COAL FATAL

A

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

DISTRICT B

3 fatals

46-063

4601374

REPORT OF COAL MINE FIRE (3 FATAL)

NO. 8-B MINE
BUFFALO MINING COMPANY
SAUNDERS, LOGAN COUNTY, WEST VIRGINIA

December 12, 1968

By

Robert G. Calvert
Coal-Mine Inspection Supervisor

Tennis H. Hatfield
Federal Coal-Mine Inspector (Electrical)

Originating Office - Bureau of Mines
Mount Hope, West Virginia 25880
W. R. Park, District Manager
Health and Safety District B

CONTENTS

REPORT OF COAL MINE FIRE

NO. 8-B MINE
BUFFALO MINING COMPANY
SAUNDERS, LOGAN COUNTY, WEST VIRGINIA

December 12, 1968

By

Robert G. Calvert
Coal-Mine Inspection Supervisor

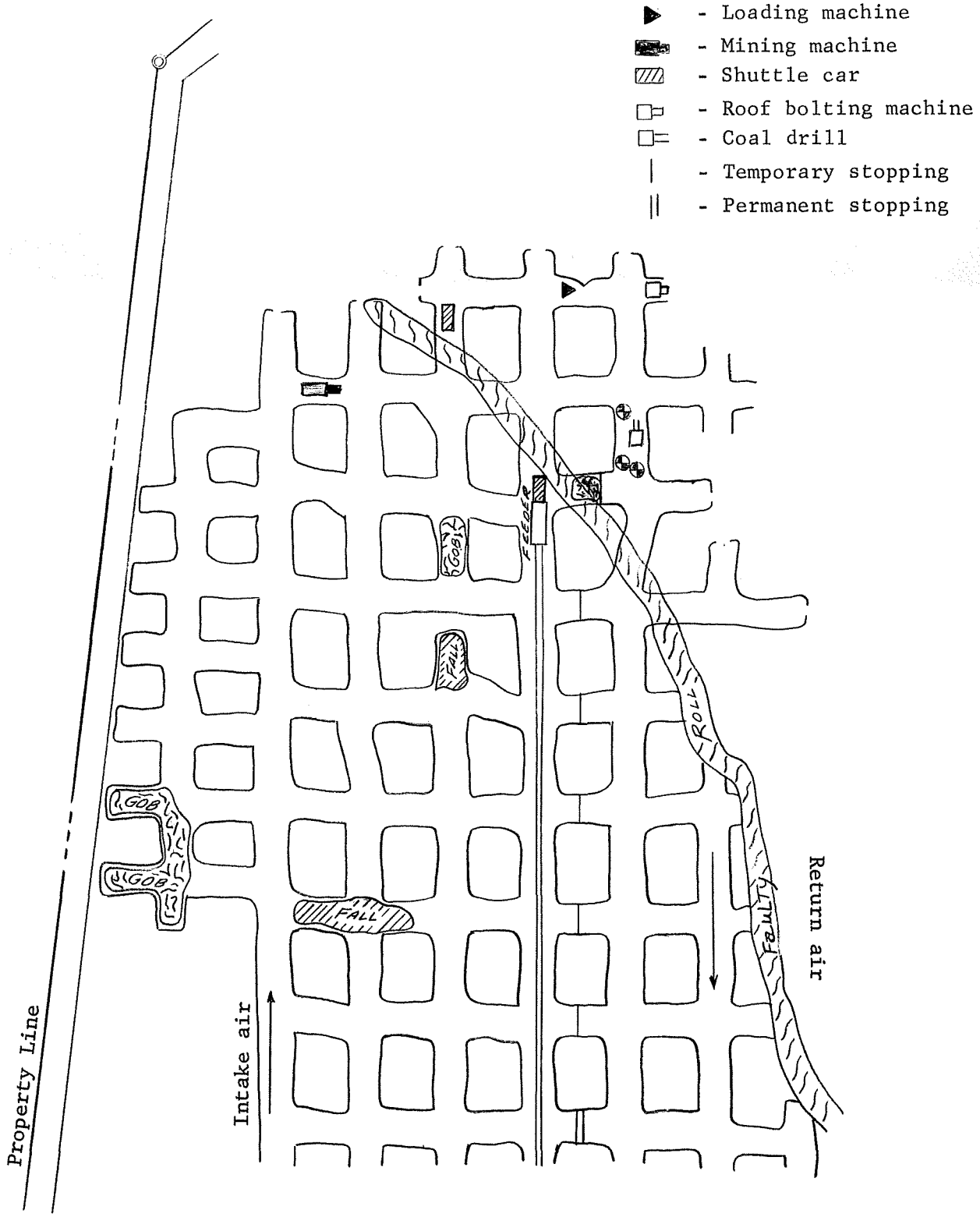
Tennis H. Hatfield
Federal Coal-Mine Inspector (Electrical)

