Homer City Mine
The Helen Mining Company
Homer City, Indiana County, PA

Methane and Coal Dust Explosion
July 3, 1983

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Abstract

This report is the result of an investigation by the Mine Safety and Health Administration (MSHA) made pursuant to Section 103(a) of the Federal Mine Safety and Health Act of 1977, Public Law 91-173, as amended by Public Law 95-164.

At approximately 5:40 p.m., July 3, 1983, a methane and coal dust explosion occurred in the E-Butt section of the Homer City Mine, The Helen Mining Company, located near Homer City, Indiana County, Pennsylvania. Sylvester Lee Mitsko, a 38-year-old assistant mine foreman with 12 years, 11 months mining experience, died as a result of the explosion. One other miner, Francis L. Dwyer, was in the mine at the time of the explosion. He was uninjured and escaped to the surface unassisted.

Mine Safety and Health Administration investigators concluded that the explosion originated in the No. 2 track entry just inby No. 36L crosscut in the E-Butt section. (See Appendix D) A methane-air mixture was ignited by an electric arc within an open contactor compartment on a battery-operated personnel carrier which was being operated by the victim. (See photograph No. 1, Appendix I) Flame and forces of the explosion propagated from the origin and traveled inby to the faces of E-Butt and outby toward the mouth of the section. The flame extended as far outby as the No. 13 crosscut and the major forces extended to the mouth of the section.

PART I

GENERAL INFORMATION

The Homer City mine was opened in May 1969, and is located about 4 miles Southwest of Homer City, Indiana County, Pennsylvania, off Legislative Route 32022. The Helen Mining Company is a wholly owned subsidiary company of The North American Coal Corporation, Cleveland, Ohio.

Company officials are as follows:

Franklin L. Scott	President, The North American Coal Corporation, Eastern Division
George Radomsky	Manager of Safety, The North American Coal Corporation, Eastern Division
Harold G. Hedgpeth	President, The Helen Mining Company
Henry M. Waneck	Vice President, The Helen Mining Company
James A. Hickman	Vice President - Operations, The Helen Mining Company
Edward F. Skvarch	Manager of Safety, The Helen Mining Company
Michael Hancher	Mine Superintendent, Homer City mine, The Helen Mining Company
Clark McElhoes	General Mine Foreman, Homer City mine, The Helen Mining Company
Gregory P. Freeland	Chief Electrician, Homer City mine, The Helen Mining Company
Lynn A. Harding	Safety Director, Homer City mine, The Helen Mining Company

The mine is opened by a double-compartment slope 2,200 feet in length and five concrete-lined shafts, two of which are double compartment, into the Upper Freeport coalbed which ranges from 37 to 80 inches in thickness. The shafts range from 614 to 682 feet in depth.

A total of 370 persons, 340 working underground, produce a daily average of 4,400 tons of coal on three coal-producing shifts, 5 days a week.

During the investigation, a standard channel sample of coal was taken in the No. 2 entry of the E-Butt working section, approximately 10 feet outby No. 28R crosscut. The location of the sample is shown on the map in Appendix D. This sample was analyzed by the Industrial Safety Division Laboratory, Bruceton Safety Technology Center, Pittsburgh, Pennsylvania. The proximate analysis of the channel sample No. ISB 258 was as follows:

	Percent
Moisture	0.0
Volatile Matter	27.5
Fixed Carbon	66.4
Ash	7.1

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 this sample was calculated to be 0.29.

The last safety and health inspection of the entire mine was completed on June 22, 1983. The Homer City mine, because of high methane liberation, is also on a 103(i), 5-day spot inspection schedule. Numerous wells extract natural gas from below the coalbed in this area. One of these active wells penetrates the coalbed in E-Butt section.

MINING METHODS AND EQUIPMENT

Both the room-and-pillar and shortwall systems of mining were employed. Main entries were developed in sets of eight on 80-foot centers with crosscuts 80 feet apart. Butt entries were developed in sets of three on 90-foot centers off the main entries with crosscuts on 90-foot centers. All entries and crosscuts were limited to 20 feet wide. One shortwall and nine continuous-mining sections were being operated at the mine. The roof was supported with combination-type roof bolts on 4-foot centers or less in all advancing sections.

VENTILATION AND EXAMINATIONS

Three exhausting axial-vane mine fans, located on the surface, provided ventilation for the mine. Each was equipped with automatic closing doors, a pressure-recording gage, and provisions for pressure relief. Each fan was also equipped with a device to give an alarm at a manned location should a fan stop.

The following data for the three fans was obtained from the last inspection:

Fan No.	Type	Blade Setting	Horsepower	Air Quantity (C.F.M.)	Pressure (Inches of Water)
1	6' Dia. Jeffrey	#5	400	276,741	5.0
2	8' Dia. Joy	#3	800	317,627	6.0
3	8' Dia. Joy	#3	800	359,730	6.4

During the last regular inspection, the three fans exhausted a total of 954,098 cubic feet per minute of air from the mine, and the mine liberated 2,701,000 cubic feet of methane in 24 hours. Solid masonry blocks were used to provide separation between intake and return air courses, isolation of the belt entry, and in the construction of overcasts and undercasts. Masonry patio blocks

finished with a layer of concrete were used for decking on the overcasts. The No. 3 fan ventilated eight active working sections; 1 South, 4 South, Burrell Mains Left Side, Burrell Mains Right Side, Muddy Run Mains, C-Butt, D-Butt, and E-Butt. Idle and abandoned areas in this portion of the mine were also ventilated by this fan. (See Appendix B) Burrell Mains and Muddy Run sections were being developed with eight entries. The other sections were developed with a three-entry system. The No. 1 (belt) entry and the No. 2 (track) entry in the E-Butt section were utilized as intake air courses and the No. 3 entry was the return air course.

During the last Safety and Health inspection, 0.3 percent methane was detected in the immediate return of the E-Butt section and 0.6 percent methane was detected at the regulator near the mouth of the section. Belt entry air was used to ventilate the working faces in all active working sections to insure that adequate ventilation was available to dilute the methane encountered in the mining operation. Bleeder systems were provided for second mining areas. The most recent Ventilation System and Methane and Dust Control Plan approved by the District Manager was dated June 22, 1983. The track and belt entries were designated as escapeways for the E-Butt section.

Preshift, onshift, and weekly examinations were conducted by certified persons. The results of the examinations were recorded in a book on the surface.

COAL DUST

The mine surfaces were generally dry. Rock dust was applied to all surfaces during the mining cycle by hand and with mini-dusting machines which were provided in each section. Follow-up rock dusting of these areas were done with portable bulk-type rock-dusting machines. Trickle-type rock dusting machines were used in conveyor belt entries as necessary. A cleanup program had been established at the mine. Dust on roadways was controlled by applications of rock dust, calcium-chloride, and water. Water was used to allay the dust at some belt drives and belt transfer points. Dust in the working sections was controlled by Venturi-type and whirl jet water sprays mounted on the continuous-mining machines.

ELECTRICITY

Three-phase electric power was purchased from the Pennsylvania Electric Company at 23,000 volts and transmitted to a surface substation near the mine slope. At the surface substation, the electric power was transformed for underground distribution to 13,200 volts by banks of 3750-KVA transformers connected in parallel and connected delta-wye. The center point of the wye secondary provides a direct neutral. The neutral was properly grounded through a 25-ampere current-limiting resistor at the source transformer. A grounding circuit, originating at the grounded side of the resistor, was used to ground the metallic frames to all underground high-voltage equipment receiving power from the underground distribution circuit.

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

The three-phase, high-voltage circuit entered the mine by means of a 300 MCM, aluminum, three-conductor, type SHD, G-GC, 15 KV cable installed in the mine slope and in the intake haulage entries of the mains and submains. Dual-circuit, vacuum bottle switch gears were installed at the beginning of each branch line at various locations in the main high-voltage circuit to provide additional electrical protection for the branch circuits and transformers. Each switch gear was provided with a visual disconnect and air-break switch to determine that the circuit was deenergized when maintenance work was performed on the high-voltage equipment. No. 2 AWG, copper, three-conductor, type SHD, G-GC, 15 KV cable was installed in the intake haulage entries to conduct power to the working sections.

The switch houses installed at the beginning of each branch circuit extending to transformers in coal-producing sections, to belt conveyor transformers, and to pump transformers, contained ground-check circuits designed to monitor continuity of the grounding circuits, and relaying designed to provide overload, short-circuit, grounded-phase, and undervoltage protection for the high-voltage branch circuits.

Twenty nine portable power centers reduced the 13,200-volt, alternating-current power to 575-volt, alternating-current power for operation of twenty belt-conveyor drive units, numerous pumps, and battery chargers. These power centers were rated at either 150 KVA or 400 KVA and were equipped with molded-case circuit breakers complete with devices that provided short-circuit, grounded-phase, undervoltage protection and ground-check circuits to monitor continuity of the grounding circuits for the 575-volt circuits originating at the power centers.

Ten portable power centers rated either 600 KVA or 750 KVA reduced the 13,200-volt alternating current to 575 volts, alternating current for operation of continuous-mining machines, roof-bolting machines, belt feeders, mine drainage pumps, water pressure pumps, welders, heaters, rock dusters, battery chargers, and approximately one-half of the shuttle cars in the ten active coal-producing sections. The remainder of the shuttle cars were supplied power by 300-volt, direct-current power rectified from the 575-volt secondary inside the section power centers. The 300-volt, direct-current power had the negative polarity grounded at the power center. Silicon grounding diodes, located on board the d.c. shuttle cars were used to provide frame grounding for the shuttle cars.

The three-stage hydraulic system used on the shortwall mining section also utilized 575 volts of alternating-current power from the section power center.

TRANSPORTATION

Coal was transported from the face regions in shuttle cars to fire-resistant belt conveyors which transported the coal to a cleaning plant on the surface. Men were transported underground in open-type, battery-operated, rubber-tired mantrips and open-type, battery-operated, track mounted personnel carriers. Battery-operated track locomotives and rubber-tired tractors were also used to haul supply cars and equipment into and out of the mine. Traffic on the track haulage system was controlled by means of an electric light, block-signaling system with lights located at strategic locations in the mine.

An electric hoist equipped with overspeed, overwind, and automatic-stop controls was installed on the surface and was used to lower supply cars and equipment into and out of the slope. The hoist could be operated automatically or manually. Qualified hoistmen were available on the surface to operate the hoist.

COMMUNICATIONS

Permissible Type Femco 24-volt telephones, approval No. 9 B-34-5, and CSE 24-volt, model 124, approval No. 9 B-93-1, were used for two-way communications between the surface and underground. These telephones were available in each active working section, near conveyor belt drives and other strategic locations in the mine. A responsible person was available on the surface when miners were underground.

FIRE PROTECTION

The firefighting and evacuation plan which includes a program of instruction, location, and use of firefighting equipment, location of escapeways, exits and routes of travel, and evacuation procedures and fire drills was approved by the District Manager on June 27, 1980. The escapeways were examined weekly and the results of the examinations were recorded in a book on the surface. A map showing the designated escapeways was posted on the surface and in a conspicuous place in each working section. Escapeway drills were conducted in each working section every 90 days and the main escapeways were traveled to the escape facilities by the section supervisor and two miners every 6 weeks. All electrical equipment using hydraulic fluid was protected by fire-suppression devices. The continuous-mining machines had manually activated water-spray, fire-suppression systems and these systems were connected directly to the mine water supply lines.

Fire protection for each section consisted of two portable fire extinguishers, 240 pounds of rock dust in bags, and a fire hose of sufficient length to reach each working face from a 4-inch high pressure waterline which is provided to each working section.

A 4-inch diameter high pressure waterline with outlets at 300-foot intervals was installed along conveyor belts and 2-inch fire hose and nozzles were provided at strategic locations along the belt entry. The equipment used to protect the belt conveyor was also used to protect the track entry. Persons on each shift and on each section were trained in the locations and use of all fire-fighting equipment available in the mine and on the working sections.

Portable 10-pound ABC fire extinguishers were provided at each permanent electrical installation and at oil-storage areas. The mine operator was granted a Petition for Modification of Section 75.1100-2(e)(2), 30 CFR 75, under 101(c) of the Act on June 7, 1983. With this modification, at least two 5-pound fire extinguishers or one 10-pound extinguisher must be provided at each temporary electrical installation in lieu of the 240 pounds of rock dust.

The belt conveyors were continuously monitored by a fire-sensor system using point-type heat sensors installed on 50-foot centers. An audible warning device was connected to the mine phones identifying each belt flight. A visual warning was also provided. A water-sprinkler system protected all belt conveyor drives.

EXPLOSIVES

Permissible explosives and electric detonators were stored in approved storage magazines on the surface about 1/4 mile from the mine supply yard. When needed, explosives and detonators were transported from the magazine to the underground special cars and to the worksite in suitable containers.

TRAINING PROGRAM AND MEDICAL ASSISTANCE PROGRAM

The operator's most recent plan for training and retraining miners was approved on November 23, 1982. Training was conducted at a training facility located at Robinson, Pennsylvania, about 12 miles from the mine. All courses were taught by Mine Safety and Health Administration approved instructors. Training consisted of the following: All newly hired, inexperienced miners receive 40 hours of training, 32 hours which is of classroom work, and 8 hours of underground orientation.

The operator's training plan also included annual refresher training for all miners employed at the mine, task training for persons assigned to new work tasks, and training for newly hired, experienced miners.

Persons trained as Emergency Medical Technicians (EMT), who provide treatment to the injured, as needed, were employed on each shift. In the event of medical emergency, the Indiana Fire Department Communications Center was contacted and assistance was dispatched to the mine. Persons were generally transported to the Indiana Hospital, Indiana, Pennsylvania, for treatment.

ILLUMINATION AND SMOKING

Illumination of the face areas was provided by permissible lighting systems mounted on the electric face equipment. All other self-propelled equipment had headlights on each end. Permissible cap lamps were used for portable illumination underground.

An approved search plan for smoking articles was in effect at the mine, requiring a weekly search of all persons entering the mine. New employees were instructed in the plan. Signs prohibiting smoking were posted at all entrances to the mine.

MINE RESCUE

The operator maintained one mine rescue team consisting of seven members who were trained in all phases of mine rescue and in the maintenance of rescue equipment. The operator had also entered into an arrangement for the services of two teams from The Florence Mining Company. The teams were equipped with Drager 4-hour self-contained breathing apparatus and supplied with spare parts as necessary for their repair. National Mine Service Company of Indiana, Pennsylvania, provided the services of filling oxygen cylinders and performing major repairs to apparatus when required. The teams were equipped with two-way communications, first-aid supplies, flame safety lamps, methane detectors, Drager multitesters and detector tubes, and oxygen-indicating detectors. Training of mine rescue personnel was conducted monthly. All persons entering the mine were provided with a 1-hour filter-type self-rescuer and trained in its use. A plan approved by the District Manager on May 21, 1983, permitted storage of self-contained self-rescuers at identified stations. All personnel were instructed in the proper use of the self-contained self-rescuers and their storage locations.

A check-in and check-out system was maintained at the mine, using a checkboard and brass checks with a number corresponding to the battery cap-lamp number. The lampman checked the board immediately after the start of each shift.

PART II

EXPLOSION AND RECOVERY OPERATIONS

PARTICIPATING ORGANIZATIONS

Officials in charge of the responsible organizations who were present during the recovery operations were Franklin L. Scott, President, Eastern Division, The North American Coal Corporation; Harold G. Hedgpeth, President, The Helen Mining Company; Walter J. Vicinelly, Commissioner, Office of Deep Mine Safety, Pennsylvania Department of Environmental Resources; Richard Trumka, President of United Mine Workers of America, Washington, D.C.; Donald W. Huntley, District Manager, Mine Safety and Health Administration, Coal Mine Safety and Health, District 2.

Rescue teams from the following organizations participated in the recovery operations:

Keystone Coal Mining Corporation, Indiana, Pennsylvania (2 teams)
The Florence Mining Company, Seward, Pennsylvania (2 teams)
Greenwich Collieries, Div. of Pa. Mines Corp., Ebensburg, Pennsylvania (2 teams)
Tunnelton Mining Company, Tunnelton, Pennsylvania (1 team)
The Helen Mining Company, Homer City, Pennsylvania (1 team)
Helvetia Coal Company, Indiana, Pennsylvania (1 team)
G. M. & W. Coal Company, Inc., Jennerstown, Pennsylvania (1 team)
The North American Coal Corporation, Clarington, Ohio (1 team)
Consolidation Coal Company, Meadowlands, Pennsylvania (1 team)

The mine rescue team members who participated in recovery operations are listed in Appendix A.

CONDITIONS IMMEDIATELY PRIOR TO THE EXPLOSION

On July 3, 1983, the weather was mild and clear most of the day. Thundershowers arrived in the area of the Homer City mine about 5:00 p.m. Temperatures ranged from 77 degrees Fahrenheit at 8:00 a.m., and reached a high of 92 degrees Fahrenheit at 4:00 p.m.

Records of barometric pressure recorded at the nearby Latrobe, Pennsylvania airport from 8:00 a.m. to 6:00 p.m., July 3, are as follows:

Date	Time	Barometric Pressure
July 3, 1983	8:00 a.m.	30.08
	12:00 noon	30.10
	4:00 p.m.	30.06
	6:00 p.m.	30.04

In the opinion of Mine Safety and Health Administration investigators, this slight variation of atmospheric pressure had no bearing on the explosion.

The explosion occurred when the mine was idle for a vacation period scheduled from June 25 to July 10, 1983. Production ended with the afternoon shift on June 24, 1983, and the only work performed in the mine during the vacation period was some limited maintenance work and patrolling of power lines, haulageways and pumps every shift.

ACTIVITIES OF MINE SAFETY AND HEALTH ADMINISTRATION PERSONNEL

Michael Hancher, superintendent, notified Ellsworth Yankuskie and Michael Bondra, coal mine safety and health inspectors, Indiana, Pennsylvania, at approximately 9:20 p.m. and 9:30 p.m., respectively, that he suspected an explosion had occurred in the Homer City mine, and that one person underground was not accounted for. Michael Bondra notified Theodore Bioni, supervisory mine safety and health specialist, Pittsburgh District office. Mr. Bioni then notified Alex O'Rourke, supervisory mining engineer, and Joseph J. Garcia, supervisory coal mine technical specialist, of the explosion. O'Rourke then notified Theodore W. Glusko, supervisory coal mine safety and health inspector, Johnstown, Pennsylvania.

Glusko dispatched personnel from the Johnstown, Indiana, and Hastings field offices to the mine. He also detailed an inspector to the Indiana field office to gather information needed for the mine. Garcia notified Donald W. Huntley, district manager, at 2:12 a.m., and Joseph A. Lamonica, administrator, Arlington, Virginia, at 2:25 a.m., on July 4, 1983.

