Reports

Siltix Mine
July 23, 1966

COAL FATAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

DISTRICT B

FINAL REPORT OF MAJOR MINE-EXPLOSION DISASTER

SILTIX MINE
THE NEW RIVER COMPANY
MOUNT HOPE, FAYETTE COUNTY, WEST VIRGINIA

July 23, 1966

By

W. R. Park
District Manager

J. D. Micheal
Technical Assistant

J. W. Crawford
Mining Health and Safety Engineer

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INTRODUCTION

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

A gas explosion occurred in the Siltix mine of The New River Company, Mount Hope, West Virginia, about 8:45 a.m., Saturday, July 23, 1966. Seven men were killed by the explosion; all died from burns and/or forces. Two of the other 41 men in the mine at the time of the explosion were injured, one only slightly. Eleven men in the 6 left section heard the explosion, but they were unaware of what actually happened, and they erected a barricade in the return entries about 250 feet from the entrance to the 6 left section when they encountered smoke and fumes in the return entries. The men remained behind the barricade until they were rescued about 10:30 a.m., July 23. The men were in good physical condition when they were rescued. After leaving the barricade, seven of these men assisted in recovery operations in the 2 left mains section; two of these seven employees and three additional men were overcome by smoke and fumes and were removed from the mine.

The names of the victims, their ages, occupations, experience, and the number of their dependents are listed in Appendix A of this report.

Bureau of Mines investigators believe that the explosion originated in the shuttle-car haulway about 100 feet outby the face of No. 4 room off No. 1 entry, 2 left mains, where an explosive mixture of methane and air was ignited by electric arcs and sparks from a

shuttle car. Forces of the explosion extended throughout the 2 left mains section into 6 left and 6 right off 2 left mains and were dissipated after traveling about 1,700 feet outby in 2 left mains.

GENERAL INFORMATION

The Siltix mine at Mount Hope, Fayette County, West Virginia, is served by the Chesapeake and Ohio Railway Company. The operating officials of the company are:

W. A. Haslam	President	Mount Hope, West Virginia
E. V. Bowman	Vice President, Operations	Tams, West Virginia
James Page	Manager of Mines	Mount Hope, West Virginia
E. E. Varney	General Superintendent	Carlisle, West Virginia
Ronald Keaton	Superintendent	Bradley, West Virginia
Maxwell Wallace	Mine Foreman	Carlisle, West Virginia

A total of 115 men is employed; 113 worked underground on 1 maintenance and 2 coal-producing shifts a day, 5 and 6 days a week. The average daily production, 1,600 tons of coal, is loaded mechanically. The mine is opened by 2 drifts, 1 slope, and 1 shaft into the Sewell coal bed, which averages 60 inches in thickness in this area. The slope is about 100 feet in length, and the shaft is about 60 feet in depth.

The immediate roof is firm laminated shale, ranging from 1 to 15 feet in thickness. A rider coal bed, about 12 inches in thickness, is present in the immediate roof at varying elevations above the coal bed. The main roof is sandstone. A coal bed, 6 to 10 inches in thickness, is encountered often at varying distances under the Sewell coal bed.

The analysis of a coal sample taken from the coal bed in this mine, as obtained from Technical Paper No. 405, "Analysis of West Virginia Coals," published by the United States Bureau of Mines, is as follows:

	Percent
Moisture	2.7
Volatile Matter	21.9
Fixed Carbon	70.7
Ash	4.7
	100.0

Numerous tests by the Bureau of Mines have shown that coal dust having a volatile ratio of 0.12 and higher is explosive. The volatile ratio of the coal in this mine as determined from the foregoing analysis is 0.23, indicating that the coal dust is explosive.

The last Federal inspection of the Siltix mine was completed June 3, 1966.

MINING METHODS, CONDITIONS, AND EQUIPMENT

Mining Methods: An entry-and-block system of mining was followed. Multiple entries, generally in sets of 5 to 8, were driven about 18 feet wide on 60-foot centers. Crosscuts were about 80 feet apart. Rooms were driven on 35- to 50-foot centers. Pillars were extracted by splitting and recovering wings left and right as the continuous miner retreated from the block.

Three working sections were producing coal on July 23; two sections, 6 left off 2 left mains and 1 right butts, were being developed with conventional loading equipment. A Lee-Norse continuous miner was being used to extract pillars in the third working section, 2 left mains. An additional section was in the process of being readied for development with conventional loading equipment.

Roof bolts were installed in all sections in compliance with the plan approved by a roof-control representative of the Bureau of Mines. Wooden timbers were used to supplement roof bolts on all sections. Roof-bolt operations in face areas were performed with rotary-hydraulic equipment; compressed-air activated equipment was used for spot-bolting outby face areas. Conventional timbering was done in pillar lifts.

Explosives: Permissible-type explosives and instantaneous electric detonators were used for blasting and were stored properly in well-constructed magazines on the surface. They were transported into the mine in a specially constructed explosives car and stored safely underground in specially constructed section-storage magazines.

Coal in the conventional loading sections was bottom cut, then blasted on shift with permissible explosives. Incombustible material was used for stemming, and the shots were fired immediately after charging with permissible blasting units. Blasting cables were in good condition and of adequate lengths. Gas tests were made immediately before and after firing the shots at the time of the June 1966 Federal inspection.

Ventilation and Mine Gases: Ventilation of the mine was induced by an axial-flow fan properly installed on the surface and equipped with all necessary safety devices. The fan operated continuously and exhausting

developed a negative pressure of 4.6 inches of water gage. The volume of air measured in the main return at the fan during the June 1966 Federal inspection was about 116,900 cubic feet a minute. Methane liberation in the return air was calculated to be 236,000 cubic feet in 24 hours.

The two active drifts were used for intake air openings. Overcasts and permanent stoppings were constructed of incombustible material. Temporary plastic stoppings were used in some instances to conduct the air flow into face areas. Line brattices were used on some sections to direct air to the faces. The quantities of air passing through the last open crosscuts in developing entries and being delivered to the intake ends of pillar lines during the June 1966 Federal inspection were more than 6,000 cubic feet a minute.

The following air measurements and methane determinations were made during the June 1966 Federal inspection:

Location	Volume of Air c.f.m.	Methane, Percent	Cubic Feet of Methane in 24 Hours
Immediate return, 1 right butts	21,500	0.15	46,000
Immediate return, 6 left section	9,200	0.10	13,000
Main return, 1 mains	30,100	0.34	147,000
Immediate return, 6 right	20,800	0.12	36,000
Main return at fan	116,900	0.14	236,000

The mine is classed gassy by the West Virginia Department of Mines and the Bureau of Mines. Preshift examinations for gas and other hazards were made by certified officials before the first operating shift each day, and preshift examinations for succeeding shifts were made by the on-shift officials during their regular tours of duty.

On-shift examinations for gas and other hazards were made by foremen, shot firers, and operators of face electrical equipment during the June 1966 Federal inspection; however, after the explosion, only the section foreman in 2 left mains had a flame safety lamp in his possession. Officials and employees testified during the official hearing that enough safety lamps were not available at the mine and that equipment operators were either double-shifting the available safety lamps or were not taking lamps underground.

At the time the 2 left main entries were being driven, the section was ventilated by a current of intake air directed through Nos. 3 and 4 entries, split right and left at the last open crosscuts and

returned through Nos. 1, 2, 5, and 6 entries. At the time of the explosion, the Nos. 1, 2, 3, and 4 entries of 2 left mains inby 6 left off 2 left mains were used for intake airways and Nos. 5 and 6 entries were used as returns. Six rooms turned left off No. 1 entry of 2 left mains were ventilated by means of intake air directed by check curtains erected across Nos. 2, 3, and 4 entries in the line of pillars at the 2 left mains belt conveyor tailpiece. Officials and employees stated that generally line curtain was not used in the continuous miner sections. Intake air for the 6 left off 2 left mains and the 2 left mains pillar section was coursed through the same entries to 6 left entries, and a regulator was not provided at any location to control the quantity of air reaching either section (See Appendix B).

No provisions had been made to provide a system of bleeder entries in 2 left mains; however, testimony of officials disclosed that bleeder entries used in other parts of the mine had been successful.

Permanent, incombustible stoppings had been erected between the intake and return air courses to within three crosscuts of the pillar line in 2 left mains entries. Temporary stoppings were erected between the intake and return air courses from the last permanent stopping to the last open crosscut, and temporary stoppings were erected between Nos. 1 and 2 entries from 6 left off 2 left mains to No. 6 room off No. 1 entry in 2 left mains section.

Dust: During the June 1966 Federal inspection, the mine surfaces varied from dry to wet. Water was used to allay dust at the faces in the continuous miner section and at several belt conveyor discharge points; dust produced during other mining operations was not considered excessive.

During the June 1966 inspection, coal dust and loose coal were not accumulated in dangerous quantities in the active underground workings. Rock dust was applied to within 40 feet of the faces of the active working places, including the open crosscuts nearest the faces. The haulageways, open parallel entries, and back entries appeared to be rock-dusted adequately.

Rock dust in the active sections was applied by hand during the coal-producing shifts, and generalized rock-dusting of the face areas by machine was done on each section every second workday at the time of the June 1966 Federal inspection. However, rock dust had not been applied in the six rooms driven off No. 1 entry in the 2 left mains section.

Rock-dust surveys were made in the 1 main entries and 6 left section during the June 1966 inspection. Dust samples were collected on

pattern in each entry. The incombustible content of 8 of the 37 samples collected was substandard; however, additional rock dust in ample quantity was applied promptly. The incombustible content of each of the 14 samples collected at spot locations in other areas of the mine was more than 65 percent.

During the underground investigation of the explosion, it was evident that coal dust had entered into and helped propagate the explosion. However, evidence of extremely violent pressure and/or forces was not found at any location, and evidence of burning coal dust, such as soot streamers and heavy coke deposits, was found only at a few scattered locations.

The floor of the entire 2 left mains section (explosion area) ranged from damp to extremely wet, with standing water at several locations. The roof and ribs ranged from damp to dry. It was apparent that the section had been rock-dusted, except that rock dust had not been applied in the recently driven rooms. In addition, the routes traversed by the shuttle cars contained accumulations of coal dust and coal spillage, and in proximity to the belt tailpiece and surge bin belt feeder, the dust accumulations were excessive. The 2 left mains belt was empty except for about a shuttle car of material just outby the tailpiece.

Following the explosion, 139 samples of the mine dust were collected in areas affected by the explosion forces (See Table 2). About 71 percent (99) of the samples collected contained less than 65 percent incombustibles. Of the 106 samples collected in 2 left mains entries, 78, or 75 percent, contained less than 65 percent incombustibles and 57 of these samples, or 53 percent, contained less than 50 percent incombustibles. Of the 33 samples collected in the 6 left entries, 21, or 63 percent, contained less than 65 percent incombustibles, and 13, or 39 percent, of these samples, contained less than 50 percent incombustibles. Dust samples collected after the explosion in 2 left mains entries and 6 left entries were not necessarily representative of mine dust conditions prior to the explosion, as coal dust thrown into suspension and deposited on rock-dusted surfaces decreased the incombustible content.