INTRODUCTION

This report is based on an investigation made in accordance with the provisions of the Federal Coal Mine Safety Act (66 Stat. 692; 30 U.S.C. Secs. 451-483) as amended.

A fire occurred about 8:20 p.m., Thursday, December 12, 1968, at a belt-conveyor feeder that was installed at a point about 80 feet outby survey station spad No. 323 in No. 4 entry, No. 1 section, 8-B JR portal of the 8-B mine. At the time of the fire, 14 men were at work in the main part of the 8-B mine and two were on the surface, one at the main portal of the 8-B mine and one at the 8-B JR portal. These men were unaffected by the fire. In the 8-B JR portal section where the fire occurred, nine men were underground; six escaped unharmed and assisted with firefighting operations, but the other three were overcome with smoke and fumes inby the fire area and were found dead after the fire was extinguished. The names, ages, and occupations of the victims are recorded in Appendix A of this report.

The fire was initiated when a short circuit occurred at a temporary splice in the power cable to the belt feeder. Hydraulic oil, preheated and escaping under pressure from ruptured hoses, and other combustible materials were ignited as a result of the electric arcing. Firefighting operations confined the fire and damage to the belt-conveyor feeder and the immediate vicinity.



Plan view of working section

REPORT OF COAL MINE FIRE
NO. 8-B MINE
BUFFALO MINING COMPANY
SAUNDERS, LOGAN COUNTY, WEST VIRGINIA

December 12, 1968

APPENDIX B

Scale 1" = 100'

GENERAL INFORMATION

The 8-B mine, at Saunders, about 3 miles north of Lorado, West Virginia, is served by the Chesapeake and Ohio Railway. The names and addresses of the operating officials are:

President	A. D. Scaggs, Jr.	Lyburn, West Virginia
Vice President	E. J. Wood	Lyburn, West Virginia
Vice President - Operations	D. S. Dasovich	Lyburn, West Virginia
Superintendent	Claude Lockhart	Lyburn, West Virginia

A total of 80 men, 71 underground and 9 on the surface, is employed on 1 maintenance and 2 coal-producing shifts a day, 5 and 6 days a week. The average daily production is 1,400 tons of coal, all of which is loaded mechanically.

The mine is opened through several drifts into the Upper Chilton coalbed, which averages 54 inches in thickness in the areas being mined. In developing the right portion of the mine property, entries turned right off 1 right emerged to the surface through previously drilled auger holes. A new portal, 8-B JR was then established on the opposite side of the mountain to continue underground mining operations in the coalbed. The belt conveyor was extended across the valley and into the 8-B JR portal openings. At the time of the fire, the 8-B JR portal entries were completely separated from the main portion of the 8-B mine, except for the coal carrying belt conveyor.

The last Federal inspection of this mine was completed October 30, 1968.

MINING METHODS, CONDITIONS, AND EQUIPMENT

Mining Methods: Mining in the 8-B JR portal section consisted of the development of main entries, which had been driven to a depth of about 1,580 feet from the surface. The entries, on 60-foot centers and 24 feet wide, were projected to be driven in sets of seven; however, the exact number driven was dependent upon faults encountered in the coalbed. Crosscuts were turned at intervals of about 70 feet.

