensley, Story, and Swanson, were working in the lower section of the left rock slope, which is connected to the right slope only by No. 10 crosscut. These men endeavored to find their way out after the explosion, but were forced back by the afterdamp. They discovered a broken air line on the right slope at the outby corner of No. 10 crosscut. Three of the men desired to make a dash for the surface, but Swanson took charge and persuaded them to remain at the point where the compressed air line was broken. All men laid on the floor, face down, keeping close to the fresh air which was delivered to them through the broken pipe from the air compressor on the surface, which, fortunately, was kept running. They were found a short time after the explosion and hoisted to the surface, apparently suffering no ill effects from the experience.

It is understood that several men, in their desire to be of assistance, entered the mine rather hastily, wearing their street clothes. Inasmuch as no one was searched for matches or

smoking material, it is not only possible, but quite probable, that some of them had matches in their clothing. The fact is appreciated, however, that during the confusion and possible temporary excitement immediately following such a catastrophe, a matter of this kind might easily be overlooked with consequent disastrous results.

Extent and Character of the Explosion:

Inasmuch as there was little or no evidence of coked dust, it is believed that this was a gas explosion in which coal dust played only a minor part. This was probably due to the limited extent of the mine workings and the liberal application of water on cutter bars and face regions.

There was no evidence of flame beyond the point just outby the 1st left raise crosscut where the two injured survivors, Ross and King, were found badly burned.

The explosion was accompanied with sufficient violence to blow out 4 temporary stoppings; to tear down the signal wires for a considerable distance along the slope, and to manifest itself on the surface by way of a cloud of dust or smoke, or probably both. On the other hand, it was local in aspect, inasmuch as two men in the back heading, approximately 320 feet from the probable origin of the explosion, were not injured, either by burns or violence. Neither were they affected by the resultant afterdamp to any great extent.

Had the two men who lost their lives from the afterdamp

been provided with self-rescuers, the chances are that they would have been saved.

Direction of Forces:

The stoppings in No. 6 and No. 8 crosscuts were blown toward the main slope, while the stoppings in No. 7 and No. 9 crosscuts were blown toward the back slope. These stoppings were quickly replaced with boards and canvas by fresh air crews.

Summary and Conclusions:

At the time of the explosion three men were working in No. 2 left raise crosscut, two were operating a mining machine, and had almost completed cutting the place, while the third was drilling the coal with a jack hammer. The  $\frac{3}{4}$ -inch compressed air line used as a blower had been shut off for approximately one hour prior to the time the driller began to operate the jack hammer.

No. 2 left raise crosscut is 108 feet in length, dead ended, and is driven to the rise on a 15 per cent grade. Line canvas was not installed for the purpose of carrying the air to the face. Reliance was placed solely on the compressed air blower to keep the face clear of gas. The end of the air line was 20 feet from the face. This place had been examined for gas at 3:25 P.M. of the day of the explosion, and found clear of gas so far as is known. The compressed air blower was evidently shut off shortly after this inspection. The controller on the mining machine was open and on the first contact.

No matches or smoking material were found on any of the bodies. However, two matches and one cigarette were found in the rope rider's coat hanging in No. 1 left raise crosscut. The rope rider was one of the two who were badly burned, but was rescued alive. There was nothing to indicate that any one of the three men killed in No. 2 left raise crosscut had been smoking. Likewise, there was no evidence that either of the two injured men found near No. 1 left raise crosscut had been smoking.

The evidence, while, perhaps, not absolutely conclusive, indicates beyond a reasonable doubt that the explosion originated in No. 2 left raise crosscut, and was caused by an ignition of gas from the non-permissible electric mining machine operating at the face.

RECOMMENDATIONS.

The following recommendations are offered in the interests of greater safety:

1. Electrical equipment of permissible type only should be used in this mine.
2. Line canvas should be maintained as near as possible to all working faces; otherwise, additional methane ignitions can confidently be expected.
3. The fan should be kept in operation continuously.
4. The rule preventing matches and smoking material underground should be rigidly enforced.
5. All underground workers should be diligently searched

for matches and smoking material from time to time prior to entering the mine.

6. The entire mine should be thoroughly rock-dusted to within 20 feet of the working face.

7. The incombustible content of the mine dust should be 70 per cent or more at all times.

8. The 20-foot non-dusted face zones should be kept thoroughly wet.

9. Closer supervision should be exercised with respect to the prevention of methane accumulations.

10. The master shot firing switch should be kept locked at all times when not in actual use.

11. The improvised gap "switch" should be replaced with a safer and more modern contrivance. Such gap "switch" should be locked in the open position when not in use. Simply twisting the wires together in order to close the gap may result in poor connections, with resultant misfires.

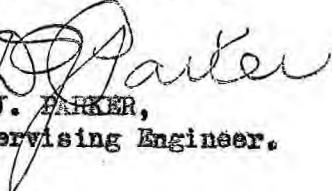
12. The voltage on the signal lines in the main slope should be reduced from 110 volts to 35 volts or less.

#### ACKNOWLEDGMENT.

The writer desires to express his sincere appreciation for the courtesies extended by Superintendent Robert Howard and

Mine Foreman George Howard, and for the valuable assistance  
given by the State Mine Inspector, John Taylor.

Respectfully submitted,

  
D. J. BARKER,  
Supervising Engineer.

APPROVED: