COAL FATAL

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

DISTRICT C

FINAL REPORT OF MINE EXPLOSION

NO. 6 MINE
ISLAND CREEK COAL COMPANY
BRADSHAW, McDOWELL COUNTY, WEST VIRGINIA

September 28, 1964

By

George Noe
Management Assistant

Millard F. Steele
Federal Coal-Mine Inspector

Originating Office - Bureau of Mines
Mount Hope, West Virginia
W. R. Park, District Supervisor
Health and Safety District C

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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).

A gas explosion occurred between 3 and 8 a.m., Monday, September 28, 1964, in the temporarily abandoned 10 butts section off 3 west mains, No. 6 mine, Island Creek Coal Company, Bradshaw, McDowell County, West Virginia. Three men were killed by the explosion. Twenty-two other men in the mine at the time were not aware of the explosion and returned to the surface at the end of their regular work shift.

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

Bureau of Mines investigators believe that the explosion originated in 10 butts off 3 west mains, when an accumulation of methane was ignited by an electric arc from the energized trolley wire and the "nip" of the "nip scooter" operated by one of the victims. The forces of the explosion traveled outwardly from 10 butts entries into 3 west mains entries and outby in 3 west mains entries to the 8 butt left overcast, a distance of 2,300 feet, where they dissipated as they moved along the well rock-dusted entries. Forces also traveled inby the point of origin into the abandoned 9 butts entries, which were interconnected with the 10 butts entries at the top end of the 9 butts pillar line.

GENERAL INFORMATION

The No. 6 mine, approximately 4 miles north of Bradshaw, West Virginia, off highway route No. 80, is served by the Norfolk and Western Railway.

The operating officials of the Island Creek Coal Company on September 28, 1964, were:

President	J. L. Hamilton	Huntington, West Virginia
Executive Vice President	N. T. Camicia	Huntington, West Virginia
Vice President and General Manager of Mines	Stonie Barker	Holden, West Virginia
Manager of Mines	Walter DeBord	Holden, West Virginia
Division Manager	T. H. Strunk	Bartley, West Virginia
Director of Safety	C. E. Linkous	Holden, West Virginia
Director of Engineering	William Diamond	Holden, West Virginia
Chief Mining Engineer	Ray Talliferro	Holden, West Virginia
Mine Foreman	John Sargent	Raysal, West Virginia
Division Safety Engineer	C. E. Barnette	Bartley, West Virginia

A total of 147 men, 124 underground and 23 on the surface, was employed on one maintenance and supply shift and two coal-producing shifts a day. The average daily production, 1,250 tons of coal, was loaded mechanically.

Access to the mine was by a shaft and seven drifts into the low-volatile bituminous Bradshaw coal bed, which averaged 40 inches in thickness.

The immediate roof was firm shale, containing slips and rolls overlain with thin seams of coal. The main roof was sandstone of undetermined thickness.

The analysis of the coal from the Bradshaw coal bed in this mine, as provided by the company, is as follows:

	Percent
Moisture	0.55
Volatile Matter	25.00
Fixed Carbon	67.45
Ash	7.00
	100.00

Numerous tests by the Bureau of Mines have shown that coal dust having a volatile-combustible ratio of 0.12 is explosive and that the explosibility increases with an increase in the volatile ratio. The volatile-combustible ratio of the coal in this mine as determined from analysis is 0.27, indicating that the dust from this coal is explosive.

A gas ignition occurred at this mine in 4 north mains on August 22, 1958, in which two men were burned to the extent that they required hospitalization. The previous Federal inspection was completed July 28, 1964, and

a check (spot) inspection was made of the No. 4 section (5 north parallels) and the haulageway thereto, on August 24, 1964.