Ventilation and Gases: The mine is classed nongassy. Ventilation for the 8-B JR portal section was induced by a propeller-type fan exhausting approximately 22,000 cubic feet of air a minute and more than 6,000 cubic feet of air a minute was reaching the last open entry crosscuts.

General Conditions: The mine surfaces ranged from wet to dry, and dangerous accumulations of loose coal and coal dust were not observed. However, the rock-dust applications in the No. 1 section were not maintained to within 40 feet of the faces, and where applied, the applications were obviously inadequate outby the face areas in all entries.

Transportation: Coal was transported from the faces in shuttle cars that discharged onto a belt feeder. A belt conveyor (fire-resistant) was then used to transport the coal to the surface, and this belt was also utilized to transport supplies into the mine. Men were not transported underground.

Electricity: Electric power at 4,160 volts a.c., purchased from the Appalachian Power Company and conducted underground through the belt entry, is used for the operation of a 300-kw rectifier. The rectifier, located in the belt entry, supplies 275 volts d.c. power for the operation of the electric face equipment, the 75-horsepower belt-conveyor drive motor, and the belt feeder. The d.c. power circuits extend inby the rectifier and along the belt-conveyor entry for a distance of 880 feet toward the face area and outby the portal. Power is conducted by 500 and 1,000 MCM copper feeder wires in the positive circuit and the grounded negative circuit. The negative power conductor was laid on the mine floor and the positive power conductor was installed on insulated bell-type hangers attached to the mine roof; however, the investigation revealed that the 275-volt bare feeder conductor was tied to wooden posts with pieces of wire for a distance of approximately 80 feet outby the belt feeder. Reportedly, this conductor was installed in this manner after firefighting operations were completed. The d.c. power circuit was protected at the rectifier by an automatic circuit breaker that was adjusted to open at a current of 1,500 amperes and lockout if a solid short circuit occurred. Inspection of the circuit breaker showed that it was operative.

The equipment involved in the fire was a Galis belt feeder, type 770H-E4, Serial No. 77066052. The feeder was equipped with two 30-horsepower electric motors. A separate controller contactor compartment provided two-speed starting for each motor, and each motor was protected by a magnetic type, instantaneously operated overload, adjustable from 76 to 217 amperes. These overloads were adjusted to the maximum. During the investigation, the operation of the overloads was checked manually and both were found to be operable, even though there was some difficulty experienced in getting the overload for the coal breaker to operate. The motors were controlled by separately operated, lever-type start-stop switches, which were mounted on a metal plate attached to the belt feeder near hydraulic installations. Electric power was

supplied and connected to the belt feeder by a 12-foot length of Anaconda No. 1/0, two-conductor, type G, P-102BM cable that was connected to a 73-foot length of General Cable Super Service, No. 2/0, two-conductor, type W, P-110BM cable, a total cable length of 85 feet. The 73-foot length of cable and the 12-foot length contained four and two temporary splices, respectively. Splices in the cables were made with hammered type splice rings; except that one of the splices was made by twisting the wires together and applying insulating tape. A trolley tap containing a 400-ampere fuse was attached to the 73-foot length of cable to provide short-circuit protection; however, the fuse failed to open the circuit when the electrical fault occurred. The negative wire of the cable was twisted around the negative feeder. The belt feeder was not frame grounded; however, the feeder was contacting the belt tailpiece which was attached to the belt-conveyor structure.

The function of one motor on the belt feeder was to operate a coal breaker while the other was utilized for the operation of a two-stage, gear type, hydraulic pump. Relief valves of the hydraulic circuits were normally set to operate at 1,300 p.s.i. The hydraulic pump intake was supplied from a reservoir which had a capacity of 130 gallons, and, according to statements of mine personnel, the reservoir was normally kept full of "Special Anti-Wear Hydraulic Oil 4208 Pure Oil Company" oil, a flammable-type oil. The pressure side of the pump supplied hydraulic power through various control and relief valves to hydraulic jacks and hydraulic motors that powered the conveyor chain drive and tramming drives. All hydraulic component parts were connected by hoses of various sizes and lengths. The belt feeder was activated at the start of each working shift and was operated continuously; however, the feeder control circuit was electrically interlocked with the belt conveyor by means of a centrifugal switch. A trolley tap containing a 400-ampere fuse provided short-circuit protection for the trailing cable of the shuttle car, and this cable and belt-feeder cable were installed across and near the mid point of the belt feeder on wooden wedges that were driven into cracks in the roof.

