

# COAL FATAL

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF MINES

Health and Safety District G

FINAL REPORT OF MINE EXPLOSION  
PEERLESS NO. 3 MINE  
PEERLESS COAL COMPANY  
EXCELSIOR, SEBASTIAN COUNTY, ARKANSAS  
(Post Office - Greenwood, Sebastian County, Arkansas)

December 11, 1957

By

R. D. Bradford  
Subdistrict Supervisor, Health and Safety District G

Michael Deak, Jr.  
Federal Coal-Mine Inspector

And

W. Marion Baker  
Federal Coal-Mine Inspector (Electrical)

Originating Office - Bureau of Mines  
McAlester, Oklahoma  
R. D. Bradford, Subdistrict Supervisor  
McAlester, Oklahoma Subdistrict, Health and Safety District G

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INTRODUCTION

A gas explosion occurred near the face of the main slope air course entry at the Peerless No. 3 mine, Peerless Coal Company, Excelsior, Sebastian County, Arkansas, about 4:30 a.m., Wednesday, December 11, 1957, resulting in the death of 4 of the 6 men in the mine at the time of the explosion. The names of the victims, their ages, marital status, occupation, and number of dependents are shown in Appendix 1 of this report.

The other two employees escaped from the mine unassisted; one of the survivors was hospitalized the following day from shock and exertion, the other received slight facial abrasions and did not require medical attention.

The explosion occurred when an explosive mixture of methane near the face of the slope air course entry was ignited with an open flame, and the forces were confined to the two development entries, the 11 east parting, and extended up the main slope to the 3 west. The general dampness of the mine dust, the presence of rock dust, and room for expansion of forces, undoubtedly prevented a widespread explosion. Property damage was very slight, consisting mainly of blown-out doors and stoppings.

Following the explosion a withdrawal Order was issued under Section 203(a)(1) of the Federal Coal Mine Safety Act because of an imminent hazard from an accumulation of methane caused by disrupted ventilation.

## GENERAL INFORMATION

The Peerless No. 3 mine, 4 miles west of Excelsior, Sebastian County, Arkansas, is served by the Midland Valley Railroad. The mine was opened in 1943 by the present company, and the names and addresses of the operating officials are:

W. H. Lewis, President, Greenwood, Arkansas  
Richard Bartlett, Mine Foreman, Ft. Smith, Arkansas

The mine was opened by a slope and a single compartment air shaft 60 feet in depth. The slope was driven on a 12-degree pitch to intersect the coal bed and thence in the coal bed for a distance of about 5,450 feet. Development is in the Upper Hartshorne coal bed which averages 26 inches in thickness and dips about 2 degrees to the south in the present workings. According to Bureau of Mines Bulletin 446, the average analyses of the Upper Hartshorne coal in this area is as follows:

	Percent
Moisture	2.7
Volatile Matter	17.1
Fixed Carbon	72.2
Ash	8.0
	<hr/> 100.0

Numerous tests by the Bureau of Mines have shown that coal dust having a volatile ratio of 0.12 is explosive and the ignitibility increases as the volatile ratio increases. The volatile ratio of the coal in this area, as determined from the above analyses, is .19, indicating that the coal dust from mines in this area is explosive.

During normal operation of the mine, a total of 165 men was employed, of which number 150 worked underground, on 2 coal-producing shifts and a maintenance supply shift, 5 days a week, to produce 750 tons of coal each day. However, since about November 25, 1957, the mine operations were confined to the development of the two main slope entries inby the 11 east, and a total of 22 men was employed, of which number 19 worked underground on 3 shifts, 5 days a week to produce about 100 tons of coal each day. All coal was loaded by hand onto chain-flight conveyors which discharged into mine cars.

Fires, explosions, or disasters had not occurred in this mine since the original Federal inspection.

The last Federal inspection of this mine was completed September 5, 1957, and a check inspection was made on October 31, 1957; however, on this date, coal was being produced from the longwalls, and the development work on the slopes below 11 east had not been started.

## MINING METHODS, CONDITIONS, AND EQUIPMENT

### Mining Methods

A modified advancing longwall system of mining was followed, and about 95 percent of the coal was extracted as the workings advanced. A main slope entry and a parallel air course were driven down the pitch, and strike entries were driven singly off the main slope at about 400-foot intervals. The main slope and strike entries were brushed to a height of about 6 feet. A single entry, locally called a "spouthole," is driven between the cross entries parallel to and 80 to 100 feet from the main slope entries. The inby rib of the "spouthole" is the original starting point of the advancing longwalls. A wingwall, about 15 feet wide, on the lower side of the cross entries, was advanced with each longwall.

Suspension supports (roof bolts) were used along the main slope and cross entry haulageways. Vertical rods, 42 inches in length, were installed on 4-foot centers with the two outer bolts being installed 1-1/2 feet from each rib, rows of bolts were installed 5 feet apart, and 6-by 6-by 1/4-inch steel bearing plates were used. Conventional timbers were used in conjunction with roof bolts in the cross entry haulageways.

### Explosives

Coal was blasted with permissible explosives, and shot holes were prepared and fired by designated shot firers.

### Ventilation and Gases

The mine is classed gassy by the Arkansas Mine Inspection Department and by the Bureau of Mines. Ventilation was induced by a centrifugal fan which was suitably installed on the surface in a fireproof housing. The mine was ventilated with two splits of air, one each for the east and west sides of the mine. The main slope haulageway was ventilated by intake air. During the last Federal inspection, the volume of air reaching the last open crosscut in the main slope and longwall faces ranged from 7,500 to 9,300 cubic feet a minute.

Blower fans with tubing were used to ventilate the roadhead faces driven in advance of the longwalls.

The Joint Industry Safety Committee, in Appeal Docket No. A-226 dated July 13, 1954, granted an exemption from the requirements of Article V, Section 2c of the Federal Mine Safety Code, concerning the use of blower fans and tubing. The exemption was granted with the provisions that the blower fans and tubing be installed and used in accordance with the following conditions:

1. When the blower fan is stopped during blasting operations, the men shall not be permitted to reenter the roadhead and the fan shall

not be started until after the area has been examined by a properly certified person and found free of methane.

2. Accumulations of methane shall be removed by substantially constructed line brattice before the fan is started.

3. The fans shall be installed so as to prevent the recirculation of air as is now being done.

4. The fan tubing shall be maintained in good condition, the discharge end of the tubing shall be kept within 20 feet of the faces of the roadhead, and the fan and tubing shall be inspected at least twice during each working shift.

5. The roadheads shall be examined for methane by a certified official before the fans are started at any time, and after any interruption of fan operation during the shift.

At the time of the spot-check inspection on October 31, 1957, the conditions of the exemption were being carried out.

#### Dust

During the September 1957, Federal inspection, the mine surfaces ranged from damp to wet throughout the mine. During a spot-check inspection made on October 31, 1957, the face of the main slope was developed to the 11 east, and the rock-dust application on the roof and ribs of the main slope for a distance of 350 feet outby the face of the main slope entry was inadequate. However, additional rock dust, in sufficient quantity, was applied at this location during the check inspection.

#### Transportation

About 90 percent of the coal was loaded by hand onto chain-flight conveyors which discharged into mine cars on the entries; coal and rock in the roadheads was loaded by hand directly into mine cars. Battery-type locomotives were used to move the cars from the longwall loading stations to the main slope where haulage was accomplished by a rope motivated by an electrically driven hoist on the surface.

#### Electricity

Electric power, 220 volts three-phase alternating current, was used on the surface and underground. The power wires entered the mine through boreholes from transformers installed on the surface, and cut-out switches were provided at all points underground where the power circuits entered the mine and for all branch circuits. All of the underground electric equipment was nonpermissible. The trailing cables for the mining machines were provided with overload protection and means of disconnecting the power. Flame safety lamps were provided for the machine men, fire bosses, and foremen to make tests for gas during cutting and blasting operations.

### Illumination and Smoking

Permissible electric cap lamps were used for portable illumination, and smoking was prohibited underground. However, smoking materials and a cigarette lighter were found underground during the investigation of the explosion, and cigarettes and matches were found in the clothing of one of the victims.

### Mine Rescue

A trained mine rescue team was not available at this mine. Fire-fighting equipment was adequate. The equipment consisted of fire extinguishers, supplies of rock dust, sand, and water lines.

## STORY OF EXPLOSION AND RECOVERY OPERATIONS

### Activities of Bureau of Mines Personnel

Michael Deak, Jr., Federal Coal-Mine Inspector, learned of the explosion from a radio newscast at 8:00 a.m., December 11, 1957, while on a routine inspection of a mine at Bokoshe, Oklahoma. Deak notified the Bureau office at McAlester, Oklahoma, and then contacted W. Marion Baker, Federal Coal-Mine Inspector (Electrical), who was inspecting mines in the Spiro, Oklahoma, area. The mine operator attempted to notify the McAlester office of the Bureau of Mines at the same time he notified the State Mine Inspector but, because all the inspectors were in the field, he was unable to make contact until about 7:30 a.m. when the telephone company switched the call to the home of one of the Bureau stenographers. Upon arriving at the mine about 8:30 a.m., Deak and Baker were briefed by the operator as to the activities following the explosion, including the recovery of three of the four victims. After the briefing, and in company with two employees, Deak and Baker entered the mine to assist John H. Berry, State Mine Inspector, and Richard Bartlett, Mine Foreman, who were in the mine, in recovering the fourth victim who had been found near the outby corner of the last open crosscut in the slope air course entry. After the body was sent to the surface, and in company with the forementioned officials, Deak and Baker examined all accessible places for fires and methane accumulations. Methane was detected at the last open crosscut in the main slope entry and at the entrance of the slope air course in 11 east parting. Because of disrupted ventilation, the methane could not be removed immediately and the party returned to the surface where Deak issued a withdrawal Order because of an imminent danger due to accumulation of methane and disrupted ventilation. A conference was held with company officials and the State Mine Inspector on the procedure to be used in restoring the ventilation. While the necessary materials were being obtained and delivered underground, the party reentered the mine, again examined for fires, and work was started to restore the ventilation so that the methane accumulation in the slope entries could be removed. After partial ventilation was restored to the 10 east, Deak and Baker returned to the surface about 8:00 p.m., and conferred with R. D. Bradford, Subdistrict Supervisor, who had arrived at the mine.

### Mine Conditions Immediately Prior to Explosion

The only work being performed in the mine on the day of the explosion was the development of the two main slope entries inby 11 east. The main slope and air course entries had been driven 254 feet inby the 11 east before a crosscut had been made. The face of the main slope was 125 feet inby the last open crosscut, and the air course had been driven 59 feet after the crosscut was completed. The main fan was operating normally, and, according to the mine record books, examinations made of the active entries by the foreman of the preceding shift revealed no unusual conditions.