The Mine Safety and Health Administration mine rescue team members in Morgantown, West Virginia, were placed on standby the morning of July 4, for possible deployment to the Homer City mine. The team members from Pittsburgh, Pennsylvania, were dispatched to the mine to assist in the recovery operations. When it was determined that there were sufficient rescue teams available for recovery operations at the mine, the Morgantown team members were removed from standby that same morning.

The first Mine Safety and Health Administration representative to arrive at the mine following the explosion was Bondra. He arrived at approximately 10:50 p.m., on July 3, 1983, and issued a Section 103(k) Order, covering the entire mine, to insure the safety of any person in the mine and to require the operator to obtain the approval of the Mine Safety and Health Administration of any plan to recover any person in the mine, or to return the affected areas of the mine to normal. A 107(a) Order was issued by Bondra on July 4 at 2:50 a.m., to assure the safety of any persons in the mine until an examination was made to determine that the entire mine was safe. A copy of the 103(k) and 107(a) Orders are included in Appendix L.

At approximately 12:50 a.m., July 4, Glusko arrived at the mine and assumed direction of Mine Safety and Health Administration activities. Joseph Trybus, Harry Rorabaugh, and George Tersine, coal mine safety and health inspectors, were dispatched to the Nos. 1, 2, and 3 mine

ventilation fans, respectively, to monitor the fans for smoke, methane, and carbon monoxide. Smoke was not observed coming from any of the fans: Initial readings at the fans were as follows:

	CO	CH_4	Water Gauge Normal	Water Gauge After Expl.
No. 1 fan	0.0%	0.3%	5.0	5.0
No. 2 fan	0.0%	0.2%	6.0	6.0
No. 3 fan	0.0%	0.2%	6.4	6.0

Copies of the fan charts from the three mine fans are shown in Appendix H. Timothy J. Thompson, mining engineer, Ronald Costlow and John Chambers, coal mine safety and health inspectors, were assigned to travel to the fresh-air base to oversee rescue team activities. Ronald Gresh, coal mine safety and health inspector, was assigned to the surface control center to monitor and log all activities. William Collingsworth, coal mine safety and health inspector (electrical), was assigned to log the readings from the fans.

At approximately 3:15 a.m. and 4:25 a.m., July 4, Alex O'Rourke and Donald Huntley, respectively, arrived at the mine. Huntley assumed direction of Mine Safety and Health Administration activities at this time. Other Mine Safety and Health Administration personnel arrived throughout the recovery operations and were assigned various duties to continue with the operations.

THE EXPLOSION AND RECOVERY OPERATIONS

Information obtained in interviews conducted during the investigation revealed the following activities and sequence of events:

On July 3, Wilbur Guile and Angelo Swanhart, assistant foremen, entered the mine at approximately 8:00 a.m. Their duties were to make a routine fire patrol of the mine which included traveling the haulage roads and examining the high-voltage power cables, pumps, and power centers from the shaft bottom to the working sections. When they arrived at the bottom of the shaft, the power went off underground. They called outside and received no answer from the fan attendant. They returned to the surface. James Groft, the fan attendant, told them that the lights had dimmed out in the mine office, but that he had not received a signal that the fans were down. Both foremen went back underground via the shaft and proceeded to the slope bottom to reset the power. They found the power was tripped at the main substation on the surface, and therefore could not be reset at the slope bottom. At approximately 9:00 a.m., they again returned to the surface. Guile got the keys for the gate from Groft and went to the outside substation and reset the underground power.

At approximately 9:30 a.m., they reentered the mine. Guile traveled to the slope bottom and reset the underground power. He also started to reset power at other places in that section of the mine. At the same time Swanhart traveled to the Burrell Mains side of the mine to patrol and reset the power. From Burrell Mains he continued

to Muddy Run Mains where he met Guile at the mouth of D-Butt. After a short conversation, Guile continued his patrol into Muddy Run Mains and Swanhart went to patrol E-Butt. Swanhart arrived at the power center in the section at approximately 11:00 a.m.

When the patrolling of the West side of the mine was completed, the two men then traveled to the East side, patrolling the high-voltage cables and resetting the switch houses. At approximately 1:00 p.m., as they reset the switch house that feeds the 1-Butt and Shortwall sections, the power kicked off. They completed patrolling of the East side of the mine however, before traveling to the slope bottom where they reset the underground power. They reenergized the power centers throughout the mine as they had done earlier in the day. After Guile had reset Muddy Run and C-Butt, he was unable to reset the D-Butt switch house, because the high-voltage plug was blown out of the D-Butt belt transformer. He continued on to E-Butt where he reset the switch house and then went to the shaft bottom at 2:00 p.m. when he met Swanhart and told him of the trouble in D-Butt. They obtained an 80-foot length of high-voltage cable, returned to D-Butt and installed it to by-pass the belt transformer to permit the circuit for the D-Butt pumps to be reenergized. This was done near the end of the shift but the D-Butt pumps were not started. They returned to the surface at approximately 3:45 p.m., and discussed the events of the day with Francis Dwyer and Sylvester Lee Mitsko, the oncoming assistant foremen. Guile told them that the power had been reestablished in D-Butt and that the pumps would have to be energized. Mitsko, who was also a production foreman in D-Butt, decided that he would go there to start the pumps. At approximately 4:05 p.m., Dwyer and Mitsko entered the mine. Mitsko took one of the track-mounted jitneys and headed towards the West end of the mine. His initials in D-Butt at the power center indicated that he had been in the section prior to the explosion. After Dwyer entered the mine he stayed at the shaft bottom area long enough to connect battery chargers to a couple of personnel carriers. He then traveled to 3 left crossing where he got a rubber-tired battery tractor to patrol the East side of the mine. After completing the run of this area, he retraced his route stopping at the 3 left belt switch house where he found that there was no power at the belt load center. Dwyer then returned to 3 left crossing.

On the surface, Earl Syster, watchman and janitor, started his workshift at 4:00 p.m. He first performed janitorial work and then made a routine check of the supply yard and personnel office near the slope. Syster next went to the hoist house where he called John Vresilovic, the fan attendant at the No. 2 shaft portal, who had replaced Groft at 3:00 p.m., that day. Syster noticed a large cloud formation in the sky and advised Vresilovic that an electrical storm was moving that way. Shortly before 6:00 p.m., all the lights in the hoist house went out and the fan signal in the hoist house sounded. Within moments, the lights came back on, but the horn continued to sound. A few minutes later, the lights went off and then came back on again. Syster called Vresilovic again on the mine phone and asked if the No. 2 fan was

down. After going to the door to check, Vresilovic reported that the No. 2 fan was running. Syster instructed Vresilovic to inform the two men underground that a fan may be down and that he went to check the Nos. 1 and 3 fans.

Syster turned off the fan signal at the hoist house and drove to the No. 1 fan. He found that it was operating and proceeded to the No. 3 fan. Since the No. 2 fan was along the way he verified that it was still operating. Syster continued on to the No. 3 fan and arrived there at approximately 6:30 p.m. The fan was down and, according to the fan recording chart, had not been operating since approximately 8:15 that morning. He restarted the fan and remained at the site several minutes to be sure that the fan was going to continue operating before returning to the No. 2 portal.

While Syster was checking the mine fans, Vresilovic tried to notify the two men underground of the possible problem. Shortly after 6:00 p.m. he made contact with Dwyer and informed him that the power to the mine was out and that possibly a fan was not operating. At this time the automatic belt warning signal for E-Butt was transmitting over the mine phone. When Dwyer learned Mitsko had not been contacted he told Vresilovic that he was going to E-Butt to find Mitsko.

Syster returned to the No. 2 portal about 6:45 p.m. He asked Vresilovic if he was aware that the No. 3 fan had been down approximately 9 hours. Vresilovic replied that he was not aware of that. The two men then went into the No. 2 fan house and found the recording pen for the fan chart lying on the floor. Because of this, there was no tracing on the No. 2 fan chart for approximately 45 minutes. Syster then went back up to the hoist house.

When Dwyer entered the E-Butt section he observed that the air was hazy and the entry blackened. After traveling about 800 feet his personnel carrier derailed. He then continued on foot for an undetermined distance but had to retreat because of a burning sensation in his eyes. Upon reaching the Muddy Run mains, he tried, unsuccessfully, to contact the surface on several mine phones. He started toward the shaft bottom until he found a phone that was working. About 7:00 p.m., he called Vresilovic and informed him of the condition in E-Butt. Syster who was at the hoist house interrupted the conversation and informed Dwyer that the No. 3 fan had been down since 8:15 a.m., and that the power was off at the substation on the surface. Dwyer instructed Vresilovic to contact the mine foreman, superintendent, and the rescue team and he then returned to the surface.

Clark McElhoes, mine foreman, arrived at the mine about 7:30 p.m. and Michael Hancher, superintendent, arrived a short time later. At approximately 8:05 p.m., Hancher, McElhoes, and Dwyer entered the mine and traveled to Muddy Run Submains. Air and methane readings were taken outby E-Butt and the air seemed normal. They began traveling in E-Butt and noticed the area was black and a

stopping between intake and return was partially blown out. When they reached Dwyer's personnel carrier, they put on their filter-type self-rescuers and continued traveling on foot a few hundred more feet, until they found a stopping half blown out between intake and return entries. When they reached number 14 R crosscut, they decided to go outside and get help. At approximately 9:00 p.m., they arrived on the surface. Hancher and McElhoes began to notify officials from Mine Safety and Health Administration, the State, and other company personnel and mine rescue teams of the occurrence.

The Florence and Helen Mining Company's mine rescue teams started to arrive at the mine approximately 10:30 p.m. At 12:01 a.m., July 4, they had enough members to make up two teams. A meeting was held in the mine office with representatives from Mine Safety and Health Administration, Pennsylvania Department of Environmental Resources, United Mine Workers of America, and company personnel to devise a plan to explore E-Butt section. It was decided that the two mine rescue teams would enter the mine, travel to the mouth of E-Butt on No. 3 track entry of Muddy Run Submains, explore the area, and take air readings and make gas checks for carbon monoxide and methane.

At approximately 1:15 a.m., July 4, two mine rescue teams entered the mine accompanied by MSHA, State, and company officials. They reached the mouth of E-Butt about 30 minutes later. Using apparatus, The Florence No. 1 team started into the E-Butt belt entry. They found four rows of blocks blown out of the return overcast on the No. 1 entry (belt) of E-Butt and the other overcasts intact. The team proceeded inby and found one-fourth of the stopping in the first room connecting E-Butt with D-Butt blown out and one-third of the stopping in the second room blown out. Both stoppings were blown toward D-Butt and the air was traveling in that direction. The team continued their exploration five crosscuts inby the second room where they detected a trace of carbon monoxide and retreated to fresh air.

In the meantime, MSHA and Pennsylvania Department of Environmental Resources personnel traveled in intake air up the No. 2 track entry of E-Butt to No. 11R crosscut checking for damaged stoppings and carbon monoxide.

The Florence No. 1 team, under oxygen, then checked the regulators in E-Butt and Muddy Run Mains. Readings taken at the E-Butt regulator were 17,000 cubic feet of air per minute, 0.3 percent methane, and traces of carbon monoxide. Muddy Run regulator had 14,000 cubic feet of air per minute, and no detectable methane or carbon monoxide.

The Florence No. 1 team then traveled from E-Butt to D-Butt to take air readings and make gas checks in the return entry. No physical damage to ventilating controls was observed in D-Butt. After the Florence No. 1 team returned from D-Butt, the Florence No. 2 team with apparatus explored the E-Butt return entry (No. 3) for a distance of eight crosscuts.

At approximately 5:20 a.m., a fresh-air base was established in the No. 2 track entry inby 13R crosscut where the first major ventilation interruption was discovered. At this location 28,000 cubic feet of air per minute was measured. Return air in No. 3 entry indicated 0.2 percent methane and traces of carbon monoxide. A monitoring station was also set up at this location where MSHA mine rescue team members were assigned to monitor the return air before ventilating inby areas.

Using apparatus The Florence No. 1 team explored inby the fresh-air base to 20R crosscut. They found stoppings between the No. 1 belt entry and No. 2 track entry and between the track entry and No. 3 return entry either blown out or with missing blocks. The top belt in No. 1 entry was blown off the structure and laying against the left rib. At this location air contaminent measurements taken with hand-held instruments at Survey Station No. 8742 in No. 3 entry were 5.2 percent methane, 19.2 percent oxygen, and a full stain on a carbon monoxide tube (+ 3,000 ppm). There was no perceptible air movement.

At 10:20 a.m., checks were installed across Nos. 1, 2, and 3 entries inby 19R crosscut. Repairs were made to any damaged ventilation controls outby the fresh-air base. After this work was completed the mine rescue team installed temporary stoppings between Nos. 2 and 3 entries up to and including 17R crosscut. The area was flushed out and at 1:34 p.m., a new fresh-air base was established in the No. 2 entry near 19R crosscut.

During the exploration between 19R and 23R crosscuts, the team reported that all stoppings were blown out in crosscuts on the left and right sides of No. 2 entry. Gas readings at 23R crosscut in No. 3 entry at 4:45 p.m. were 5 percent methane, 12 percent oxygen, and a full stain on a carbon monoxide tube. After this exploration, checks were installed across all three entries inby 23L crosscut. The area was ventilated and at 8:37 p.m., a new fresh-air base was established in No. 2 entry near 23L crosscut. During exploration inby 23L crosscut, teams reported stoppings blown out on both sides of No. 2 entry up to No. 32 crosscut. They also found an impassable fall about 25 feet inby No. 30R crosscut in the No. 3 entry and the belt torn or blown down in the No. 1 entry. Methane readings reported by mine rescue teams in 32R crosscut taken with electrical hand-held detectors showed 2.0 percent methane. Oxygen readings were 5.0 percent and a full stain on a carbon monoxide tube was found. A vacuum bottle air sample was taken to verify these measurements and the bottle was taken to Pittsburgh Health Technology Center for gas chromatographic analysis. The results of this analysis were as follows: Methane - 13.88 percent, oxygen - 6.25 percent, carbon monoxide - 4.14 percent and hydrogen - 2.62 percent (See Appendix K). The analytical results tend to indicate that hand-held electrical methane detectors do not accurately indicate true methane concentrations in low oxygen atmospheres. Checks were installed across the entries inby 30R crosscut, the area was ventilated and the fresh-air base was advanced at approximately 7:55 a.m., July 5.

At 10:43 a.m., a track personnel carrier was found approximately 5 feet inby 36L crosscut in No. 2 entry. Mitsko's body was found lying on the mine floor beside the right rib (See Appendix F). Removal of the victim was delayed until the fresh-air base could be advanced.

At approxmately 3:40 p.m., July 5, the areas inby the fresh-air base were explored up to 37R crosscut. Checks were installed across Nos. 1, 2 and 3 entries inby 37L crosscut and also between Nos. 2 and 3 entries, leaving the last two crosscuts open. Due to the roof fall in No. 3 (return) entry, ventilation could not be established up to the new base. After regulating more air into E-Butt and retightening checks between Nos. 2 and 3 entries, ventilation was advanced to 37R crosscut at approximately 11:55 p.m.

Thomas Streams, Indiana County coroner, entered the mine at 10:25 p.m. and traveled to the E-Butt Section where he examined the victim and pronounced him dead. Mitsko's body was removed from the mine at 12:50 a.m., July 6, 1983.

Exploration continued inby 37 R crosscut at approximately 2:20 a.m., July 6. Shortly thereafter, exploration was halted due to inadequate ventilation at the fresh-air base.

At approximately 7:25 a.m., the teams moved back to No. 2 entry inby 28R crosscut. The air was coursed around the cave in No. 3 entry into No. 2 entry at 31R crosscut. After the proper checks were installed, the air current atill was not sufficient. Ventilating checks were then arranged to permit the air to go through No. 32R crosscut into No. 2 entry and back in at No. 30R crosscut, which made the No. 2 entry a return for approximately 150 feet. This change increased the ventilation, permitting the teams to continue exploring inby 37R crosscut. Exploration continued without any further delays or problems. At approximately 7:00 p.m., the E-Butt section was explored and ventilated.

During the exploration and recovery of E-Butt section, extreme caution had to be used throughout when exploring inby fresh-air bases. Mine rescue teams frequently encountered high concentrations of methane, carbon monoxide, and low oxygen. Air samples analyzed showed concentrations as high as 26 percent methane, 4.73 percent carbon monoxide, and oxygen as low as 4.10 percent (See Appendix K).

During recovery work, one mine rescue team member was overcome by carbon monoxide during the exploration. He was removed from the mine and taken to the hospital where he recovered without any ill effects. Since the team member had a beard, a tight seal might have been prevented around the facepiece.

Other difficulties encountered were bad roof areas, a roof fall which hindered the reestablishment of ventilation in E-Butt section, and hanging, twisted and distorted roof mats (bacon skins) which made traveling difficult.

ELECTRIC CIRCUITS AND EQUIPMENT IN THE EXPLOSION AREA

E-Butt Section

The investigation revealed the following equipment was present in the section at the time of explosion:

1. One West Virginia Armature Rail Runner Type II Personnel Carrier, Serial No. 200-0655, 120-volts d.c. battery-powered.

2. One 750 KVA Pemco combination section power center, Serial No. A1622-776 and 13.2 KV supply cable (energized at time of explosion).

3. One 150 KVA Pemco load center located in 35L crosscut (not energized).

4. One S & S Model 270 tractor connected to a battery charger, Company No. BB-15 (charger not energized).

5. One Hertner Battery charger, type 2A (not energized).

6. One Rock Duster motor, driven by power from batteries on 270 tractor (not connected to 270 tractor).

7. One Aitken 6 KW heater (not energized).

8. One Jabco audio alarm belt heat sensor unit with 4,000 feet of sensor cable. The sensor circuit was energized by a battery-powered, 24-volt, intrinsically safe circuit. The sensor unit was activated by the explosion.

9. 110-volt belt conveyor control circuit terminating in B & B Electrical Manufacturing Co., Inc. control switch (not energized).