Illumination and Smoking: Permissible electric cap lamps were used for portable illumination underground. Smoking was prohibited underground; however, evidence found during the investigation indicated that the employees used smokers' articles.

Mine Rescue and Firefighting Facilities: Firefighting equipment consisted of dry-chemical fire extinguishers and rock dust. Rescue equipment was not used in the recovery of the bodies; however,

"All-Service" gas masks were worn by three men to locate the bodies. Some of the employees on the No. 1 section had in their possession "self-rescuers," but they did not use them. Reportedly, one of the victims had a "self-rescuer" attached to his person.

STORY OF FIRE AND RECOVERY OPERATIONS

Activities of Bureau of Mines Personnel: The Logan office of the Bureau of Mines was notified of the fire by E. J. Wood, vice president of the company, about 10:15 p.m., December 12, 1968. Robert Calvert, coal-mine inspection supervisor, and Frank Smith, Jr., Federal coal-mine inspector, proceeded immediately to the mine and upon arrival they learned that the fire had been extinguished, and the bodies of the three victims had been recovered and brought to the surface. After being briefed by company personnel on the surface, they proceeded underground and examined the scene of the fire and surrounding areas. The investigation was continued on December 13 and was completed December 16, 1968.

During the underground investigation on December 13, 1968, Withdrawal Orders (Form 203(a)) were issued for mine explosion and mine fire dangers because coal dust was inadequately inerted and the bare power cable was tied to several wooden timbers. The Orders were annulled by the Director on December 16, 1968.

Evidence of Activities and Story of Fire: The No. 1 section crew with Franklin Bradley, section foreman, entered the 8-B JR portal about 3:45 p.m. and arrived on the section shortly thereafter. Coal production on the section progressed in the usual manner after mining operations were started. About 8:20 p.m., Joe Walls, mining machine operator, Herman Johnson, shot firer, and Luther Davis, shuttle-car operator, were in the vicinity of the No. 2 entry two crosscuts outby the face. Walls was taking his lunch period, Johnson was repairing a trailing cable, and Davis was loading supplies into his shuttle car. Clyde Frye, drill machine operator, had been sent to the surface by the section foreman to obtain oil for the mining machine. The roof-bolting machine had been moved to the face of No. 5 entry crosscut, and Archie Adams and Jackie Cook, operator and helper, were installing roof bolts to support known heavy roof in this place. Frank Collins, timberman, had brought roof support materials to the roof-bolting machine and was in this vicinity awaiting the completion of the bolting operations. In the meantime, Ray Webb, loader operator, had trammed the loading machine from the No. 4 entry to the right crosscut off No. 4 entry and had loaded one shuttle car with coal.

(This cut of coal had shot through toward No. 5 entry, thus making two open crosscuts inby the belt feeder.) Chester Elkins, operator of the loaded shuttle car, had proceeded to the belt feeder and while he was unloading the shuttle car, he stated that the belt feeder suddenly exploded and engulfed the entire surrounding area in flame.

Elkins immediately ran toward the face in No. 4 entry and positioned himself in the crosscut between Nos. 3 and 4 entries from where he called to Ray Webb, loader operator. Webb in turn sounded the alarm to the roof-bolting crew working in the opposite crosscut off No. 5 entry; however, Webb stated that the warning could not be heard because of the operation noise of the bolting machine. Elkins further stated that although it took him only about 30 seconds to reach the face areas, great clouds of black smoke were passing through the last open crosscuts and the loader operator could not be seen. He continued to call out until the loader operator came his way through the smoke.