Weather conditions and barometric pressure are believed to have had no bearing on the explosion. The weather in the area was clear and cold, and barometer readings obtained at the U. S. Weather Bureau, Airport Station, Ft. Smith, Arkansas, which is about 9 air miles from the mine, indicated a gradual raise in pressure from 29.720 at 5:00 p.m., December 10, to 30.020 at 8:00 a.m., December 11, the day of the explosion.

### Story of the Explosion

After producing the necessary tonnage to fill their current order, production of coal from the longwalls was stopped about November 25 and work was started to develop the main slope and slope air course from 11 east to a point where 12 east and 12 west cross entries could be turned. This development work was being performed three shifts a day, and the coal was loaded by hand onto chain conveyors which discharged into mine cars at the loading point on the main slope just inby 11 east and the other on the 11 east parting. Ventilation for this development was provided by installing a blower fan and tubing in the main slope just outby the end of the brushing and a second blower fan and tubing was installed on the 11 east parting to ventilate the slope air course. Both blower fans were in intake air since the main air current was split at the 11 east. The main slope and air course had been driven 254 feet where a crosscut had been made. During the day shift on December 10, the installation of a door had been completed in the haulageway between the main slope and the 11 east parting; however, the door was left open to provide fresh intake air for each of the blower fans. The mine foreman stated that he instructed the second shift foreman to move the two blower fans to a point just outby the last crosscut and close the new door at 11 east. He also stated that he called Kendrick Richardson on the telephone at his home and told him the second shift was moving the blower fans and that the door at 11 east should be kept closed. If these instructions had been carried out with the blower fans properly installed, the accident might not have occurred. However, apparently the instructions from the mine foreman were misunderstood and the second shift employees moved the blower fan from the 11 east parting to a point outby the last open crosscut in the air course and installed it near the east rib. The blower fan in the main slope was not moved, and the door at 11 east was closed. According to a statement by the second shift foreman, he was the last man to leave the working section on his shift and the door at

11 east was closed. This shift arrived on the surface about 11:00 p.m. The third shift composed of a six-man crew entered the mine at 11:00 p.m., December 10, and proceeded to their respective working places. Moore and Martin (victims) worked at the face in the main slope entry; Sewell and Simmons (victims) worked at the face in the slope air course; Miller (survivor) worked at the loading point for the slope air course on the 11 east parting and operated the cutting machine. Richardson (survivor) worked at the loading point in the main slope. According to statements by the two survivors, Kendrick Richardson and Frank Miller, the door at 11 east was propped open when they arrived at their respective working places. However, some of the other third shift employees (all victims of the explosion) preceded them into the mine and could have opened the door. Richardson's regular job was a fire boss but during this development work he also operated the loading point, and looked after the pumps along the main slope. Each loading point operator not only ran the conveyor and loaded the mine cars, he also operated a battery locomotive and placed the empty cars to be loaded, as well as pulling the loaded cars to a sidetrack up the main slope.

When Richardson arrived at the car-loading point on the main slope, he noticed that this blower fan had not been moved and he did not check to see whether or not the blower fan in the air course had been changed from its former location. Richardson stated that he made a test for gas at the face of the main slope at the beginning of his shift, then brought his lamp back and set it down near his dinner bucket just outby the loading point on the main slope, but did not go in or test for gas at the face of the slope air course at any time, since the machine man in each place was supposed to have a safety lamp and there was another fire boss (Gene Moore) on the third shift. However, a thorough search of the explosion area by the investigating party revealed that the only flame safety lamp underground during the third shift was the lamp used by Richardson and it was found near his dinner bucket just outby the loading point on the main slope. Richardson stated that so far as he knew his was the only flame safety lamp on the shift and that no one except himself used this lamp during the shift preceding the explosion. During the development work, Gene Moore was working at the face of the main slope cutting and loading coal, and his personally owned flame safety lamp was found in the lamp house on the surface.

Richardson said that shortly before the explosion, he again went to the face of the main slope and tested for gas with his safety lamp following blasting of a fresh cut of coal, and just as he returned to the loading point on the main slope to start the conveyor he saw Frank Miller come out of the 11 east on a battery locomotive and travel up the slope. Richardson started the conveyor and had loaded about one-half car of coal when the explosion occurred. The force of the explosion knocked Richardson down and he started to crawl up the slope toward the outside following the rail and keeping his face near the bottom because of the heat and dust. From the loading point to the 10 east the heat was terrific and so dusty he could not see the bottom with his face five inches above the rail. Outby the 10 east the air was better, and as he was crawling around some cars about 9 west he came upon Frank



Miller who asked him what had happened. Richardson and Miller continued to crawl up the slope until they got above the 9 east where they encountered better air. They noticed that the doors in 9 east and 9 west, as well as the man-doors in the stoppings on each side of the slope had been blown open, and they tried to close these doors before Miller started to the outside to summon help since there was no one on duty on the surface. Upon his arrival on the surface, Miller called W. H. Lewis, who in turn notified Richard Bartlett, Mine Foreman, J. H. Berry, State Mine Inspector, and attempted to notify the McAlester office of the Bureau of Mines. After Miller started to the surface, Richardson continued to make temporary repairs to the doors until he got to the overcast near the 5 west and found that the bottom of the overcast had been partially blown-out which almost completely short-circuited the air at this point. Richardson worked a while trying to stop the openings in the overcast, then started up the slope and met Frank Miller who had returned with Richard Bartlett, the mine foreman. Richardson then made his way to the surface.