Transportation: Coal was hauled in permissible-type cable-reel shuttle cars from the face regions to well-installed belt conveyors, which transported the coal to the surface. Beltmen were employed to travel along and regularly inspect assigned belts for spillage, defective or stuck rollers, the belt drives, and the slippage and sequence controls. The track and rolling stock, used primarily for man trip and supply haulage purposes, were in reasonably good condition. Men were transported underground in mine cars, and the man trips were operated under the supervision of certified officials.

Electricity: Electric power at 13,200 volts alternating current was reduced to 6,900, 2,300, 440, 220, and 110 volts alternating current and 275 volts direct current for use on the surface and 4,160, 440, and 220 volts alternating current and 275 volts direct current were used underground. The 4,160 volts alternating current was conducted underground through a borehole by a three-conductor, 2/0 shielded type, nonmetallic armored, high-voltage cable. The high-voltage circuit was protected against overloads by an oil circuit breaker, equipped with time overcurrent relays, unbalanced phase relays, and ground-fault tripping. The ground-trip relays were adjusted to open the main power circuit on a fault exceeding 16 amperes. A current-limiting resistor was installed in the neutral circuit to limit the amount of current flow under fault conditions. Lightning arresters were installed in the high-voltage circuit at the top of the borehole, and disconnecting switches were installed at the bottom of the borehole and at the beginning of all branch lines. The high-voltage cable was installed in the track entry and supported by spool-type porcelain insulators or insulated J hooks. However, the belt-conveyor remote control cable and the direct-current insulated feeder were in contact with the high-voltage cable in the main and 2 left main entries.

A portable 3-phase, air-cooled, 150-kv.-a. power center located in No. 5 entry 2 left mains section, reduced the 4,160 volts to 440 volts alternating current for operation of a permissible-type CM32 Lee-Norse continuous miner.

The power conversion equipment consisted of three rectifiers, a 500 kw unit on the surface and a 400 kw and a 300 kw installed underground. The direct-current circuit breakers were adjusted to open the 275-volt direct current circuit above 3,200, 3,000, and 1,500 amperes, respectively. The rectifiers were properly ventilated and suitably installed in fireproof enclosures. Number 9 section trolley wire paralleled by 500 MCM and 1,000 MCM feeders in the positive circuit and bonded 60-pound track rails paralleled with 500 MCM feeder in the negative circuit conducted 275 volts direct current from the rectifiers throughout the track system and to the coal-producing sections. The trolley wire was installed on bell-type insulators, and the feeder cables were installed on porcelain insulators. However, the bare feeder was in contact with a wooden crib between the track and conveyor belt in 2 left mains. Cutout switches were not installed at suitable intervals in the direct-current system. The frames of the off-track direct-current electric face equipment were not grounded. The ground-fault trip circuit for the continuous miner was not in operating condition, in that the grounding conductor was not connected to the current-limiting resistor in the neutral of the 440-volt secondary at the 150-kv.-a. power center.

During the June 1966 Federal inspection, suitable tests for gas were made before the electric face equipment was taken to the working faces and at suitable intervals while equipment was being operated at the faces. However, on the day of the explosion, neither the continuous miner operator nor the roof bolter had a flame safety lamp in his possession. Sufficient safety lamps were not available for the electric face equipment operators.

At the time of the explosion, the permissible-type face equipment in 2 left mains section consisted of a CM32 Lee-Norse continuous miner, three MT66 Jeffrey shuttle cars, and one Galis roof bolter. A 2-inch Gorman Rupp pump was installed in the first crosscut outby the loading point between Nos. 5 and 6 entries. This electric face equipment was examined thoroughly during the investigation, and the following permissibility violations and other defects were found:

The CM32 Lee-Norse miner had one bolt missing, two loose bolts, a damaged packing gland tube, and insufficient packing in the left headlight; one lockwasher missing from a bolt on the inspection cover of the left cutting motor; a loose packing gland and damaged conduit hose on the safety switch; an opening in excess of .004-inch and one lockwasher missing from the inspection cover on the pump motor; one bolt missing from the rear cover and two bolts missing from the front cover of the contactor compartment; the undervoltage release was blocked in with wood in the pump motor circuit breaker, a control circuit fuse was bridged with bond wire, and the overload heater elements were bridged in circuit breakers of the pump and cutting motors; one bolt was missing from the cover of the control station; one bolt missing from the right headlight cover; and one bolt was missing from the inspection cover of the right cutting motor.

The No. 1 standard drive MT66 Jeffrey shuttle car located immediately outby the continuous miner had openings in excess of .004-inch in the forward and reverse tram switches; a splice in the rear headlight cable and a broken headlight globe; a hole burnt through the trailing cable reel into the collector ring assembly; and six temporary splices in the trailing cable, exposed conductors were present in two splices.

The No. 2 standard drive MT66 Jeffrey shuttle car at the entrance of No. 4 room in No. 1 entry had three bolts missing and an opening in excess of .004-inch between the rear contactor compartment and cover; damaged conduit hose on the resistance cable; nine bolts missing and an opening in excess of .004-inch in the resistance compartment; and a hole burnt through the trailing cable reel into the collector ring assembly.

The off-standard drive MT66 Jeffrey shuttle car in the second crosscut inby the loading point between Nos. 3 and 4 entries contained an opening in excess of .004-inch in the rear contactor compartment; an opening in excess of .004-inch, four bolts missing, and an improper length bolt in the front contactor compartment; one bolt and lock washer missing from the contactor compartment; a broken packing gland, damaged motor cable and conduit hose, an opening in excess of .004-inch, and four loose bolts in the inspection cover of the front traction motor; an opening in excess of .006-inch and a bolt missing from the front headlight.

The Galis roof bolter had several lock washers missing from the control switch, one lock washer missing from the contactor compartment, and six temporary splices in the trailing cable.

The 2-inch Gorman Rupp pump installed in the return air course and one crosscut outby the loading point between Nos. 5 and 6 entries was not provided with overload protection, twisted-type telephone lines were used as power conductors, and the choke resistor was lying on the mine floor with exposed conductors.

An examination of the permissible-type electric face equipment in the other active sections of the mine revealed permissibility violations similar to those found in the 2 left mains equipment.

Illumination and Smoking: Permissible electric cap lamps were used for portable illumination underground. Smoking was prohibited underground, and searches for smokers' articles were conducted frequently.

Mine Rescue and Fire-Fighting Facilities: Trained mine rescue men and equipment were not available at the mine; however, trained and equipped mine rescue teams were available at Slab Fork, Tralee, and Itmann, West Virginia. These teams were maintained by the Slab Fork Coal Company; Semet-Solvay Division, Allied Chemical Corporation; and the Pocahontas Fuel Company, respectively. These teams were placed on a stand-by basis following the explosion, although it did not become necessary to utilize them.

Less than 50 percent of the underground employees were provided with self-rescuers; however, self-rescuers for each employee were on order.

Fire-fighting facilities included a 2-inch water line installed along the belt conveyors with outlets at varying intervals. Dry-type chemical fire extinguishers were provided at each section loading point and at other necessary places underground. A steel water-tank car, equipped with a high-pressure pump and hose, was also available.

STORY OF EXPLOSION AND RECOVERY OPERATIONS

Participating Organizations: Officials and employees of The New River Company and representatives of the West Virginia Department of Mines, United Mine Workers of America, and United States Bureau of Mines participated in the recovery operations and underground investigation.

Activities of Bureau of Mines Personnel: District Manager W. R. Park was informed by James Page, manager of mines for The New River Company, during a telephone call shortly after 9 a.m., July 23, 1966, that an explosion had likely occurred in the Siltix mine. Immediately thereafter, Park instructed Inspectors R. J. Penman and Loraine Wotring to proceed to the mine promptly, ascertain what had occurred if possible, and thereafter, travel underground immediately if necessary. Penman and Wotring arrived at the mine about 9:40 a.m.; they were briefed by company officials with all available details, and then they proceeded underground to assist with recovery operations. Park, after directing Inspectors Wotring and Penman to the mine, telephoned Washington and local representatives of the Bureau of Mines of the occurrence. Park, J. D. Micheal, T. A. Allamon, F. H. Ryan, and J. W. Crawford arrived at the mine about 10:15 a.m. After briefing, Park, Allamon, and Ryan entered the mine and assisted with the restoration of ventilation in the affected areas and the recovery of the bodies. Director Walter Hibbard and Assistant Director James Westfield arrived at the mine about 4 p.m., July 23, and they participated in the underground investigation of the disaster. The following additional Bureau of Mines personnel arrived at the mine at various times July 23, and they assisted with recovery operations and the investigation: M. S. Childers, J. W. Weekly, C. E. Adams, C. E. Lester, J. W. Collier, G. S. Vargo, C. E. Phillips, J. W. Rutherford, and R. M. Cain.

On July 23, 1966, a Withdrawal Order was issued under Section 203(a)(1) of the Federal Coal Mine Safety Act, debarring all persons from the Siltix mine, except those needed for exploratory and recovery work. Before the Order was issued, management had withdrawn all men except those mentioned above from the mine.

Mining Conditions Immediately Prior to the Explosion: The weather was warm, humid, and partly cloudy on July 23, 1966. Records of barometric pressure recorded at the United States Weather Bureau at the Raleigh County Airport, Beckley, West Virginia, from 12 noon, July 22, to 12 noon, July 23, 1966, are as follows:

12 noon	July 22, 1966	27.59
12 midnight	July 22, 1966	27.59
7 a.m.	July 23, 1966	27.63
12 noon	July 23, 1966	27.65

It is the opinion of the Bureau investigators that the slight variation in atmospheric pressure had no bearing on the explosion.

The report of the examinations of the fire boss who made the preshift examinations for the 7:30 a.m. to 3:30 p.m. production shift, July 23, 1966, indicated that conditions on each section were normal, and gas was not found at any location.

Evidence of Activities and Story of Explosion: The day-shift crew (7:30 a.m. to 3:30 p.m.) consisting of 48 men, entered the mine about 7:30 a.m., July 23, 1966, and they were transported in mine cars to their respective sections without incident. Employees of the 6 left and 1 right butts conventional loading sections reached their working faces promptly and were loading coal when the explosion occurred.

The continuous miner and shuttle cars in the 2 left mains section had been moved back from the faces of the rooms at the end of the shift near midnight July 22 to clean up fallen roof rock in the pillar split (shuttle-car roadway) between Nos. 3 and 4 entries. The continuous miner and shuttle cars were left at this location to be trammed back to the room faces by the day-shift crew.

Two electricians worked their entire shift, 12 midnight to 8 a.m., repairing electric face equipment in the 2 left mains section. The electricians stated that only two other men visited the section during their shift, a roof-bolter and the fire boss. They stated further that neither they nor the roof-bolter traveled to any of the working faces and that they worked their entire shift in the vicinity of the belt tailpiece.