MINING METHODS, CONDITIONS, AND EQUIPMENT

Mining Methods: The mine was developed by a room-and-pillar method. Main and butt entries were driven in sets of 4 to 12, and room entries were driven in sets of 3 to 6 at intervals of 260 feet. Entries and rooms were driven 24 feet wide and crosscuts were about 80 feet apart. Present mining was confined to the 4 and 5 north areas, where rooms were being driven into barrier pillars left from previous mining. Pillars were being recovered in Nos. 1 and 3 sections. The Nos. 9, 10, 11, and 12 butts off 3 west mains were temporarily abandoned and being ventilated at the time of the occurrence.

In development places, one row of permanent posts was to be set on 6-foot centers on each side of 14- to 16-foot-wide roadways to within 10 feet of the faces, and a minimum of two safety posts were to be set near the faces during each cycle of operations. In pillar lifts, the minimum standards for roof support required a double row of posts, including breaker posts, to be set not over 6 feet apart on the open side. Roof bolts, installed in accordance with the recommendations of a Bureau of Mines roof-control representative, were used in conjunction with conventional timbers at spot locations.

Coal was loaded mechanically. Two sections used conventional equipment and one section used permissible battery-powered tractor haulage equipment.

Pillars were being recovered by the open-end method in Nos. 1 and 3 sections.

Ventilation and Gases: Ventilation was induced by a propeller fan, installed suitably on the surface with recording devices and exhausting about 258,000 cubic feet of air a minute, at the time of the occurrence. A standby fan, capable of exhausting 250,000 cubic feet of air a minute, was at the same location. The fan was operated continuously, except for three or four interruptions in the last six weeks due to power line repair when "outages" were scheduled.

A split system of ventilation was used, utilizing incombustible stoppings and overcasts. Air-lock doors were used on the intake to regulate the air to No. 3 section, and a single door was used to regulate the intake air to the abandoned 3 west mains butt entries.

The mine is classed gassy in accordance with the laws of the State and the Bureau of Mines. The air sample collected at the fan during the previous Federal inspection did not contain methane. During the month of September, the fire boss' record book indicated that methane had been detected three times in No. 4 section. Gas or oil wells did not penetrate the coal bed on this property.

Air measurements and methane contents recorded in the July 1964 Federal inspection report are as follows:

Location	Volume of Air, c.f.m.	Methane Percent	Cubic Feet of Methane in 24 Hours
Immediate return at last open crosscut in No. 1 entry, No. 3 section	16,800	0.00	----
Immediate return at last open crosscut in No. 4 entry, No. 2 section	6,800	0.10	5,900
Immediate return at last open crosscut in No. 1 entry, No. 4 section	18,000	0.05	13,000
Main return at bottom of fan shaft	300,000	0.00	----

The analytical results of air samples collected during the December 1963 Federal inspection, when four sections were producing coal in 9, 10, 11, and 12 butts off 3 west, indicated that methane was being liberated freely in the explosion area. The air measurements and analyses of the air samples are as follows:

Location in Mine	Volume of Air, c.f.m.	Methane Percent	Cubic Feet of Methane in 24 Hours
Immediate return No. 7 entry regulator No. 5 section 9 butts	11,000	0.10	16,000
Immediate return No. 5 entry, No. 1 section 10 butts	6,400	0.38	35,000

Immediate return No. 5 entry 11 butts	9,600	0.17	24,000
Immediate return 12 butts regulator No. 4 section	9,000	0.19	25,000
Split return, No. 7 and No. 1 sections at 9 butts overcast	20,000	0.20	58,000
Bleeder return regulator at mouth 8 butts	350	0.89	4,600
Split return pillared area 3 west overcast	74,000	0.07	75,000
Main return No. 1 station main fan	163,000	0.05	117,000
Main return No. 2 station main fan	132,000	0.12	228,000

Prior to the occurrence, the ventilation plan for the temporarily abandoned 3 west butt entries was to utilize the 9 and 10 butts entries for intake airways, split the air left and right at the top end of 9 and 10 butts to sweep the pillared areas and returned through the gob areas and bleeders. The intake air reading at 3 west overcast obtained by the fire boss on August 20, 1964, indicated 36,692 cubic feet of air a minute was being used to ventilate this area. However, on August 31, 1964, the pitch of the blades on the fan was changed from the 4 to 1 positions. Air readings obtained by the fire boss before (297,714 c.f.m.) and after the change (259,920 c.f.m.) indicated a loss of approximately 38,000 cubic feet of air a minute at the fan and 10,608 cubic feet of air a minute at 3 west overcast.