#### Recovery Operations

Upon his arrival at the mine, Richard Bartlett, Mine Foreman, and Frank Miller, one of the survivors, entered the mine and started to restore the ventilation by making temporary repairs to damaged doors and stoppings. As soon as additional workmen arrived, men and material were sent underground and sufficient ventilation was provided to the 11 east. The bodies of two of the victims were located on the main slope between the 10 east and 11 east, and a third was found just inby 11 east near the loading point on the main slope. The State Mine Inspector arrived and assisted with recovering the third body, after which an examination of the main slope and slope air course was made to the last crosscut where the fourth and last victim was found and removed to the surface about 9:20 a.m., the day of the explosion. (See Appendix 2 for location of bodies). Federal inspectors Deak and Baker arrived underground and assisted with the recovery of the last body.

After a thorough examination of the affected area up to the last crosscut between the main slope and slope air course, work was started to make permanent repairs to the damaged doors and stoppings so that sufficient ventilation would be available to clear the accumulated gas in the slope and air course inby the last crosscut. These repairs were completed about 10:00 a.m., December 12, 1957.

#### INVESTIGATION OF CAUSE OF EXPLOSION

##### Investigation Committee

The underground investigation of the cause of the explosion was conducted on December 12, 1957. Members of the official investigation committee were:

Arkansas Mine Inspection Department

John H. Berry

Chief Mine Inspector

Company Official

Richard Bartlett

Mine Foreman

United Mine Workers of America

Paul Harris

Safety Committeeman

Walter Newton

Safety Committeeman

United States Bureau of Mines

R. D. Bradford

Subdistrict Supervisor

Michael Deak, Jr.

Federal Coal-Mine Inspector

W. Marion Baker

Federal Coal-Mine Inspector  
(Electrical)

A. M. Evans

Mining Health and Safety Engineer

On December 12, 1957, one of the survivors (Frank Miller) was interrogated briefly in the hospital at Ozark, Arkansas, and a complete statement was obtained from him on January 7, 1958. The other survivor was interrogated in the office of the State Mine Inspector on December 13, and at the official hearing on December 20, 1957.

Members of the second shift crew were interrogated at Peerless No. 3 mine on December 12 and 13, and a hearing was held in Ft. Smith, Arkansas, on December 20, 1957. At this hearing representatives of the United Mine Workers of America, the State Mine Inspector, the Peerless Coal Company, and the Bureau of Mines were permitted to direct questions to the witnesses.

Methane as a Factor in the Explosion

The mine is classed gassy by the Arkansas State Mine Inspection Department and by the Bureau of Mines, and methane has been detected in the mine on numerous occasions. Methane in excess of 1.0 percent was detected with a permissible flame safety lamp at the last open crosscut in the main slope and at the mouth of the slope air course in 11 east parting while work was in progress to restore ventilation during recovery operations and during the investigation. During the last Federal inspection, completed September 5, 1957, the mine was liberating methane at a calculated rate of 273,802 cubic feet in 24 hours. The results of the analyses of the air samples collected after the explosion are shown in Table 1.

Flame

The flame was confined to the air course entry from the face back to and into the crosscut. This was evidenced by the soot streamers

on the roof and ribs starting near the face and increasing in length gradually from this point to the open crosscut where the soot streamers were extremely long and heavy on both roof and ribs. Some evidence of intense heat was noted on pieces of loose coal laying in the crosscut, but pieces of paper, empty rock-dust sacks, and small splinters on the timbers outby the above area were not scorched or burned. The bodies of the two victims who were working in the air course (Sewell and Simmons) were badly burned, but the two who were loading coal at the face of the main slope (Martin and Moore) had no burns, and, according to the undertaker, died from carbon monoxide poisoning.

Fourteen dust samples were collected during the investigation within the explosion area, and the results of the analyses are listed in Table 2. Sample Nos. 1 to 7 inclusive were collected on the main slope from 11 east to 9 east and were roof and rib samples only because the floor was too wet for sampling. It will be noted that the incombustible content of these seven samples ranged from 39.7 to 86.6 percent, and the average was 61.1 percent. Sample Nos. 8 to 14 inclusive were band samples collected in the main slope and air course inby 11 east. The incombustible content of these samples ranged from 15.0 to 29.5 percent, which indicates that the amount of rock dust applied in these unbrushed entries was not adequate by itself to prevent the coal dust from entering into the explosion. However, water was used on the cutter bars of the mining machines while cutting, and, according to statements, the places were damp to wet prior to the explosion. In addition, most of these samples were collected in the area where the explosion was most violent and do not indicate the conditions relative to adequacy of rock-dusting prior to the explosion. The alcohol coke tests indicate a trace of coke particles in the sample collected 40 feet outby the face in the air course, a large amount 59 feet outby the face, and none in the two samples collected in the air course between the last crosscut and 11 east. A small amount of coke particles was present in the sample collected in the last crosscut, in the sample 50 feet inby the last crosscut in the main slope, and in the sample 75 feet outby this crosscut on the main slope. Large and very large amounts of coke particles were present in the four samples collected on the main slope between 11 and 10 east, while only a small amount was present in the sample collected 40 feet outby 10 east, only a trace in the sample collected 150 feet inby 9 east, and none in the sample collected at 9 east. It is believed that these coke particles were deposited by the forces from the explosion, and they, along with the other dust, account for the extremely hot and dusty atmosphere encountered by Kendrick Richardson when he was crawling from the loading point to 10 east after the explosion. The location of the dust samples are shown in Appendix 2.