The day-shift crew in 2 left mains, consisting of a foreman, continuous miner operator and helper, electrician, roof-bolt machine operator, and three shuttle-car operators, arrived on the section about 8:20 a.m. Company rules require that the section foremen notify the superintendent or the tipple foreman on the surface of the condition of the section and/or that coal-producing operations have been started. Dallas Ayers, 2 left mains section foreman, called to the surface about 8:30 a.m. and informed the superintendent that they were "loading." This was the last verbal contact the 2 left mains employees had with other mine employees prior to the explosion.

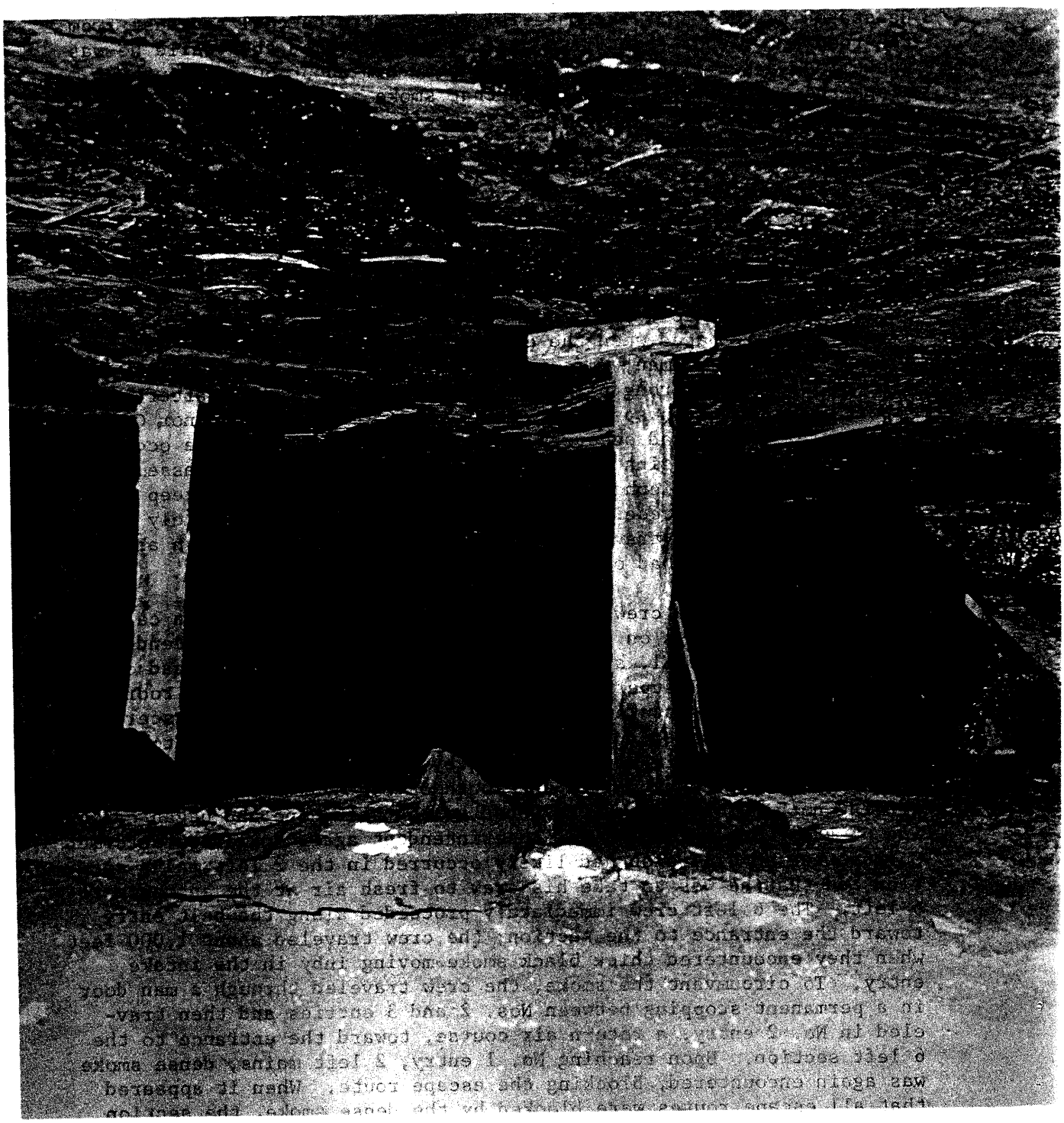
Before entering the mine on July 23, Ayers was instructed to finish driving a crosscut right off No. 4 room into the gob and then begin extracting the room pillars between Nos. 4, 5, and 6 rooms.

Lloyd Marcum, beltman, was shoveling coal splillage onto the belt conveyor at 6 left off 2 left mains when the explosion occurred. Marcum stated that prior to the occurrence, about two shuttle cars

of coal and material passed by him on the 2 left mains belt conveyor. He stated further that the material appeared to be coal and dust from the roadways rather than fresh coal. Marcum stated that while he was shoveling, a terrific blast of air tossed him about 60 feet outby along the belt conveyor. He said that smoke and dust suspended in the air prevented him from seeing for some time, although he did not see any flame. Marcum moved along the timberline adjacent to the conveyor belt until he reached the 6 left telephone and notified Superintendent Keaton of the occurrence. Keaton instructed Marcum to remain at 6 left until he received assistance.

On the morning of July 23, the mine foreman, Maxwell Wallace, rode underground in the 6 left man trip with the section foreman and a crew of 10 men. The 6 left section crew began producing coal promptly, and coal was being loaded when the explosion occurred. Wallace and Wiley Cullop, section foreman, were near the 6 left belt tailpiece when they felt an unusually strong blast of wind. Immediately thereafter, they observed dense dust suspended in the air. Neither Wallace nor Cullop were aware of what had occurred or had any idea of where the occurrence might have originated. Wallace instructed Cullop to assemble his crew near the telephone at the 6 left tailpiece and to keep the crew there until he received further instructions. Immediately thereafter, Wallace began traveling outby along the 6 left belt in an attempt to learn what had occurred.

Cullop assembled the crew at the telephone, and he then began calling the surface buildings on the telephone. The general superintendent answered Cullop's call, and after Cullop had explained what had occurred, the general superintendent suggested that possibly a roof fall had occurred in an intake air course and he (Cullop) was to ascertain if a fall had occurred. Thereafter, Cullop ordered the crew to remain at the telephone while he traveled outby. Cullop traveled about 1,000 feet in the belt entry toward the mouth of the section, and after observing nothing unusual, he returned to the telephone and began calling on the phone. The general superintendent again answered, informed Cullop that an explosion had likely occurred in the 2 left mains section and that he was to take his crew to fresh air at the entrance to 6 left. The 6 left crew immediately proceeded along the belt entry toward the entrance to the section; the crew traveled about 1,000 feet when they encountered thick black smoke moving inby in the intake entry. To circumvent the smoke, the crew traveled through a man door in a permanent stopping between Nos. 2 and 3 entries and then traveled in No. 2 entry, a return air course, toward the entrance to the 6 left section. Upon reaching No. 1 entry, 2 left mains, dense smoke was again encountered, blocking the escape route. When it appeared that all escape routes were blocked by the dense smoke, the section foreman and the crew decided to locate a suitable place in No. 2 entry, 6 left and construct a barricade. Members of the crew began



INSIDE OF BARRICADE.

searching for barricading materials in the return air courses. The barricade was constructed at a crosscut between Nos. 2 and 3 entries, 6 left, three crosscuts inby the mouth of 6 left; it consisted of three plies of brattice cloth supported by wooden timbers and nails and was shaped in a semi-circle (See Appendix B). One end of the barricade was attached to the inby corner of the crosscut and the other end was attached to the outby corner of the crosscut. The rear wall of the barricade was formed by a permanent stopping between Nos. 2 and 3 entries. From measurements taken during the investigation, the cross-sectional area within the barricade was about 580 square feet. The 11 men entered the barricade and remained therein for approximately 45 minutes; they were rescued about 10:30 a.m. The men remained calm while confined and all decisions made were agreed upon by all members of the crew. None of the men showed ill effects from their confinement, and all were in good physical condition when rescued.

A section foreman and 10 men were performing normal coal-producing duties in the 1 right butts section when the explosion occurred. These entry face regions were not affected by the explosion. The crew was instructed by telephone from the surface to deenergize the sectional equipment and come to the surface. The crew arrived on the surface about 10 a.m. without incident.

During the examination of the 2 left mains section after the disaster, the continuous miner was found 47 feet outby the face of No. 4 room with the ripper heads at the outby edge of the crosscut right. It was apparent that the continuous miner was being moved toward the face. The body of the miner operator was found on the shuttle-car roadway about 25 feet outby the continuous miner on the controls side of the No. 1 standard drive shuttle car. The No. 1 standard-drive shuttle car was found about 15 feet outby the discharge boom of the continuous miner. The continuous miner trailing cable was looped over the back of the front seat of the shuttle car, and it appeared that the shuttle car was pulling the miner cable forward as the miner advanced toward the face of No. 4 room. The body of the No. 1 standard-drive shuttle-car operator was located opposite the controls side of the No. 2 standard-drive shuttle car against the left rib (See Appendix C). The No. 2 standard-drive shuttle car was located about 65 feet outby No. 1 shuttle car. The investigators believe the No. 2 shuttle car was not being operated at the time of the explosion. The body of the No. 2 shuttle-car operator was found about 5 feet from the discharge end of the No. 2 shuttle car. The roof-bolt machine was located in No. 2 entry in the second crosscut outby the pillar line. The body of the roof-bolt machine operator was found in No. 3 entry. It was apparent that the roof-bolt machine was not in use, and the operator was assisting other members of the crew in moving the continuous miner toward the faces.

The body of the section foreman was located in No. 3 entry, and the off-standard shuttle car was located in an open crosscut between Nos. 3 and 4 entries. This car was not in operation at the time of the explosion. The body of the electrician was found in No. 4 entry about 10 feet inby the surge bin belt feeder. The body of the continuous miner helper was found in No. 1 entry against the pillar fall. The injured survivor, Donald K. Legg, was located in the crosscut between Nos. 3 and 4 entries about 10 feet outby the off-standard shuttle car. The four men nearest the working faces, the miner operator and helper, the roof bolter, and a shuttle-car operator, moved short distances following the ignition, but the investigators believe that the other crew members moved only relatively short distances, if any, following the explosion.

The four victims closest to the room faces in 2 left mains section were burned severely, and the roof and ribs of the No. 4 room and the 2 left mains entries showed that gas had burned in these areas.