10. Femco 24-volt, approval number 9-B-34-5, telephone (energized).

11. Jeffrey 1206 continuous miner, Serial No. 37105 (not energized).

12. Two Joy 21SC d.c. shuttle cars Serial Nos. 9831 and 12397 (not energized).

13. Fletcher DDO ATRS roof bolter Serial No. 81042 (not energized).

14. Stamler belt feeder Serial No. 11567 (not energized).

15. Cunningham SunFlow 20 hp. pressure pump, Serial No. 821895 (not energized).

Equipment at Mouth of E-Butt Section

16. Pemco High Voltage Switchhouse, Model 5H-1-VSA, Serial No. 4194-670, with feed through 13.2 KV (energized).

17. Pemco 150 KVA belt load center, 600 volt secondary, Serial No. C198-480 (energized).

18. Pemco Model MS-100 belt starter Serial No. A5033-674 (not energized).

MINE EMERGENCY OPERATIONS (MEO)

Robert G. Peluso, chief, Pittsburgh Health Technology Center, was notified of the explosion at approximately 6:00 a.m., on July 4, 1983, and in turn notified J. L. Banfield, Jr., chief of the ventilation division, instructing him to have personnel proceed to the mine site to provide assistance. This group, comprised of E. J. Miller, supervisory mining engineer; John E. Urosek and Kevin G. Stricklin, mining engineers; R. Keith Younger, industrial hygienist; and Herman Schade, mining engineering technician, arrived at the mine site at approximately 11:00 a.m.

Upon arriving at the mine, Miller, the team leader, was briefed and then arranged to continuously monitor the air being discharged from the mine by the No. 3 fan during the rescue and recovery operation. A remote monitoring station was established approximately 100 feet from the No. 3 fan. Air from the fan discharge was pumped through tubing to this location, thus allowing continuous monitoring for methane, carbon dioxide, oxygen and carbon monoxide. Monitoring proceeded in this manner from 2:30 p.m. on July 4 until approximately 4:00 p.m. on July 6 at which time the group was released.

During the continuous monitoring, the maximum concentrations of methane, carbon dioxide, and carbon monoxide measured in the discharge of the No. 3 fan were 0.29 percent, 0.07 percent and 145 ppm respectively. These maximums occurred during various stages of the reventilation of the explosion area.

PART III

INVESTIGATION, DISCUSSION AND EVALUATION

ORGANIZATION AND INTERVIEWS

During the period from July 3 to July 6, 1983, while the rescue and recovery work was being performed and the mine ventilation was being reestablished in the E-Butt section, MSHA selected an investigation team and developed plans and procedures for investigating the explosion.

On July 8, 1983, the investigation team began a comprehensive investigation and evaluation of existing conditions in the affected underground areas. All observed conditions were recorded by the team members on a map or in a notebook. Maps showing the detailed information gathered in E-Butt are contained in Appendices D, E, and F. Where necessary, photographs were taken and sketches were made of conditions and equipment. In conjunction with the underground portion of the investigation, interviews of mine officials and mine workers who could supply information pertinent to the events occurring before and after the explosion were conducted. On July 11, 1983, mine dust surveys were made in Muddy Run Submains just inby C-Butt and in E-Butt following standard MSHA procedures for making these surveys.

PERSONS WHO PARTICIPATED IN THE INVESTIGATION

The onsite investigation into the causes of the explosion was begun on July 7, 1983, by conducting tests at the three mine fan installations and continued until July 18, 1983. The following persons participated in or contributed to the investigation:

The Helen Mining Company

James A. Hickman	Vice President of Operations
George Radomsky	General Manager of Safety
Timothy M. Biddle	Attorney
Michael Hancher	Superintendent
Clark McElhoes	Mine Foreman
Gregory P. Freeland	Chief Electrician
Charles C. Dobbins	Electrical Engineer
Joseph Dunn	Belt Foreman
Francis L. Dwyer	Assistant Foreman
Angelo D. Swanhart	Assistant Foreman
Wilbur Q. Guile	Assistant Foreman
Andrew Lazeration	Assistant Foreman
James Milligan	Assistant Foreman
James M. Groft	Draftsman
Earl R. Syster	Watchman
John E. Vresilovic	Watchman
Paul R. Whalen	Assistant Chief Engineer
Paul B. Flynn	Chief Engineer
William M. McCrea	Outside Foreman

United Mine Workers of America

Harry Nicklow	Staff Assistant to the Administrator, Washington, D.C.
Leonard Fleming	International Health and Safety Representative, District 30
Henry Yaskowitz	International Health and Safety Representative, District 2
Robert A. Douds	Safety Committeeman
Ronald L. Rhoades	Safety Committeeman
Roger K. Jordan	Chairman of Safety Committee
George U. Zayak	President of Union, No. 1619
Denny J. Rager	Miner Operator Helper
Robert A. Henninger	Continuous-Miner Operator
Erving T. Robinson	Continuous-Miner Operator
Dennis J. Loaskie	Continuous-Miner Operator

Pennsylvania Department of Environmental Resources

Jesse L. Bolen	Mine Inspector
John F. Funka	Mine Inspector
William F. Cherry	Mine Inspector
Charles Fenchak	Mine Inspector (Electrical)
Michael A. Anderson	Mine Inspector (Electrical)
Ellsworth R. Pauley	Mine Inspector
Gerald A. Wilders	Mining Engineer
William Larkin	Attorney

Old Republic Insurance Co.

David E. Hazlett	Loss Control Representative

Mine Safety and Health Administration

Theodore W. Glusko	Supervisory Coal Mine Safety and Health Inspector
Timothy J. Thompson	Mining Engineer
Gerald E. Davis	Coal Mine Safety and Health Inspector (Electrical)
Joseph S. Tortorea	Mining Engineer
Ronald J. Gossard	Electrical Engineer
Curtis D. Edgerton	Supervisory Geologist
Samuel J. Brunatti	Coal Mine Safety and Health Inspector
John A. Kuzar	Coal Mine Safety and Health Inspector
Lewis E. Kish	Coal Mine Safety and Health Inspector
Clyde G. Turner	Coal Mine Safety and Health Inspector
William D. Sparvieri, Jr.	Coal Mine Safety and Health Inspector
Kevin G. Stricklin	Mining Engineer, Tech Support
Robert A. Haney	Supervisory Mining Engineer, Tech Support
Steven J. Gigliotti	Mining Engineer, Tech Support
Edward J. Miller	Supervisory Mining Engineer, Tech Support

FACTORS AFFECTING THE EXPLOSION

METHANE, VENTILATION

The E-Butt (001) section had been developed approximately 4,000 feet by three entries. The No. 1 entry, which contained the belt conveyor, was an intake aircourse to ventilate active working places. The No. 2 entry was a track entry and intake aircourse isolated from the main returns in the Muddy Run Submains by overcasts. Masonry block stoppings were used in the crosscuts to separate the intake and return (No. 3 entry) aircourses, except in the last crosscut outby the faces. Masonry block stoppings were also used in the crosscuts to separate the intake and belt entries outby the section loading point. The ventilating air current for this section was controlled by a regulator across the return entry at the mouth of the section.

The daily methane liberation from the mine as determined by analysis of vacuum bottle and air measurements taken in the main return aircourses immediately inby the main fans during an inspection of the entire mine between April 6 and June 22, 1983, was calculated to be 2,701,000 cubic feet. On May 18, 1983, the daily methane liberation rate from the E-Butt section as calculated from air and methane reading was 272,000 cubic feet. The last weekly examination for methane and hazardous conditions prior to the explosion was conducted on June 30, 1983. The recorded results indicated that 285,120 cubic feet of methane was being liberated in E-Butt section every 24 hours.

The mine was ventilated by three exhaust fans installed on the surface which were equipped with automatic closing doors. The No. 3 fan, which ventilated the E-Butt section, exhausted 359,730 cfm of air from the mine at a recorded pressure of 6 inches of water. The total mine airflow was 954,098 cfm. The approved Ventilation System, Methane and Dust Control Plan for the mine required 9,000 cfm in the last open crosscut of E-Butt and 4,000 cfm at the end of the line canvas.

On Sunday, July 17, 1983, a team of investigators comprised of personnel from MSHA, State, Company and Miner's representatives entered the mine for the purpose of taking simultaneous air measurements in specific locations ventilated by the No. 3 fan to simulate air flow to the affected areas before and after stoppage of No. 3 fan. Air measurements were taken and recorded at the locations with all the fans running at normal water gauge. At 9:30 a.m. the No. 3 fan was shutdown and all incoming power to the mine was deenergized. Repeat air measurements were taken at the same locations. The fan was restarted within 15 minutes at which time the investigators had begun to walk out of the mine. The results of the findings are as follows:

	All Fans Operating	No. 3 Fan Down
C-Butt		
Track	34,279	p.m.*
Belt	20,655	p.m.* (reversed)
Regulator	16,660	not measured
D-Butt		
Track	19,219	p.m.* (reversed)
Belt	23,377	p.m.* (reversed)
Regulator	3,234	p.m.* (reversed)
E-Butt		
Track	31,926	p.m.*
Belt	23,925	p.m.* (reversed)
Regulator	57,000	no movement
Muddy Run Submains - Faces		
Left Regulator	14,250	p.m.*
Right Regulator	25,050	2,200
Intakes Near No. 3 Fan		
No. 3 Entry	126,600	23,546
No. 5 Entry	42,596	p.m.*
Mouth of Muddy Run Submains		
Track	104,975	11,220
No. 5 Entry	60,950	p.m.* (reversed)
Belt	not measured	p.m.* (reversed)

*p.m. - perceptible movement

Each of the three mine fan installations was equipped with a single switch to activate the fan signal alarm system (See photograph No. 2, Appendix I). In the No. 3 fan, the switch was mounted on a wall of the fanhouse and a 2-inch-diameter pipe extended from the switch into the fan duct to sense the mine ventilating pressure. During normal fan operation, the negative pressure developed by the exhaust fan causes an aluminum flapper to close. With the flapper in the closed position, electrical contacts close and keep the alarm system from operating. The device is designed so that when the ventilating pressure decreases to less than negative 0.12 inches of water, the switch will open the electrical contacts activating the alarm system at the mine portal and the hoisthouse.

From an examination of the fan charts following the explosion, it was revealed that at approximately 8:15 a.m., on July 3, 1983, the No. 3 fan shut down. The switch on this fan did not activate the alarm system because the Nos. 1 and 2 fans were still in operation and were maintaining a negative pressure of approximately 1.0 inch of water in the No. 3 fan duct. In was also determined from examining the fan charts that at approximately 5:40 p.m. when the explosion occurred, the pressure in this fan duct changed enough to activate the switch and thus the alarm system alerting mine personnel that the fan was not operating. See Appendix H.

COAL DUST

During the three previous MSHA inspections, 48 mine dust samples were taken in the E-Butt (001) section from the mouth of the section to number 31R crosscut in all three entries. The analyses of these samples showed that all exceeded the minimum incombustible content. In the No. 1 intake entry (belt), none of the 15 samples was less than 85% incombustible with the average being 96%. In the No. 2 intake entry the lowest of 17 samples was 85% incombustible and the average was 92%. In the No. 3 return entry, the lowest sample of the 16 samples was 95% incombustible and the average was 99%. The average incombustible content of all samples collected during the surveys was 96%.

During the investigation, MSHA conducted a mine dust survey of the affected area of the mine. Samples were collected in the Muddy Run Submains beginning inby C-Butt and in E-Butt from the mouth of the section to the faces on July 12 and 13, 1983. A total of 216 samples were collected and analyzed for incombustible content. In Muddy Run Submains, samples were collected at approximately 160-foot intervals. The samples collected in E-Butt were taken at approximately 80-foot intervals and were also analyzed for the presence of coke. Coke was found in all samples collected inby crosscut 10L in the belt entry, 8L in the track entry, and 12R in the return entry. The amount of coke ranged from a trace to an extra-large amount. The results of the mine dust survey conducted following the explosion and accompanying map are shown in Appendices G-1 and G-2.

SMOKING

There was no evidence or testimony that would indicate that smoking articles were taken into or used in the mine.

THE EXPLOSION AND PROPAGATION

Based on observations and evidence, the investigation team concluded that the explosion originated in the No. 2 entry near crosscut 36L where the victim and a track mounted battery-operated personnel carrier were found. Coke deposits confirmed that coal dust entered into the explosion (See photograph No. 3, Appendix I). Flame and major forces of the explosion propagated from the origin, traveled inby to the faces and outby to the mouth of E-Butt. The explosion developed enough pressure to destroy, damage, or otherwise disrupt ventilation in E-Butt from the faces to a distance of 4,000 feet outby to an overcast located at the mouth.

Pressure relief was a factor which contributed in arresting the flame propagation as the explosion developed. As shown on the map in Appendix C, off-setting forces in certain places in E-Butt converged upon each other to cause a reduction of the magnitude of the leading pressure wave. In addition, the three entries of E-Butt open up into eight entries in the Muddy Run Submains. Dispersed inert material was considered by the investigation team

as the major mechanism that limited the flame propagation in E-Butt following the explosion. The results of the most recent mine dust survey conducted during the last inspection prior to the explosion showed samples in excess of 90% incombustible between crosscut 16R to 31R. It was within this 1300 feet that the flame terminated and forces were greatly reduced. The incombustible content of the mine dust inby crosscut number 31 prior to the explosion is unknown; however, according to the testimony received during the investigation, the faces of E-Butt were bulk dusted two days prior to the explosion.

Based on observations made during the investigation there is no doubt that coal dust entered into and contributed to the explosion in E-Butt; however, based on knowledge of the duration of the No. 3 fan stoppage and also on the rate of methane liberation in E-Butt, it is the opinion of the investigators that the explosion was predominantly a violent methane explosion.

EXTENT OF FLAME AND FORCES

The extent of the flame and forces of the explosion has been determined from the underground observations of the investigation team.

Flame: Melted wire insulation, charred paper, melted brattice material, melted plastic, soot deposits and coke on roof, posts, mining equipment and in other places were visibly evident in the E-Butt section from the faces as far outby as the 13th crosscut into No. 1 (belt) entry. Coke was readily found in the No. 2 entry inby and outby the battery personnel carrier. It was also evident in crosscuts connecting Nos. 1 and 2 entries and, to a lesser degree, in the No. 1 entry. Coke was located sporadically in the No. 3 (return) entry. Coke formation in the No. 2 entry near the origin of the explosion can be attributed to a slower moving flame while higher flame speeds in the belt and the return entry inhibited coke formation. Thick deposits (1/4- to 1/2-inch) of coke in solid masses on the sides of equipment and on the tops of some wooden roof supports can be attributed to a relatively slow moving flame burning coal dust. In several locations in No. 2 entry and connecting crosscuts, coke was found on the sides of objects opposite the direction of the major forces of the explosion. Research has shown that where an explosion increases in violence, coke is found chiefly on the side opposite the direction of the major forces.

There was evidence of flame found in the faces of E-Butt. Flame of the explosion propagated into the dead-end areas of entries (faces) indicating that the atmosphere therein contained an explosive gas/air mixture.

Some of the mine dust samples collected for analysis of incombustibility were also analyzed for coke. Chemical analysis for coke is more sensitve than visual observation, and coking was found by chemical analysis beyond the areas where coke was visually observed. The investigators believe that some of the coke found in areas where it could not be visually observed was placed there by the air movement during the explosion. Data on the coke in the dust samples are in Appendix G-2.

The extent of the flame was determined from coking, burned paper, melted brattice and other signs of heat. The extent of the flame is shown in Appendix C.

Forces: Major forces of the explosion propagated from the origin and traveled inby in Nos. 1 and 2 entries to the faces of E-Butt and outby in all three entries toward the mouth of the section. The direction of the forces was predominantly from the No. 2 entry toward the No. 1 entry and toward the No. 3 entry. Between crosscuts 30 and 24, the direction of forces in the crosscuts was generally from Nos. 1 and 3 entries toward the No. 2 entry. Outby crosscut 24 the direction was from No. 3 to No. 2 and from No. 2 to No. 1 entries. All permanent stoppings inby 17 crosscut were completely destroyed. Steel roof mats were ripped away from roof bolts and bent in all directions. Posts were dislodged and scattered throughout the entries. Power conductors were torn apart. Cover plates were torn off equipment and miscellaneous material was thrown around the section. The belt feeder was moved several feet and the belt cables were severed and strewn throughout the No. 1 entry (See photograph No. 4, Appendix I). Damage to ventilating devices was observed as far outby as the mouth of the section.

The major forces moved outby in the three entries. Masonry block stoppings were blown into the adjacent entries. Failure of block stoppings would normally occur at overpressures of about 3 psi. Flame speeds in excess of 800 ft./sec. are not uncommon in a methane/coal dust explosion. This flame speed corresponds to a static pressure of 15 psig and dynamic pressure of about 30 psig. Tests by researchers on the physiological effect of blast pressures have shown that a peak overpressure of one (1) psi will knock a person down, five (5) psi will rupture eardrums, fifteen (15) psi causes lung damage, and thirty-five (35) psi is the threshold for fatalities.

The victim suffered extensive flash burns with evidence of smoke inhalation and carbon monoxide poisoning. There were no significant contusions, abrasions or lacerations and no fractures were found. This leads the investigators to believe that the victim was located near the source of the ignition where the flame was still slow moving and pressures had not yet developed their destructive capabilities.

ELECTRICAL CIRCUITS AND EQUIPMENT

All energized electric circuit and equipment located in the area of the mine in which evidence of heat or flame was found, or which supplied power to electric equipment in this area, were examined or tested to determine the adequacy of short-circuit, overload and ground-phase protective devices.

The high voltage switchhouse located at the mouth of E-Butt section off Muddy Run Mains where the 13,200-volt branch circuit originated was examined. The high voltage circuit breaker protective relays for E-Butt section were set as follows:

1. Inverse time overcurrent, 80 amperes.

2. Instantaneous overcurrent, 480 amperes.

3. Inverse time grounded phase, 4.5 amperes.

The grounding resistor located in the surface substation limited grounded-phase current to 25 amperes. The high-voltage cable from the switchhouse to the E-Butt section power center was No. 2 AWG, type SHD G-GC. The high-voltage circuit breaker inside E-Butt switchhouse was found tripped with the instantaneous trip unit indicator targets in the drop down position. This most likely happened during the explosion. It could not be determined if the power tripped at the surface substation, because the surface high-voltage circuit breaker is wired to open 4 minutes after a fan signal alarm.

DISCUSSION OF POTENTIAL IGNITION SOURCES IN E-BUTT

All equipment and other potential ignition sources in the E-Butt section were examined for evidence of a methane ignition. The results of these examinations are set out below.

The following electric equipment which was located at various locations throughout the E-Butt section could not have been the source of the ignition in that they had all been disconnected from their source of power prior to the explosion:

1. One Aitken 6 KW heater
2. One Hertner battery charger
3. One Jeffrey continuous miner
4. Two Joy 21SC d.c. shuttle cars
5. One Fletcher DDO roof drill
6. One Stamler belt feeder
7. One Cunningham SunFlow pressure pump
8. One Rock Duster
9. Belt conveyor control circuit
10. One 150 KVA load center

The Jabco audio alarm belt sensor unit, Model No. JG-107, was located in the track entry of Muddy Run Submains at the E-Butt belt overcast. The fire sensors were located along the E-Butt belt at approximately 50' intervals. The sensors are intrinsically safe and therefore could not have been the source of ignition. The alarm system activated at the time of the explosion.