#### Forces

Evidence indicated that the forces of the explosion started at or near the last open crosscut in the slope air course with the main force traveling out the air course to 11 east parting and extending up the slope to 3 west. (See Appendix 4). Some slight force extended through the crosscut and came out the slope entry, as evidenced by the disrupted

blower-fan tubing and the fact that Richardson, who was at the loading point, was knocked down and received abrasions on the side of his face which was turned toward the face of the slope. The blower fan in the air course had been moved outby and turned from its original position, the conveyor pans in the air course outby the crosscut were damaged to some extent, and most of the timbers in the air course outby the crosscut were dislodged and blown toward the 11 east parting. The doors in 9 and 10 west and 10 east, and a concrete-block stopping at 11 east were blown-out; part of the bottom of the overcast at 5 west was destroyed, and the man-doors in the concrete-block stoppings along the main slope up to 3 west were blown open. The magnetic starter and push-botton control for the conveyor in the air course were blown about 30 feet, from their original position on the 11 east parting, toward the main slope; however, the 11 east door was not damaged and this is positive proof that the door was open at the time of the explosion.

#### Evidence of Activities

Testimony of the survivors and evidence found during recovery operations and the investigation indicate that, at the time of the explosion, two of the men (Martin and Moore) were shoveling coal onto the conveyor at the face of the main slope. The cut of coal had been shot down, and Richardson had tested for gas at the face and returned to the loading head where he started the conveyor and had loaded about one-half car of coal. On the air course side, two men (Sewell and Simmons) had loaded all except about one car of coal in the cut when the conveyor was stopped by Miller at the car-loading point while he went up the slope to get more empty cars. The conveyor in the air course was full of coal, and all of the cars at the loading point were loaded. It was customary for each crew to leave a fresh cut of coal for the oncoming shift. Miller stated that he had cut the place, and, after it was shot down, he told Sewell and Simmons there was only one empty at the loading point and when it was loaded he would have to get two more to clean up so the place could be cut again for the next shift. Miller had returned from the face to the loading point, started the conveyor, loaded the car, stopped the conveyor, and took the locomotive up the slope for more empty cars when the explosion occurred. Sewell and Simmons were waiting at the face to finish loading out the last car of coal when the ignition occurred. Miller also stated that no tests for gas were made in the air course during his shift. A miner's cap, belonging to Simmons, was found on the right side of the conveyor, and a pair of gloves, a can of smoking tobacco with cigarette papers, and an open cigarette lighter were found on the left side. These objects were near the shovels at approximately the normal position where the men would be loading coal. The cutting machines in both places were parked in their normal position while coal was being loaded, and both controllers were in the "off" position.

It is believed that Sewell and Simmons were at their normal loading position near the face of the air course when the methane gas was ignited, and that they both started to crawl toward the crosscut with the methane-air mixture burning slowly. Simmons, who was on the traveling side of the conveyor and closer to the crosscut, was able to get to, and possibly through, the crosscut ahead of Sewell, who apparently

had reached the crosscut when the forces struck him. This would account for the burns to both men, and, according to the undertaker, Sewell's burns were much more extensive and he had received a fatal blow on his side from being blown against the rib or from being struck by some object. Simmons received severe burns to his head, neck, shoulders and back, but had no other injuries. Simmons travelled to the loading point on the main slope just outby the end of the brushing where he apparently was overcome by the afterdamp.

Moore and Martin were able to travel, from their working place at the face of the slope, a distance of approximately 680 feet where their bodies were found, 50 feet apart, face down headed toward the outside. According to the undertaker, they had received no burns or other injuries, and both were overcome by the afterdamp. It is possible that Simmons, Moore and Martin could have escaped if self-rescuers had been available to them. (See Appendix 3 for details in face area, and Appendix 2 for location of bodies).

#### Probable Point of Origin

There is unanimity of opinion of all parties investigating the explosion, that it originated near the face of the slope air course.

#### Factors Preventing Spread of Explosion

It is believed that the major factors in preventing the spread of the explosion were the moisture present in the coal dust together with the rock dust and possibly volatile-combustible ratio of the coal dust. It is also believed that the relief of the explosion pressure through the wide area in the 11 east parting and the main slope definitely limited the violence and destruction.

#### Summary of Evidence

Conditions observed in the mine during recovery operations and the investigation following the explosion, with the information obtained from officials, workmen, the State Mine Inspector, and reports of Federal inspections of the mine, provided evidence as to the cause and origin of the explosion. This evidence is summarized as follows:

1. Delegation of authority was not definite as to who, if anyone, was in charge of the third shift charged with the responsibility of checking to see that the working places were adequately ventilated.
2. There was a misunderstanding regarding the orders to move the blower fans and the operation of the door at 11 east.
3. There was only one flame safety lamp underground during the third shift, and it was found outby the loading point on the main slope.
4. Tests for mothane were not made in the slope air course during the entire third shift.

5. The door at 11 east remained open during the third shift, a period of approximately 5-1/2 hours.

6. The blower fan used to ventilate the face of the slope air course was moved during the second shift and installed in a manner that permitted recirculation of air.

7. The face of the main slope was ventilated with a blower fan and tubing; the fan was installed in fresh air at the loading point on the main slope.

8. The ventilation in the slope air course was not adequate to dilute and carry away the methane being liberated.

9. Smoking materials and an open mechanical cigarette lighter were found about 7 feet outby the face of the slope air course which the evidence indicated was the point of origin.

10. Nine cigarettes and thirty-two kitchen-type matches were found in the clothing of one of the victims who was working in the air course where the ignition occurred.

