

Report of Investigation Underground Coal Mine Explosions



U.S. Department of Labor
Mine Safety and Health Administration
1993

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I.D. No. 15-02055
Scotia Coal Company
Ovenfork,
Letcher County,
Kentucky**

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UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
OFFICE OF THE ADMINISTRATOR
COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION
UNDERGROUND COAL MINE EXPLOSIONS

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Scotia Coal Company
Ovenfork, Letcher County, Kentucky

March 9 and 11, 1976

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INFORMATIONAL NOTICE

In September 1977, the Mining Enforcement and Safety Administration (MESA), Department of the Interior, was prepared to release its Accident Report concerning the March 9-11, 1976 twin explosions at the Scotia Coal Company's Scotia Mine which killed 26 people. Scotia and its parent company, Blue Diamond Coal Company, filed suit in federal district court to enjoin release of the Report based on a claim of prejudicial harm to its defense of pending tort litigation. After a preliminary order enjoining release of the Report to consider the legal challenge, Federal District Court Judge H. David Hermansdorfer issued a December 17, 1977 order that the Report could not be released unless an explanatory paragraph or caveat was added to it. On January 24, 1978, the Judge affirmed his December 17, 1977 decision. These events occurred when mine safety and health jurisdiction resided with the Department of the Interior.

After transfer of the mine safety and health program to the Department of Labor in March 1978, the Labor Department reviewed the Report and determined that the caveat to the Report was inappropriate and renewed legal action to have the January 1978 ruling reversed. However, because of other priority litigation relating to the explosion the effort to remove the caveat was informally stayed and the Report sealed (except for in camera use by certain attorneys) pending resolution of administrative civil penalty cases and criminal indictments pending against Blue Diamond and Scotia. The civil penalty action and criminal indictments against Scotia have been resolved as well as the various federal tort suits. The Report litigation, which was inactive during this period, was then reactivated. After further proceedings, the District Court for the Eastern District of Kentucky ruled on June 14, 1985, that the Report could be released after all explosion-related litigation was concluded (at this time, two state court actions remained pending). However, the court further ruled that any release must contain the caveat, which the court found to be informational rather than restrictive. At this point it was decided that no further appeals would be taken. The matter lay in this posture while the last of the pending state tort suits were being litigated to conclusion. The Department was notified in August 1992 that all pending tort litigation had been concluded. Therefore, the Report may now be publicly released.

Because the Department believes that the Report is an accurate account of what facts could be determined by the accident investigation, and is of historical and current value, the Report is being released to the public. While disagreeing with the District Court orders of December 1977, January 1978 and June 1985, but for the purpose of compliance with those orders, we have included the caveat in the Report. This informational statement is provided to fully explain the circumstances of its inclusion and the 15 year delay in the release of this Report.

August 11, 1993

COURT ORDER CAVEAT

NOTICE: This Report is the subject of a pending legal action in the United States District Court for the Eastern District of Kentucky in the case of Blue Diamond Coal Co. v. Secretary of the Interior, et al. It has been adjudged in that action that there exist the appearances of agency impropriety which arguably affect the trustworthiness of this Report. The Report has been remanded to the Secretary for reconsideration.

January 24, 1978

Abstract

This report is based on an investigation made pursuant to the Federal Coal Mine Health and Safety Act of 1969 (83 Stat. 742).¹

Two gas and coal dust explosions, the first at approximately 11:45 a.m., March 9, 1976, and the second at approximately 11:30 p.m., March 11, 1976, occurred in the 2 Southeast Main area of the Scotia Mine, Scotia Coal Company, Ovenfork, Letcher County, Kentucky. All 15 Men working in the 2 Southeast Main area at the time of the first explosion died as a result of the explosion. Ninety-one men in other parts of the mine at that time reached the surface without mishap. At the time of the second explosion, 13 men were underground near the entrance of 2 Southeast Main; 11 died as the result of the explosion and 2 repairmen working a short distance outby escaped without injury.

The names of the victims, their ages, occupations, training, and experience are listed in Appendix A.

MESA investigators believe that the first explosion originated near No. 31 crosscut in 2 Southeast Main when a mixture of methane and air was ignited by an electric arc or spark from a battery-powered locomotive. Forces of the explosion spread to all five 2 Southeast Main entries, extended into 2 Left Section off 2 Southeast Main and dissipated as they reached the Northeast Main junction. See mine map in Appendix D.