The Femco telephone, Koehler flame safety lamp, and the victim's battery cap lamp were removed from the mine and sent to MSHA Approval and Certification Center, Triadelphia, West Virginia. Tests performed on this equipment has shown that they were not the source of the ignition. The report of the findings on the equipment is located in Appendix J.

SECTION POWER CENTER

The 750 KVA combination power center was located in intake air, in the third crosscut (40R) from the face, approximately 320 feet outby the face of the No. 2 entry in E-Butt section. It was determined through testimony given during the investigation that the power center would have been energized. There were several open-type relays that in normal operation would create arcing containing sufficient energy to readily ignite methane; however, during this idle vacation period all of the equipment disconnect plugs were removed from the receptacles. The direction of the explosion forces and testimony to the effect that there was no occurrence which would have caused the electrical relay contacts to be broken under load, indicates that the explosion was not initiated at the load center.

MODEL 270 TRACTOR AND CHARGER

The model 270 S & S tractor and charger were located in 37R crosscut approximately 580 feet outby the face of No. 2 entry. The forces of the explosion caused minimal physical damage to the tractor and charger. On the last work shift, the trailing cable for the charger was disconnected at the load center. The batteries in the model 270 tractor were connected to the charger at the time of explosion. During the investigation, the following tests were conducted on the 270 charger:

1. The 3-phase full wave bridge rectifier inside the charger was tested for diode failure and possible voltage discharge from the batteries through the charger. All the components were tested and inspected for damage to the insulation that could cause arcing or overheating. These tests were conducted with the tractor batteries connected to the charger as it was found following the explosion.

2. The charger was brought to the surface repair shop where it was energized and connected to batteries in a personnel carrier and tested for proper operation. An oscilloscope was used to observe the ripple voltage present on the d.c. voltage output of the full wave bridge rectifier.

3. Amperage output on the d.c. side of the rectifier was 190 amperes when first energized and gradually dropped to 150 amperes after 2 hours of operation. The arc chutes were removed from the a.c. line side contactor to determine condition of contacts, seal-in of contacts when closed, and the amount of arcing when contacts opened. Only a minimum amount of arcing could be observed when the contacts opened.

Testimony given during the investigation indicates the charger plug was removed from the load center prior to the explosion, and there is no evidence to indicate that Lee Mitsko (victim) plugged the charger into the load center, because the cable plug was laying undamaged several feet in front of the load center. The direction of the explosion forces appear to have originated in this area; however, there was no electrical component failures or malfunctions discovered to indicate the explosion was initiated by the 270 charger or tractor batteries.

PERSONNEL CARRIER

The West Virginia Armature Rail Runner Type II personnel carrier used by Mitsko (victim) was located in No. 2 entry just inby 36L crosscut. The only physical damage caused by the forces of the explosion were the two sealed beam headlights on the inby end which were broken by debris and loose coal. The open-type main contactor panel contained 15 contactors that under normal operation would create arcing of sufficient energy to ignite methane. The metal cover over the main contactor panel was loose fitting with open areas at the ends and around the molded case circuit breaker where methane could enter easily. An inspection of the tram controller compartment revealed no physical evidence of arcing or soot deposits around the cover flanges. The two 20-horsepower traction motors were opened up and tested for commutator arcing and grounding. These showed no evidence of being a source of ignition. The resistor, knife blade disconnect and battery compartments were covered with heavy soot and were considered as a source of ignition; however, there was no evidence of arcing, ground faults or short circuits.

DISCUSSION OF POINT OF ORIGIN

Based upon the location of flame, direction of the forces of the explosion, physiological condition of the body of the victim, and the following discussion, the investigators conclude that the ignition of methane originated at the track-mounted, battery-operated personnel carrier located in No. 2 entry just inby 36L crosscut. The personnel carrier was found with the directional control and light switch in the forward position, the parking brake disengaged and the hydraulic brake in the neutral position, indicating that it was being operated at the time of the explosion. In addition, the entrance of the personnel carrier into the area was the most likely event that was taking place in the area at the time of the explosion. It is the concensus of the investigators that the ignition source was the arcing created in the open contactor compartment by the resistance contactors opening and closing as Mitsko trammed the personnel carrier toward the faces.

PART IV

FINDINGS OF FACT

1. The volatile ratio of the channel sample collected in E-Butt section was calculated to be 0.29 indicating that the coal dust is explosive.

2. During the last Safety and Health inspection, the three fans exhausted a total of 954,098 cubic feet per minute of air from the mine, and the mine liberated 2,701,000 cubic feet of methane in 24 hours.

3. During the last Safety and Health inspection, 0.3 percent methane was found to be in the immediate return off the working faces of E-Butt and 0.6 percent methane was detected at the regulator near the mouth of the section.

4. The mine was idle because of vacation at the time of the explosion. The last production was on the afternoon shift of June 24, 1983. Patrolling and some scheduled maintenance were the only work performed at the mine during this period.

5. Initial readings at the fans following the explosion were as follows:

	CO	CH^4	Water Gauge	
			Normal	After Expl.
No. 1 fan	0.0%	0.3%	5.0	5.0
No. 2 fan	0.0%	0.2%	6.0	6.0
No. 3 fan	0.0%	0.2%	6.4	6.0

6. Swanhart arrived at the power center in the E-Butt section at approximately 11:00 a.m. in the course of his normal patrolling duties.

7. At approximately 4:05 p.m., Dwyer and Mitsko entered the mine. Mitsko's initials in D-Butt at the power center indicated that he was in the section prior to the explosion.

8. At approximately 5:40 p.m., an explosion occurred in the E-Butt section. On the surface, all the lights in the hoisthouse went out and the fan signal, located in the hoisthouse, sounded.

9. Syster arrived at the No. 3 fan at approximately 6:30 p.m. He discovered that the fan was down and according to the fan recording chart, had not been operating since approximately 8:15 that morning.

10. Shortly after 6:00 p.m., Vresilovic contacted Dwyer and informed him that possibly a fan was not operating. About the same time, the automatic belt warning signal for E-Butt was transmitting over the mine phone. When Dwyer learned that Mitsko had not been contacted, he informed Vresilovic that he was going to E-Butt.

11. Upon entering the E-Butt section, Dwyer observed that the air was hazy and the entry blackened. He had proceeded inby the E-Butt switch approximately 800 feet when his jitney derailed. He then continued on foot for an undetermined distance until he had to retreat because of a burning sensation in his eyes.

12. After being notified, Hancher, McElhoes, and Dwyer entered the mine about 8:05 p.m. and traveled to E-Butt. They quickly concluded that an explosion had occurred and returned to the surface to arrange for assistance.

13. The Florence Mining Company Nos. 1 and 2 mine rescue teams started to arrive at the mine approximately 10:30 p.m., and about an hour and a half later had enough members to make up two teams.

14. At approximately 5:20 a.m., the first fresh-air base was established on the No. 2 track entry inby 13R crosscut in E-Butt section.

15. The victim was removed from the mine at 12:50 a.m., July 6, 1983. At approximately 7:00 p.m., the same day, the E-Butt section was explored and ventilated.

16. During the exploration and recovery of E-Butt section, extreme caution had to be used throughout when exploring inby fresh-air bases. Mine rescue teams frequently encountered high concentrations of methane, carbon monoxide, and low oxygen. Air samples analyzed showed concentrations as high as 26 percent methane, 4.73 percent carbon monoxide, and oxygen as low as 4.10 percent.

17. The E-Butt (001) section had been developed approximately 4,000 feet by three entries. The No. 1 entry, which contained the belt conveyor was an intake aircourse used to ventilate active working places. The No. 2 entry was an intake aircourse containing the track, and the No. 3 entry was the return aircourse.

18. The daily mine methane liberation from the coal seam as determined by analysis of vacuum bottle and air measurements taken in the main return aircourses immediately inby the main fans during an inspection of the entire mine between April 6 and June 22, 1983, was 2,701,000 cubic feet.

19. On May 18, 1983, the daily methane liberation rate from the E-Butt section as calculated by air and methane readings was 272,000 cubic feet.

20. The last mine foreman's weekly examination for methane and hazardous conditions prior to the explosion was conducted on June 30, 1983. The recorded results indicated that 285,120 cubic feet of methane was being liberated in E-Butt section every 24 hours.

21. The No. 3 fan, which ventilated the E-Butt section, exhausted 444,750 cfm of air from the mine at a recorded pressure of 6 inches of water.

22. During the investigation, simultaneous air measurements were taken at specific locations ventilated by the No. 3 fan, to determine affected air flow before and after No. 3 fan was stopped. Air measurements were taken and recorded at the locations with all the fans running at normal water gauge. With the No. 3 fan shut down, the second set of air readings showed that air quantities were greatly reduced or, in many cases, air direction was reversed. Air movement in E-Butt virtually stopped when No. 3 fan was shut down.

23. Each of the three mine fan installations is equipped with a single switch to activate the fan signal alarm system. In the No. 3 fan, the switch was mounted on a wall of the fan-house and a 2-inch diameter pipe extended from the switch into the fan duct to sense the mine ventilating pressure. The device is designed so that when the ventilating pressure decreases to less than negative 0.12 inches of water, the switch will open the electrical contacts activating the alarm system at the mine portal and the hoisthouse.

24. From an examination of the fan charts following the explosion, it was revealed that at approximately 8:15 a.m., on July 3, 1983, the No. 3 fan stopped. The switch on this fan did not activate the alarm system because the Nos. 1 and 2 fans were still in operation and were maintaining a negative pressure of approximately 1.0 inch of water in the No. 3 fan duct.

25. At approximately 5:40 p.m., when the explosion occurred, the pressure in this fan duct changed enough to activate the switch and thus the alarm system alerting mine personnel that the fan was not operating.

26. During the investigation, a mine dust survey was conducted in the affected area of the mine. Coke was found in all samples collected inby crosscut 10L in the belt entry, 8L in the track entry, and 12R in the return entry.

27. The investigation team concluded that the explosion originated in the No. 2 entry inby crosscut 36L where the victim and a track-mounted battery-operated personnel carrier were found. Coke deposits confirmed that methane and coal dust entered into the explosion.

28. Flame and major forces of the explosion propagated from the origin, traveled inby to the faces and then outby to the mouth of E-Butt. The explosion developed pressure to destroy, damage, or otherwise disrupt ventilation in E-Butt from the faces to a distance 4,000 feet outby to an overcast located at the mouth of E.

29. Dispersed inert material (rock dust) is considered by the investigation team as the major mechanism that limited the flame propagation in E-Butt following the explosion.

30. Based upon observations made during the investigation, coal dust was a factor in propagation of the explosion in E-Butt. The duration of the No. 3 fan stoppage and also on the rate of methane liberation in E-Butt, however, led the investigators to conclude that the explosion was predominantly a violent methane explosion.

31. Melted wire insulation, charred paper, melted brattice material, melted plastic, soot deposits and coke on roof, posts, mining equipment and in other places was visibly evident in the E-Butt section from the faces as far outby as 13 crosscut in No. 1 (belt) entry.

32. There was evidence of flame found in the faces of E-Butt. Flame of an explosion will propagate into a dead-end area of an entry (faces) only if the atmosphere therein contains an explosive gas/air mixture.

33. Major forces of the explosion propagated from the origin and traveled inby in Nos. 1 and 2 entries to the faces of E-Butt and outby in all three entries toward the mouth of the section.

34. All permanent stoppings inby 17 crosscut were completely destroyed. Steel roof mats were ripped away from roof bolts and bent in all directions. Posts were dislodged and scattered through the entries. Power conductors were torn apart. Cover plates were torn off of equipment and miscellaneous material was thrown around the section. The belt feeder was moved several feet and the belt and belt wires were severed and strewn throughout the No. 1 entry. Damage to ventilating devices was observed as far outby as the mouth of the section.

35. The victim suffered extensive flash burns with evidence of smoke inhalation and carbon monoxide poisoning. There were no significant contusions, abrasions or lacerations and no fractures were found.

36. The direction of the explosion forces and testimony to the effect that there was no occurrence which would have caused the electrical relay contacts to be broken under load, indicates that the explosion could not have initiated at the section power center.

37. Based upon location of positions of operating controls on the personnel carrier, flame, direction of the forces of the explosion, and physiological condition of the body of the victim, the investigators conclude that the ignition of methane originated at the track-mounted, battery-operated personnel carrier located in No. 2 entry just inby No. 36L crosscut.

38. It is the consensus of the investigators that the ignition source was the arcing created in an open compartment by the resistance contactors opening and closing as Mitsko trammed the personnel carrier toward the faces.

Four of the conditions and practices in the Findings of Fact contributed to the explosion and constituted violations of the Federal Mine Safety and Health Act of 1977 and the mandatory standards contained in 30 CFR. These are listed below:

§75.301	The volume and velocity of air ventilating E-Butt (001) working section off of Muddy Run Submains on July 3, 1983, was not sufficient to dilute, render harmless, and to carry away flammable, explosive and harmful gases which permitted methane, an explosive gas, to accumulate in this area.
§75.314	On July 3, 1983, on the 4:00 p.m. to 12 midnight shift, evidence revealed the person who was required to enter the idle Muddy Run Submains areas in the performance of his duties was not properly equipped with means approved by the Secretary for detecting methane.
§75.300	On July 3, 1983, at approximately 8:05 a.m., the No. 3 mine ventilation fan stopped. The automatic signal device placed at the No. 2 shaft portal to be seen or heard by a responsible person did not give an alarm when the No. 3 mine ventilation fan stopped.
§75.314	On July 3, 1983 on the 8:00 a.m. to 4:00 p.m. shift, the two certified persons were performing their duties including making a fire examination (checking high-voltage cables) along the track haulage in the idle Burrell Mains, 1st South, 4th South, C, D, and E Butts of Muddy Run Submains and Muddy Run Mains. At approximately 8:05 a.m., the No. 3 mine ventilation fan stopped, which was the ventilating system for the above areas. With the No. 3 fan down, a dangerous condition existed, which was not observed by the two certified persons entering these areas.

A copy of these citations is in Appendix L.

Other violations were found during the investigation which did not contribute either to the cause or severity of the explosion. Appropriate citations were issued to The Helen Mining Company for all violations.

PART V

CONCLUSION

The investigators concluded that at 8:15 a.m., on July 3, 1983, the No. 3 fan ceased operation. This disruption in ventilation virtually stopped the flow of air in E-Butt and allowed methane to accumulate to an explosive range in the E-Butt section. At approximately 5:40 p.m., Sylvester Lee Mitsko (victim) entered the unventilated area on a track-mounted, battery-operated personnel carrier. The electric components of the personnel carrier were housed in an open-type electrical compartment which allowed the methane to easily migrate inside. The victim's operation of the carrier tram control, opened and closed contactors within the compartment, creating arcing, which ignited the explosive methane-air mixture. The open compartment also easily permitted flame to escape once the methane was ignited. The escaping flame propagated further into the explosive methane-air mixture in the No. 2 entry and surrounding areas.

The following conditions and/or practices contributed to the cause of the accident:

1. The automatic signal device which was installed in the No. 3 fan ducting did not give an alarm at the manned No. 2 shaft portal when the No. 3 mine ventilation fan shut down.

2. The day shift assistant foremen who traveled and worked in the Muddy Run area of the mine between 8:00 a.m. and 4:00 p.m., failed to recognize that the ventilation had been drastically reduced.

3. The person (Mitsko) who was required to make examinations in E-Butt did not have in his possession a means approved by the Secretary for detecting methane.

Respectfully submitted,

Theodore W. Glusko

Theodore W. Glusko
Supervisory Coal Mine Safety and Health Inspector

Timothy J. Thompson

Timothy J. Thompson
Mining Engineer

Gerald E. Davis

Gerald E. Davis
Coal Mine Safety and Health Inspector (Electrical)

Joseph S. Tortorea

Joseph S. Tortorea
Mining Engineer

Approved by:

William R. Devett

William R. Devett
Subdistrict Manager--Coal Mine
Safety and Health District 2

Donald W. Huntley

Donald W. Huntley
District Manager--Coal Mine
Safety and Health District 2

APPENDIX A

MINE RESCUE TEAMS

KEYSTONE COAL MINING CORPORATION
Indiana, PA

Keystone No. 1

Michael W. Kaskan, Captain
Dorman L. Nicholson
Joseph B. Pasterick
Carl E. Bullers
Ronald D. Van Horne
L. Ray Bashline - Briefing Officer
James P. Futscher
Dennis R. Malcolm

Keystone No. 2

Edward A. Parks, Jr., Captain
Gary L. Ryan
Wayne W. Pritt
Kenneth W. Redinger
Jose W. Gutierrez
George Nadzadi, Jr. - Briefing Officer
John J. Bertulino
David E. Druchniak
David E. Wells

GREENWICH COLLIERIES, DIVISION OF PENNSYLVANIA MINES CORPORATION
Ebensburg, PA

Greenwich No. 1

Allen M. Jones, Captain
Joseph B. Mantini
Roger A. Leamer
Paul A. Enedy
Joseph A. Weber
Raymond V. Letizia - Briefing Officer
Frederick J. Bender
Andrew Smilo

Greenwich No. 2

Thomas L. Gratton, Captain
Anthony J. Barczak
James Roman
William A. Garay
Kevin W. Fowler
Larry A. Wojno
George R. Bonneau
Raymond L. Noon - Briefing Officer

THE FLORENCE MINING COMPANY
Seward, PA

Team No. 1

Gary A. Buckles, Captain
Chris M. Yeager
Merle T. Baird
Barry L. Henderson
Gary L. Sowers
Paul E. Burd - Briefing Officer

Team No. 2

Dwight L. Hess, Captain
Albert Michalides
Marlin D. Betts
Kevin L. Hess
Edward J. Houser, Jr.
Larry J. Pelipesky
Marvin D. Lichtenfels - Briefing Officer
Jeffrey Stanchek

TUNNELTON MINING COMPANY
Tunnelton, PA

Gerald F. Shugars, Captain
Robert N. Condor
Ronald R. Lupyan
Andrew G. Pavlik, Jr.
James C. Gradwell
Edward J. Jones - Briefing Officer
Robert W. Dice

THE HELEN MINING COMPANY
Homer City, PA

Kenneth G. Smith, Captain
Frank W. Horrell
David H. Turner
John P. Dzimiera
Larry Braun, Jr.
Dale B. Montgomery
Lynn A. Harding - Briefing Officer

HELVETIA COAL COMPANY
Indiana, PA

Thomas F. Zack, Captain
James W. Buterbaugh
James R. Clendenen
John J. Rhoades
Richard J. Flack
Dennis E. Hellgren
Richard Radakovich - Briefing Officer