Dust: At the close of the July 1964 Federal inspection, the mine ranged from wet to dry. Coal dust and loose coal were not accumulated in dangerous quantities in the active underground workings, and excessive dust was not raised into the air during mining operations. Water and calcium chloride were used to allay the dust on shuttle-car roadways, and water sprays were used to allay the dust on loaded trips. Portable rock-dust machines were used for section rock-dusting. A high-pressure track-mounted machine was used to rock dust track haulageways and parallel and back entries. Rock dust was applied to within 40 feet of the faces, and open crosscuts within 40 feet of the faces were rock-dusted. Haulageways, open parallel entries, and back entries were rock-dusted, and the applications appeared adequate.

During the July 1963 Federal inspection, a rock-dust survey was made in the 10 butts left entries off 3 west. Dust samples were collected on pattern in each entry beginning 50 feet inby engineers survey station No. 8763 in No. 5 entry and at 240-foot intervals to within 150 feet of the faces, except in areas too wet to sample. The incombustible content of the 18 dust samples collected during the survey ranged from 71.0 to 91.0 percent. The survey ended one crosscut (approximately 70 feet) inby the point where the ignition occurred.

Transportation: Coal was transported from the faces to the loading points by cable-reel shuttle cars on two sections and in rubber-tired mine cars pulled by battery-operated locomotives on one section, then transported to the surface by trolley locomotives. Repairmen, foremen, and other general labor traveled in the mine on "scooters" receiving power through trolley poles and/or nips. Men were transported underground in portal buses under the supervision of certified officials. All track haulageways were installed in intake air.

Electricity: Electric power at 13,000 volts alternating current, purchased from the Appalachian Power Company, was used to operate rectifiers and motor-generator sets, supplying 275 volts direct-current power for use underground and 110, 220, 440, and 2,300 volts alternating current power was used on the surface. Two rectifiers were located underground and seven rectifiers and motor-generator sets were located on the surface. Electric power wires entered the mine through the portal drift and boreholes. Disconnecting switches and lightning arresters were provided in the circuits near the points where the circuits entered the mine. The trolley and feeder wires were installed on insulated hangers and cutout switches were provided at suitable intervals and near the beginning of branch lines. The electric face equipment was of the permissible and nonpermissible types, and the permissible equipment was in permissible condition at the close of the July 1964 inspection. The trailing cables for the mobile equipment were approved as fire resistant and provided with short-circuit protection at the nip ends. Tests for methane were made with permissible flame safety lamps before the electrically driven equipment was taken into or operated in the face regions and at frequent intervals while such equipment was operated at the faces.

Illumination and Smoking: Permissible electric cap lamps were used for portable illumination underground, and fixed electric lights were installed at the underground repair shop. Smoking was not permitted or observed underground. Searches were conducted for smokers articles and a record was kept of the searches.

Mine Rescue: A mine rescue team was not maintained at the mine; however, a fully equipped and trained team was maintained at the company's mine

rescue station at Bartley, West Virginia. The rescue station is equipped with the necessary gas detection devices, self-contained oxygen breathing apparatus, Chemox oxygen-generating breathing apparatus, and Universal gas masks. A fully equipped State mine-rescue truck was located at Welch, 25 miles from the mine. Self-rescuers were worn by the underground employees.

Adequate fire-fighting facilities were provided at the mine. Suitable fire extinguishers were kept in each working section and at each electrical installation. Supplies of rock dust were stored at doors and other strategic locations. A track-mounted Carboloy chemical car, equipped with a pressure pump and 500 feet of 3/4-inch hose, was stored at a strategic location. Water lines were available at each active section.