MESA investigators believe that the second explosion originated near the entrance of or in 2 Left Section off 2 Southeast Main when a methane-air mixture was ignited by one of five possible sources: an electric arc or spark from a battery-equipped deluge system; three battery-equipped telephones; scoop batteries; residual fires; or a frictional spark from a fall of mine roof on a roof-bolting machine. The forces of the explosion extended throughout 2 Left Section and all five entries of 2 Southeast Main, spread north and south in all entries in both panels of Northeast Main, and dissipated near the junction of 3 Southeast Main in the northern direction and near the junction of Southeast Main in the southern direction. See mine map in Appendix E.

¹In May 1973, the enforcement agency was removed from the Bureau of Mines and became the Mining Enforcement and Safety Administration (MESA), Department of the Interior. The Federal Mine Safety and Health Amendments Act of 1977, effective March 9, 1978, redesignated the enforcement agency as the Mine Safety and Health Administration (MSHA) and placed the agency under the Department of Labor.

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PART I

GENERAL INFORMATION

The Scotia Mine, Scotia Coal Company, is located near Overfork in Letcher County, Kentucky, on the Poor Fork of the Cumberland River, approximately 14 miles northeast of Cumberland, Harlan County, Kentucky.

The Scotia Coal Company is a wholly-owned subsidiary of the Blue Diamond Coal Company, Knoxville, Tennessee.

Following is a list of Blue Diamond corporate officials:

Gordon Bonnyman	President
Dr. Frank C. Thomas	Executive Vice President
Jasper K. Cornett	Vice President, Operations
R. D. Cornwell	General Manager of Mines

Following is a list of management officials of the Scotia Mine at the time of the occurrences:

Freddie Maggard	General Superintendent
Richard Carter	Assistant Superintendent
Richard Combs	General Mine Foreman
Garland Couch	Chief Electrician
Charles Kirk	Safety Inspector

The Scotia Mine was started in July, 1962. It was originally opened by nine slope entries into the Imboden coalbed which averages 72 inches in thickness locally. The slope entries were developed into the coalbed and inclined due to the pitching characteristic of the coalbed from its outcrop. The outcrop slope entries, South Main, dip approximately 5 percent for a distance of about 1,400 feet from the surface. The entries then dip about 1.5 percent for an additional 4,000 feet to the 1 West Main. Inby this point for a distance of approximately 8,500 feet, the coalbed is relatively even with occasional dips and rises. The coalbed south of Northeast Main rises on a 2 percent grade.

In 1975, an additional opening in the form of a concrete-lined 13.5-foot diameter shaft, 376 feet deep, was raise-bored near the face areas of Northeast Main. The lining of the shaft was completed July 21, 1975, and work was begun to install an automatic elevator. On March 9, 1976, such work had not been completed and the shaft was being used only as an intake air opening.

Of 310 employees, 275 worked underground on two coal-producing shifts and one maintenance shift per day, 5 days a week. Approximately 2,500 tons of coal were produced daily on six active sections, consisting of five continuous mining sections and one conventional mining section.

A standard channel sample of coal taken in 2 Southeast Main by MESA personnel was analyzed by the Bureau of Mines Laboratory in Pittsburgh, Pennsylvania, as follows:

	<u>Percent</u>
Moisture	1.9
Volatile Matter	29.3
Fixed Carbon	44.9
Ash	23.9

Numerous tests by the Bureau of Mines have established that coal dust having a volatile ratio of 0.12 and higher is explosive. The volatile ratio of the coal in 2 Southeast Main is 0.395.

The last Federal inspection of the entire mine was completed on February 27, 1976. When the 2 Southeast Main area was examined during that inspection, the main entries were being developed. Sometime in February they were stopped and the mining equipment was moved out and utilized to start the 2 Left Section off 2 Southeast Main. A list of the number of MESA inspection mandays and the number of Notices of Violation and Orders of Withdrawal issued from May 13, 1970, to March 9, 1976, is in Appendix P.

On March 8, 1976, on the evening shift, a Federal Coal Mine Inspector conducted a Health and Safety Technical Inspection on 2 Left Section off 2 Southeast Main.