G. M. & W. COAL COMPANY
Jennerstown, PA

John Datko, Jr., Captain
Jerry C. Smith
Raymond M. Cunningham
Michael A. Ford
Keith E. Stanko
Joseph J. Darrigo
Michael L. Bittner
David L. Flick - Briefing Officer

THE NORTH AMERICAN COAL CORPORATION
Clarington, Ohio

Richard S. Rice, Captain
James E. Vogler
Jerry M. Taylor
Theodore W. Hunt
John J. Lysien
Charles R. Crumbaker - Briefing Officer

CONSOLIDATION COAL COMPANY
Meadowlands, PA

William Blackwell, Captain
John Bopp
Peter Wnek
Hobert Davis
Donald Wnek
Charles Pettit
William Schlaupitz - Briefing Officer

UNITED STATES DEPARTMENT OF LABOR
MSHA LABORATORIES - MOUNT HOPE, WEST VIRGINIA

APPENDIX G-2

TABLE____ - ANALYSES OF DUST SAMPLES COLLECTED July 12 and 13, 1983

MINE Homer City COMPANY The Helen Mining Company

COLLECTED BY Samuel J. Brunatti

CAN NUMBER	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	PERCENT INCOMBUSTIBLE
2A27	Ribs, Bottom	0 + 2110	X-Large	61
2A28	Ribs, Bottom	0 + 2190	X-Large	66.5
2A29	Ribs, Bottom	0 + 2270	X-Large	74.6
2A30	Band	0 + 2350	Large	60
2A31	Band	0 + 2430	X-Large	61.9
2A32	Band	0 + 2510	X-Large	42.5
2A33	Band	0 + 2590	X-Large	63.7
2A34	Band	0 + 2670	X-Large	71.5
2A35	Band	0 + 2750	X-Large	68.9
2A36	Band	0 + 2830	X-Large	38.7
2A37	Band	0 + 2910	X-Large	42.6
2A38	Band	0 + 2990	X-Large	44.2
2A39	Band	0 + 3070	X-Large	52.2
2A40	Band	0 + 3150	X-Large	54
2A41	Band	0 + 3230	X-Large	45.3
2A42	Bottom	0 + 3310	X-Large	62
		Survey stopped 32 feet from Face, No. 1 Entry		
		No. 2 Entry, Track		
2B1	Band	0 + 30	Trace	84
2B2	Band	0 + 110	Trace	74
2B3	Band	0 + 190	None	79
2B3X	Band	0 + 229	None	48
2B4	Band	0 + 270	None	73
2B5	Band	0 + 350	Trace	90
2B6	Band	0 + 430	None	77
2B6X	Band	0 + 465	None	55
2B7	Band	0 + 510	None	70
2B8	Band	0 + 590	None	74
2B9	Band	0 + 670	Trace	78
2B9X	Band	0 + 694	Trace	53
2B10	Band	0 + 750	Trace	63.6
2B11	Band	0 + 830	Trace	76

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		E Butt		
		No. 1 Entry, Belt		
2A1	Wet	0 + 30		
2A2	Band	0 + 110	None	73
2A3	Wet	0 + 190		
2A4	Wet	0 + 270		
2A5	Band	0 + 350	None	55
2A6	Band	0 + 430	None	61
2A7	Band	0 + 510	None	59.2
2A8	Band	0 + 590	None	70
2A9	Band	0 + 670	None	70
2A10	Band	0 + 750	Trace	60.2
2A11	Band	0 + 830	Trace	67
2A12	Sides, Bottom	0 + 910	Trace	70
2A13	Ribs, Bottom	0 + 990	Trace	62.5
2A14	Ribs, Bottom	0 + 1070	Trace	69
2A15	Ribs, Bottom	0 + 1150	Trace	72
2A16	Sides, Bottom	0 + 1230	Trace	78
2A17	Sides, Bottom	0 + 1310	Trace	71
2A18	Band	0 + 1390	Small	71
2A19	Sides, Bottom	0 + 1470	Small	56
2A20	Sides, Bottom	0 + 1550	Small	62.5
2A21	Sides, Bottom	0 + 1630	Small	69
2A22	Sides, Bottom	0 + 1710	Large	73.7
2A23	Sides, Bottom	0 + 1790	Small	84
2A24	Wet	0 + 1870		
2A25	Ribs, Bottom	0 + 1950	Large	73.1
2A26	Ribs, Bottom	0 + 2030	X-Large	58.5

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2B12	Band	0 + 910	Trace	75
2B12X	Band	0 + 940	Trace	51
2B13	Band	0 + 990	Trace	72
2B14	Band	0 + 1070	Small	62
2B15	Band	0 + 1150	Small	58.5
2B15X	Band	0 + 1190	Trace	54
2B16	Band	0 + 1230	Small	58
2B17	Band	0 + 1310	Trace	59
2B18	Band	0 + 1390	Small	59
2B18X	Band	0 + 1420	Small	53
2B19	Band	0 + 1470	Small	57
2B20	Band	0 + 1550	Small	54
2B21	Band	0 + 1630	Small	66
2B21X	Band	0 + 1660	X-Large	52.1
2B22	Band	0 + 1710	Large	56.7
2B23	Band	0 + 1790	Large	56
2B24	Band	0 + 1870	Large	50
2B24X	Band	0 + 1900	Small	57
2B25	Band	0 + 1950	Large	59.5
2B26	Band	0 + 2030	X-Large	58.5
2B27	Band	0 + 2110	X-Large	51.1
2B27X	Band	0 + 2140	X-Large	54
2B28	Band	0 + 2190	X-Large	51.7
2B29	Band	0 + 2270	X-Large	60.8
2B30	Band	0 + 2350	X-Large	51.8
2B30X	Band	0 + 2360	X-Large	42.2
2B31	Band	0 + 2430	X-Large	32.1
2B32	Band	0 + 2510	X-Large	39.7
2B33	Band	0 + 2590	X-Large	44.3
2B33X	Band	0 + 2614	X-Large	41.5
2B34	Band	0 + 2670	X-Large	40
2B35	Band	0 + 2750	X-Large	52.8
2B36	Band	0 + 2830	X-Large	37.7

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2B36X	Band	0 + 2870	X-Large	37.2
2B37	Band	0 + 2910	X-Large	44.4
2B38	Band	0 + 2990	X-Large	42.4
2B39	Band	0 + 3070	X-Large	47.8
2B39X	Band	0 + 3120	X-Large	51.3
2B40	Band	0 + 3150	X-Large	54.8
2B41	Band	0 + 3230	Small	44
2B42	Band	0 + 3310	X-Large	49.7
2B42X	Band	0 + 3335	X-Large	46.4
2B43	Band	0 + 3390	X-Large	40.1
		No. 3 Entry, Return		
2C1	Band	0 + 00	Trace	82
2C2	Band	0 + 80	None	98
2C3	Band	0 + 160	None	99
2C3X	Band	0 + 190	None	89
2C4	Band	0 + 240	None	99
2C5	Band	0 + 320	None	94
2C6	Band	0 + 400	None	94
2C6X	Band	0 + 430	None	83
2C7	Band	0 + 480	None	97
2C8	Band	0 + 560	None	95
2C9	Band	0 + 640	None	82
2C9X	Band	0 + 700	None	72.3
2C10	Band	0 + 720	None	88
2C11	Band	0 + 800	None	92
2C12	Band	0 + 880	None	83
2C12X	Band	0 + 940	None	73.4
2C13	Band	0 + 960	Trace	74.1
2C14	Band	0 + 1040	Trace	74.1
2C15	Band	0 + 1120	Trace	76.3
2C15X	Band	0 + 1190	Trace	74
2C16	Band	0 + 1200	Small	74

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MSHA LABORATORIES - MOUNT HOPE, WEST VIRGINIA

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CAN NUMBER	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	PERCENT INCOMBUSTIBLE
2C17	Band	0 + 1280	Small	82
2C18	Band	0 + 1360	Small	73.5
2C18X	Band	0 + 1420	Small	73.3
2C19	Band	0 + 1440	Small	75.4
2C20	Rib, Bottom	0 + 1520	Small	72
2C21	Rib, Bottom	0 + 1600	Small	73.1
2C21X	Rib, Bottom	0 + 1660	X-Large	52.1
2C22	Rib, Bottom	0 + 1680	Large	67.5
2C23	Rib, Bottom	0 + 1760	Large	64.2
2C24	Rib, Bottom	0 + 1840	Large	71.2
2C24X	Band	0 + 1900	X-Large	51.5
2C25	Rib, Bottom	0 + 1920	Small	74.6
2C26	Rib, Bottom	0 + 2000	Large	68.7
2C27	Band	0 + 2080	Large	74.3
2C27X	Band	0 + 2140	X-Large	56.9
2C28	Band	0 + 2160	Large	72.3
2C29	Band	0 + 2240	X-Large	61.4
2C30	Band	0 + 2320	Large	78.7
2C30X	Band	0 + 2380	X-Large	50.3
2C31	Band	0 + 2400	Large	86.3
2C32	Band	0 + 2480		NO SAMPLE REC.
2C33	Band	0 + 2560	Large	83.3
2C33X	Band	0 + 2620	Large	46
2C34	Band	0 + 2640	X-Large	55.9
2C35	Band	0 + 2720	X-Large	78.4
2C36	Band	0 + 2800	X-Large	71.3
2C36X	Band	0 + 2820	X-Large	54.5
2C37	Band	0 + 2880	X-Large	79.7
2C38	Band	0 + 2960	X-Large	74.7
2C39	Band	0 + 3040	X-Large	68.6
2C39X	Band	0 + 3080	X-Large	52.1
2C40	Band	0 + 3120	X-Large	88.1
2C41	Band	0 + 3200	X-Large	75.1

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MSHA LABORATORIES - MOUNT HOPE, WEST VIRGINIA

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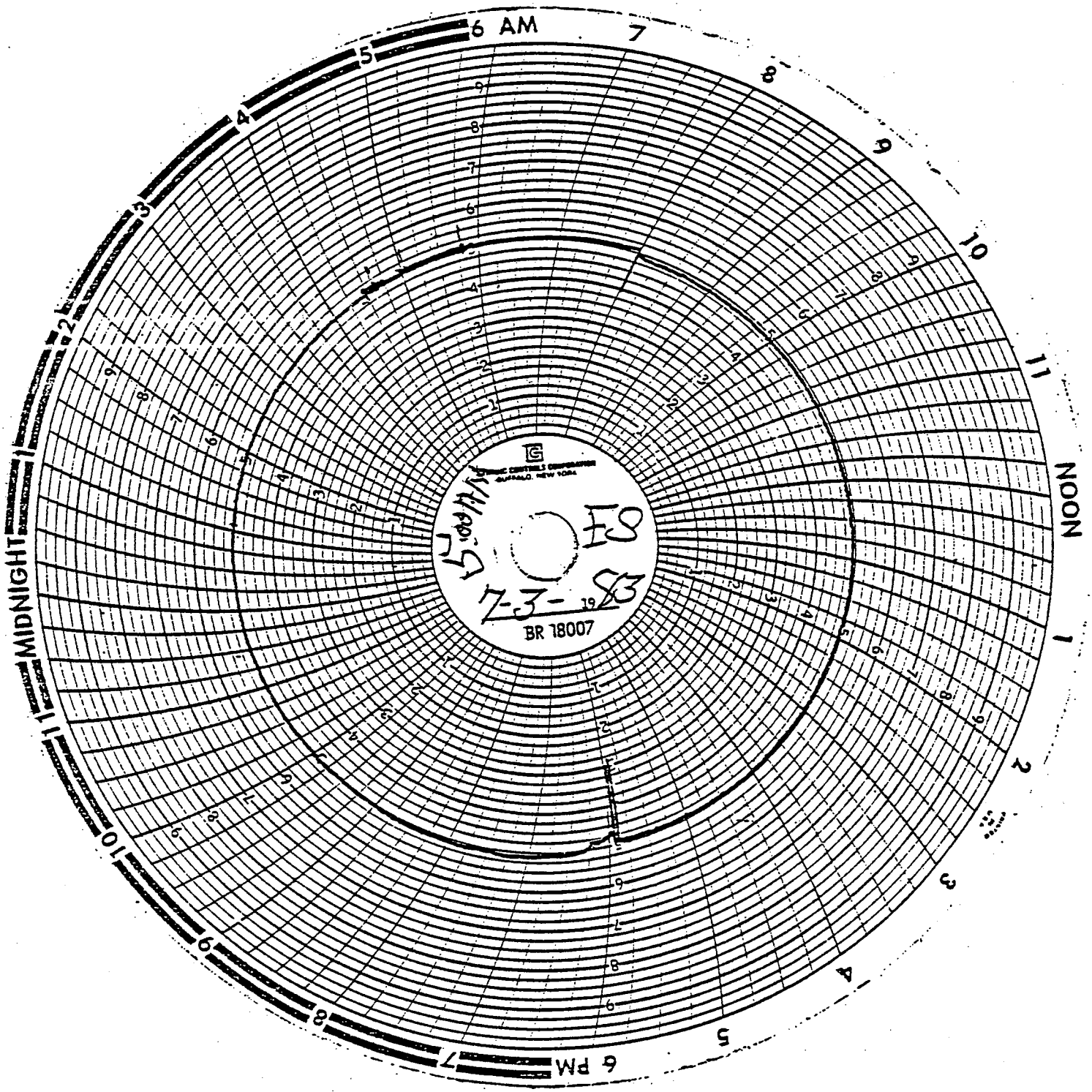
MINE Homer City COMPANY The Helen Mining Company

COLLECTED BY Samuel J. Brunatti

CAN NUMBER	SAMPLE OF DUST FROM	LOCATION IN MINE	ALCOHOL COKE TEST	PERCENT INCOMBUSTIBLE
2C42	Band	0 + 3280	X-Large	71.5
2C42X	Band	0 + 3320	X-Large	49
2C43	Band	0 + 3366	X-Large	67.4
		Survey stopped 9064 + 50 feet inby No. 3 Entry		