Franklin Bradley traveled quickly to the scene of the fire from No. 1 entry and then rushed outby to the rectifier. After he tripped the switch on the circuit breaker, he got the fire extinguisher kept at the rectifier and returned to the fire. The mine telephone, installed near the belt feeder, could not be reached. Whereupon, Bradley sent Johnson to the surface to notify company officials of the occurrence. Johnson proceeded to the surface and then walked about a mile to the main portal of the 8-B mine, where he notified Harlen Baisden, electrician, of the fire.

Recovery Operations: Heavy black clouds of smoke were emitting from the belt feeder, but the ventilating air currents kept the area outby the feeder free of smoke, thereby, permitting Bradley, Walls, Webb, Davis, and Elkins to conduct firefighting operations with the supply of rock dust and fire extinguishers normally kept in the area. In about 1 hour and 15 minutes, flame had been extinguished, but dense black smoke continued to be emitted from the fire area for a considerable time after flame had ceased. The rapid burning of the hydraulic oil and the de-energizing of the power circuits permitted the fire to be brought under control and extinguished in the relatively short time. While fighting the fire, Bradley and the other men made several attempts to contact or reach the three missing men, but each of these attempts proved futile because of the dense smoke. On one occasion about 9:15 p.m., Bradley managed to get into No. 5 entry and could see lights, but he was again forced to retreat because of smoke.

About 9:20 p.m., Willie Baker, general mine foreman, and Franklin Hatfield, chief electrician, arrived at the scene of the fire with

"All-Service" gas masks and additional fire extinguishers. Baker, Hatfield, and Bradley then donned the apparatus and traveled through the first crosscut into No. 5 entry where they located the bodies of the three victims. The victims had traveled a distance of only about 100 feet from their place of work to the next outby crosscut. The rescue party then retreated to fresh air and waited until the area was cleared of smoke before recovering the bodies. The victims were brought to the surface about 10:30 p.m.

INVESTIGATION OF CAUSE OF FIRE

Investigation Committee: The following persons took part in the investigation or supplied information relative to the occurrence:

Buffalo Mining Company

E. J. Wood	Vice President
Steve Dasovich	Vice President - Operations
Claude Lockhart	Superintendent
Willie Baker	General Mine Foreman
Franklin Bradley	Section Foreman
Franklin Hatfield	Chief Electrician

United Mine Workers of America

Joe Ellis	Director, Logan-Williamson Field, District 17
Robert Browning	Field Representative, District 17
Earl Daniels	President, Local Union No. 8454
Chester Elkins	Shuttle-Car Operator
Ray Webb	Loader Operator

West Virginia Department of Mines

E. C. Workman	Director
Hobart Rice	Inspector-at-Large
Pat Heatherman	Assistant Inspector-at-Large
Harry Herald	District Inspector

United States Bureau of Mines

Robert Calvert	Coal-Mine Inspection Supervisor
Frank Smith, Jr.	Federal Coal-Mine Inspector
Tennis H. Hatfield	Federal Coal-Mine Inspector (Electrical)

A hearing conducted by the West Virginia Department of Mines on December 16, 1968, was headed by E. C. Workman, director, who received assistance from other State personnel. Mr. Workman invited representatives of the United Mine Workers of America, Buffalo Mining Company, and the Bureau of Mines to participate in the interrogation of anyone who might have knowledge of the events prior to the fire.

Evidence revealed during the investigation indicated that a well made but poorly insulated ring-type splice in the belt feeder power conductor was resting against a hydraulic valve and was in close proximity to several hydraulic hoses containing hydraulic oil under pressure. Also, there was evidence of a ruptured hydraulic hose and it was apparent that the pump motor had continued to run until the oil supply in the hydraulic tank was practically exhausted. There is no doubt that spraying, flaming oil intensified the fire and caused the ignition of coal and coal dust, a nearby wooden crib, rubber covering of numerous hydraulic hoses, the conveyor belt at the tailpiece, and part of the insulation from the power cables of the belt feeder and shuttle car.