MINING METHODS, CONDITIONS AND EQUIPMENT

Mining Methods

Coal was being extracted by the room-and-pillar system of mining. Pillar extraction was conducted as part of the mining sequence. Entries, rooms and crosscuts were driven approximately 18 feet wide on 64- to 96-foot centers. The sections being worked were: 1 West Main, 1-1/2 Right 2 East, Southeast Main, Left Panel Southeast Main, 2 Left off 2 Southeast Main, and Right Panel Northeast Main.

The immediate roof was generally weak shale. Roof bolts had been installed on a full pattern throughout the mine and posts, cribs and crossbars supplemented the roof bolts in many locations. For approximately 2 years preceding the accident, resin-grouted roof bolt rods were installed on a full pattern throughout.

Ventilation

Mine ventilation was induced by a Jeffrey-8 BU-96 Aerodyne fan exhausting in the 4B-4S blade position. The fan was installed on the surface and was exhausting approximately 225,000 cubic feet of air a minute at 6.2 inches water gauge pressure. Approximately 175,000 cubic feet of air a minute was intaking at the main slope openings and 50,000 cubic feet of air a minute was intaking at the 13.5-foot diameter air shaft in the

Northeast Main area. The fan was V-belt driven by a 500-horsepower electric motor which rotated at approximately 900 rpm.

The Nos. 1 and 2 entries of the main slope entries were return aircourses. A belt conveyor was installed in the No. 3 entry and Nos. 4, 5 and 6 entries were intake aircourses. The Nos. 1 and 2 entries were badly restricted by falls of roof. In order to provide additional escapeways and return aircourses for the mine, three entries had been driven from the surface adjacent to and parallel with the slope return aircourses from a distance of approximately 2,000 feet to intersect the old left panel entries of the South Main. Stoppings had been erected in these left panel entries to isolate the new returns from the remainder of the mine until such time as the necessary work was completed to connect them to the mine return system. This area was isolated at the time of the explosions. Ventilation for the new returns during development and at the time of the explosions was induced with a Jeffrey 48-inch fixed blade fan exhausting approximately 46,000 cubic feet of air a minute.

Each of the six working sections was ventilated with a separate split of air. Overcasts and permanent stoppings were constructed of incombustible material. Line brattice was used to direct ventilation to the working faces. According to Federal inspection reports of 1975, the total mine methane liberation was 568,000 cubic feet in a 24-hour period. An air sample collected during the last Federal inspection completed February 27, 1976, showed that the 2 Southeast Main area was liberating 69,000 cubic feet of methane in a 24-hour period.

Preshift examinations were reportedly made and were recorded. The mine was operating two coal-producing and one maintenance shift per day. One fire boss was assigned to examine the mine prior to the first coal-producing shift each day and the first shift following an idle period. The preshift examinations for succeeding shifts were made by certified persons during their regular tour of duty. On-shift and weekly examinations were made by certified on-shift examiners. The results of examinations for methane and other hazards were recorded in books on the surface.

Testimony presented during the public hearings conducted at Whitesburg, Kentucky, before a special panel appointed by the Secretary of the Interior to determine the causes of the explosions indicated that the recording of preshift examinations on the non-coal producing shifts was highly irregular and that the examinations themselves were perfunctory and incomplete.

The mine was operating pursuant to a Ventilation System and Methane and Dust Control Plan which had been most recently approved on June 25, 1975. Subsequently, supplemental dust control plans were submitted by the operator and approved by the MESA District Manager. As required by law, the ventilation plan was submitted by the operator for review during January, 1976.

This plan contained discrepancies in the location of some of the ventilation controls and was returned to the operator for revision. A revised plan was submitted and received by the District Manager on March 1, 1976. It was being evaluated at the time of the first explosion. The approved plan of June 25, 1975, required that a minimum of 9,000 cubic feet of air a minute pass through the last open crosscuts and at the intake end of the pillar lines. A minimum of 3,000 cubic feet of air a minute was required to be delivered within 10 feet of the deepest point of penetration of the working faces where mining operations were in progress. Plastic brattice material was used to provide face ventilation on all sections, with an exhaust system used on the continuous mining sections and a blowing system used on the conventional mining section. A bleeder system was provided for second mining areas.