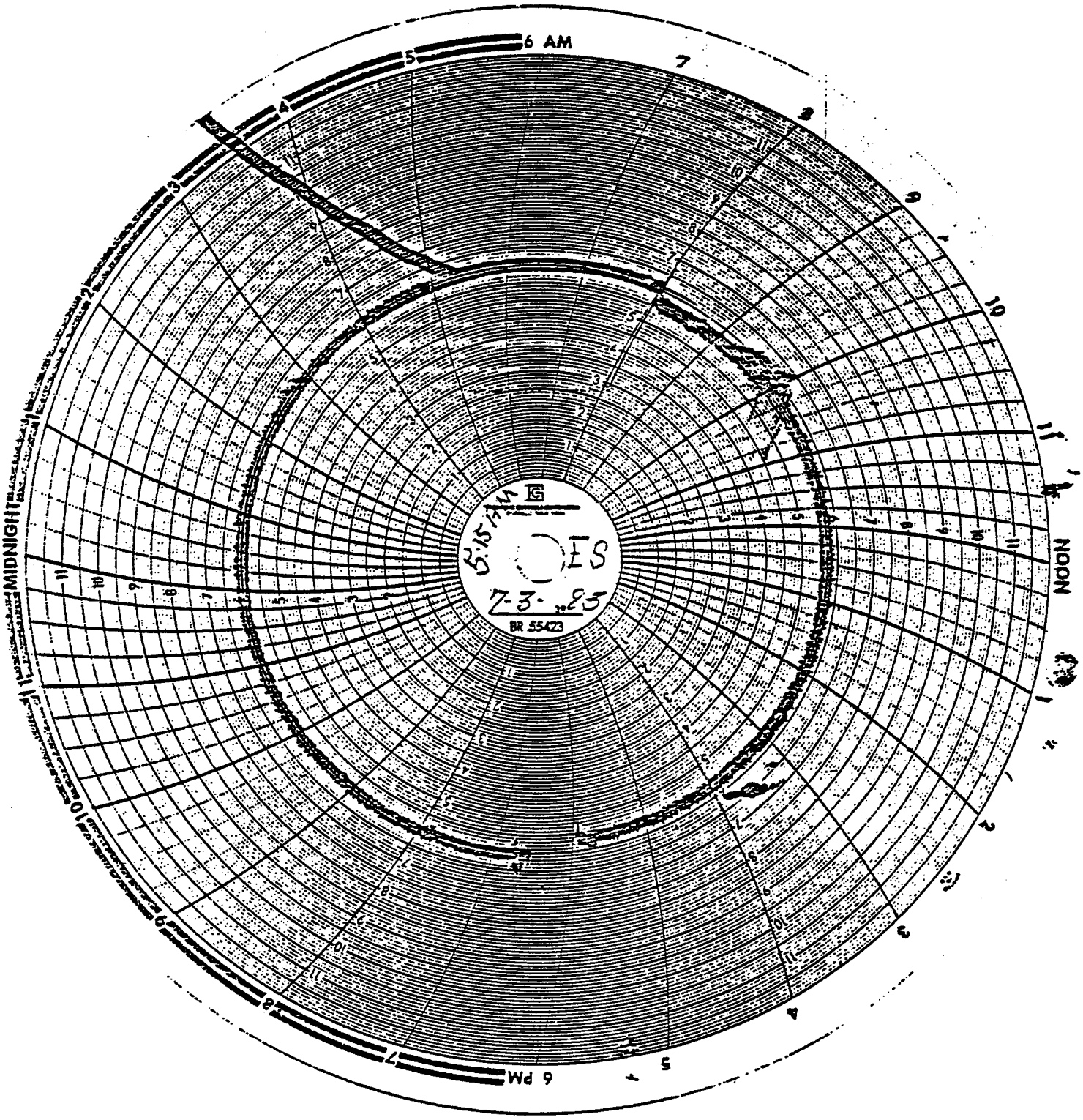
APPENDIX H



HOMER CITY MINE

NO. 1 FAN CHART

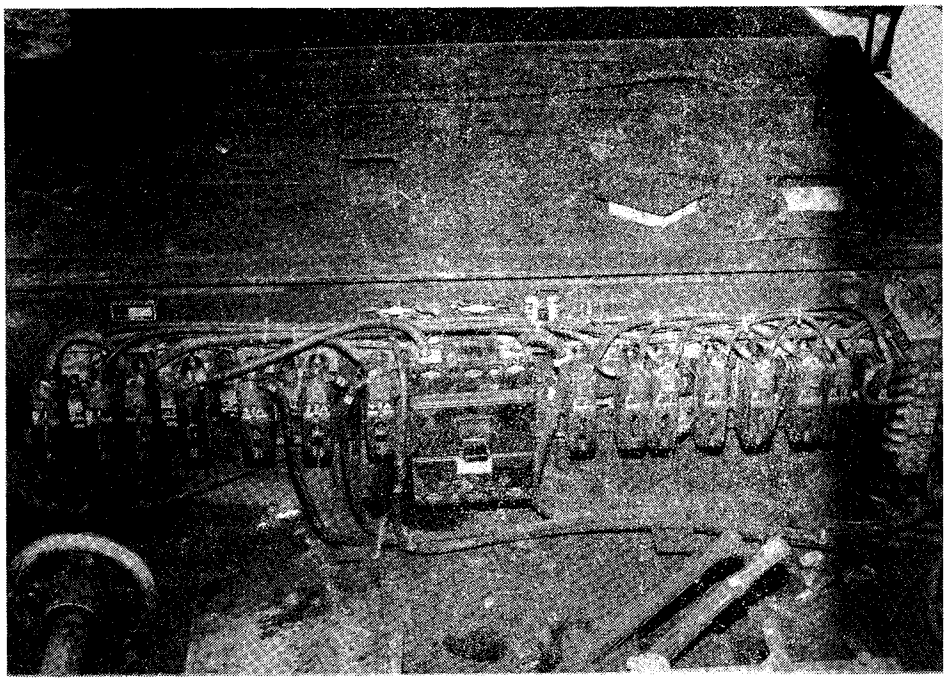
APPENDIX H



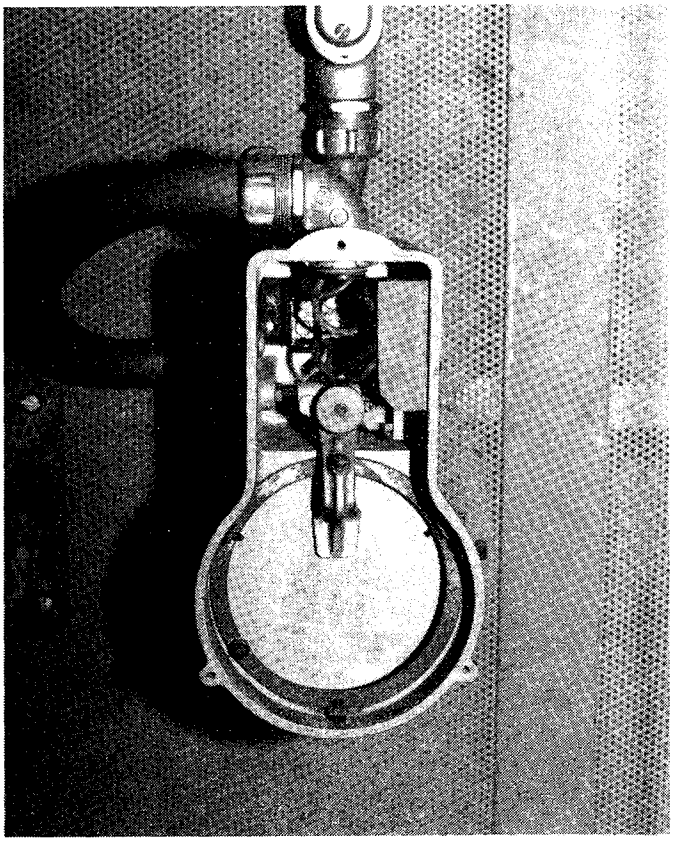
HOMER CITY MINE

NO. 2 FAN CHART

APPENDIX I

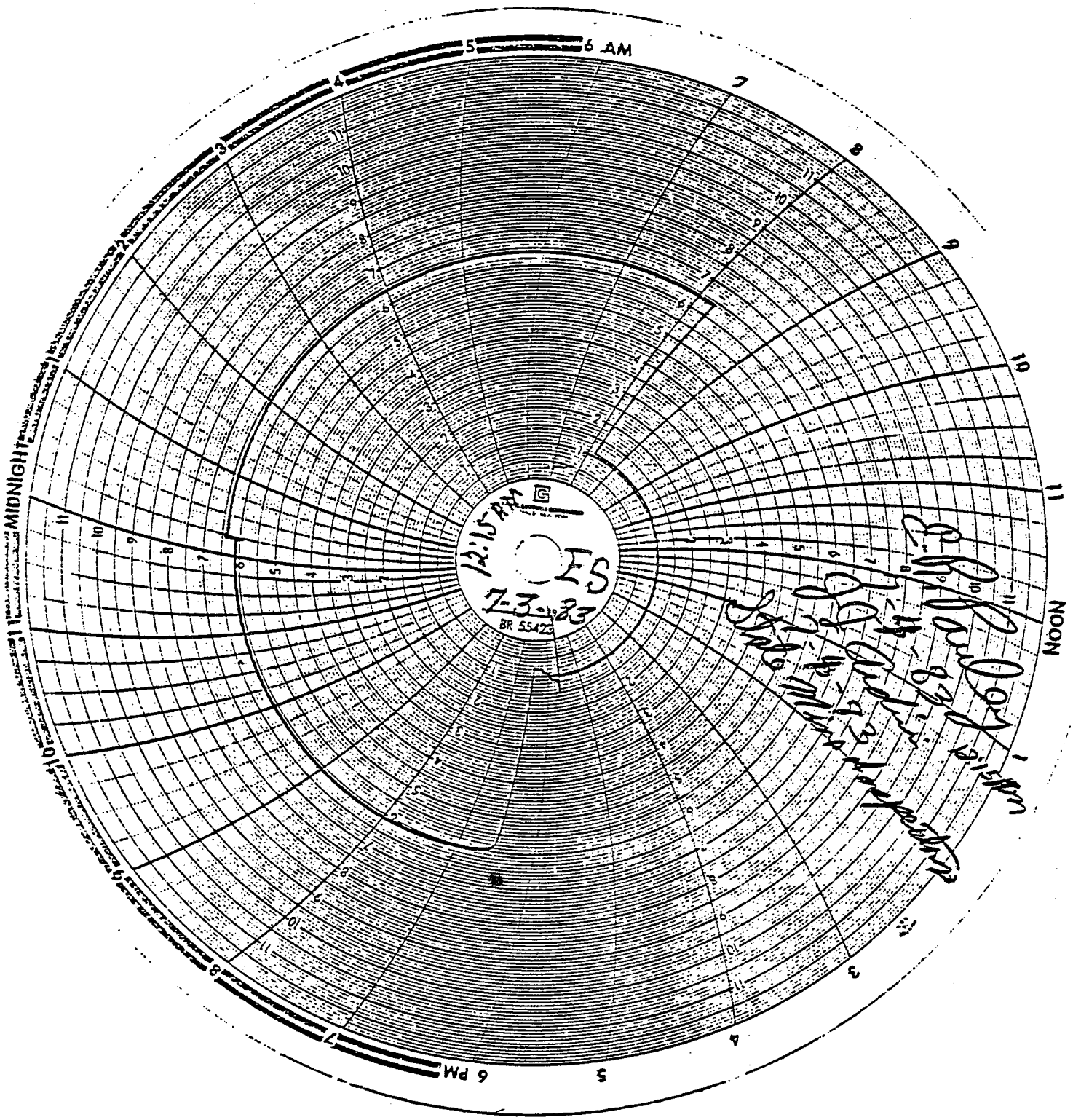


PHOTOGRAPH NO. 1 - Battery-powered contact compartment on personnel carrier inby 36L crosscut.



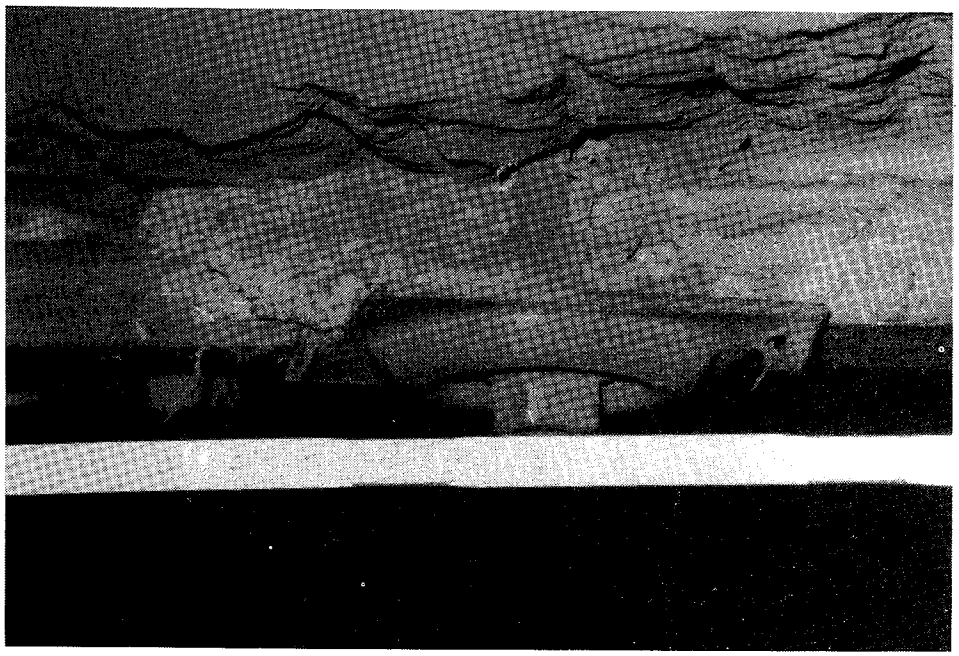
PHOTOGRAPH NO. 2 - Fan signal alarm switch.

APPENDIX H

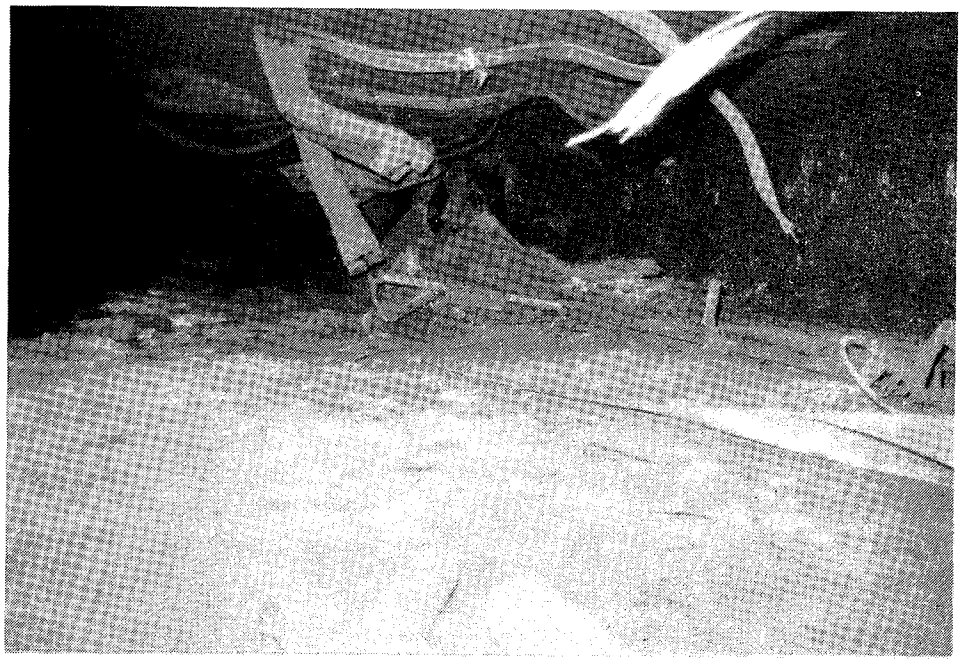


HOMER CITY MINE

NO. 3 FAN CHART



PHOTOGRAPH NO. 3 - Coke deposits in area of power distribution center in 40R crosscut.



PHOTOGRAPH NO. 4 - No. 1 belt entry outby 32L crosscut.

APPENDIX J

U. S. Department of Labor

Mine Safety and Health Administration
Industrial Park Boulevard
RR 1, Box 201B
Triadelphia, West Virginia 26059

November 9, 1983

MEMORANDUM FOR: DONALD W. HUNTLEY
District Manager, Coal Mine Safety and Health
District 2

THROUGH: ROBERT W. DALZELL
Chief, Approval and Certification Center

ROBERT E. MARSHALL
Chief, Division of Electrical Safety

FROM: KENNETH A. SPROUL
Chief, Intrinsic Safety and Instrumentation Branch

SUBJECT: Report of Investigation on Equipment from the Homer City Mine Explosion

Enclosed is a copy of the final report on the investigation of equipment recovered from a recent mine explosion at Helen Mining Company's Homer City Mine. A permanent record of that investigation has been filed at the Approval and Certification Center under Investigation No. X-162. If you need more information or clarification, you may contact Mr. Robert A. Bradburn (FTS 923-1039), the investigator assigned to the project.

Final Report
By: RABradburn
RAWolf
Date:

APPENDIX J

Special Investigation X-162

Evaluation of Equipment Recovered from Homer City Mine, Helen Mining Company, Indiana County, Pennsylvania.

Summary and Findings:

Three items of mine equipment recovered from the area of an explosion that took place in the Homer City Mine (Indiana County, PA) on July 3, 1983 were investigated at the Approval and Certification Center. One item, a mine paging telephone, was delivered in several pieces. The investigation included preliminary and detailed inspections of each item, comparison with MSHA approval records to determine the permissibility of the equipment, performance tests, and circuit evaluations and ignition tests to determine if the equipment was capable of causing an ignition of an explosive methane gas atmosphere.

Based on the inspections, evaluations, and tests performed, the findings of this investigation are summarized as follows:

1. No source of ignition of explosive methane gas could be found in any of the evaluated equipment.

2. Two of the items of equipment, a mine cap lamp and a flame safety lamp, were positively identified as being MSHA-approved units.

3. The third item of equipment, a mine paging telephone in several separated pieces, had no readable labels but was presumed to have been approved based on the similarity of its parts to those specified for an approved unit. There were, however, a few discrepancies in the circuitry of the evaluated phone when compared with the electrical drawings applicable to the approved unit. The discrepancies were minor and did not affect the operation or safety of the phone.

4. The lens in the cap lamp headpiece had been cracked, had an approximate one square inch triangular section of glass missing, and was loose in the lens holder. However, as a result of the glass being broken, the bulb ejection mechanism was effective in pushing the bulb from its socket and, thus, disconnecting it from the battery. This condition negated the possibility of the bulb being a source of a thermal ignition.

5. Except for the broken lens, the cap lamp was in permissible condition with only normal dents and surface abrasions.

6. The flame safety lamp could be lit without readjusting the wick but only after filling the font with fuel.

7. The height of the flame in the flame safety lamp was abnormally high but reduced to a more normal level after cleaning the air holes in the lower gauze ring.

8. The height of the flame in the flame safety lamp progressively increased when the lamp was exposed to one and two percent methane-in-air but the flame was extinguished when the methane concentration was three percent or higher.

(Note: This determination was obtained before the air holes in the lower gauze ring were cleaned and the initial flames height was abnormally high.)

9. When lit, the flame safety lamp responded to oxygen-deficient air by lowering its flame height for decreasing oxygen contents from normal air to about 16.9 percent oxygen at which level the flame was extinguished.

10. The flame safety lamp was in permissible condition with only normal dents and surface abrasions.

11. The mine paging telephone had been totally destroyed having been delivered to the Approval and Certification Center in ten major separate pieces and several miscellaneous small parts.

12. The appearance of the enclosure pieces of the page phone, having been pushed inward, and the absence of any charring or burning in the interior areas indicated that the damage to the phone resulted from exterior forces rather than from an internal explosion.

13. All of the evaluated equipment was extremely dirty and dust covered.

Introduction:

On July 27, 1983, three items of equipment were received at the Approval and Certification Center, Triadelphia, West Virginia. The equipment had been recovered from a recent mine explosion and was delivered by Mr. Joseph S. Torterea, Mining Engineer for MSHA, Coal Mine Safety and Health, District 2, Pittsburgh, Pennsylvania for the purpose of evaluation by A&CC technical personnel. The objective of the evaluation was to determine if any of the delivered items may have been the cause of, or related to, the mine explosion that had taken place at the Homer City Mine as the result of, allegedly, the accumulation of explosive methane gas.

The personnel assigned to this investigation were:

Robert A. Bradburn, Electrical Engineer - Chief Investigator
Robert A. Wolf, Physicist
Edward Vensko, Electrical Engineering Technician

On July 27, 1983, Robert A. Bradburn was assigned the responsibility of conducting the investigation by Mr. Kenneth A. Sproul, Chief of the Intrinsic Safety and Instrumentation Branch, and took custody of the equipment.

A complete record of this investigation is recorded in a permanent record book and filed at the Approval and Certification Center under Investigation No. X-162.

Equipment Evaluated:

The equipment that was evaluated is tabulated on the following page which also includes the results of preliminary visual inspections. Detailed photographs showing the condition of each item of equipment when received are included in the back of this report.

Investigation No. X-162
Equipment Recovered from Homer City Mine Explosion
Preliminary Examination

(1) Exhibit No.	Type Equipment	(3) Tag No.	(2) Recovered From	(3) Approval No.	Mfgr.	Ser. No.	Physical Condition	Remarks
P-12	Cap Lamp	None	Sylvester L. Mitsko (info on evidence identification sheet)	6D-37	MSA	None Visible	Battery Good-Lens in head piece broken	Light does not turn on. Low electrolyte. Dust layer over most external surfaces. Strips of adhesive tape stuck on top of battery cover.
P-14	Flame Safety Lamp	L. Mitsko (no number)	(apparently) L. Mitsko	"MSHA" Visible Appr. No. (if any) obscured by dirt.	Kohler	None Visible	Good	Dirt and/or dust covers most external surfaces.
P-15	Mine Page Phone	None	-	No visible approval plate.	Appears to be similar to MSHA-owned Femco Phone P/N741301 /401, Ser. No. 647009 (Appr. No. 9B-34). No visible label.	None Visible	Destroyed	In 10 separate pieces.

NOTES: 1. Exhibit No. assigned by CMS&H.
2. From information on evidence identification sheets.
3. Identification markings read before cleaning the instruments.

Evaluation Procedures:

The equipment was evaluated according to the following procedures:

1. The equipment was received, logged in, signed for on custody forms, and secured in a locked cabinet.

2. A preliminary visual inspection was performed on each item of equipment without cleaning or disturbing the equipment.

a. The manufacturer's label data, if any, was recorded when legible.

b. The MSHA approval number, if any, was recorded when legible.

c. The serial number, if any, was recorded when legible.

d. The equipment tag number, if any, was recorded when legible.

e. The name of the individual, from whom the equipment was recovered, was recorded. (This information was furnished by CMS&H).

f. The apparent condition of the equipment was noted and recorded as observed by a visual inspection.