STORY OF EXPLOSION AND RECOVERY OPERATIONS

Participating Organizations: The organizations who participated in recovery work were Island Creek Coal Company, West Virginia Department of Mines, United Mine Workers of America, and United States Bureau of Mines.

Activities of Bureau of Mines Personnel: Millard F. Steele, Federal Coal-Mine Inspector, stopped at the No. 6 mine shop about 9:30 a.m., Monday, September 28, 1964, where he was informed that three men had failed to come out of the mine at the end of their regular work shift. After word was received from underground personnel that smoke and gas had been encountered near the mouth of 9 butts left entries off 3 west mains, Steele advised W. R. Park, District Supervisor, of the occurrence. Steele was instructed to go underground and assist in determining what had occurred. Thereafter, Bureau personnel J. L. Gilley, V. D. Tennant, J. C. Blankenship, Jr., M. E. Bragg, W. R. Park, and George Noe, arrived at the mine and spent one or more days assisting with the recovery work or investigation. A Federal inspector remained on duty each shift until the explosion area had been sealed.

Mine Conditions Immediately Prior to Explosion: The weather on September 28, 1964, was fair and clear. Records of barometric readings taken from the recording barometer in the superintendent's office at Olga No. 1 mine, Olga Coal Company, Coalwood, McDowell County, West Virginia, approximately 7 air miles from No. 6 mine were as follows:

Sunday, September 27, 1964

Time	Barometric Pressure
6 a.m.	28.70
12 noon	28.71
6 p.m.	28.73
12 midnight	28.60

Monday, September 28, 1964

Time	Barometric Pressure
4 a.m.	28.60
6 a.m.	28.60

The normal pressure for this area is 28.50. The slight change in atmospheric pressure was not believed to have been a contributing factor in the explosion.

The mine operated Monday through Friday, September 21-24, 1964, and was idle the two following days, Saturday and Sunday. A power "outage" was scheduled for Sunday, September 27, 1964, and the fan did not operate from 7:15 a.m. to 11:45 a.m. on this date.

John Sargent, mine foreman, was on vacation and Harry Gates, assistant mine foreman, was in charge of the mine during Sargent's absence.

Evidence of Activities and Story of Explosion: According to T. H. Strunk, division manager, Bartley Division, and other mine personnel interviewed, the activities in and about the mine on Sunday and Monday were as follows:

A power "outage" was scheduled for Sunday, September 27, 1964, at 7:15 a.m., which necessitated a fan shutdown until 11:45 a.m. Glen Walsh, section foreman, was on duty on the surface until the fan was again operating. After two hours of fan operation, Walsh patrolled the haulageways and examined the No. 1 section in 4 north and Nos. 3 and 4 sections off 5 north. The Fire Boss, Leonard Allen, entered the mine at 7 p.m. and began the fire-boss examination for the midnight shift electricians and supply crews at 8 p.m. Allen returned to the surface at 10:25 p.m., September 27, 1964, and properly recorded his findings, which indicated no methane detected, roadways on the active sections were dusty, and abandoned works were not inspected.

The third shift entered the No. 6 mine as usual after each man was assigned duties by the shift foreman. Raymond Prueitt was working in 3 north loading slate, which had been shot at an overcast location. The Foreman, John Hagerman, came to 3 north about 3 a.m., and he informed Prueitt that he was going to 10 butts to get a track switch and would be there in case he was needed. Apparently, no one else talked to Hagerman after this conversation. When Hagerman and two other men failed to arrive on the surface at their regular quitting time, 7:30 a.m., September 28, 1964, Harry Gates, acting mine foreman, went to 3 north where the track materials were to have been delivered. Gates did not find Hagerman in 3 north, and while he was talking to the dispatcher, Ballard Payne, pipeman, called to "get the road". Gates instructed Payne to travel into 3 west to look for the missing men. Enroute, Payne met Howard Holbrook, pumper, who accompanied him. Holbrook, riding a 6-ton locomotive, and Payne, following on a "scooter" traveled to near the mouth of 8 butts where cinder blocks were found in the track. The blocks were removed from