Examination of the 2 left mains section after the explosion revealed that considerable methane was emitting from breaks and crevices in the mine floor in Nos. 4, 5, and 6 rooms as well as at several other locations in the section. Furthermore, considerable methane was being released from inby pillared areas of 2 left mains and particularly from the Nos. 1, 2, and 3 rooms areas. Methane continued to be released from the floor openings in the rooms and other section areas and from the pillared areas for several days. Company officials and employees stated that increased methane liberation usually occurs in areas of this mine following pillar falls. The officials and employees stated further that such methane emissions were increased liberation rather than sudden releases.

The mine foreman stated that 7,800 cubic feet of air was entering the No. 6 room on the morning of July 22, 1966, and that this amount of air was measured after checks had been repaired and tightened. Inasmuch as neither line curtain nor other means were provided to course air to the faces of Nos. 4, 5, or 6 rooms, sufficient air could not have been reaching the three working faces so as to dilute or carry away even small quantities of methane. Furthermore, examination of checks during the investigation that had been installed in 2 left mains section before the explosion indicated that most of the marginal quantity of intake air reaching the section would be short-circuited before reaching a working face. Inasmuch as a fire boss made a preshift examination of the Nos. 4, 5, and 6 rooms and the pillar areas of the section several hours prior to the explosion and found all such areas free of gas, the investigators must conclude that "weight" and falling roof material in the pillar areas caused increased methane liberation in the rooms and in the section. Whether methane liberation in the 2 left mains section increased

because of pillar falls and/or weights is conjectural; however, sufficient air was not reaching the section prior to the explosion or for several days thereafter to prevent gas accumulations in the explosive range. Consequently, inadequate ventilation was a major factor in this explosion.

Donald Legg, shuttle-car operator injured by the explosion and the only survivor of the 2 left mains crew, stated that ventilation in the six rooms had been weak. He stated further that the miner operator had complained of inadequate ventilation in Nos. 4, 5, and 6 rooms and that both the miner operator and the section foreman had found sufficient gas in these rooms on several occasions to necessitate "shutting down" the equipment. The gas at the working faces was cleared by tightening the check curtains. Legg also stated that it was the usual practice to "tie up" the end or side of the check curtain on the shuttle-car operator's side to prevent the wet curtain from striking the operator on the face or head. Legg mentioned that the trailing cable on his shuttle car caught on fire while he was waiting to be loaded on the return side of the section on Wednesday, July 20. Ventilation was so weak that smoke and fumes from the burning cable forced the entire crew to move back to the belt tailpiece for about 30 minutes while the area was clearing.

During the underground investigation of this occurrence, the investigators were of the opinion that the foreman had not examined the working faces of Nos. 4, 5, and 6 rooms at any time after his arrival on the section. During direct questioning concerning such an examination, Legg replied that the foreman had been near him (close to the belt tailpiece) from the time the crew arrived on the section until the explosion occurred. Legg stated further that the crew began moving the miner and two shuttle cars toward the room faces immediately after they arrived on the section.

Recovery Operations: The main fan was not damaged by the explosion, and it was not stopped during recovery operations.

Ronald Keaton, mine superintendent, was at the motor pit underground when he learned of the explosion by telephone message; he proceeded toward 2 left main entries immediately. Keaton encountered smoke and dust about 500 feet inby the mouth of 2 left mains, and the smoke and dust became extremely dense at 4 right. When the smoke and dust were encountered, the chief electrician was sent to the mouth of 2 left mains to deenergize all power circuits. Keaton and other employees then advanced to 6 right entries where they found stoppings blown out. They began repairing the damaged permanent stoppings with brattice cloth so as to increase ventilation sufficiently to advance to the continuous miner section. Shortly after reaching the belt

conveyor tailpiece on 2 left mains, this recovery group found the body of the electrician and an injured survivor, Donald Legg; both were moved to fresh air. Weak ventilation at the belt tailpiece made it apparent to the group that considerable work and time would be required to reventilate the 2 left mains section. Keaton therefore decided that they should check and ascertain the whereabouts of the 6 left section crew. They began re-establishing ventilation in 6 left by repairing stoppings with brattice cloth when they heard pounding sounds coming from behind a permanent stopping between Nos. 2 and 3 entries. Verbal contact was made with the barricaded crew, and the 6 left crew was removed from the barricade and then to safety in the 2 left mains outby 6 left. All the barricaded men were in good physical condition, and seven of the men that had been barricaded volunteered to assist in restoring ventilation and recovery operations in 2 left mains.

Additional company, State, and Bureau of Mines personnel entered the mine about 10:30 a.m., and they went directly to the affected area and began restoring ventilation and exploring the area. The injured survivor in the section was sent to the surface promptly, and five men, including Superintendent Keaton and Mine Foreman Wallace, had reached the man-trip loading zone in 2 left mains as the additional company, State, and Bureau personnel reached the man-trip station. Keaton, Wallace, and the other three employees had been overcome with noxious fumes. These five men were transported to the surface promptly and then sent to the hospital for examination. They were treated promptly and all released the same day. Inasmuch as evidence of explosion forces were found about 1,700 feet outby the 2 left mains section, and noxious gases were encountered inby 6 left, the fresh recovery crew, equipped with detective and protective equipment, decided that while part of the crew worked on repairing and replacing stoppings in the 2 left main entries, other crew members would work to re-establish ventilation in the 2 left main face regions. Insofar as possible, ventilation of the 2 left main face regions was effected only after such areas were examined for fires and other hazards by men wearing gas masks, so as to lessen the possibility of forcing an explosive mixture of methane air over an undiscovered fire. Most of the stoppings in 2 left mains inby 6 right were destroyed, and high percentages of carbon monoxide and explosive mixtures of methane were present in the 2 left mains face regions until the last body was located and moved to fresh intake air. Universal gas masks were used in restoring the ventilation and exploring the entire section. Ventilation was restored sufficiently to recover the bodies, but heavy concentrations of methane emanated from along the ribs and floor of No. 4 room and from the pillar falls in the Nos. 1, 2, and 3 rooms and No. 1 entry throughout the recovery operations.

The body of the last victim was located about 5 p.m., July 23, and all bodies and all members of the recovery crew were removed from the mine by 6:15 p.m., July 23, 1966.

After the last body was removed from the mine on July 23, representatives of the company and union and State and Federal inspectors decided to begin the underground investigation of the disaster on July 25, 1966. An official hearing on the occurrence was held July 28, 1966.

Company employees began rehabilitating the mine on July 26, 1966, by replacing permanent stoppings in 2 left mains; thereafter, the explosion area and other parts of the mine were cleaned of coal dust and rerock-dusted. Face electric equipment was restored to permissible condition, and the Director of the Bureau of Mines revised the Closure Order of July 23 to permit resumption of loading operations in 1 right butts August 3, 6 left on August 8, and the remainder of the mine August 17, 1966. A State and a Federal inspector were on duty each shift during rehabilitation of the mine.

INVESTIGATION OF CAUSE OF EXPLOSION

Investigation Committee:

The New River Company

W. A. Haslam	President
E. V. Bowman	Vice President, Operations
E. E. Varney	General Superintendent
R. E. Short	Safety Director, Winding Gulf Coals, Incorporated

United Mine Workers of America

Charles Ferguson	Director, Safety Division
James Leeber, Jr.	Safety Director, District 29
William Burke	President, Local Union No. 1353
George Wiley	Chairman, Safety Committee
Theodore C. Nelson	Safety Committee
William C. Hoke	Safety Committee

West Virginia Department of Mines

W. F. Eigenbrod	Director
J. A. Philpott	Inspector-at-Large
J. W. Hatfield	Assistant Inspector-at-Large
Milton Hitechew	District Mine Inspector
Russell Matthew	District Mine Inspector

United States Bureau of Mines

Walter R. Hibbard, Jr.	Director
James Westfield	Assistant Director--Health and Safety
W. R. Park	District Manager
J. D. Micheal	Technical Assistant
J. W. Crawford	Mining Health and Safety Engineer
M. S. Childers	Federal Coal-Mine Inspector (Electrical)
C. E. Lester	Federal Coal-Mine Inspector
J. W. Collier	Electrical Engineer

A detailed examination of the area affected by the explosion was carefully made by the investigating committee. The electrical equipment in the explosion area was studied by electrical inspectors of the interested groups, and their findings have been recorded heretofore in this report.

The hearing conducted by the West Virginia Department of Mines on July 28, 1966, at the Mount Hope office of the Bureau of Mines at Mount Hope, West Virginia, was headed by W. F. Eigenbrod, Director, who received assistance from other State personnel. Mr. Eigenbrod invited representatives of the United Mine Workers of America, The New River Company, and the Bureau of Mines to participate in the interrogation of anyone who might have knowledge of events prior to the explosion or practices which might have set the stage for the disaster.

Methane as a Factor in the Explosion:

1. The mine is classed gassy by the West Virginia Department of Mines and by the Bureau of Mines, and methane has been detected in the mine on numerous occasions. Conflicting statements were made concerning gas having been detected in the reactivated 2 left mains section prior to the explosion.

2. Air samples collected during the Federal inspection completed June 3, 1966, showed a methane liberation of about 236,000 cubic feet in 24 hours from the mine.

3. Methane in concentrations in excess of 5 percent was detected in the explosion area (2 left main face regions) throughout the recovery operations. After the recovery operations, methane was being liberated from No. 4 room off No. 1 entry and the pillar falls in Nos. 1, 2, and 3 rooms and in No. 1 entry consistently.

4. Air samples collected July 23, 1966, in the main return at the fan showed 0.21 percent methane and 248,000 cubic feet of methane in a 24-hour period, respectively.

5. Unquestionably, the disaster resulted from the ignition of a considerable quantity of methane that was liberated in the rooms left off No. 1 entry and from the pillar falls in 2 left mains. Evidence of gas burning was found at numerous places in the face regions of the 2 left mains section.

Flame: Soot deposits were found in No. 4 room and Nos. 1 and 2 entries; evidence of soot was also found in the several crosscuts outby the faces of Nos. 2 and 3 entries. Slight to heavy deposits of coke were found at various locations in the section (See Appendix B). Flame extended from near the face of No. 4 room throughout the 2 left mains face regions and outby to the 6 left entries (See Appendix B). Evidence of flame was not found anywhere else in 2 left mains or in the 6 left section. Dust samples collected in the explosion area contained traces to very large coke particles (See Appendix B).

The presence of coke in the mine dust samples is one of the criteria by which extent of flame was fixed, although it is possible that such coke farthest from the face regions of 2 left mains section may have been blown there. Coke that ranged from a fraction of an inch to about an inch in thickness was plastered on roof bolts, on roof-bolted cap pieces, and other materials in the explosion area.

Forces: Evidence in the mine indicated that the forces of the explosion radiated from near the faces of No. 4 room and No. 1 entry, traversed all entries in 2 left mains, into 6 left and 6 right, and were dissipated in 2 left mains about 1,700 feet outby the face regions.

Forces of the explosion dissipated rapidly after reaching the junction of 6 left and 6 right with 2 left mains.

Violence occurred in the 2 left mains area as evidenced by blown out stoppings, although extreme violence was not observed at any location.