Point of Origin: The fire originated at the belt conveyor feeder in No. 4 entry No. 1 section of the 8-B JR portal at a point about 80 feet outby survey station spad No. 323.

Summary of Evidence: Conditions observed in the mine during the investigation following the fire, together with information available from company officials, workmen, and mine records, provided evidence as to the cause and origin of the fire. The evidence from which the conclusions of the Federal investigators are drawn is summarized as follows:

1. The resistance to current flow at the short circuit was such that the necessary current needed to open the fuse could not flow.

2. The trolley tap fuse nip and the control switches for the belt feeder were both in the flame area and could not be reached to stop the feeder. The fuse nip and control switches were within 5 or 6 feet of the short circuit.

3. The fire damaged a wire-supporting hanger, allowing the feeder wire to fall and contact a 5/8-inch wire rope used to support the belt conveyor structure. This rope extended approximately 30 feet behind the rope anchor at the belt tailpiece. The resultant arcing caused the power feeder wire and 5/8-inch wire rope to separate and apparently the separated feeder wire contacted the negative side of the power circuit lying on the mine floor. This contact of the feeder circuits might have allowed sufficient current to flow to activate the rectifier circuit breaker and thereby de-energize the power circuit and stop the belt feeder.

Cause of Fire: It was the consensus of the investigating committee that the belt-feeder power cable short circuited at a poorly insulated temporary splice near a hydraulic valve, and the resultant electric arcing ruptured a hydraulic hose or hoses releasing and igniting hydraulic oil, preheated and under pressure, and surrounding combustible materials. It was agreed however that a hydraulic hose might have burst and the escaping oil, striking the power cable, caused a poorly insulated temporary splice in the power cable to contact a hydraulic valve.

RECOMMENDATIONS

The following recommendations are made to prevent a similar occurrence:

1. Temporary splices in trailing cables should be made in a workmanlike manner and well insulated.

2. Power cables of equipment drawing high-current loads should be provided with circuit-breaker protection.

3. Power cables should be properly installed, excessive lengths avoided, and where possible, should not be located in close proximity to hydraulic apparatus, or such cables should be protected by metal conduit.