11. The bodies of the two employees who were working at the face of the slope air course at the time of the explosion were severely burned, but the two working at the face of the main slope were not burned.

12. Blasting operations were not being performed at the time of the explosion.

13. The only electrical equipment in operation in the air course at the time of the explosion was the blower fan, and it was located about 9 feet outby the open crosscut. The switch was in the running position, and the contacts were tight. The fan motor was the alternating-current induction type. Evidence of forces at the fan indicate that the ignition did not occur at this point.

14. Members of the investigating party were the first persons, other than the victims, to travel inby the last open crosscut in the main slope and air course after the explosion.

#### Cause of Explosion

From testimony and evidence obtained during the investigation, it is believed that the explosion was caused by the ignition of an accumulation of methane in the face area of the slope air course by an open flame (match or mechanical cigarette lighter). The methane was allowed to accumulate when a door at 11 east was left open for a period of approximately 5-1/2 hours, and a blower fan used to ventilate the face of the air course was moved to a location that permitted recirculation of the air. The investigating party is in agreement with these findings.

## RECOMMENDATIONS

Compliance with the following recommendations should aid in the prevention of a similar occurrence.

1. The volume and velocity of the current of air at working faces should be sufficient to dilute so as to render harmless, and to carry away, flammable or harmful gases.

2. The working places should be examined for methane at the beginning of each shift, before and during cutting operations, before and after blasting, and oftener if necessary for safety.

3. Smoking should not be permitted or practiced underground, nor should any person be permitted to carry smoking materials, matches, or lighters underground.

4. The intentional creation of any arc, spark, or open flame should be prohibited in this gassy mine.

5. Officials and workmen whose regular duties require them to inspect working places for methane and other dangers should have a permissible flame safety lamp in their possession and it should be kept lighted.

6. Doors should be erected in pairs to form air locks; where single doors are used, they should be attended constantly while the section of the mine controlled by such doors is in operation.

7. A properly certified person should be designated by the operator to be in charge of each underground shift, whose duty it should be to see that the provisions of the State laws and the Federal Coal Mine Safety Act that pertain to the health and safety of the workmen are complied with.

8. Designated fire bosses should not be required to perform duties other than those of making tests for gas, checking ventilation, and inspecting for other dangers pertaining to the health and safety of the men underground.

9. Changes in ventilation made on one shift should be reported to the person in charge of the succeeding shift.

10. Auxiliary blower fans with tubing should be so installed that recirculation of air is not possible.

11. Crosscuts should be made between entries at intervals in accordance with the applicable State law; provided, however, that in no case should the distance between crosscuts exceed 105 feet.

12. Self-rescuers should be provided and available for all underground employees, who should be properly instructed in their use, maintenance, and limitations.

13. A qualified hoisting engineer should be on duty continuously while any person is underground.



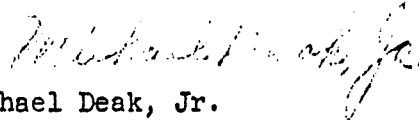
# ACKNOWLEDGMENT

The writers gratefully acknowledge the help given by the members of the United Mine Workers of America, officials of the company, and the State Mine Inspector. The writers are especially grateful for the able assistance given them in connection with collecting material for the report by the Local Safety Committee and A. M. Evans, Mining Health and Safety Engineer, Bureau of Mines, Dallas, Texas

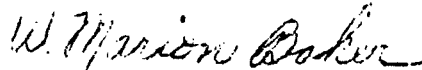
Respectfully submitted,



R. D. Bradford  
Subdistrict Supervisor  
Health and Safety District G

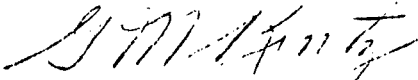


Michael Deak, Jr.  
Federal Coal-Mine Inspector



W. Marion Baker  
Federal Coal-Mine Inspector (Electrical)

Approved by:



G. M. Kintz  
District Supervisor  
Health and Safety District G

TABLE 1 ANALYSIS OF AIR SAMPLES COLLECTED AFTER EXPLOSION December 11 and 12, 1957

MINE Peerless No. 3 COMPANY Peerless Coal Company COLLECTED BY Michael Deak, Jr. and W. Marion Baker

BOTTLE NO.	LABORATORY NO.	DATE AND HOUR SAMPLED	LOCATION IN MINE	Carbon Dioxide CO <sub>2</sub>	Oxygen O <sub>2</sub>	Carbon Monoxide CO	Methane CH <sub>4</sub>	Nitrogen N <sub>2</sub>	Air Quantity
P-1789	316400	12-11-57 2:00 P.M.	Return off main slope entries, 11 east out by end of slope air course	0.06	20.48	0.00	2.01	77.45	Still
P-1702	316397	12-12-57 12:30 P.M.	Return off main slope entries, 11 east out by end of slope air-course	0.07	20.59	0.00	1.05	78.29	7,480
P-1706	316398	12-12-57 12:30 P.M.	Face of main slope entry	0.10	20.21	0.00	3.06	76.63	Still
P-1686	316399	12-12-57 12:35 P.M.	Face of slope air-course entry	0.11	20.36	0.00	2.50	77.03	Still

LAB. NOS. F-64169 to F-64182

TABLE 2 ANALYSES OF DUST SAMPLES.