the track and a wire spool was seen next on the track inby 8 butts overcast, and dust was noticed on the rails indicating that something was wrong. The two men then traveled back to the mouth of 3 west to telephone and request that a certified man be sent to the area, as it appeared that there had been an explosion in the area. Gates, Auburn Robertson, section foreman, and Gilbert Horn, electrician, arrived at the mouth of 3 west mains shortly after the telephone call, and the five men proceeded to 8 butts overcast. Thereafter, they proceeded on foot, testing with a flame safety lamp as they traveled inby. They detected methane in 10 butts and then retreated to the 3-west telephone and notified company officials on the surface of the explosion.

Recovery Operations: Immediately after being notified of the occurrence, T. H. Strunk, division manager, contacted other company mines and arranged for mine rescue team members to be sent to the No. 6 mine with their equipment. Upon Strunk's arrival at No. 6 mine office, Harry Gates, acting mine foreman, informed him that definitely an explosion had occurred. The dispatcher was advised by Mr. Strunk to send the men on coal-producing sections to the surface. Law enforcement agencies were notified and put in charge to keep unauthorized persons from entering the mine property. Federal Inspector Steele entered the mine about 11 a.m. with the company mine rescue members and Ray Perkins, chief electrician. They arrived at the 9 butts overcast about 11:20 a.m. Tests for methane and carbon monoxide were made at 9 butts overcast. Movement of air was barely perceptible under the overcast and 0.01 percent carbon monoxide was detected in the return over the overcast.

After conferring with Harry Gates and checking for methane and carbon monoxide in 10 butts, where 0.01 percent carbon monoxide and 1.50 percent methane were found at engineer spad No. 8719, No. 2 entry, it was decided to try to explore 9 butts as far as possible. The No. 2 entry and stopping line were explored as far as engineer's spad No. 8699, where air movement ceased; it was then decided to return to 10 butts, as the victims were believed to have entered these entries. Carbon monoxide, 0.02 to 0.04 percent, was detected at two locations in the return entry of 9 butts.

At 1 p.m., two men, wearing Chemox oxygen breathing apparatus, advanced approximately 1,100 feet inby engineer's spad No. 8719, No. 2 entry 10 butts (fresh air base), where they found the bodies of the three victims and the two "scooters" the men had been riding. Tests for carbon monoxide indicated 0.04 percent enroute to the "scooter" location.

Shortly afterward, company officials and State and Federal inspectors arrived at 10 butts to assist in the recovery. Other State and Federal

inspectors had arrived at the mine and were assigned various duties. The fan was attended constantly by State and Federal inspectors until recovery and investigation operations were completed.

Self-contained breathing apparatus were taken into the mine, and at 5:40 p.m. three mine rescue men, pushing a "scooter" left the fresh air base and returned at 6:25 p.m. with the bodies. The bodies arrived on the surface at 7:15 p.m., September 28.

After the bodies were removed from the mine, a conference was held in the mine office and the following were present:

West Virginia Department of Mines

W. F. Eigenbrod	Director
Elmer C. Workman	Deputy Director
Harry Harman	Inspector-at-Large

Island Creek Coal Company

C. E. Linkous	Director of Safety

United Mine Workers of America

James Leeber, Jr.	Safety Director, District 29

United States Bureau of Mines

George Noe	Management Assistant

At this conference, it was agreed that a State and Federal inspector would be in attendance at the fan around the clock to make regular checks of the air returning from the mine to determine the carbon monoxide and methane contents and to call their findings to the No. 6 mine office. It was also agreed to send a State and Federal inspector and a fire boss into the mine to take air readings and make tests for carbon monoxide and methane. After these men returned from the mine and reported their findings to the interested parties, it was agreed to let the mine stand as was until the following day, Tuesday, September 29, 1964. On September 29, 1964, the same persons who had attended the September 28 meeting conferred again; W. R. Park, District Supervisor, attended this meeting. During the September 29 conference, it was agreed that the following steps would be taken to reventilate the 10 butts left entries:

1. All of the 9 butts intake and return openings would be closed with plastic stopping material.

2. All intake airways of 3 west mains inby 10 butts left would be closed with plastic stopping material.

3. The openings in the old compressor station, in 8 butts overcast, and in the crushed stopping near the mouth of 10 butts would be closed with plastic stopping material. After the above openings were closed, the ventilating current near the mouth of 3 west mains would be short-circuited, and thereafter, the 3 west mains intakes and openings at the other locations would be closed. Men engaged in this work would then retreat to the mouth of 3 west mains, there restore normal ventilation and then return to the surface.