The 2 Southeast Main entries rose on a 2 percent grade and had been advanced approximately 3,700 feet in by the Northeast Main. The ventilation system utilized the Nos. 1 and 2 entries as return aircourses, No. 3 as the belt entry, and Nos. 4 and 5 entries as intake aircourses. The mining height (8 feet plus) encountered in the face areas made for difficult mining with the available equipment so the operator decided to move the equipment back and start the 2 Left Section. In early February, 1976, the 2 Left Section was started off the return entries of 2 Southeast Main before permanent ventilation was established. Access to the 2 Left Section was gained by removing two permanent stoppings, one between the track (No. 4 entry) and belt entry (No. 3 entry) and one between the belt entry and the No. 2 return entry at No. 23 crosscut, 2 Southeast Main. A check curtain was installed between the Nos. 3 and 4 entries to course ventilation up through the 2 Southeast Main entries and back to the 2 Left Section. During the public hearings, there was abundant testimony that the check curtain was maintained only intermittently and in a haphazard manner and that little effort had been made to maintain it at all after the track was laid into 2 Left Section. Miners who worked on 2 Left Section testified that on the evening prior to the first explosion they were sent by the section foreman to install check curtains across the two intake entries of 2 Southeast Main in by 2 Left when the Federal Coal Mine Inspector issued a Notice of Violation for insufficient air in the last open crosscut. They stated that the check curtains were taken down at the end of the shift. Construction of overcasts at the entrance of 2 Left Section was in progress at the time of the March 9 explosion.

During the last Federal inspection of the entire mine, completed February 2 1976, Notices of Violation were issued when a Federal Coal Mine Inspector found less than 9,000 cubic feet of air a minute reaching the last open crosscut in three of the active working sections. The air was promptly increased to more than 9,000 cubic feet a minute and the Notices of Violation were terminated.

On the evening shift of March 8, 1976 (the evening before the first explosion), a Federal Coal Mine Inspector made a Health and Safety Technical Inspection on 2 Left Section off 2 Southeast Main. During the course of this inspection three Notices of Violation were issued pursuant to Section 104(b) of the Act, two of which were for noncompliance with ventilation regulations. One was for failure to maintain the line brattice to within

10 feet of the face, the other for failure to maintain 9,000 cubic feet of air a minute passing through the last open crosscut. The line brattice was extended to within 10 feet of the face and the air passing through the last open crosscut was increased to 10,472 cubic feet a minute. The Notices of Violations were terminated.

The track haulage entries, separated from belt conveyor entries and return entries, were designated intake escapeways. The belt conveyor entries, except for portions driven prior to December 31, 1969, were separated from intake and return air entries and ventilated by separate splits of air. There were no bare trolley or trolley feeder wires in the mine.

There were no oil or gas wells on the mine property.

Coal Dust

During a Health and Safety Inspection conducted January 5, 1976, through February 27, 1976, the surfaces of the Scotia Mine ranged from damp to wet. Nine 104(b) Notices of Violations were issued during this inspection for accumulations of loose coal, coal dust and float coal dust on previously rock-dusted surfaces. Dust samples collected on surveys of the 2 Southeast Main area during previous inspections had revealed the rock dust to be adequate. During the Health and Safety Technical Inspection conducted on the evening shift prior to the first explosion, the inspector found rock dust to be adequate in 2 Left Section.

Water was used to allay dust during cutting and loading operations. The cleanup was accomplished by shoveling the loose coal and coal dust from the ribs by hand and loading it with battery-powered scoops. Rock dust was initially applied to the mine surfaces by hand. This initial application was followed by rock dusting utilizing battery-powered pneumatic rock-dusting machines.

Electricity

Three-phase power at 69,000 volts was purchased from Kentucky Power Company, reduced to 12,470 volts and transmitted to a surface substation near the mine portal. At the surface substation, electric power was reduced to 7,200 volts by a bank of three 1,250-kVA single-phase transformers for underground distribution. The transformers were connected delta-wye and the secondary neutral was grounded through a 25-ampere current-limiting resistor. A grounding circuit originating at the grounded side of the resistor was used to ground metallic frames of all high-voltage equipment served from the circuit.

A 600-ampere oil circuit breaker in the surface substation was equipped with a ground check monitor circuit and relaying designed to provide overload, short-circuit, grounded-phase and undervoltage protection for the high-voltage underground circuit.