COLLECTED December 11-12, 1957

Michael Deak, Jr. and

MINE Peerless No. 3

COMPANY Peerless Coal Company

COLLECTED BY W. Marion Baker

SAMPLE NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	Alcohol Coke Test	As-Received Percent Incombustible
			Amount of Particles	
1	Roof & Rib	End of relay at 9 east on main slope.	None	86.6
2	Roof & Rib	150 feet inby 9 east on main slope.	Trace	81.7
3	Roof & Rib	40 feet outby 10 east on main slope.	Small	63.4
4	Roof & Rib	At 11 east parting on main slope.	Large	39.7
5	Roof & Rib	50 feet outby 11 east on main slope.	Very large	39.8
6	Roof & Rib	100 feet outby 11 east on main slope.	Very large	59.4
7	Roof & Rib	150 feet outby 11 east on main slope.	Large	57.4
8	Band	59 feet outby face, slope air course.	Large	20.0
9	Band	40 feet outby face, slope air course.	Trace	18.5
10	Band	80 feet inby 11 east on slope air course.	None	15.0
11	Band	40 feet inby 11 east on slope air course.	None	29.5
12	Band	10 feet in crosscut off main slope entry.	Small	17.0
13	Band	50 feet inby crosscut in main slope entry.	Small	21.9
14	Band	75 feet outby last crosscut, main slope entry.	Small	15.2
NOTE: Where roof and rib samples were collected, floor was too wet for sampling.				

APPENDIX 1

Appendix 1

Victims of Explosion, Peerless No. 3 Mine  
Peerless Coal Company  
December 11, 1957

Name	Age	Occupation	Years of Experience	Marital Status	Dependents
Joe Martin ✓	47	Machine Operator	2	Married	3
<del>Eugene Moore</del>	35	Fireboss	2	Married	3
✓ L. D. Sewall	36	Machine Helper	2	Married	1
✓ George Simmons	51	Machine Operator	14	Married	2

Record of mine experience other than that at Peerless No. 3 mine not available.

APPENDIX 2

Dust samples Nos. 1 and 2  
were taken in main slope  
between 9 and 10 West

Dust Sample No. 3

10 West Roadway

West Air Course

Main Slope

Slope Air Course

East Air Course

10 East Roadway

Doors at 10 west and  
10 east blown in by  
explosion

Eugene Moore's body headed  
outward in middle of track

Joe Martin's body headed  
outward near west rib

Dust Sample No. 7

Dust Sample No. 6

Dust Sample No. 5

Dust Sample No. 4

Extent of forces

Blower fan with tubing 11W

Simmons' body

Battery locomotive and 2 cars

Car loading point

Bottom brushed to this point

Pan conveyor

Dust Sample No. 14

Dust Sample No. 12

Dust Sample No. 13

SLOPES INBY 9 EAST AND WEST  
PEERLESS NO. 3 MINE

Scale 1" = 100'