4. After the foregoing ventilation changes were completed, men would remain out of the mine for 48 hours; then company, State, and Federal representatives would examine the 10 butts area.

5. Carbon monoxide and methane determinations would be made every hour in the main return at the fan.

The ventilation change was completed at 9:15 p.m., September 29, 1964.

INVESTIGATION OF CAUSE OF EXPLOSION

Investigation Committee: The underground investigation of the cause of the explosion was made in the accessible areas on October 2, 1964. Members of the official investigating committee were:

West Virginia Department of Mines

W. F. Eigenbrod	Director
Edward Jarvis	District Mine Inspector

Island Creek Coal Company

John Sargent	Mine Foreman
Elmer Layne	Safety Engineer
Eddie McGraw	Section Foreman
Auburn Robertson	Section Foreman
Leonard Allen	Fire Boss

United States Bureau of Mines

W. R. Park	District Supervisor
James C. Blankenship, Jr.	Federal Coal-Mine Inspector

Because of inadequate ventilation and the presence of carbon monoxide in air returning from the affected area, it was impossible to examine the entire abandoned area of 3 west mains. During a conference after the underground investigation, company officials were informed by State and Federal representatives that the 3 west area should be ventilated adequately and inspected regularly or the affected area should be sealed, and the conferees were agreed that sealing of the area was the safest procedure. Therefore, it was agreed to seal the 3 west main area, and sealing operations were begun on October 2, 1964, and completed October 6, 1964. A total of 36 seals were installed to close the sealed area. Pipes and valves were installed in three of the seals for sampling purposes.

W. F. Eigenbrod, Director of the State Department of Mines, conducted an official inquiry and investigation of the explosion by interrogating a number of officials and employees of the company in the company's mine office at Bartley, West Virginia, October 6, 1964. The purpose of the inquiry was to hear and record all testimony relevant to conditions and practices in the mine prior to and on September 28, and determine therefrom if possible, the cause of the explosion. Some of the information thus obtained is included in this report. Representatives of the operating company, United Mine Workers of America, West Virginia Department of Mines, and Bureau of Mines questioned the officials and employees during the inquiry.

Methane and/or Dust as a Factor in the Explosion: The mine is classed gassy by the West Virginia Department of Mines and by the Bureau of Mines. Methane has been detected in the mine on numerous occasion.

During recovery operations, 2.0 percent of methane was detected two crosscuts inby the fresh air base in 10 butts.

Very little, if any, coal dust entered into the explosion.

Flame: Due to the restricted underground investigation, the extent of the flame was not determined; however, the victims were burned severely.

Forces: The forces radiated inby and outby from the point of origin. Forces traveled out of the 10 butts entries to the 3 west mains entries, outby in the 3 west mains entries to the 8 butts left overcast, a distance of approximately 2,300 feet. Forces also traveled inby from the point of origin into the abandoned 9 butts entries, which were interconnected with the 10 butts entries at the top end

of the 9 butts pillar line. Six stoppings were blown out, several stoppings damaged slightly, and one overcast was damaged by the forces of the explosion. Very little other evidence of the forces was visible.

Probable Point of Origin: The consensus of the investigators of the Bureau of Mines is that the explosion originated in No. 2 entry 10 butts, the track haulageway, 1,350 feet inby the 10 butts overcast, where the two "scooters" and victims were found.