4. Fire-resistant hydraulic fluids rather than flammable hydraulic oils should be used in belt feeders.

5. Electric switches controlling equipment should be installed as far from hydraulic apparatus as feasible.

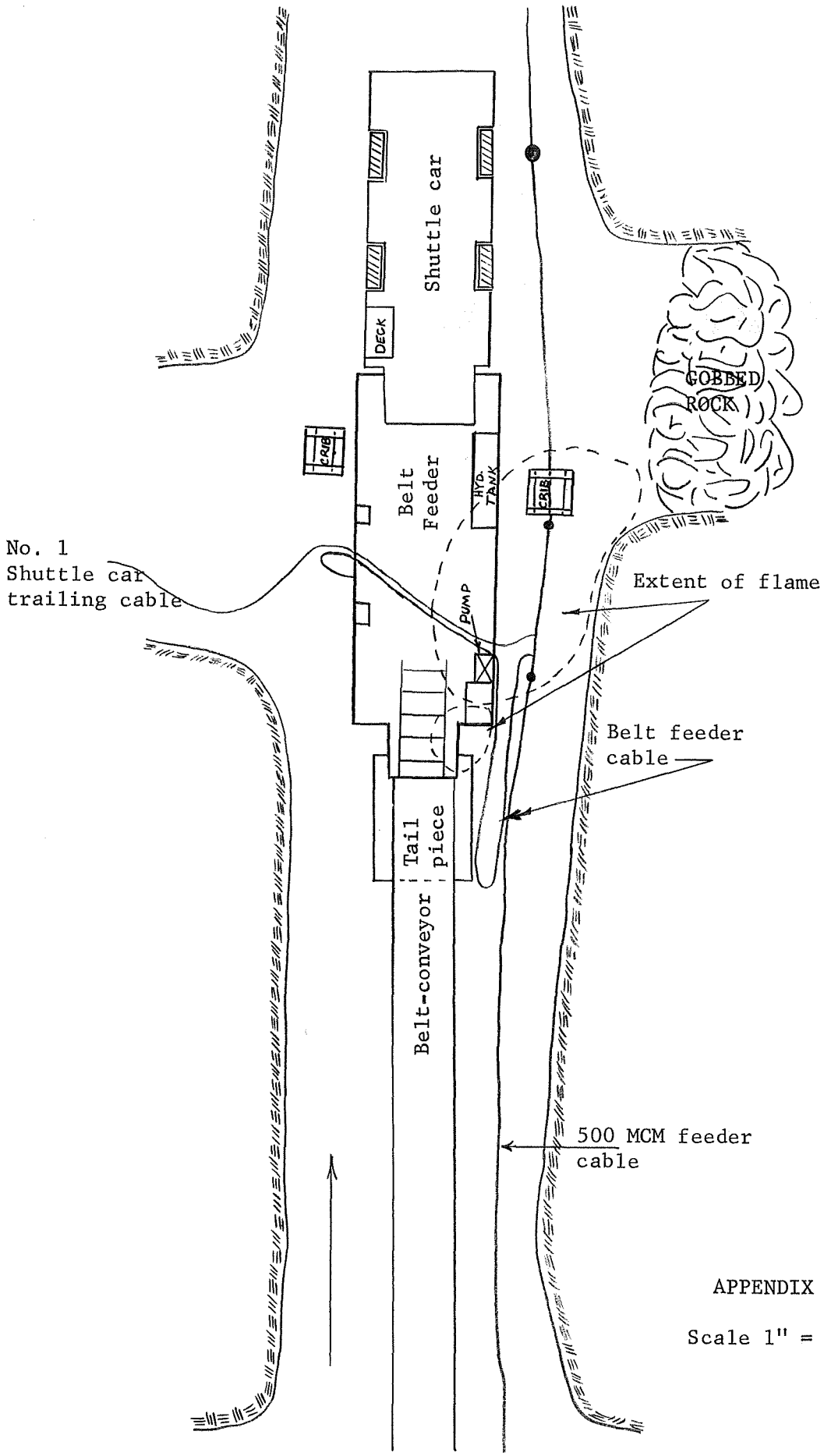
6. Power feeder wires should be installed on insulators.

7. Grounded power conductors for electric machinery should be clamped securely.

8. The frames of electric equipment should be grounded effectively or equivalent protection should be provided.

9. Electric equipment and wiring should be inspected frequently by a competent person to assure safe operating conditions and any defects found should be corrected promptly.

10. Ventilating controls should be established in such a manner that air passing over a belt feeder will be coursed directly into the return airway.



APPENDIX B

Scale 1" = 10'

11. Fire drills should be initiated and conducted at frequent intervals so that in the event of a fire, all underground employees will have prior knowledge of prearranged meeting places, assigned duties, and other precautionary measures to safeguard their lives.

12. All underground employees should have a "self-rescuer" in their possession and be given periodic instructions in its care, use, and limitations.

ACKNOWLEDGMENT

The cooperation of the company officials, members and officials of the United Mine Workers of America, and the representatives of the West Virginia Department of Mines during this investigation is gratefully acknowledged.

Respectfully submitted,

/s/ Robert G. Calvert

Robert G. Calvert
Coal-Mine Inspection Supervisor

/s/ Tennis H. Hatfield

Tennis H. Hatfield
Federal Coal-Mine Inspector
(Electrical)

Approved by:

/s/ W. R. Park

W. R. Park
District Manager
Health and Safety District B

APPENDIX A

VICTIMS OF MINE FIRE
NO. 8-B MINE
BUFFALO MINING COMPANY

December 12, 1968

Name	Age	Number of Dependents	Occupation	Married	Years Experience In Mines
Frank Collins	42	8	Timberman	Yes	16
Archie Adams	36	3	Roof-Bolt Machine Operator	Yes	3-1/2
Jackie Cook	25	0	Roof-Bolt Machine Helper	No	3/4