3. Detailed photographs of each item of equipment was taken by Mr. Regis Hollinger and Mr. Frank Stetter, both of Boeing Services, Inc., U.S. Government contractor.

4. A detailed visual examination was performed on each item of equipment and all notable defects and other observations were recorded.

5. Performance tests, when deemed appropriate, were performed on the individual items of equipment.

6. Intrinsic safety tests and evaluations were performed on each item of equipment as follows:

a. Spark ignition tests were performed, using the MSHA spark test apparatus, at each point in the circuits where a short circuit or a circuit interruption had any likelihood of occurring. The most ignitable mixture of methane gas and air was used in the test chamber. Some ignition tests were not deemed necessary based on measured voltage and current levels.

b. The equipment was examined under operating conditions to determine any thermal ignition potential.

c. The flame safety lamp (Exhibit No. P-14) was operated within a chamber containing explosive methane/air concentrations to determine its ignition capability.

7. Each item of approved equipment was examined closely to determine if it conformed with the applicable approval drawings and specifications.

8. A formal (typed) final report was completed and copies thereof submitted to appropriate MSHA officials.

Results of Preliminary Inspections:

Before cleaning or disturbing any of the equipment, a preliminary visual inspection of each item was conducted.

1. Cap lamp (Exhibit No. P-12).

   a. Legible identifying markings:
   MSA Approval No. 6D-37

   b. Apparent condition of the battery was good.

   c. The lens in the headpiece was cracked and broken.

   d. The light could not be turned on.

   e. The electrolyte level was low.

   f. There was a layer of dust over most external surfaces.

   g. There were strips of adhesive tape stuck to the top of the battery cover.

2. Flame Safety Lamp (Exhibit No. P-14).

   a. Legible identifying markings:
   KOHLER MSHA L. METSKO

   b. The apparent condition was good.

   c. Most external surfaces covered with dirt and dust.

3. Mine Page Phone (Exhibit No. P-15).

   a. There were no legible identifying markings.

   b. The unit was totally destroyed being delivered in what appeared to be 10 separate major pieces in addition to other separated miscellaneous parts.

   c. Heavy accumulation of apparent coal dust in main enclosure. Most surfaces were covered with dirt and dust.

Results of Detailed Inspections:

A detailed inspection was conducted of each item of equipment. All observable discrepancies, defects, and noteworthy features were noted. The results of these inspections are as follows:

1. Cap Lamp (Exhibit No. P-12).

   a. The lamp and battery assembly were removed from the plastic bag. Both units were covered completely with a thick layer of coal dust or soot that nearly obliterated all markings.

   b. The lens of the headpiece had several cracks and a piece of glass (about 1 sq. inch) was missing. Black soot or coal dust covered the inside of the headpiece including the reflector.

   c. Because of the broken lens, the lamp bulb was pushed from its socket due to the spring action in the ejection mechanism. It, therefore, did not make electrical contact in the socket and would not light when the switch was turned on.

   d. By manually pushing against the broken lens and causing the bulb to make electrical contact in the socket, the bulb lit and glowed brightly with the switch in its original position.

   e. The top cover of the battery was removed and a fine layer of dust covered most of the terminals, wires, and thermal circuit protector. Otherwise, everything was intact and not excessively dirty.

   f. The battery voltage measured 4.15 volts on open circuit and 3.9 volts with the lamp lit. This indicates a fairly good state of charge.

   g. The electrolyte level was low and the battery was refilled to the full mark.

   h. After cleaning the battery, the following label data was apparent.

      "Permissible Electric Cap Lamp Approval No. 6D-37 MSHA";
      "Canada Certified Electric Cap Lamp No. 931 Coal Mines";
      "Issued to Mine Safety Appliances Co."

2. Flame Safety Lamp (Exhibit No. P-14).

   a. The unit was intact with a slight dent on the top cap. There was no other visible damage other than that attributable to normal dents and scratches.

   b. The entire lamp was covered with a heavy layer of coal dust or soot.

c. After cleaning the unit, the following identifying markings were apparent on the top cover:

"MSHA Permissible Flame Safety Lamp
Approval No. 209
Issued to the Koehler Mfg. Co.
Marlboro, Mass. USA"

d. Initially, the lamp could not be lit but the striker worked effectively.

e. Disassembled the lamp and observed that the magnetic lock was in working order.

f. There was some dust accumulation inside the lamp.

g. The position of the wick was observed to be 1/16" below the top of the wick holder.

h. It was observed that the lamp had been assembled properly and there were no missing parts or internal damage.

i. There was no odor of fuel when the font cap was removed indicating that the lamp was out of fuel.

j. After refilling the font with fuel, the lamp was lit successfully after sitting for about 15 minutes. No adjustment of the wick was made.

k. The lamp glass was marked "MONEX" which is an alternate material specified in the approval documents.

l. With the wick in its original position, the flame height was 1-1/4" to 1-1/2", which is higher than what it normally would be adjusted to.

3. Mine Page Phone (Exhibit No. P-15).

a. The phone, as delivered, included the following separated pieces:

(i) Main enclosure with circuit board but with the front and top covers detached.

(ii) Handset half with microphone and cord detached from main unit (Note: Initially, it was believed that one wire in the handset cord was connected to a terminal inside the enclosure).

(iii) Other handset half with both earphone and earphone cap detached.

(iv) Detached handset earphone element.

(v) One insulated battery separator.

(vi) Two 12 volt, Eveready No. 732, NEDA 926 lantern batteries -- the type used in approved page phones.

(vii) One loud speaker with a single wire extending out of it and with the end bell (interior end) missing.

(viii) Detached front cover from main enclosure.

(ix) Detached top cover with handset bracket.

(x) One five inch (approx.) section of wire (approx. #18) with red insulation and with a resistor soldered to one end. It is deduced that this is one of two positive battery leads.

(xi) Several miscellaneous small pieces such as switch contact elements.

b. Removed 145 grams of loose coal dust from the two battery shelves. It was approximated that the dust would cover the shelves evenly with a 3/8 inch layer.

c. Foreign matter within the main enclosure included an approximate 1 inch triangular piece of slate and several smaller pieces of solid coal.

d. Most surfaces were covered with a layer of coal dust or soot.

e. The only readable marking, other than that on the batteries and some electrical components, was a 1 inch diameter yellow sticker with the word "BELIEVE" which could be read only after rubbing off the layer of dirt. It was surmised that this was a religious symbol placed on the phone by a worker

f. It was determined that the exhibit unit had been of a type similar to an MSHA-owned phone, FEMCO P/N 741301, which had MSHA Approval 9B-34. Further inspection and comparison with approval drawings made it reasonably certain that the exhibit phone was that type and thus, had been a permissible unit with that approval number.

g. In comparing the electrical circuit with the schematic diagram for the FEMCO P/N 741301-402 mine page phone, Approval 9B-34, it was determined that the circuit board was substantially the same as that shown on the diagram with but one non-critical resistor missing from the board.

h. The wire connector (female) on the wire harness connected to the printed circuit board was missing.

i. The page switch which was badly damaged had nine wires in a bundle connected to it. This agrees with the wiring diagram for the approved phone (9B-34) but the terminal connections do not agree.

j. The main enclosure was greatly distorted. It was pushed inward greatly at the bottom and top on the right side. To a lesser extent, the left side was pushed outward at the top.

k. The phone line terminals were intact and installed at the bottom of the enclosure but there were no wires connected to the terminals inside the unit. This was probably so in order to meet Pennsylvania requirements which prohibit exposed live telephone terminals.

l. The front cover of the enclosure had a prominent inward impression.

m. The internal circuits did not have the appearance of being burned or as having been exposed to flames for a prolonged period of time.

n. The multi-terminal strip on the inside back panel of the main enclosure was broken with but one terminal with two connected wires remaining.

o. One of the two cover clamps on the main enclosure was broken and inoperative. The other one was missing.

p. Voltage/current/resistance measurements were made with the following results:

No. 1 battery voltage -- 0.178V
No. 1 battery short circuit current -- 6 microamperes
No. 2 battery voltage -- 0.22V
No. 2 battery short circuit current -- 0.31 milliampere

(The above measurements indicate almost total depletion of charge.)

The resistor in what was assumed to be a battery lead measured 2.25 ohm and had the color band marking of a 2.2 ohm resistor which is that specified in Approval 9B-34.

Comparison with Approval Drawings:

Each exhibit item was compared with the applicable approval drawings on file at the Approval and Certification Center with the following results:

1. Cap Lamp (Exhibit No. P-12). No discrepancies.

2. Flame Safety Lamp (Exhibit No. P-14). No discrepancies.

3. Mine Page Phone (Exhibit No. P-15).

There was sufficient similarity between the remains of the exhibit phone and the approval drawings pertaining to FEMCO P/N 741301/402 mine page phone, to establish that it most likely had been an approved unit and bore Approval 9B-34. The approval label had apparently been destroyed in the explosion. Several minor discrepancies, however, in the circuit were in evidence as follows:

a. One non-critical resistor, specified on the drawing, was missing from the circuit board.

b. The terminal connections on the paging switch did not agree with that shown on the approved wiring diagram.

The above discrepancies were such as to not effect the safety or proper operation of the phone. The wiring changes consisted of using spare contacts on the switch.

Discussion of Inspection Results:

Based on the inspections and drawing comparisons, it was determined that the cap lamp and flame safety lamp are MSHA-approved units. Also, because of the similarity between the parts used in the mine page phone and those specified in the documents applicable to Approval 9B-34, it was evident that the phone had that approval. The approval label, apparently, had been destroyed in the explosion.

In the cap lamp, the effectiveness of the bulb ejection mechanism was demonstrated by the bulb being pushed out of the socket and disconnected from the terminals as a result of the lens breaking. Since the bulb was intact, there were no exposed hot filaments and, therefore, the bulb could not have been a thermal ignition source.

The flame safety lamp was in permissible condition.

The discrepancies, other than those attributable to damage, uncovered in the electrical circuitry of the page phone were minor and not of a nature that would adversely affect intrinsic safety. No energy limiting component was found to have been substituted or bypassed. The sunken-in appearance of the enclosure members and the absence of any charring or burn indications in the interior areas all substantiate a high probability that the damage to the phone resulted from exterior forces rather than from an explosion originating within the phone enclosure.

Performance Tests:

Performance tests were conducted of the flame safety lamp to determine its capability to detect the presence of methane gas. In addition, the flame safety lamp was tested to determine its response when exposed to oxygen deficient air. The procedures and test results follow:

1. Tests to determine methane detection capability. The tests were performed with the flame safety lamp mounted in a 5"D x 13" lucite chamber. Methane/air samples were introduced into the chamber at various methane percentages, up to the 8.3 percent explosive level, and the flame height was noted. The test gases were produced using a Mathiesen Dyna-Blender gas mixing apparatus and the percent methane was verified with an MSA LIRA infrared gas analyzer.

A continuous gas flow system was used. At the end of the test, the explosiveness of the 8.3 percent mixture was verified by removing the lamp glass and observing that the bare flame caused the mixture to ignite. The test data and test arrangement are recorded on test sheet No. 1.

TEST RESULTS - Flame safety lamp responds to increasing methane concentrations by increasing its flame height for concentrations up to about 3% methane-in-air at which the flame is extinguished. (After this test, it was observed that cleaning the air holes in the lower gauze ring resulted in the flame height reducing to a more suitable level.)

Exposure of the lighted lamp to explosive methane/air concentrations resulted in the flame being extinguished without igniting the explosive concentration.

2. Tests of flame safety lamp in oxygen deficient atmospheres.

The tests were performed using the same chamber as that used for the methane detection tests. The oxygen deficient air was produced by mixing pure air with pure nitrogen gas using a Mathiesen Dyna-Blender gas mixing apparatus. The oxygen deficient air samples were introduced into the test chamber, by continuous flow, and the height of the flame was noted for each of several oxygen levels. The oxygen percentage was monitored using a National Mine Service type MX240 02 meter placed inside the chamber. The flow rate was adjusted to approximately 5.0 liters per minute. The oxygen percentage in the gas mixture was reduced in steps to where the flame just went out. The test arrangement and test data are recorded on test sheet No. 2.

TEST RESULTS - The flame height reduces in approximate proportion for reductions in oxygen percentage from 21 (normal air) to 17.9 percent oxygen. Reducing the oxygen concentration to 16.9 percent results in the flame being extinguished.

Ignition Tests and Evaluations:

1. Electric Cap Lamp (Exhibit No. P-12).

a. Spark ignition tests.

Spark ignition tests were performed to determine if sparking due to repetitive short circuits across the battery terminals could produce an ignition of explosive methane gas. The MSHA spark test apparatus was used with a cadmium disc and No. 24 AWG copper electrode wires. The spark tester was rotated for a total of 400 cycles which produces more than 1000 repetitive short circuits. The test gas concentration was adjusted to 8.3 percent methane-in-air, the most ignitable mixture.

The cap lamp battery was completely charged initially and after each 100 rotations of the spark tester. Since this test represented a more severe condition of sparking than what realistically could occur in the cap lamp, no other spark tests were deemed necessary. A circuit protector, integral to the cap lamp battery, was not bypassed during the tests.

The test arrangement and test data are recorded on test sheet No. 3.

RESULTS - No Ignition.

b. Thermal ignition tests.

(i) Thermal overcurrent protective device. Refer to test sheet 3.

The maximum temperature of this device during the spark tests was determined to be 40 C. With the lamp on continuously for 5 minutes, the maximum temperature was 27 C. These temperatures are well below the level that could present an ignition hazard.

(ii) Other considerations.

The lens had been broken and the bulb was ejected from the bulb socket. This precluded the possibility of an ignition due to exposure of the hot bulb filament. In addition, the bulb was unbroken and, therefore, isolated the filament from the atmosphere.

There were no exposed wires or other components that could have presented a thermal ignition hazard.

2. Flame Safety Lamp (Exhibit No. P-14).

In the methane detection tests, the lamp was exposed to explosive levels of methane gas. There were no ignitions in any of the tests. The tests do not indicate that the flame safety lamp was an ignition source for explosive methane gas. Refer to test sheet No. 1.

3. Mine Page Phone (Exhibit No. P-15).

a. Spark ignition tests.

Spark ignition tests were performed in the page phone circuit using the MSHA spark test apparatus. The tests produced sparking, within a chamber filled with the most ignitable concentration of methane-in-air, due to the normal opening and closing of switch contacts and also the shorting or interruption in the phone line wires. In some tests, a second similar-type page phone was activated on the page line circuit to account for the additional energy that a second phone would contribute.

In other than two of the most severe phone line tests involving the second page phone, the tests were conducted using fully charged bench batteries and a cadmium disc was used in the spark tester. For the two severe phone line tests, lantern batteries in new condition and of the specified type were used. A brass disc was used in one of the two phone line tests and a copper disc in the other test because the use of the more sensitive cadmium disc was considered unrealistically severe.

In some tests, a safety factor was introduced by using less resistance in the battery circuit than what is specified.

(i) Test sheet No. 4. Sparking due to the opening and closing of press-to-talk switch contacts in the handset.

TEST RESULTS - No Ignition.

(ii) Test sheet No. 5. Sparking due to the opening and closing of the paging switch contacts.

TEST RESULTS - No Ignition.

(iii) Test sheet No. 6. Spark ignition test - Sparking due to repetitive short circuit across phone line.

TEST RESULTS - No Ignition.

(iv) Test sheet No. 7. Sparking due to interruption in phone line wire with incoming page signal.

TEST RESULTS -No Ignition.

(v) Test sheet No. 8. Sparking due to short across phone line with combined page signals from two phones.

TEST RESULTS - No Ignition.

(vi) Test sheet No. 9. Sparking due to interruption in phone line wire with combined page signals from two phones.

TEST RESULTS - No Ignition.

(vii) Speaker circuit. The speaker coil was open circuited indicating a break in the coil. In addition, the page amplifier was defective and produced no output. Therefore, no meaningful test could be performed.

The DC impedance across the speaker terminals measured 8 megohms which indicates almost complete DC isolation. Since the speaker was of the specified type which had been thoroughly tested previously with no negative results, it is unlikely that it could have been a source of an incendive spark.

b. Thermal ignition considerations. There were no hot surfaces or components in the page phone circuit that could have resulted in a thermal ignition.

APPENDIX K

MINE Homer City Mine COMPANY The Helen Mining Company DATE ANALYZED 7/4, 7/5

ADDRESS Indiana, Pennsylvania REPORTED TO: Theodore W. Glusko

SAMPLE IDENTIFICATION	LOCATION IN MINE	PERCENT				AS LABELED		PPM			Ar(%)
		O_2	N_2	CO_2	CH_4	CO	H_2	Ethylene C_2H_4	Ethane C_2H_6	Acetylene C_2H_2	
	7/4/83 9:37P 32 X-Cut between #2 & #3 entry	6.25	67.48	4.56	13.88	4.14%	2.62%	1400	364	676	0.80
H 172	7/5/83 12:00P #2 entry inby 37 X-Cut	4.10	58.18	4.08	26.01	4.20%	2.47%	1460	402	681	0.69
H 173	7/5/83 #2 entry 37 X-Cut area	4.88	58.90	3.57	24.40	4.73%	2.57%	1410	390	700	0.70

APPENDIX L

Mine Citation/Order

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

Section I—Violation Data

1. Type of issuance (check one): Citation ☐ Order ☒ Safeguard ☐
2. Date: 07 03 83 (Mo. Da. Yr.)
3. Time (24 hr. clock): 1100
4. Citation/Order Number: 2111885
5. Served To: Clark McElhoes - Mine Foreman
6. Operator: The Helen Mining Company
7. Mine: Homer City Mine
8. Mine ID: 36-00926 (Contractor)
9. Type of Action: 103 - K -
10. Violation: A. Health ☐ Safety ☒ Other ☐ B. Section of Act C. Part/Section of Title 30 CFR
11a. Significant and Substantial (see reverse) ☐
11b. Written Notice ☐
12. Condition or Practice

An explosion had occurred in ~~the face area~~ of the "E" Butt 001 active working section of this mine. This order is being issued to insure the safety of the miners pending an investigation to determine the cause of the accident and a means to prevent a similar occurrence. This order permits the following persons to enter the mine for investigation and recovery purposes; State officials, company officials, respresentatives of the miners and M.S.H.A. officials.