Factors Preventing Spread of Explosion: The Bureau investigators believe that the predominate factor which prevented a more violent and widespread explosion was that the methane laden atmosphere in the 10 butts left section was deficient in oxygen due to the lack of ventilation in the explosion area. Other factors that helped limit the explosion were: Adequate rock-dusting in the area, the cooling effect of the extensive rib, roof and floor surfaces of the several entries and many crosscuts in the path of the explosion, and the ample open areas including the gob areas inby and on the right side of the section, resulting in reduction of flame speed and temperature.

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

1. Mining operations in 9 butts left section off 3 west mains were temporarily abandoned March 28, 1964, in 10 and 11 butts off 3 west mains in January 1964, and all mining equipment and materials, except track and trolley and feeder wires were removed from the three sections.

2. The company officials considered the 3 west mains area inby the 3 west mains overcasts as being abandoned.

3. A pump on the 3 west mains entries located 340 feet inby and one pump located 3,250 feet inby the 3 west mains overcasts were being operated and checked regularly by the pumper. The pumper rode a locomotive to the inby pump and examinations of the area were not made before he visited the pump.

4. After the pitch of the fan blades was changed, reducing the amount of air being circulated through the mine, air readings were

not made inby the 3 west overcasts to determine if air in sufficient quantity was being delivered to 9, 10, and 11 butts entries and 3 west mains entries to keep them clear of gases.

5. Employees were assigned at irregular intervals to travel into the abandoned areas of 3 west mains on locomotive or "scooters" to recover materials, and examinations of these areas were not made before the trolley and feeder wires were energized.

6. It was a common practice for officials and other men to ride locomotives or "scooters" to the end of the track and/or trolley wire in abandoned or idle sections before making tests for gas.

7. After the fan shutdown on September 27, 1964, only the active coal-producing sections and the haulageways leading thereto were examined.

Cause of Explosion: The Federal investigators are of the opinion that the explosion was caused by the ignition of an accumulation of methane near engineer's spad No. 9821, in 10 butts off 3 west mains by an electric arc from the energized trolley wire and the "nip" of the "nip scooter" operated by one of the victims.

RECOMMENDATIONS

1. Abandoned or idle areas shall be effectively ventilated or sealed, and if ventilated, they shall be examined regularly and a record of the examinations kept.

2. A thorough examination for gas and other dangerous conditions by a certified foreman or fire boss shall be made in idle, abandoned, or similar areas in gassy mines, immediately before other employees are permitted to enter or work in such areas.

3. When the volume of air being circulated through a mine is reduced for any reason, sufficient examinations and air readings should be made to ascertain that all affected areas are effectively ventilated.

4. Air readings should be made weekly in ventilated idle or abandoned workings to ascertain that such areas are effectively ventilated and records of such readings recorded.

5. After a prolonged fan stoppage, electric power should not be restored to any portion of the area affected by the fan stoppage until the fan has been in operation for a reasonable period of time,

and the entire affected area shall be examined thoroughly for methane by a certified person or persons traveling on foot before other employees are permitted to enter the area.

ACKNOWLEDGMENT

The writers gratefully acknowledge the courtesies, cooperation, and assistance extended by officials and employees of the Island Creek Coal Company, the United Mine Workers of America, and representatives of the West Virginia Department of Mines.

Respectfully submitted,

/s/ George Noe

George Noe
Management Assistant

/s/ Millard F. Steele

Millard F. Steele
Federal Coal-Mine Inspector

Approved by:

/s/ W. R. Park

W. R. Park, District Supervisor
Health and Safety District C

APPENDIX A

VICTIMS OF EXPLOSION, NO. 6 MINE

ISLAND CREEK COAL COMPANY

September 28, 1964

Name	Age	Dependents	Occupation When Injured	Experience This Job	Experience in Mines
Nash A. Riffe	50	8	Trackman	1 month	28 years
Harry J. Hillyer	52	1	Move Crew Man	6 months	34 years
John P. Hagerman	39	5	Shift Foreman	8 years	17 years

APPENDIX B

NO. 2 ENTRY 10 BUTTS
OFF 3 WEST MAINS