11E

Door said to have  
been propped open

Bottle No. P-1789

Bottle No. P-1702

Car loading point

Concrete block stopping  
blown out by explosion

Dust sample No. 11

Dust sample No. 10

Pan conveyor

Blower fan with tubing

Sewell's body, badly  
burned, found here

Dust sample No. 8

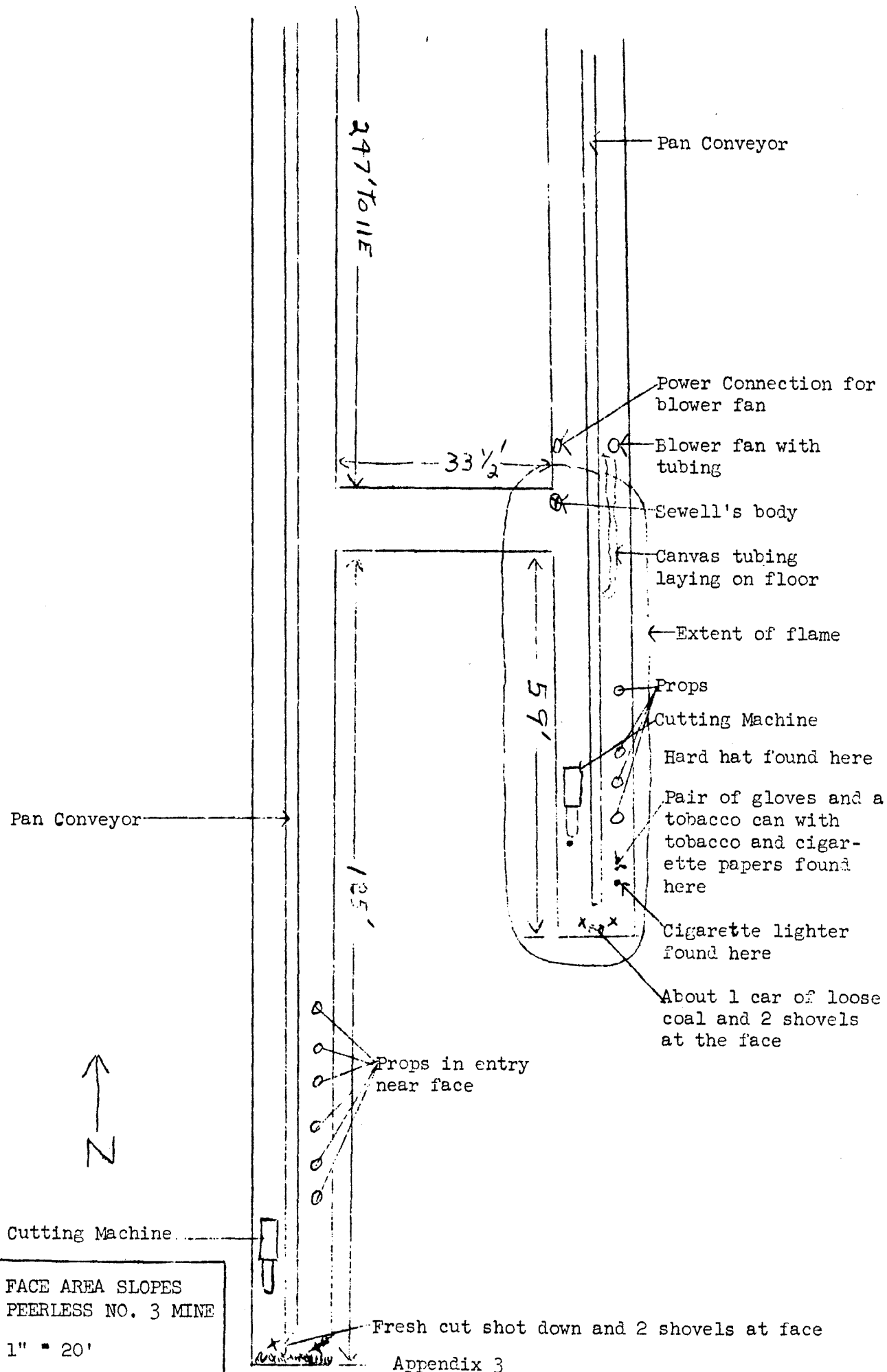
Dust sample No. 9

Bottle No. P-1636

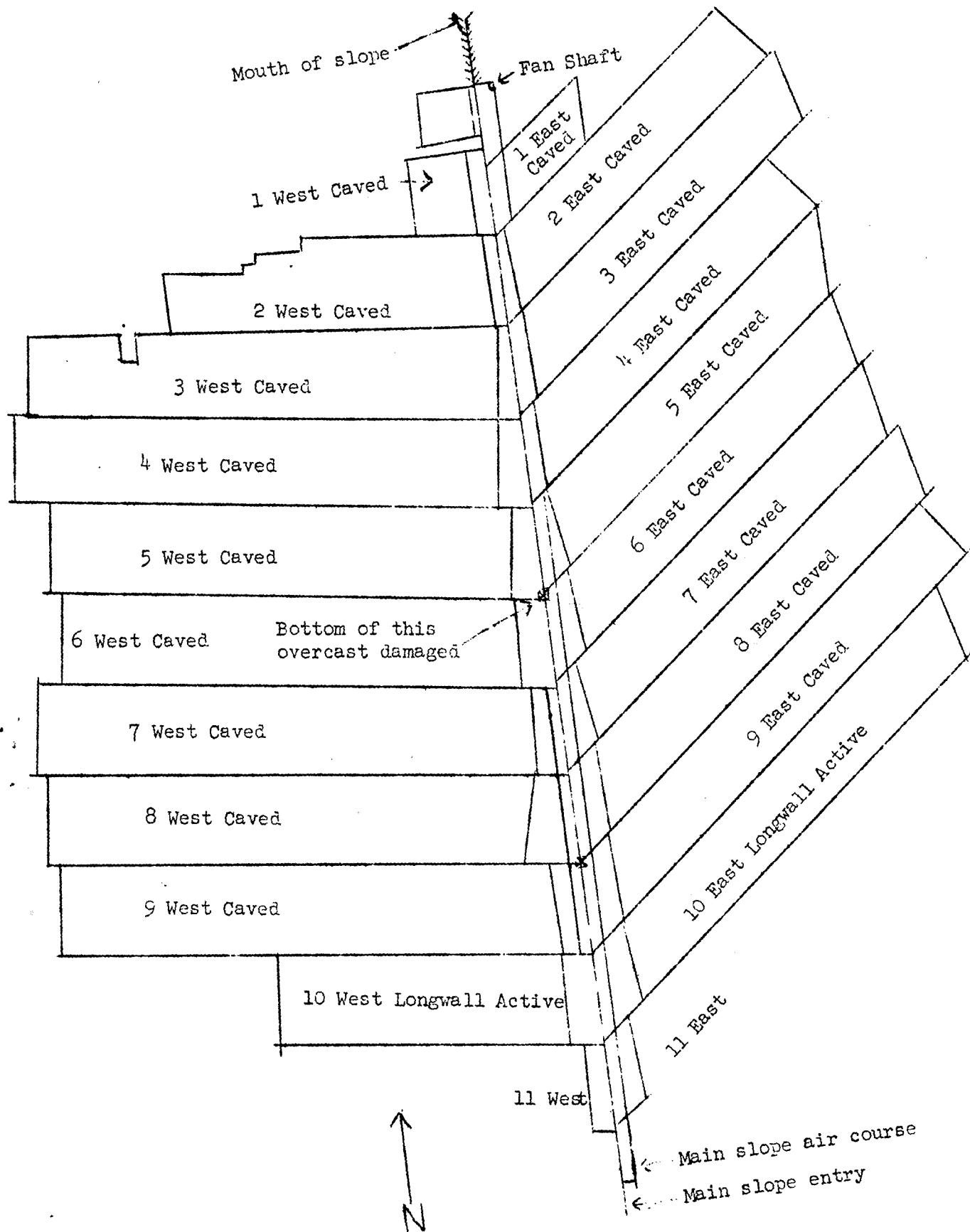
Bottle No. P-1706

APPENDIX 3





APPENDIX 4



PEERLESS NO. 3 MINE

Scale 1" = Approximately 600'

Appendix 4