Point of Origin: Bureau of Mines investigators believe that the explosion originated about 100 feet outby the face of No. 4 room off No. 1 entry, 2 left mains, at the location where the No. 1 standard-drive shuttle car was found.

Factors Preventing Spread of Explosion: All evidence indicated that the explosion was relatively weak; nothing in the explosion area

showed that high pressures and/or excessive speeds developed during the explosion propagation. The factors that likely caused this to be a relatively weak explosion and inhibited propagation are:

1. Accumulated methane in the explosion area was likely near and/or above the maximum explosive range.

2. The ignition of the methane was in a relatively opened area which permitted expansion of forces without a quick pressure buildup.

3. The floor of the active face regions ranged from damp to wet with standing water at several locations.

4. The 2 left main entries had been well rock-dusted prior to the section being reactivated July 11, 1966.

5. The 2 left mains belt conveyor was practically empty of coal at the time of the explosion.

Summary of Evidence: Conditions observed in the mine during recovery operations and the investigation following the disaster, together with information available from previous Federal coal-mine inspection reports and that obtained from a hearing and from company officials, workmen, and mine records, provided evidence as to the cause and origin of the explosion. The evidence from which the conclusions of the Federal investigators are drawn is summarized as follows:

1. Records of fire-boss examinations of all working sections list no unusual condition observed during the examination made several hours before the explosion.

2. This was primarily a gas explosion, and coal dust entered into propagation only to a minor degree.

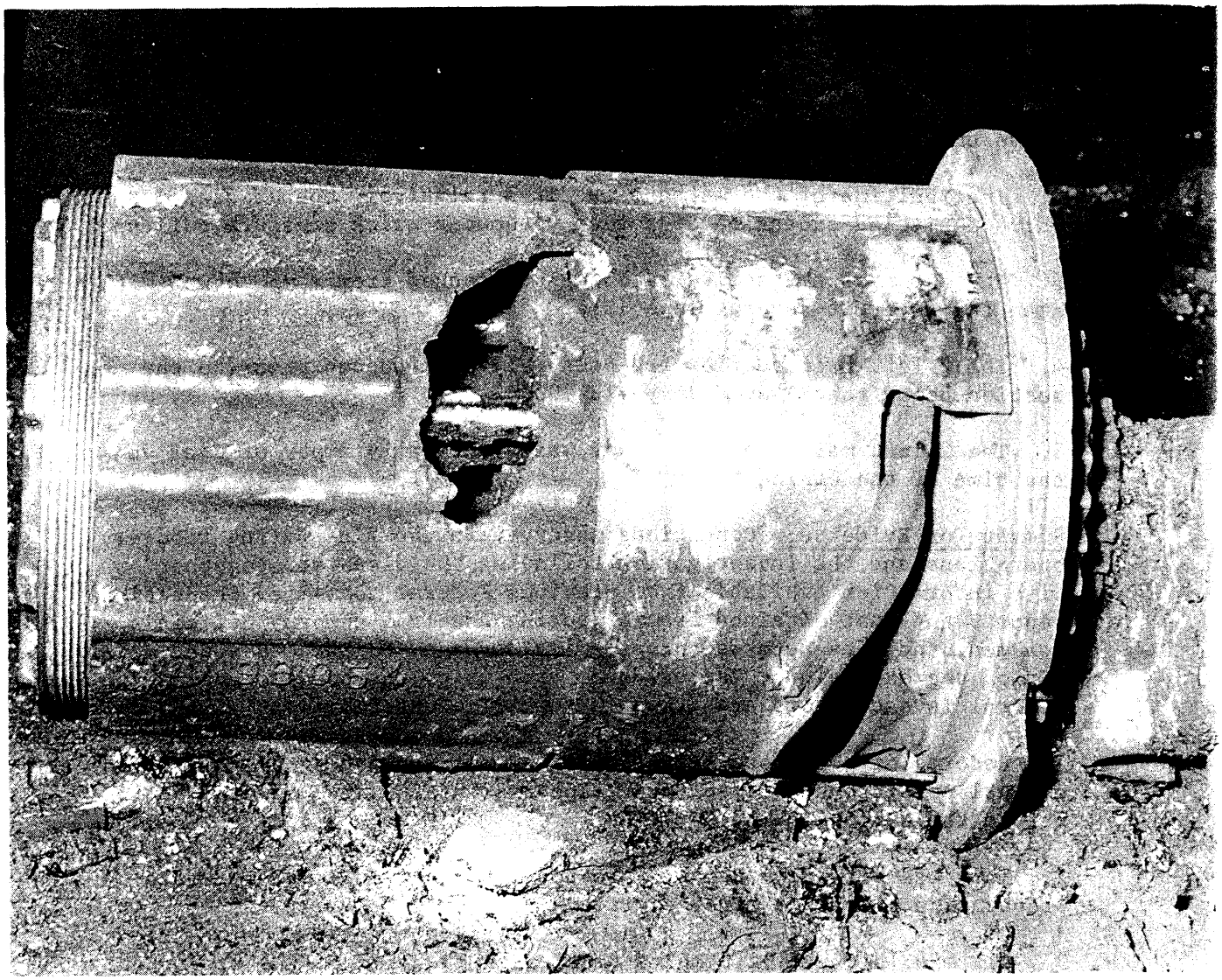
3. All men in the 2 left mains section at the time of the explosion, except one survivor, died in a relatively short time.

4. All forces emanated from No. 4 room off No. 1 entry.

5. The 2 left mains conveyor belt was running practically empty of coal.

6. Only the section foreman in the group of eight men in the 2 left mains section carried a flame safety lamp on the day of the explosion.

7. The first pillar falls had occurred on the section and they likely exposed the rider coal bed from which the methane may have been liberated.



DAMAGED CABLE REEL OF NO. 1 STANDARD DRIVE SHUTTLE CAR.

8. Sufficient flame safety lamps were not available at the mine to provide a lamp for the operator of each piece of face electric equipment.

9. A nearly intact check installed in No. 2 entry prior to the explosion showed poor installation that would have permitted excessive leakage.

10. Generally, line brattice was not used in continuous miner working places.

11. Generally, temporary stoppings (checks) were erected with single plies of brattice cloth. Such installations permitted excessive air leakage and damage by equipment and men passing through the check curtains.

12. Shuttle-car operators tied up checks on the operator's side to prevent the wet canvas from striking them on the face or head.

13. A bleeder system to provide positive pressure on pillared areas had not been established for the 2 left mains section.

14. Gas tests were not made in the face regions before the crew began moving the miner and shuttle cars.

15. All of the face electric equipment in the 2 left mains section was in nonpermissible condition at the time of the explosion.

16. A continuous miner and a shuttle car were being moved in No. 4 room off No. 1 entry when the explosion occurred.

17. The shuttle car following behind the miner was relieving the tension in the miner trailing cable.

18. Arcs or sparks at the cable-reel collector ring assembly of the No. 1 standard-drive shuttle car in operation in No. 4 room off No. 1 entry were the igniting agent.

19. Two separate splits of air from the same primary intake circuit were not positively controlled or regulated.

20. The combination of a damp to wet section, rock-dusting, and opened areas for explosion expansion inhibited propagation and caused the explosion forces to dissipate rapidly.

Cause of the Explosion: This disaster was caused by the ignition of a body of methane by an electric arc or spark. The methane was

liberated in Nos. 4, 5, and 6 rooms and from the pillared areas in Nos. 1, 2, and 3 rooms and No. 1 entry and accumulated because of insufficient ventilation.

RECOMMENDATIONS

The following recommendations are made to prevent similar disasters:

1. Air in sufficient quantity shall be directed to the working faces at all times so as to prevent accumulations of explosive gases or noxious fumes.

2. The use of temporary stoppings (checks) should be kept to the absolute minimum; where used, they should be of substantial construction and erected and maintained so as to keep air loss to a minimum.

3. Employees and officials shall be prohibited from tying up checks; officials allowing or condoning such practice should be disciplined.

4. When a current of intake air is divided into splits, the volume of air in the separate split should be controlled completely with regulators or by other means.

5. Bleeder systems should be established to provide positive pressure on pillared areas to prevent methane released by a pillar fall being suddenly forced into working places or gradually accumulating in active places.

6. A flame safety lamp should be provided for each shot firer and operator of electric face equipment.

7. A program covering the storage, maintenance, and distribution of flame safety lamps should be put into effect, and a competent person should be given the responsibility of ascertaining that each face equipment operator takes his lamp underground daily.

8. Methane monitors should be provided on electric face equipment, especially on continuous miners, loading machines, and mining machines.

9. Examinations for gas in face workings shall be made before any electrically driven equipment is taken into or operated in face regions, and frequent examinations for methane shall be made during such operations.

10. Operation of electric equipment shall be stopped immediately in any area where more than 1 percent of methane is detected. Such equipment shall not be re-operated until the area is reasonably free of methane.

11. Foremen shall be required to examine all working places in their section for gas and other hazards before section employees are permitted to start working, and the foremen's telephone report to surface employees should include the specific information that the working places are free of hazards.

12. Rock dust shall be applied and maintained to within 40 feet of the faces in all working places that are not definitely wet.

13. Rock dust shall be distributed uniformly on the roof, ribs, and floor and maintained in such quantity that the incombustible content of the combined rock dust, coal dust, and other dust will not be less than 65 percent, plus 1 percent for each 0.1 percent of methane present in the ventilating current.

14. Coal dust and loose coal shall not be permitted to accumulate in dangerous quantities in any active underground workings.

15. Permissible equipment shall be maintained in permissible condition.

16. A suitable maintenance program that will keep permissible equipment in permissible condition shall be developed, adopted, and followed.

17. The number of splices in trailing cables shall not exceed five.

18. Temporary splices in trailing cables should be made in a workmanlike manner.

Hazards and substandard operating practices responsible for the following recommendations did not contribute to this disaster; however, safe, efficient mining necessitates that the recommendations be complied with:

1. Feeder cables should not touch combustible materials.

2. Ground-fault protective devices should be maintained in proper operating condition.

3. Electric equipment should be provided with suitable overload protection, and power conductors to such equipment should have adequate current-carrying capacity.

4. Electric wiring and components should be regularly inspected by a competent person, and any defects should be corrected promptly.

5. Trolley feeder wires should be provided with cutout switches at intervals of not more than 2,000 feet.

The following good mining practices were inaugurated by management when mining was resumed:

1. All stationary underground electrical equipment was installed in intake air.

2. Positive control of the volume of air circulated in the 6 left off 2 left mains section was assured by regulation.

ACKNOWLEDGMENT

The writers gratefully acknowledge the courtesies, cooperation, and assistance extended by officials and employees of the operating company, officials and other members of the United Mine Workers of America, and representatives of the West Virginia Department of Mines and United States Bureau of Mines.