13. Area or Equipment
The underground areas of the mine.

14. Initial Action: Citation ☐ Order ☐ Safeguard ☐ Written Notice ☐
15. Citation/Order Number
16. Dated (Mo. Da. Yr.)
17. Termination Due: A. Date (Da. Yr.) B. Time (24 hr. clock)
C. Signature: Michael Bondra
D. AR Number: 20248 ☐ See continuation form (MSHA Form 7000-3a)

Section II—Termination Action

18. Action to Terminate

19. Terminated: A. Date (Mo. Da. Yr.) B. Time (24 hr. clock) C. Signature D. AR Number

Section III—Inspector's Evaluation

20. Negligence (check one): A. None ☐ B. Low ☐ C. Moderate ☐ D. High ☐ E. Reckless Disregard ☐

21. Gravity
A. The occurrence of the event against which the cited standard is directed was: No Likelihood ☐ Unlikely ☐ Reasonably Likely ☐ Highly Likely ☐ Occurred ☐
B. The injury resulting from or contemplated by the occurrence of the event could reasonably be expected to be: No lost workdays ☐ Lost workdays or restricted duty ☐ Permanently Disabling ☐ Fatal ☐
C. Number of persons who would be affected if the event occurred or were to occur:

22. Good Faith
A. Failure to abate within the time period given ☐
B. Signature
C. AR Number

Section IV—Automated System Data

23. Type of Inspection (activity code): CAA
24. Event Number: 5082681
25. Primary or Mill

MSHA Form 7000-3, Apr 82, (revised)

I & B for RGN

Mine Citation/Order

U.S. Department of Labor APPENDIX L
Mine Safety and Health Administration

Section I—Violation Data

1. Type of issuance (check one) Citation ☐ Order ☒ Safeguard ☐
2. Date 07/04/83 (Mo./Da./Yr.)
3. Time (24 hr. clock) 0250
4. Citation/Order Number 2111886
5. Served To: Joseph Dunn - Belt Foreman
6. Operator: The Helen Mining Company
7. Mine: Homer City Mine
8. Mine ID: 36-00926 (Contractor)
9. Type of Action: 107-a
10. Violation: A. Health ☐ Safety ☒ Other ☐ B. Section of Act C. Part/Section of Title 30 CFR
11a. Significant and Substantial (see reverse) ☐
11b. Written Notice ☐
12. Condition or Practice

An underground mine explosion had occurred in the E Butt 001 section of this mine. This Order is issued to assure the safety of any persons in the mine until an examination is made to determine if the entire mine is safe.

13. Area or Equipment

The operator of this mine shall withdraw all persons from the mine except those referred to in Section 104(c) of the Federal Coal Mine Safety and Health Act of 1977

14. Initial Action: Citation ☐ Order ☐ Safeguard ☐ Written Notice ☐
15. Citation/Order Number
16. Dated (Mo./Da./Yr.)
17. Termination Due: A. Date (Da./Yr.) B. Time (24 hr. clock) C. Signature: Michael Bondra D. AR Number: 20248 ☐ See continuation form (MSHA Form 7000-3a)

Section II—Termination Action

18. Action to Terminate

19. Terminated: A. Date (Mo./Da./Yr.) B. Time (24 hr. clock) C. Signature D. AR Number

Section III—Inspector's Evaluation

20. Negligence (check one) A. None ☐ B. Low ☐ C. Moderate ☐ D. High ☐ E. Reckless Disregard ☐

21. Gravity

A. The occurrence of the event against which the cited standard is directed was: No Likelihood ☐ Unlikely ☐ Reasonably Likely ☐ Highly Likely ☐ Occurred ☐

B. The injury resulting from or contemplated by the occurrence of the event could reasonably be expected to be: No lost workdays ☐ Lost workdays or restricted duty ☐ Permanently Disabling ☐ Fatal ☐

C. Number of persons who would be affected if the event occurred or were to occur: ☐☐☐

22. Good Faith
A. Failure to abate within the time period given ☐
B. Signature
C. AR Number

Section IV—Automated System Data

23. Type of Inspection (activity code) CAA
24. Event Number 5082681
25. Primary or Mill

MSHA Form 7000-3, Apr 82, (revised)

NBFW RGN

Mine Citation/Order

U.S. Department of Labor APPENDIX L
Mine Safety and Health Administration

Section I—Violation Data

1. Type of issuance (check one): Citation ☒ Order ☐ Safeguard ☐
2. Date: 08 (Mo.) 03 (Da.) 83 (Yr.)
3. Time (24 hr. clock): 0845
4. Citation/Order Number: 2108674
5. Served To: Clark McElhoes - Mine foreman
6. Operator: The Helen Mining Company
7. Mine: Homer City Mine
8. Mine ID: 36-00926 (Contractor)
9. Type of Action: 104-3-
10. Violation: A. Health ☐ Safety ☒ Other ☐ B. Section of Act: C. Part/Section of Title 30 CFR: 75.301-
11a. Significant and Substantial (see reverse) ☒
11b. Written Notice ☐
12. Condition or Practice:

The volume and velocity of air ventilating E-Butt (001) working section off of Muddy Run Sub-Mains on July 3, 1983, was not sufficient enough to delute, render harmless, and to carry away flammable, explosive, and harmful gases which permitted methane a explosive gas to accumulate in this area. On July 3, 1983, at approximately 5:40 P.M., the methane accumulation was ignited causing an explosion which resulted in the death of one miner and property damage. This violation was determined during part of the investigation into the fatal explosion in E-Butt section. This citation was one of the factors that contributed to the issuance of Imminent Danger Order No. 2111886 dated July 3, 1983; therefore, no abatement time was set.

13. Area or Equipment:

14. Initial Action: Citation ☐ Order ☐ Safeguard ☐ Written Notice ☐
15. Citation/Order Number:
16. Dated: Mo. Da. Yr.
17. Termination Due: A. Date: Da. Yr. B. Time (24 hr. clock):
C. Signature: Theodore W. Sluzko
D. AR Number: 20218
☐ See continuation form (MSHA Form 7000-3a)

Section II—Termination Action

18. Action to Terminate:

The operator established ventilation in E-Butt (001) working section which was sufficient to delute, render harmless, and carry away flammable, explosive, and harmful gases in this area.

19. Terminated: A. Date: 08 (Mo.) 03 (Da.) 83 (Yr.) B. Time (24 hr. clock): 0850 C. Signature: Theodore W. Sluzko D. AR Number: 20218

Section III—Inspector's Evaluation

20. Negligence (check one): A. None ☐ B. Low ☐ C. Moderate ☒ D. High ☐ E. Reckless Disregard ☐
21. Gravity
A. The occurrence of the event against which the cited standard is directed was: No Likelihood ☐ Unlikely ☐ Reasonably Likely ☐ Highly Likely ☐ Occurred ☒
B. The injury resulting from or contemplated by the occurrence of the event could reasonably be expected to be: No lost workdays ☐ Lost workdays or restricted duty ☐ Permanently Disabling ☐ Fatal ☒
C. Number of persons who would be affected if the event occurred or were to occur: 001
22. Good Faith
A. Failure to abate within the time period given ☐
B. Signature: Theodore W. Sluzko
C. AR Number: 20218

Section IV—Automated System Data

23. Type of Inspection (activity code): CAA
24. Event Number: 5084860
25. Primary or Mill:

MSHA Form 7000-3, Apr 82, (revised)

Mine Citation/Order

U.S. Department of Labor APPENDIX L
Mine Safety and Health Administration

Section I—Violation Data

1. Type of issuance (check one): Citation [X] Order [ ] Safeguard [ ]
2. Date: 08 (Mo.) 03 (Da.) 83 (Yr.)
3. Time (24 hr. clock): 0850
4. Citation/Order Number: 2110144
5. Served To: Clark McElhoes - mine foreman
6. Operator: The Helen Mining Company
7. Mine: Homer City Mine
8. Mine ID: 36-00926 (Contractor)
9. Type of Action: 104-a-
10. Violation: A. Health Safety [X] Other [ ] B. Section of Act: C. Part/Section of Title 30 CFR: 75.314
11a. Significant and Substantial (see reverse) [X]
11b. Written Notice [ ]
12. Condition or Practice

On July 3, 1983, on the 4:00 P.M to 12 midnight shift, evidence revealed the person who was required to enter the idle Muddy Run Sub-Mains area in performance of his duties was not properly equipped with a means approved by the Secretary for detecting methane. The investigation revealed no evidence that the person making such an examination was equipped with a methane detector. The violation was determined during part of the July 3, 1983, fatal explosion in E-Butt section. The citation was one of the factors that contributed to the issuance of Imminent Danger Order No. 2111886 dated July 3, 1983; therefore, no abatement time was set.

13. Area or Equipment

14. Initial Action: Citation [ ] Order [ ] Safeguard [ ] Written Notice [ ]
15. Citation/Order Number:
16. Dated: Mo. Da. Yr.
17. Termination Due: A. Date: Da. Yr. B. Time (24 hr. clock):
C. Signature: Theodore W. Slusko
D. AR Number: 20218
[ ] See continuation form (MSHA Form 7000-3a)

Section II—Termination Action

18. Action to Terminate

19. Terminated: A. Date: Mo. Da. Yr. B. Time (24 hr. clock): C. Signature: D. AR Number:

Section III—Inspector's Evaluation

20. Negligence (check one): A. None [ ] B. Low [ ] C. Moderate [X] D. High [ ] E. Reckless Disregard [ ]

21. Gravity
A. The occurrence of the event against which the cited standard is directed was: No Likelihood [ ] Unlikely [ ] Reasonably Likely [ ] Highly Likely [ ] Occurred [X]
B. The injury resulting from or contemplated by the occurrence of the event could reasonably be expected to be: No lost workdays [ ] Lost workdays or restricted duty [ ] Permanently Disabling [ ] Fatal [X]
C. Number of persons who would be affected if the event occurred or were to occur: 001

22. Good Faith
A. Failure to abate within the time period given [ ]
B. Signature: Theodore W. Slusko
C. AR Number: 20218

Section IV—Automated System Data

23. Type of Inspection (activity code): CAA
24. Event Number: 5084860
25. Primary or Mill:

MSHA Form 7000-3, Apr 82, (revised)

Mine Citation/Order

U.S. Department of Labor APPENDIX L
Mine Safety and Health Administration

Section I—Violation Data

1. Type of issuance (check one): Citation ☒ Order ☐ Safeguard ☐
2. Date: 08 (Mo.) 03 (Da.) 83 (Yr.)
3. Time (24 hr. clock): 0900
4. Citation/Order Number: 2108665
5. Served To: Clark McElhaes - mine foreman
6. Operator: The Helen Mining Company
7. Mine: Homer City Mine
8. Mine ID: 36-00926 (Contractor)
9. Type of Action: 104-a-
10. Violation: A. Health ☐ Safety ☒ Other ☐ B. Section of Act: C. Part/Section of Title 30 CFR: 75.300
11a. Significant and Substantial (see reverse) ☒
11b. Written Notice ☐
12. Condition or Practice

On July 3, 1983, at approximately 8:05 A.M., the #3 mine ventilation fan stopped. The automatic signal device placed at #2 shaft portal which will be seen or heard by a responsible person did not give an alarm when the #3 mine ventilation fan stopped. This violation was determined during part of the investigation into the July 3, 1983 fatal explosion in E-Butt. The citation was one of the factors that contributed to the issuance of Imminent Danger Order No. 2111886 dated July 3, 1983; therefore, no abatement time was set.

13. Area or Equipment

14. Initial Action: Citation ☐ Order ☐ Safeguard ☐ Written Notice ☐
15. Citation/Order Number:
16. Dated: Mo. Da. Yr.
17. Termination Due: A. Date: Da. Yr. B. Time (24 hr. clock):
C. Signature: Theodore W. Slusko
D. AR Number: 20218 ☐ See continuation form (MSHA Form 7000-3a)

Section II—Termination Action

18. Action to Terminate

The automatic signal devices placed at #2 shaft portal which will be seen or heard by a responsible person did give an alarm when the #3 mine ventilation fan stopped.

19. Terminated: A. Date: 08 (Mo.) 03 (Da.) 83 (Yr.) B. Time (24 hr. clock): 0910
C. Signature: Theodore W. Slusko
D. AR Number: 20218

Section III—Inspector's Evaluation

20. Negligence (check one): A. None ☐ B. Low ☐ C. Moderate ☒ D. High ☐ E. Reckless Disregard ☐
21. Gravity
A. The occurrence of the event against which the cited standard is directed was: No Likelihood ☐ Unlikely ☐ Reasonably Likely ☐ Highly Likely ☐ Occurred ☒
B. The injury resulting from or contemplated by the occurrence of the event could reasonably be expected to be: No lost workdays ☐ Lost workdays or restricted duty ☐ Permanently Disabling ☐ Fatal ☒
C. Number of persons who would be affected if the event occurred or were to occur: 001
22. Good Faith
A. Failure to abate within the time period given ☐
B. Signature: Theodore W. Slusko
C. AR Number: 20218

Section IV—Automated System Data

23. Type of Inspection (activity code): CAA
24. Event Number: 5084860
25. Primary or Mill:

MSHA Form 7000-3, Apr 82, (revised)

Mine Citation/Order

U.S. Department of Labor APPENDIX L
Mine Safety and Health Administration

Section I—Violation Data

1. Type of issuance (check one): Citation ☒ Order ☐ Safeguard ☐
2. Date: 08 (Mo.) 03 (Da.) 83 (Yr.)
3. Time (24 hr. clock): 0920
4. Citation/Order Number: 2108666
5. Served To: Clark McElhoes - mine foreman
6. Operator: The Helen Mining Company
7. Mine: Homer City Mine
8. Mine ID: 36-00926 (Contractor)
9. Type of Action: 104-a-
10. Violation: A. Health ☐ Safety ☒ Other ☐ B. Section of Act: C. Part/Section of Title 30 CFR: 75.314-
11a. Significant and Substantial (see reverse) ☒
11b. Written Notice ☐
12. Condition or Practice

On July 3, 1983, on the 8:00 A.M. to 4:00 P.M shift, the two certified persons in performing their duties included making a fire examination (checking high-voltage cables) along the track haulage in idle Burrell mains, 1st South, 4th South, C, D and E Butt of Muddy Run Sub-Mains and Muddy Run Mains. Also, checking pumps in D-Butt. These areas shall be inspected for methane and for oxygen deficiency and other dangerous conditions. At approximately 8:05 A.M the #3 mine ventilation fan stopped which was the ventilation system for the above areas. With the #3 fan down a dangerous condition existed which was not observed by the two certified persons entering these areas. This violation was determined during part of the investigation into July 3, 1983, fatal explosion in E-Butt section.

13. Area of Equipment

14. Initial Action: Citation ☐ Order ☐ Safeguard ☐ Written Notice ☐
15. Citation/Order Number:
16. Dated: Mo. Da. Yr.
17. Termination Due: A. Date 08 08 83 (Mo. Da. Yr.) B. Time (24 hr. clock) 0800 C. Signature: Theodore W. Kluska D. AR Number 2021 8 ☐ See continuation form (MSHA Form 7000-3a)

Section II—Termination Action

18. Action to Terminate

19. Terminated: A. Date (Mo. Da. Yr.) B. Time (24 hr. clock) C. Signature D. AR Number

Section III—Inspector's Evaluation

20. Negligence (check one): A. None ☐ B. Low ☐ C. Moderate ☒ D. High ☐ E. Reckless Disregard ☐

21. Gravity
A. The occurrence of the event against which the cited standard is directed was: No Likelihood ☐ Unlikely ☐ Reasonably Likely ☒ Highly Likely ☐ Occurred ☐
B. The injury resulting from or contemplated by the occurrence of the event could reasonably be expected to be: No lost workdays ☐ Lost workdays or restricted duty ☐ Permanently Disabling ☐ Fatal ☒
C. Number of persons who would be affected if the event occurred or were to occur: 002

22. Good Faith
A. Failure to abate within the time period given ☐
B. Signature: Theodore W. Kluska
C. AR Number: 2021 8

Section IV—Automated System Data

23. Type of Inspection (activity code): CAA
24. Event Number: 5084860
25. Primary or Mill:

MSHA Form 7000-3, Apr 82, (revised)

RC

Data Sheet

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

SECTION A—VICTIM DATA

1. Name: Sylvester L. Mitsko 2. Sex M☒ F☐ 3. SSN: 164-34-6390

4. Age: 38 5. Job classification: Assistant Mine Foreman

6. Experience at this classification: 8 years 7. Total mining experience: 12 years 11 months

8. What activity was being performed at time of accident? Idle shift examination of the mine

9. Victim's experience at this activity: 8 years

10. Was victim trained in this task? Yes

11. Health and Safety courses/Training received **(related to accident)** — Date received

Ventilation, Methane Detection and Oxygen Deficiency 6/6/83

SECTION B—SUPERVISOR DATA (supervisor of victim)

12. Name: 13. Certified: Yes☐ No☐

14. Experience as supervisor: 15. Total mining experience:

16. Health and Safety courses/Training received **(related to accident)** Date received

17. When was the supervisor last present at accident scene prior to the accident?

18. What did he do when he was there?

19. When was he last in contact with the victim?

20. Did he issue instructions relative to the accident?

21. Was he aware of or did he express an awareness of any unsafe practice or condition?

Section I (Coal Only)

MSHA and/or State Certification and/or Qualification

Mine ID 36 00926

	Date Training Received		Date Training Received
Date Training Plan Approved 1/29/75			
* [X] Certified Person (Underground)	6/6/83	[X] Dust (Sampling)	10/80
		[ ] Dust (Calibration)	
* [ ] Certified Person (Surface)		[ ] Noise	
* [ ] Methane & Oxygen Deficiency Testing		* [ ] Impoundments	
		* [ ] Hoisting Engineer	
* [X] Electrical	11/03/82		
* [X] Energized Surface High Voltage	11/03/82		

* Annual Retraining Required

Section II (Metal-Non-metal and Coal)
MSHA Training Programs Completed

Date of Hire 7/24/70 Date Training Plan Approved 1/29/75

Required Training (Victim)	Date Training Received	[ ] Required Training (Victim)	Date Training Received
[ ] New Miner (U.B.)		[ ] Hazard Training (U.G.)	
[ ] New Miner (Sur.)		[ ] Hazard Training (Sur.)	
[ ] Newly Employed Experienced (U.G.)			
[ ] Newly Employed Experienced (Sur.)		Task Training Specify Type:	
[X] Annual Refresher (U.G.)	6/6/83		
[ ] Annual Refresher (Sur.)			

Section III

Company Training Program Completed:

Training	OJT/Formal	Instructor	Date Completed

Section IV

DID VICTIM HAVE TRAINING SPECIFICALLY RELATED TO THE TASK BEING PERFORMED AT THE TIME OF THE ACCIDENT?

[ ] YES [ ] NO WHEN?_____

BY WHOM? DNA HOW WAS TRAINING GIVEN?_____

Section V

RECOMMEND TRAINING PLAN EVALUATION BY EDUCATION & TRAINING OFFICE

[ ] YES [X] NO