Respectfully submitted,

/s/ W. R. Park

W. R. Park
District Manager

/s/ J. D. Micheal

J. D. Micheal
Technical Assistant

/s/ J. W. Crawford

J. W. Crawford
Mining Health and Safety Engineer

Approved by:

/s/ Walter R. Hibbard, Jr.

Walter R. Hibbard, Jr.
Director

/s/ James Westfield

James Westfield
Assistant Director--Health and Safety

ANALYSES OF AIR SAMPLES

TABLE 1

COLLECTED AFTER EXPLOSION

BOTTLE NO.	LABORATORY NO.	LOCATION IN MINE	PERCENT IN VOLUME						CUBIC FEET AIR PER MINUTE	CUBIC FEET METHANE IN 24 HOURS
			CARBON DIOXIDE	OXYGEN	METHANE	CARBON MONOXIDE	NITROGEN			
		EXPLOSION SAMPLES								
F5112	69170	main return top of return air shaft behind fan	0.10	20.72	0.04	none	79.14		82,280	47,000
F5113	69171	main return top of return air shaft behind fan	0.10	20.70	0.21	less than 0.01	78.99		82,060	248,000

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			2 left mains, No. 1 entry 25 feet outby spad 1852 = 0 + 00		
190864	1A1	ribs and floor	0 + 00	large	16.0
190865	1A2	same	0 + 160	very large	41.0
190866	1A2CC	band	0 + 160	very large	41.2
190867	1A3	"	0 + 320	small	26.1
190868	1A3CC	"	0 + 320	trace	42.5*
190869	1A4	floor and ribs	0 + 480	trace	26.0*
190870	1A4CC		0 + 480	trace	16.0*
190871	1A5	band	0 + 640	none	41.5*
190872	1A5CC	"	0 + 640	none	68.5*
190873	1A6	"	0 + 800	none	36.5*
	1A6CC		0 + 800 fall, no sample		
	1A7		0 + 960 wet, no sample		
	1A7CC		0 + 960 same		
	1A8		0 + 1,120 same		
190874	1A8CC	"	0 + 1,120	none	48.0*
	1A9		0 + 1,280 wet, no sample		
	1A9CC		0 + 1,280 fall, no sample		
	1A10		0 + 1,440 wet, no sample		
190875	1A10CC	"	0 + 1,440	none	23.5*
	1A11		0 + 1,600 wet, no sample		
	1A11CC		0 + 1,600 fall, no sample		
	1A12		0 + 1,760 wet, no sample		
	1A12CC		0 + 1,760 gobbed area		

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE		ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES			
			2 left mains - No. 2 entry 25 feet outby spad 1852 = 0 + 00			
190876	1B1	band	0 + 00		large	21.5
190877	1B2	"	0 + 160		large	50.8
190878	1B2CC	"	0 + 160		large	31.4
190879	1B3	"	0 + 320		small	40.3
190880	1B3CC	"	0 + 320		small	37.2
190881	1B4	"	0 + 480		trace	49.0*
190882	1B4CC	"	0 + 480		trace	35.0*
190883	1B5	"	0 + 640		none	54.5*
190884	1B5CC	"	0 + 640		none	40.5*
190885	1B6	"	0 + 800		none	77.0*
	1B6CC		0 + 800	fall, no sample		
	1B7		0 + 960	wet, no sample		
	1B7CC		0 + 960	same		
190886	1B8	"	0 + 1,120		none	49.5*
190887	1B8CC	"	0 + 1,120		trace	35.0*
	1B9		0 + 1,280	fall, no sample		
	1B9CC		0 + 1,280	same		
	1B10		0 + 1,440	same		
	1B10CC		0 + 1,440	same		
190888	1B11	"	0 + 1,600		trace	46.0*
	1B11CC		0 + 1,600	fall, no sample		
190889	1B12	"	0 + 1,760		trace	71.0*
	1B12CC		0 + 1,760	gobbed area		

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			2 left mains - No. 3 entry 25 feet outby spad 1851 = 0 + 00		
190890	1C1	band	0 + 00	very large	27.3
190891	1C2	"	0 + 160	very large	30.8
190892	1C2CC	"	0 + 160	very large	33.3
190893	1C3	"	0 + 320	small	38.6
	1C3CC		0 + 320 fall, no sample		
190894	1C4	"	0 + 480	large	46.0
190895	1C4CC	"	0 + 480	small	72.1
	1C5		0 + 640 wet, no sample		
190896	1C5CC	"	0 + 640	none	54.5*
190897	1C6	"	0 + 800	none	61.9
	1C6CC		0 + 800 fall, no sample		
190898	1C7	"	0 + 960	none	68.1
190899	1C7CC	"	0 + 960	none	53.5*
190900	1C8	"	0 + 1,120	none	62.6
190901	1C8CC	"	0 + 1,120	none	58.4
190902	1C9	"	0 + 1,280	none	35.0*
190903	1C9CC	"	0 + 1,280	none	54.0*
190904	1C10	"	0 + 1,440	none	65.3
190905	1C10CC	"	0 + 1,440	none	78.5*
190906	1C11	"	0 + 1,600	none	54.0*
190907	1C11CC	"	0 + 1,600	none	65.5*
190908	1C12	"	0 + 1,760	none	45.0*
190909	1C12CC	"	0 + 1,760	none	61.4

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			2 left mains - No. 4 entry - 50 feet outby spad 1850 = 0 + 00		
190910	1D1	band	0 + 00	very large	17.6
190911	1D2	"	0 + 160	large	68.1
190912	1D3	"	0 + 320	large	81.3
190913	1D4	"	0 + 480	small	89.5
190914	1D5	"	0 + 640	small	87.6
190915	1D6	"	0 + 800	trace	81.0*
190916	1D7	"	0 + 960	none	81.0*
190917	1D8	"	0 + 1,120	none	70.0*
190918	1D9	"	0 + 1,280	none	85.5*
190919	1D10	"	0 + 1,440	none	75.0*
190920	1D11	"	0 + 1,600	very large	66.7
190921	1D12	"	0 + 1,760	very large	74.0

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE		ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES			
			2 left mains - No. 5 entry 40 feet outby spad 1854 = 0 + 00			
190922	1E1	band	0 + 00		very large	24.0
190923	1E1CC	"	0 + 00		very large	26.3
190924	1E2	"	0 + 160		very large	23.7
190925	1E2CC	"	0 + 160		large	45.5
190926	1E3	floor	0 + 320	roof and ribs wet	small	48.1
190927	1E3CC	band	0 + 320		small	57.9
190928	1E4	"	0 + 480		none	33.0*
	1E4CC		0 + 480	wet, no sample		
	1E5		0 + 640	same		
190929	1E5CC	"	0 + 640		none	55.7
190930	1E6	"	0 + 800		none	50.0*
190931	1E6CC	"	0 + 800		none	69.0*
190932	1E7	"	0 + 960		none	66.3
	1E7CC		0 + 960	fall, no sample		
	1E8		0 + 1,120	same		
	1E8CC		0 + 1,120	same		
190933	1E9	"	0 + 1,280		none	51.0*
190934	1E9CC	"	0 + 1,280		none	29.0*
190935	1E10	"	0 + 1,440		none	51.0*
190936	1E10CC	"	0 + 1,440		none	65.5*
190937	1E11	"	0 + 1,600		none	65.1
190938	1E11CC	"	0 + 1,600		large	41.0*
190939	1E12	"	0 + 1,760		large	57.6
	1E12CC		0 + 1,760	wet, no sample		

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE		ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES			
			2 left mains - No. 6 entry 40 feet outby spad No. 1855 = 0 + 00			
190940	1F1	floor	0 + 00	roof and ribs wet	large	28.4
190941	1F1CC	"	0 + 00	same	small	27.2
	1F2		0 + 160	too wet, no sample		
	1F2CC		0 + 160	same		
	1F3		0 + 320	same		
	1F3CC		0 + 320	same		
	1F4		0 + 480	roof fall, no sample		
190942	1F4CC	band	0 + 480		small	61.9
190943	1F5	floor and ribs	0 + 640	roof wet	none	25.0*
190944	1F5CC	band	0 + 640		none	84.0*
190945	1F6	"	0 + 800		none	51.0*
190946	1F6CC	"	0 + 800		none	67.5*
190947	1F7	"	0 + 960		none	79.0*
190948	1F7CC	floor	0 + 960	roof and ribs wet	none	38.5*
	1F8		0 + 1,100	roof fall, no sample		
190949	1F8CC	"	0 + 1,120	roof and ribs wet	none	54.0*
190950	1F9	band	0 + 1,280		none	39.0*
190951	1F9CC	"	0 + 1,280		none	64.2
190952	1F10	"	0 + 1,440		none	32.5*
	1F10CC		0 + 1,440	wet, no sample		
	1F11		0 + 1,600	same		
190953	1F11CC	floor	0 + 1,600	roof and ribs wet	none	25.0*
	1F12		0 + 1,760	wet, no sample		
	1F12CC		0 + 1,760	same		

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2 COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			2 left mains - No. 7 entry 40 feet outby spad 1874 = 0		
	1G1		0 + 00 wet, no sample		
	1G2		0 + 160 entry not driven		
	1G3		0 + 320 same		
	1G4		0 + 480 fall, no sample		
190954	1G4CC	band	0 + 480	none	37.5*
190955	1G5	floor	0 + 640	none	37.5*
190956	1G5CC	band	0 + 640	none	75.0*
190957	1G6	"	0 + 800	none	23.5*
190958	1G6CC	"	0 + 800	none	67.9
	1G7		0 + 960 wet, no sample		
190959	1G7CC	floor	0 + 960	none	22.0*
	1G8		0 + 1,120 wet, no sample		
190960	1G8CC	"	0 + 1,120	none	35.0*
	1G9		0 + 1,280 wet, no sample		
190961	1G9CC	band	0 + 1,280	none	44.0*
190962	1G10	"	0 + 1,440	none	29.0*
190963	1G10CC	floor	0 + 1,440	none	31.0*
	1G11		entry not driven		
	1G12		same		
			roof and ribs wet		
			*By Volumeter		

TABLE 2 COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			2 left mains - No. 8 entry 50 feet outby spad No. 1874 = 0 + 00		
	1H1		0 + 00 entry not driven, no sample		
	1H1CC		0 + 00 same		
	1H2		0 + 160 same		
	1H2CC		0 + 160 same		
	1H3		0 + 320 same		
	1H3CC		0 + 320 same		
	1H4		0 + 480 same		
	1H4CC		0 + 480 same		
190964	1H5	band	0 + 640	none	43.0*
	1H5CC		0 + 640 wet, no sample		
	1H6		0 + 800 same		
	1H6CC		0 + 800 same		
	1H7		0 + 960 same		
190965	1H7CC	floor	0 + 960 roof and ribs wet	none	20.0*
190966	1H8	band	0 + 1,120	none	16.0*
190967	1H8CC	floor	0 + 1,120	none	40.0*
	1H9		0 + 1,280 wet, no sample		
190968	1H9CC	band	0 + 1,280	none	32.0*
190969	1H10	"	0 + 1,440	none	51.0*
	1H11		0 + 1,600 entry not driven, no sample		
	1H11CC		0 + 1,600 same		
	1H12		0 + 1,760 same		
	1H12CC		0 + 1,760 same		

*By Volumeter

TABLE 2 COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			set of 6 entries, 6 left section, 2 left mains - centerline No. 1 entry 2 left mains + 25 feet = 0 + 00		
			No. 1 entry		
190970	2A1	band	0 + 00	none	65.5*
190971	2A1CC	"	0 + 00	none	35.0*
	2A2		0 + 240 wet, no sample		
190972	2A2CC	"	0 + 240	none	45.0*
	2A3		0 + 480 wet, no sample		
190973	2A3CC	"	0 + 480	none	46.5*
	2A4		0 + 720 wet, no sample		
	2A4CC		0 + 720 same		
	2A5		0 + 960 same		
	2A5CC		0 + 960 same		
	2A6		0 + 1,200 same		
	2A6CC		0 + 1,200 same		
	2A7		0 + 1,440 same		
190974	2A7CC	floor	0 + 1,440	none	68.6
			No. 2 entry		
190975	2B1	band	0 + 00	none	40.5*
190976	2B1CC	"	0 + 00	none	36.0*
190977	2B2	"	0 + 240	none	54.5*
190978	2B2CC	"	0 + 240	none	52.0*
	2B3		0 + 480 wet, no sample		
190979	2B3CC	"	0 + 480	none	32.0*
	2B4		0 + 720 wet, no sample		
190980	2B4CC	"	0 + 720	none	73.0*
	2B5		0 + 960 wet, no sample		
	2B5CC		0 + 960 same		
	2B6		0 + 1,200 same		

TABLE 2 COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
	2B6CC		0 + 1,200 wet, no sample		
	2B7		0 + 1,440 same		
190981	2B7CC	floor	0 + 1,440	none	54.0*
			No. 3 entry		
190982	2C1	band	0 + 00	none	76.0*
	2C1CC		0 + 00 wet, no sample		
	2C2		0 + 240 same		
190983	2C2CC	floor	0 + 240	none	61.0
190984	2C3	"	0 + 480	none	74.5*
190985	2C3CC	"	0 + 480	none	49.0*
190986	2C4	"	0 + 720	none	66.0*
190987	2C4CC	"	0 + 720	none	45.0*
	2C5		0 + 960 wet, no sample		
	2C5CC		0 + 960 same		
190988	2C6	"	0 + 1,200	none	67.9
	2C6CC		0 + 1,200 wet, no sample		
	2C7		0 + 1,440 same		
	2C7CC		0 + 1,440 same		
			No. 4 entry		
190989	2D1	band	0 + 00	none	59.7
	2D1CC		0 + 00 wet, no sample		
190990	2D2	floor	0 + 240	none	39.0*
190991	2D2CC	"	0 + 240	none	66.5*
190992	2D3	"	0 + 480	none	41.0*
190993	2D3CC	"	0 + 480	none	45.5*
	2D4		0 + 720 roof fall, no sample		
	2D4CC		0 + 720 same		
	2D5		0 + 960 wet, no sample		
	2D5CC		0 + 960 same		
190994	2D6	"	0 + 1,200	none	68.0*
	2D6CC		0 + 1,200 wet, no sample		

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
190995	2D7	floor	0 + 1,440	none	44.0*
190996	2D7CC		0 + 1,440	none	80.0*
			No. 5 entry		
190997	2E1	band	0 + 00	none	64.5
	2E1CC		0 + 00 wet, no sample		
190998	2E2	floor	0 + 240	none	53.0*
190999	2E2CC	band	0 + 240	none	81.0*
191000	2E3	floor	0 + 480	none	44.0*
	2E3CC		0 + 480 wet, no sample		
	2E4		0 + 720 fall, no sample		
	2E4CC		0 + 720 same		
	2E5		0 + 960 same		
	2E5CC		0 + 960 wet, no sample		
	2E6		0 + 1,200 same		
	2E6CC		0 + 1,200 same		
	2E7		0 + 1,440 same		
191001	2E7CC	"	0 + 1,440	none	62.1
			No. 6 entry		
	2F1		0 + 00 wet, no sample		
191002	2F2	"	0 + 240	none	65.3
	2F3		0 + 480 wet, no sample		
	2F4		0 + 720 roof fall, no sample		
	2F5		0 + 960 wet, no sample		
	2F6		0 + 1,200 same		
	2F7		0 + 1,440 same		

roof and ribs wet

*By Volumeter

ANALYSES OF DUST SAMPLES

TABLE 2

COLLECTED AFTER EXPLOSION

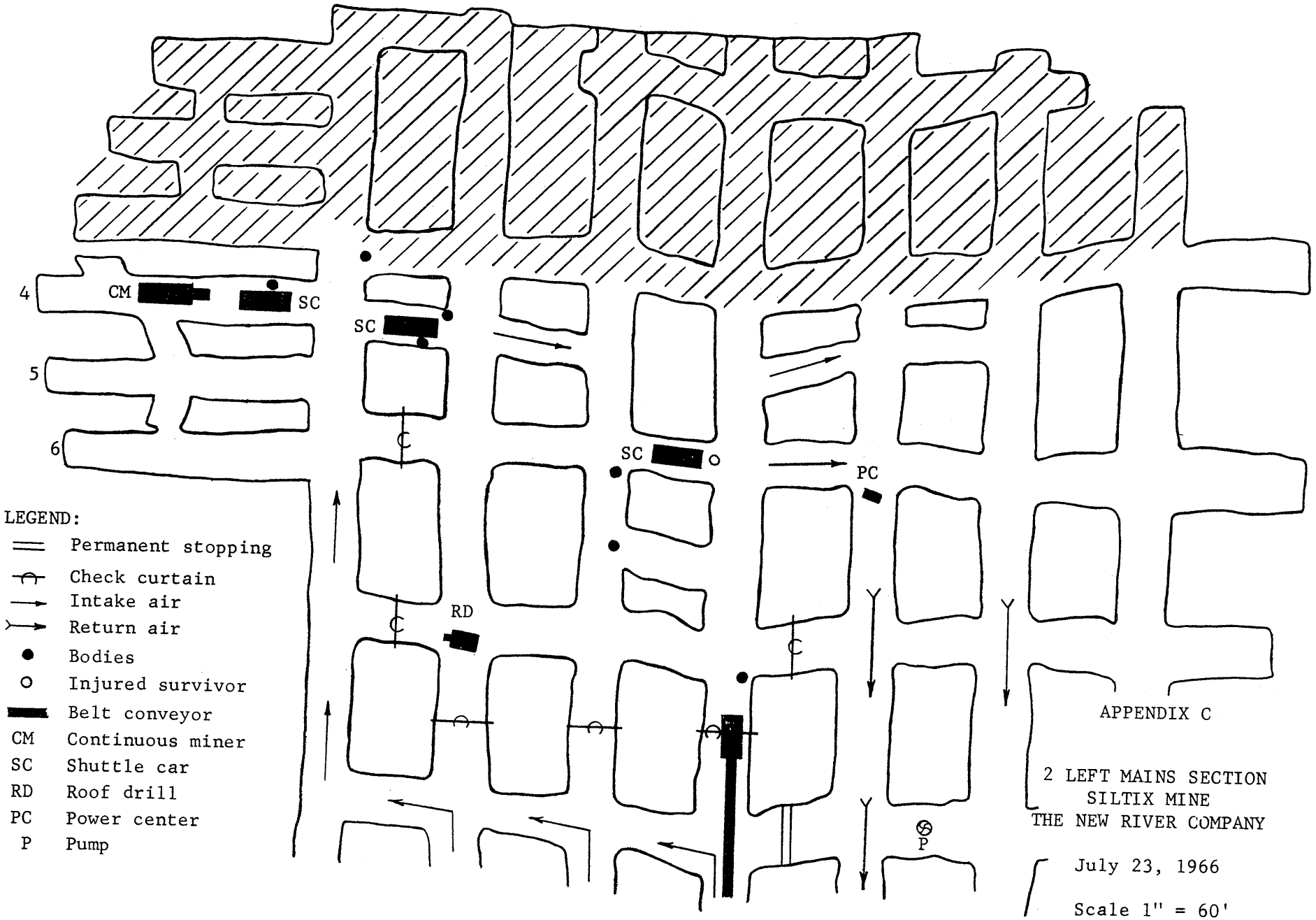
LAB. NO.	CAN NO.	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	AS-RECEIVED PERCENT INCOMBUSTIBLE
			EXPLOSION SAMPLES		
			2 left mains near origin of explosion		
190859	1	band	15 feet outby continuous miner in crosscut between Nos. 4 and 5 rooms	large	10.0
190860	2	"	in No. 4 room 10 feet inby continuous miner	large	9.4
190861	3	roof and ribs	in No. 4 room at continuous miner controls	large	12.2
190862	4	band	in No. 4 room at continuous miner discharge boom	large	10.7
190863	5	"	in No. 4 room at No. 1 shuttle-car controls immediately outby continuous miner	small	10.3

APPENDIX A

VICTIMS OF EXPLOSION, SILTIX MINE, THE NEW RIVER COMPANY

July 23, 1966

Name	Age	Number of Dependents	Occupation	Experience This Occupation	Experience In Mines
Dallas L. Ayers	45	6	Section Foreman	5 months	7 years
Luther E. Bowyer	46	4	Electrician	18 years	Not known
Clarence Cummings	32	2	Shuttle-Car Operator	3 years	5 years
Robert C. Daniel	21	2	Continuous-Miner Helper	2 weeks	3 years
Herbert Dowdy	35	5	Roof Bolter	3 years	10 years
James H. McGuire	44	6	Continuous-Miner Operator	10 years	15 years
Howard Morris	32	6	Shuttle-Car Operator	2 years	10 years

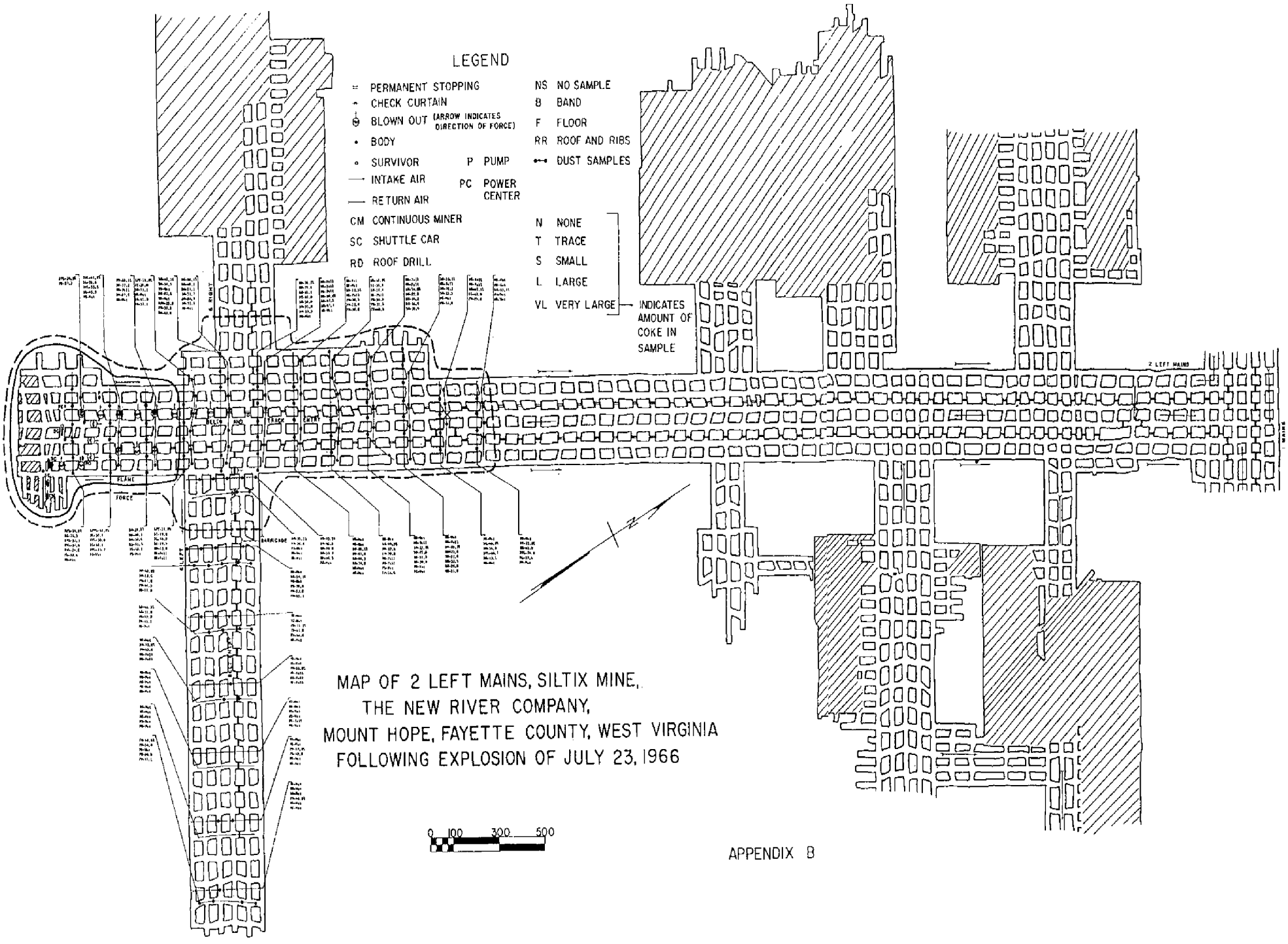


APPENDIX C

2 LEFT MAINS SECTION
SILTIX MINE
THE NEW RIVER COMPANY

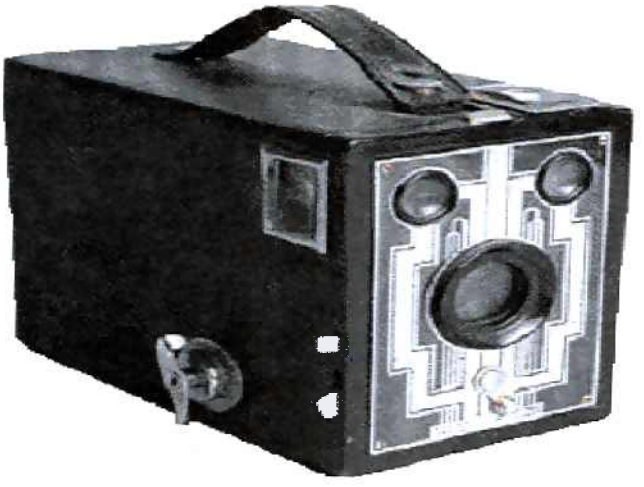
July 23, 1966

Scale 1" = 60'

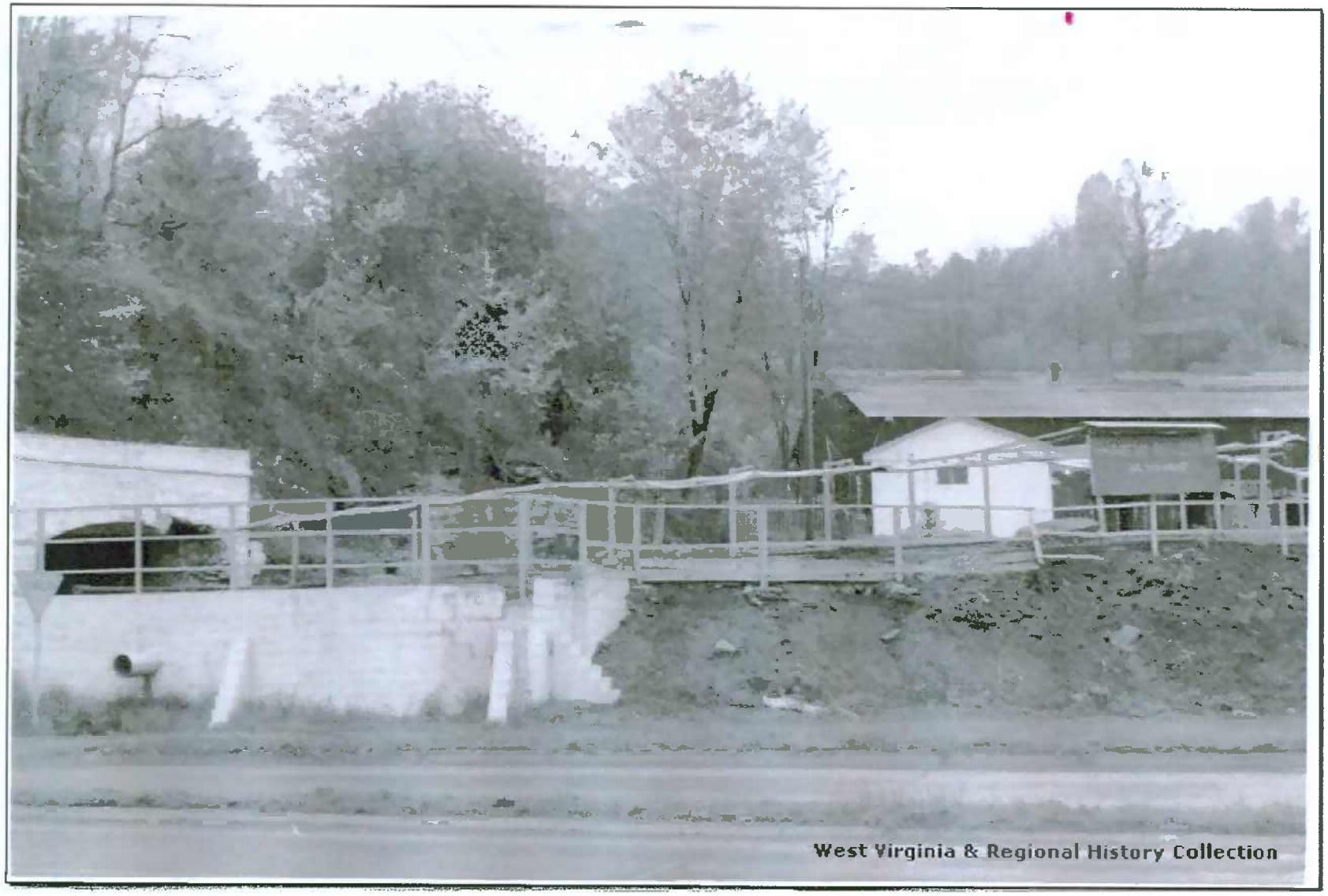


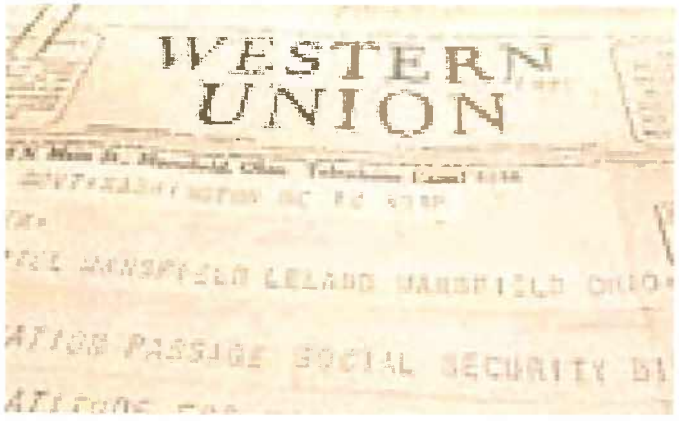
MAP OF 2 LEFT MAINS, SILTIX MINE,
THE NEW RIVER COMPANY,
MOUNT HOPE, FAYETTE COUNTY, WEST VIRGINIA
FOLLOWING EXPLOSION OF JULY 23, 1966

APPENDIX B



Photographs


West Virginia & Regional History Collection



Telegraph

http://www.wvculture.org/history/disasters/siltix01.jpg7/17/200711

CLASS OF SERVICE
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WESTERN UNION TELEGRAM

W. P. MARSHALL, CHAIRMAN OF THE BOARD — 440P — H. McFALL, PRESIDENT

SYMBOLS
DL = Day Letter
NL = Night Letter
LT = International Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination

VE9 (SUBJECT TO CORRECTION)=GOVT PD 1 EXTRA=WASHINGTON DC
AUG 8 359P EDT
=W A HASLAM, PRESIDENT= THE NEW RIVER CO
MOUNT HOPE WV1R:

SPECIAL INSPECTION YOUR SILTIX MINE AT MOUNT HOPE WEST VIR AUGUST 6, 1966 BY THREE REPRESENTATIVES BUREAU OF MINES REVEALS THAT MINE EXPLOSION DANGER DESCRIBED IN WITHDRAWAL ORDER ISSUED OPERATOR SAID MINE JULY 23, 1966 BY INSPECTOR JAMES W RUTHERFORD PURSUANT TO SECTION 203A FEDERAL COAL MINE SAFETY ACT ABATED TO THE EXTENT THAT SAID ORDER IS HEREBY FURTHER REVISED TO ALLOW RESUMPTIONS OF OPERATONS IN THE MINE EXCEPT IN THE TWO LEFT MAINS INBY 6 LEFT. THE MINE EXPLOSION ORDER OF JULY 23, 1966 SHALL REMAIN IN EFFECT IN TWO LEFT MAINS INBY 6 LEFT.

PLEASE POST THIS TELEGRAM ON MINE BULLETING BOARD=
H F WEAVER ACTING ASSISTANT DIRECTOR BUREAU OF MINES==

= 8 1966 23 1966 203A 6 23 1966 6=

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE