UNITED STATES

DEPARTMENT OF LABOR

MINE SAFETY AND HEALTH ADMINISTRATION

COAL MINE SAFETY AND HEALTH

REPORT OF INVESTIGATION

UNDERGROUND COAL MINE INUNDATION (WATER)

Porter Tunnel Mine - ID 36-01892
Kocher Coal Company
Tower City, Schuylkill County, Pennsylvania

March 1, 1977

By

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Authority

This report is based on an investigation conducted pursuant to Section 103 of the Federal Coal Mine Health and Safety Act of 1969 (the Act), (83 Stat. 742). The title page of this report refers to the enforcement Agency as the Mine Safety and Health Administration (MSHA), Department of Labor, which reflects the changes brought by the Federal Mine Safety and Health Amendments Act of 1977. The body of the report refers to the Mining Enforcement and Safety Administration (MESA), Department of the Interior, which was the enforcement Agency at the time of the accident.

Abstract

On Tuesday, March 1, 1977, at approximately 11:50 a.m., an inrush of water occurred in the West Skidmore South Dip conveyor gangway section of the Porter Tunnel Mine, Kocher Coal Company, causing the death of nine miners, injuries to three and entrapment of one who was eventually rescued. Six miners in the effected section escaped safely via the return air emergency escapeway leading to the surface. The miners working in other sections of the mine, 65 in all, traveled both the intake and return air escapeways leading to the surface.

The first of the nine bodies recovered was found in the main tunnel on March 1, 1977. The second body was located on March 2, 1977, at the No. 4 chute in the gangway. Ronald Adley, the entrapped miner, was confined in No. 17 slant breast from the time of the inrush until 8:05 a.m., Sunday, March 6, 1977, when a rescue hole driven from No. 15 breast was completed. Two miners who were working with Adley in the No. 17 slant breast at the time of the inundation did not survive. Their bodies were located and recovered shortly after Adley was rescued. The bodies of three other miners were recovered March 28, 1977, and the last two bodies were recovered on March 30, 1977. These last five bodies were found in debris above the face of the gangway. (See Appendix G, Figure 4, for location of victims.)

The inrushing water entered the mine through a breach in the mine floor at the low side rib in the gangway between No. 18 chute and the face of the gangway. The source of the water was abandoned mine workings adjacent to the West Skidmore South Dip conveyor gangway section of Porter Tunnel Mine. These abandoned workings reportedly were developed in the late 1930's and abandoned in the early 1940's and were never completely surveyed nor accurately shown on any mine maps. Some of these abandoned workings were in the Skidmore vein beneath the advancing West Skidmore South Dip conveyor gangway, and the water that had accumulated in the abandoned workings broke through the floor of the advancing gangway.

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

PART I

GENERAL INFORMATION

During the period from approximately 1928 through 1943, the area of land near the Porter Tunnel was mined for anthracite by bootleg operations. The term "bootlegger" generally has been used in this context to refer to an independent coal mining operation which had no legal right to extract coal from a particular tract of land, had no lease, and was not paying royalties. In approximately 1944, the Western Anthracite Company leased the land which now includes the Porter Tunnel Mine and adjacent property. Western Anthracite attempted to close down this land to bootleg operators, including the Bush Old Bootleg Slope Mine. Other bootleg operations in this immediate area were known as Miller Old Bootleg Slope Mine and Weaver Old Bootleg Slope Mine.

The Porter Tunnel Mine was owned and operated by the Reading Coal Company from approximately 1946 until 1953. The mine was closed due to economic reasons and remained inactive until 1968, at which time the Leon E. Kocher Coal Company obtained the Porter Tunnel Mine under a lease-purchase agreement. The land leased from Reading apparently included the three bootleg mines referred to above.

The Porter Tunnel Mine is located three miles east of Tower City, Schuylkill County, Pennsylvania, one-fourth mile south of Route 209. On June 5, 1975, the name of the operating company was changed from the Leon E. Kocher Coal Company to the Kocher Coal Company.

The titles, names and addresses of the operating officials were:

President	R. W. Rissinger	Box 127, Valley View, Pennsylvania 17983
Vice-President	Leon F. Richter	Box 127, Valley View, Pennsylvania 17983
Vice-President	Howard Hoffman	Box 127, Valley View, Pennsylvania 17983
Secretary	Baylor C. Custer	Box 127, Valley View, Pennsylvania 17983
Mine Foreman and Health and Safety Officer	Samuel Klinger	R. D. #1, Ashland, Pennsylvania 17921

A total of 145 miners were employed at the mine; 125 underground and 20 on the surface. The mine was operated two shifts a day, five days a week, and reportedly produced an average of 700 tons of anthracite daily. Reportedly, production during 1976 was 198,752 tons. The mine is opened by a rock tunnel, driven in a northerly direction through folded strata

into the Big Lick Mountain for a distance of about 4,300 feet, and by several other openings used for return airways and escapeways. The tunnel, as it penetrates the mountain, intersects nine minable coal veins dipping in northerly and southerly directions. They are first intersected on the north dip at inclinations varying between 70 and 90 degrees. They are intersected again on the south dip at inclinations, generally varying between the horizontal and 48 degrees. Mining was being conducted east of the main tunnel in the Primrose, Holmes and Top Split Mammoth veins and west of the main tunnel in the Skidmore and Middle Split Mammoth veins. These veins vary in thickness from 5 to 25 feet.

PART II

INUNDATION OF MARCH 1, 1977

Mine Conditions Immediately Prior to Inundation

Reportedly, the mine was operating normally on the day of the inundation. Nineteen miners were assigned to work in the West Skidmore South Dip conveyor gangway section off the main tunnel under the supervision of Palmer Merwine, section foreman. The miners were assigned to perform duties at the following locations: Harry D. Fishburn, Jr., and Gary Klinger were assigned to the mine car-loading station at the counter chute in the main tunnel, where coal from No. 1 chain conveyor discharges onto the counter chute; Bruce Smith was at the transfer point from No. 2 to No. 1 chain conveyor; Joseph Narcavage was assigned as a chain conveyor attendant along No. 1 conveyor; John Morgan and Ernest Morgan were assigned duties at chute Nos. 12 and 13 to regulate the flow of coal from the chutes into the chain conveyor; Philip Sabatino, Ronald Herb and Mark Kroh were gangway face workers whose duties were to advance the gangway; Dennis Morgan, John Moyer and Timothy Grose were monkey airway face workers whose duties were to advance the monkey airway; and, Ronald Adley, Ralph Renninger and Donald Shoffler were No. 17 slant breast face workers. The purpose of this slant breast was to make a connection from No. 17 to No. 15 breast. Albert Carl, Jan Kornaski and Leroy Manhart were pillar recovery miners assigned to recover Nos. 12 and 13 breast pillars. (See Appendix G, Figure 3, for locations of persons in the West Skidmore South Dip conveyor gangway section, immediately prior to the inundation of water.)

In addition to the miners in the West Skidmore South Dip conveyor gangway section, crews were working in the East Holmes North Dip and East Primrose South Dip off No. 20 tunnel and the East Top Split Mammoth South Dip, East Primrose North Dip and West Middle Split Mammoth North Dip off the main tunnel.

Witnesses' Accounts of Inundation

Bruce Smith was working in the vicinity of No. 12 chute. He stated that he felt a gush of air while he was sitting on the No. 2 chain conveyor motor at No. 12 chute in the gangway. He looked around and saw water coming out the gangway and saw the conveyor moving out. He ran up chute No. 11 and out the monkey airway to the return air escapeway, seeing no one along the way. When he reached the surface, he got a ride from the stripping foreman in his pickup truck to the mine office and told John Messaros, chief clerk, what happened.

Ernest Morgan was working in the vicinity of No. 13 chute. He stated that he and John Morgan had been performing their normal duties in the monkey airway at No. 12 chute until sometime just prior to the inundation. They had completed the work at No. 12 chute and were at No. 13. Suddenly, there was a gust of wind, and they knew something unusual was happening. Ernest Morgan looked toward the face of the airway and saw a wall of water

coming out. Both men started to run from No. 13 to No. 12 chute and scrambled up No. 12 breast, trying to stay ahead of the water. Ernest Morgan ingested mine water, causing him to be hospitalized.

Ronald Adley, who was entrapped until March 6, 1977, said that they had fired a "popper" (small explosive charge) in the top coal to blow down some overhang. He and the other two men working in No. 17 chute waited in the chute for quite awhile for the smoke to clear. After waiting, they started to go to the face of the slant (being driven from No. 17 to No. 15 breast), but smoke was still thick so they again decided to wait. Suddenly, Adley felt some wind coming from the monkey airway. It seemed at first to come in broken waves, but soon there was a terrific wind and then he saw the water rushing in from the monkey airway.

Adley shouted to Ralph Renninger and Donald Shoffler to jump to the high rib. He then jumped toward the high rib; however, he was caught in the inrushing water and was washed toward the face. He held his breath as long as possible and was able to survive until the water receded. During this period he lost his cap lamp and was unable to find it in the debris; however, he saw a light below which turned out to be the cap lamp of a co-worker. He took the light and obtained tools to help dig his way out to the monkey airway. Adley thought that he had reached the airway, but due to its being blocked, he could not find a way out. About this same time, coal from the high side rib in the slant started falling. Consequently, Adley returned to the face of the slant breast, knowing that he would have to wait to be rescued. (See Appendix G, Figure 4.)

When questioned, Adley could not remember if there had been any blasting done in the gangway or monkey airway prior to the inundation. He did not know where the gangway and monkey airway workers were when the inundation occurred, nor did he see or hear any of these miners after the inundation. Adley could not be positive as to the exact time of the inundation.

Escape Route of Miners

The following miners escaped from the flooded section through the designated return air escapeway to the surface: Bruce Smith, Harry D. Fishburn, Jr., Joseph Narcavage, James McHale, Jr., Ernest Morgan, John Morgan, Albert Carl, Jan Kornaski and Leroy Manhart. Ernest Morgan, John Morgan and Harry D. Fishburn, Jr., required assistance.

After the water had receded, the miners from the area of the West North Dip sections traveled to the surface through the main tunnel.

Some of the miners from the East North and South Dip sections off No. 20 tunnel traveled through the emergency escapeway in return air on the East South Dip, and others traveled out the main tunnel to the surface. Miners from the East Top Split Mammoth South Dip gangway off the main tunnel traveled through the return airway to the surface.

Activities of Supervisory Personnel When Inundation Occurred

The general mine foreman, Samuel Klinger, was attending a monthly mine rescue meeting at the office of Hegins Mining Company, located approximately 14 miles from the Porter Tunnel Mine. He was notified by telephone that something was wrong at the mine, and immediately returned to the mine property. Palmer Merwine, section foreman, was in the East Top Split Mammoth South Dip section. Earl Dunkel, section foreman, was in the No. 20 tunnel area.

John Messaros, chief clerk, received a call in the mine office at about 11:50 a.m. on March 1, 1977, from James McHale, Jr., motorman, who was working in the tunnel. McHale reported that there was a "break." Messaros then called into the mine and talked to Palmer Merwine. Earl Dunkel overheard the conversation between Merwine and Messaros and said that he would check the West Skidmore South Dip conveyor gangway section. Dunkel and Merwine contacted other miners by telephone and instructed them to leave the mine. Martin Donahue, motorman, broke in on the conversation and said he was preparing to come out with a trip, but found water and debris on the track and could not continue.

Samuel Klinger became aware that an inundation had occurred when Bruce Smith, a laborer from the effected section, escaped to the surface by way of the return air escapeway on the east side of the West Skidmore South Dip conveyor gangway section (return air escapeway). Smith caught a ride on a pickup truck driven by Howard Hoffman, stripping foreman, from there to the mine office, a distance of 5.5 miles.

At approximately 12:30 p.m., Samuel Klinger attempted to walk in the main tunnel, but could not do so because water flowing from the tunnel was over the top of his boots. He then traveled approximately 5.5 miles from the main office to the return air escapeway to enter the mine and was the first person to reach the effected area, where he found three injured persons and assisted them to the surface.

PART III

RESCUE AND RECOVERY OPERATIONS

Rescue Activities

Shortly after the inundation occurred, Samuel Klinger entered the West Skidmore South Dip conveyor gangway section by the return escapeway. He met Albert Carl, Jan Kornaski and Leroy Manhart, all of whom were working in the No. 12 breast off the West Skidmore South Dip conveyor gangway. These men assisted the injured persons, John Morgan, Ernest Morgan and Harry D. Fishburn, Jr., who had all ingested water, to the surface by way of the return airway. The inundation made most parts of the gangway and monkey airway impassable due to water and debris. Most of the coal pillar at the counter chute had been washed out, thus cutting off the most direct escape route to the main tunnel. An awaiting ambulance transported the three injured miners to the Pottsville Hospital in Pottsville, Pennsylvania.

The Schuylkill Haven MESA Field Office was notified of the accident at approximately 1:30 p.m., by John Messaros, chief clerk, at the Porter Tunnel Mine. Coal Mine Health and Safety's District 1 Office, located in Wilkes-Barre, Pennsylvania, was immediately notified by the Field Office and was also notified at approximately 1:30 p.m. by Leon F. Richter. At approximately 2:15 p.m., after obtaining preliminary information, John B. Shutack, District Manager, District 1, notified Joseph O. Cook, Deputy Assistant Administrator, Coal Mine Health and Safety, Mining Enforcement and Safety Administration, in Arlington, Virginia.

Federal Coal Mine Inspection Supervisor James R. Laird, Schuylkill Haven Field Office, arrived at the mine at approximately 2:20 p.m., and Federal Coal Mine Inspectors Dean W. Updegrave and Earl J. Cawley arrived at approximately 2:25 p.m. They were informed by company official Leon F. Richter that an inundation had occurred in the West Skidmore South Dip conveyor gangway. The first persons entering the main tunnel following the inundation recovered the body of Gary Lee Klinger. The body was located in the main tunnel approximately 1,060 feet outby the West Skidmore South Dip conveyor gangway counter chute and was removed to the surface at about 2:30 p.m. on March 1, 1977.

MESA Inspectors Cawley and Updegrave entered the mine through the main tunnel at approximately 2:35 p.m., to go to the effected area to determine what had happened. They arrived at the counter chute off the tunnel at the entrance to the effected section at approximately 2:55 p.m. and found it impassable due to the fact that the timber, part of the coal pillar and the steps leading to the gangway, had been washed out. The main tunnel in the area of the counter chute was covered with coal and debris to a depth of about 5 feet.

Updegrave and Cawley returned to the surface at approximately 4 p.m. to confer with Laird about conditions in the main tunnel and the Skidmore counter chute area.

A 103(f) Order, pursuant to the Act, was issued at 4:25 p.m. on March 1, 1977, and required all persons except company officials and rescue workers, Federal and State officials, to be withdrawn from the mine and prohibited all other persons from entering the mine until otherwise notified by an authorized representative of the Secretary.

A 104(a) Order, issued at 4:30 p.m. on March 1, 1977, required all persons except public officials and those required to eliminate the condition described in the Order to be prohibited from entering all areas of the underground mine until an authorized representative of the Secretary determined that the imminent danger no longer existed.

At 4:45 p.m., an exploratory crew consisting of MESA Inspectors Earl J. Cawley and Albert Zegley, and company personnel, consisting of Samuel Klinger and three miners, traveled to the return escapeway opening and entered the mine in an attempt to locate the missing miners. At the same time, Laird and Updegrave entered the mine via the main tunnel and proceeded to the West Skidmore South Dip conveyor gangway counter chute to coordinate rescue and recovery efforts in that area. At approximately 5 p.m., John B. Shutack and Frank P. Danna arrived at the mine. At that time, nine miners of the West Skidmore South Dip conveyor gangway crew were unaccounted for, three of whom were gangway face workers, three were monkey airway face workers and three were workers in No. 17 slant breast.

Shortly after his arrival, Shutack, and Laird made an inspection trip into the tunnel. The District 1 MESA rescue effort was organized, and inspectors were given assignments to insure MESA presence inside the mine and on the surface during rescue and recovery operations. Selected MESA personnel under the jurisdiction of the District Manager were present on each shift pursuant to Section 103(e) of the Act. Jack E. Tisdale, representing the Assistant Administrator, Coal Mine Health and Safety, arrived from Arlington, Virginia, at 11 p.m., to assist in directing the rescue and recovery operation.

Personnel from MESA's Mine Emergency Operations Branch (MEO) were alerted by the Arlington Office at 3:20 p.m. on March 1, 1977. The Seismic Communications/Location system of MEO was ordered to deploy at 12:05 p.m. on March 2, 1977, and arrived at the mine site at 9:30 p.m. the same day. A Command/Communications trailer was ordered for MESA's use during the rescue operations, which was delivered and made functional by 8:20 p.m., March 2, 1977.

At approximately 7:30 p.m., March 1, 1977, the Pennsylvania State Police set up a command post with telephones and radio communications and were on duty to control the crowd that had started to assemble at the mine site.

As the recovery work progressed, MESA officials conferred with Walter Vicinelly, Commissioner of Deep Mine Safety, Commonwealth of Pennsylvania, and Leon Richter concerning the direction of recovery efforts. After all parties had concurred and the representative of the miners had been advised, the plans for recovery operations were implemented.

Relatives of the trapped miners and the news media were briefed on a regular schedule relative to the progress of the rescue and recovery operations. All efforts were made to ensure that these briefings were factual and timely. In most instances, these briefings were held by representatives of MESA, the State and Kocher Coal Company.

A body, later identified as Philip Sabatino, a gangway face miner, was sighted by mine workers at about 12:50 a.m. on March 2, 1977, in the West Skidmore South Dip conveyor gangway near No. 4 chute. A rescue team entered the mine at approximately 5 a.m. to recover the body. This team transported the body to the surface, traveling the difficult up-and-down, vein-to-vein, rock hole-to-rock hole route to the main tunnel and from there to the surface, arriving at approximately 2:20 p.m. on March 2, 1977.

During the morning of March 2, 1977, a review of maps of the West Skidmore South Dip conveyor gangway section indicated that a slant was being driven up-pitch off No. 17 breast toward No. 15 breast. All access to the slant was completely blocked by debris. Because of the possibility of survivors in the high area of the No. 17 slant breast, a decision was made by Shutack, Tisdale and Richter, to drill an exploratory hole from No. 15 breast in the coal to No. 17 slant breast. Workers had installed an air line for compressed air by about 5:55 p.m. on Wednesday, March 2, 1977, and were waiting for the necessary drill steel to be delivered to the drilling site. While awaiting the drill steels, a "rapping" was heard at the west rib of the No. 15 breast. The crew determined that the "rapping" was coming from the slant off No. 17 breast and that there was a miner or miners entrapped. When the drill steels arrived, a 1-3/4-inch-diameter hole, about 48 feet in length, was drilled through to the slant breast. At that time, voice contact was made with a miner in the slant, who identified himself as Ronald Adley. Adley informed the rescue crew that he was alright and that there were two other miners in the slant breast below him; however, he was not certain of their condition. Subsequently, there was a second 1-3/4-inch-diameter hole drilled through the pillar. A 1-inch plastic pipe was then installed in this hole at 9:55 p.m., March 2, 1977. Adley was given orange juice through the pipe. A third 1-3/4-inch-diameter hole was drilled through, and this third hole was utilized to communicate with Adley, while the first drill hole was being enlarged to 4 inches in diameter.

In an effort to provide for Adley's safety and comfort and also to provide him with light, the headpiece of a miner's cap lamp, with a cable long enough to be attached to a cap lamp battery in No. 15 breast, was passed through the 4-inch hole at 6:20 a.m. on March 3, 1977. In addition, coveralls, socks, a blanket, and solid food were also passed through this hole.

In order to accomplish rescue in the shortest time possible and by the safest means available, a decision was made to drive a rescue tunnel through the coal pillar between No. 15 breast and No. 17 slant. Work to drive this tunnel was started without delay. Based on information received from Adley as to the conditions of the slant breast where he was entrapped and the physical evidence of the area at No. 15 breast, a decision was made to drill a pattern of holes in the coal and break the coal with the aid of hand-held, air-operated chipping hammers. This method was selected because blasting the escape tunnel with explosives might have caused a pillar run or a fall of roof in the slant breast or the No. 15 breast.

As rescue workers advanced toward Adley, progress became increasingly difficult. Coal dust concentrations caused by the uninterrupted drilling and chipping in the restricted and confined rescue tunnel increased to a level that caused considerable discomfort to workers in the immediate area. Respirators were provided which helped to alleviate the discomfort. As the rescue tunnel was being advanced, the coal became increasingly hard to drill. Pyrite deposits were frequently encountered, thus limiting progress to approximately 5 inches an hour. On March 5, 1977, at approximately 8:50 p.m., with 7 feet remaining, unusually large concentrations of pyrite were encountered which further slowed progress.

As the rescue tunnel neared the slant where Adley was entrapped, a coning effect developed, resulting in an opening too small to permit him to crawl out. Because of this coning effect, it was determined that it would be easier to enlarge the opening from the inby end, since Adley stated that he was in good physical condition. Consequently, at 7:55 a.m. on March 6, 1977, a chipping hammer was passed through to Adley, who enlarged the hole from his location. At approximately 8:05 a.m. on March 6, 1977, the tunnel was sufficiently enlarged to allow Adley to escape. After a brief discussion at the rescue site with rescue workers, Adley walked to the main tunnel level with his rescuers. Adley boarded the man-trip in the main tunnel and was transported to the surface, arriving at approximately 8:35 a.m. An awaiting ambulance transported him to the Pottsville Hospital.

At approximately 9:30 a.m. on March 6, 1977, a recovery team consisting of Clarence E. Miller, Pennsylvania Department of Environmental Resources, Samuel Klinger, Raymond Keefer, section foreman, and Earl J. Cawley entered the No. 17 slant breast through the narrow escape tunnel to explore the area. This team recovered the body of Ralph Renninger and sighted the body of Donald Schoffler. Renninger's body was located approximately 46 feet from the face of No. 17 slant breast along the high side coal rib. Removal of the body through the narrow escape tunnel was difficult. Much difficulty was encountered in transporting the body up to the second miner heading and down to the monkey airway and then to the main tunnel.

A second recovery crew consisting of Randy Slodysko, George Feester, Richard Schaeffer, Robert Long, Melvin Krise, Charles McGee, James Fetterhoff, John Zanella, all miners, Palmer Merwine, section foreman, MESA Inspectors Dean W. Updegrave and Michael C. Scheib, and State Inspectors Arthur E. Hand and Joseph J. Halaburda, entered the No. 17 slant breast to recover the body of Donald Schoffler and to search for additional victims. At approximately 4:30 p.m. on March 6, 1977, Schoffler's body was recovered 68 feet from the face. At approximately 6:58 p.m., Schoffler's body was transported to the main tunnel. Both bodies were then transported to the surface, arriving at 7:30 p.m. on March 6, 1977.

Rescue and recovery activities in the main tunnel and in the West Skidmore South Dip conveyor gangway were begun when the water receded sufficiently to permit entry. These rescue and recovery activities were not interrupted during the time that the rescue hole for Adley was being driven.

During the early planning for rescue and recovery operations, the feasibility of drilling holes into the effected area from the surface was one of the many possibilities considered. In meetings on March 2 and 3, 1977, between MESA, State and company personnel, the company was advised that MESA equipment for drilling 28-inch-diameter escape holes was on standby and could be made available without delay. They were also advised that MESA could obtain equipment for drilling 48- to 64-inch-diameter holes, depending upon the strata encountered. The first determination to be made concerned location and purpose of holes drilled from the surface.

The debris laden and damaged condition of the gangway and monkey airway impeded the rescue and recovery progress. Early information indicated the need for a large diameter hole drilled into the gangway at No. 16 chute which would allow access inby some inaccessible areas. Such a hole could be equipped with hoisting facilities and could be used for hoisting debris to the surface from this location, as well as for escape if any survivors were found in this area. The MESA drilling equipment in Salt Lake City, Utah, was ordered to be airlifted to the site on the evening of March 3, 1977. Concurrent with these discussions, it was decided that small diameter probe holes from the surface were the most rapid means of exploring unrecovered areas in the mine.

Subsequent information provided early on March 4, 1977, indicated that local drillers might have the large hole capabilities. Initial telephone contact with Al Roman, Vice-President, No. 1 Contracting Company, indicated that they could drill a large diameter drill hole, and that he had already dispatched sufficient equipment to the site for drilling 8-inch-diameter probe holes.

After a meeting with Mr. Roman, it was apparent that there were three possible choices for equipment to drill a large diameter hole. Equipment from No. 1 Contracting Company could ream an 18-inch hole to a diameter of 24-1/2 inches. The MESA rig on location at Ebensburg, Pennsylvania, had the capability of drilling a 28-1/2-inch hole, and the equipment in the Western United States could drill a 64-inch-diameter hole. However, during the discussion time while the above information was being evaluated, additional knowledge of the conditions in the mine became known.

The underground recovery advance was to No. 15 breast at the monkey. Visual examination by rescue workers indicated that the conditions inby No. 15 breast were hazardous. Lengthy discussions with mine and State officials indicated that the underground advance would be to No. 16 chute location in the gangway in ten days, the estimated time for drilling a large diameter drill hole. The increased knowledge based on rescue and recovery progress from the mine indicated that the large diameter hole would be of little value, and the best rescue activity would comprise the normal MEO mode, which is small (8-inch) diameter probe holes to locate and sustain trapped miners while a 28-inch-diameter hole is drilled for rescue purposes. The airlift operation was then cancelled, and the MESA rig on location in Ebensburg, Pennsylvania, was ordered to the site to reinforce No. 1 Contracting Company's probe holes.

The first probe hole was started on March 4, 1977, at 10:10 p.m. Three additional drills were employed, and by March 11, 1977, all four drill rigs were on site and drilling. In all, 14 holes were drilled, the last being completed on March 17, 1977. The MESA rig capable of drilling a 28-inch-diameter rescue hole remained at the site until March 18, 1977.

Fourteen design locations for probe holes to enter the mine were carefully selected. All of the target areas were inaccessible from underground. Each were at locations believed to be most conducive to ascertaining the presence of survivors or victims and underground conditions. Foster Miller Associates were contacted to penetrate and survey the probe holes with a down-the-hole intercom probe and remote television cameras. The No. 1 probe hole broke through at its designated location underground at No. 18 chute in the gangway. Probe hole No. 2 was drilled to a depth of 399 feet and missed its desired location due to folded strata which caused the drill to drift. Thereafter, the services of the Sperry-Sun Well Surveying Company were obtained, and the remaining probe holes were surveyed by gyroscope, in order to determine if they were being drilled to the underground location they were designated to hit. (See Appendix G, Figure 5.)

The Seismic Communications/Location System arrived on site March 2, 1977, at 9:30 p.m. By 12:30 a.m. on March 3, the seismic equipment had been deployed on the surface and was operational. Prior to the rescue of Ronald Adley, explosive charges were not detonated on the surface as a signal to possible survivors underground for two reasons: It was not known whether detonating explosive charges on the surface would cause roof falls in Adley's chamber, and because activity for rescue of Adley would have to be stopped for a quiet period of at least an hour for the seismic test to be interpreted. At 11 a.m. on March 6, 1977, promptly after the recovery of Adley, a seismic test was conducted with negative results.

At 2:45 a.m. on March 7, 1977, Federal Coal Mine Inspector James Schoffstall came to the surface and reported to Derwood DeHaven, Assistant District Manager, that the monkey airway work crew in the vicinity of No. 11 chute heard a return rap while breaking rock. They waited for a while and heard a muffled rap, but on the third try, there was "no return rap." DeHaven, thinking that the rapping sound that was heard could have been coming from the drill site where hole casing was in progress, called the drill site and arranged for a trial rapping test. Accordingly, this test was conducted and the results were negative. No sound from the drill rig was heard in the mine. The work crew that reported hearing the "rapping" consisted of Ivan Sweinhart, Thomas Profit, Richard Nahodil and Harold Betz, Jr.

John B. Shutack was notified of this incident at 3:30 a.m. by DeHaven, and at 5:55 a.m., a meeting was held between MESA, State and company officials. It was decided to move the seismic sensors underground to listen for sounds to determine if any miners were still alive in the area being recovered. Since the "rapping" sound reportedly heard by the miners was apparently coming from the general direction of chute No. 12, three sets of geophones were set up underground surrounding this location. The geophones were

connected to the seismic van via cables run through the escapeway portal close to the van. During the period from March 7 through March 10, 1977, four underground seismic tests were conducted. These tests necessitated a quiet period, in order to listen for any sounds coming from trapped miners. The entire series of tests proved negative. Nothing repetitive or distinctive was heard that would indicate any signs of life in the area in which the rapping was reportedly heard.

On March 6, 1977, cleanup in the main tunnel to the counter chute and to No. 6 chute in the gangway had been completed. Communications also had been restored to No. 6 chute in the West Skidmore South Dip conveyor gangway section. Cleanup continued around-the-clock in the gangway and the monkey airway. Cleanup in the monkey airway was progressing from No. 10 chute toward the face.

The monkey airway had been completely blocked from inby No. 10 chute because the timbers had been dislodged and portions of the coal ribs had been washed off by the force of the water. Two chain conveyor drive-units and some conveyor pans in the gangway were damaged and inoperable. While the conveyor drive-units were being repaired, coal and debris were being removed from the gangway by a stream of water, from a 2-inch air-powered pump. Conveyor pans were used as a sluice to wash the material to the main tunnel level, where it was loaded by an air-operated Eimco mucking machine into mine cars for transportation to the surface. Progress was slow, but this was the only means available at that time.

About noon, March 7, 1977, the first chain conveyor drive-unit had been freed from debris and was available for repair. It was brought to the surface because the company did not have the required facilities to dismantle and repair it underground. The flood waters had forced foreign material into the housing of the unit. The company had attempted to purchase another conveyor drive-unit without success.

On March 7, 1977, a 3-foot-diameter corrugated steel pipe, approximately 46 feet in length, was installed in the counter chute and was utilized as a travelway from the main tunnel level to the West Skidmore South Dip conveyor gangway. Prior to this, access to the gangway was gained by traveling the escapeway to the second miner heading and down the pitch to the gangway. Installation of the pipe reduced climbing distance by approximately 750 feet and travel time to climb this distance to the gangway by 30 minutes. This afforded protection to persons traveling through this area. As the corrugated steel pipe was being installed, a set of six permissible air-driven electric lights were installed for illumination in the tunnel outby the Skidmore counter chute area.

At approximately 5 p.m. on March 7, 1977, work to reinstall the drive-unit on the No. 1 chain conveyor was underway and conveyor pans had been replaced to No. 5 chute. At 9:14 p.m., the No. 11 chute was rehabilitated, and at 10:30 p.m., the conveyor had been reinstalled to No. 8 chute. The repaired drive-unit on the No. 1 chain conveyor was not functioning properly and required realignment. However, during the time the drive-unit

was being realigned, debris was being cast to the side and pans were being added to extend the conveyor line.

At approximately 4:45 p.m. on March 9, the drive-unit on the second chain conveyor had been righted, and preparations were made to install air lines so the unit would be operational when pans on the first unit reached its limits. At approximately 8:45 a.m. on March 10, the No. 1 chain conveyor line became fully operational.

At approximately 8:25 p.m. on March 10, the gangway had been rehabilitated to a point 20 feet inby the West rib of No. 11 chute. At 9:13 p.m., debris was being cleaned from No. 11 chute and the second chain conveyor unit was being installed. At 12:20 a.m. on March 11, the monkey airway had been rehabilitated to No. 11 chute. At approximately 5:10 a.m., the gangway had been rehabilitated to the No. 12 chute, and by 10:10 a.m., the second chain conveyor unit, located about midway between Nos. 12 and 13 chutes, was operational. Recovery crews also found the gangway completely blocked with debris at this point. As cleanup progressed, it was found to be blocked from that point to the face, a total distance of about 400 feet. Most of the original roof and rib support timbers and lagging in the area had also been washed out by the force of the inundation and had to be replaced as recovery progressed. Because these pillar supports were removed, the high side coal pillars were pushed into the gangway, making the recovery work extremely difficult. Timber sets had to be installed almost skin-to-skin from about No. 12 chute and inby to the face during the recovery work. For safety purposes, forepoles had to be driven over each timber set from No. 13 chute inby to the face so that cleanup for the next set could be accomplished. It was also necessary with each timber set to use side lagging and, from time to time, large poles were needed to support the pillars on the high side of the gangway. It was also necessary to repair and install the conveyor line for removal of the debris as work progressed. All of the debris had to be loaded by hand onto the conveyor and progress was slow. (See Appendix D, Photographs - Figures 1 through 12.)

The coal pillar between the gangway and monkey airway inby No. 18 chute, for a distance of about 55 feet, was almost pushed out and laying loose on the 48-degree pitch. Recovery progress along the gangway from this point to the face was slow and difficult. Roof supports were dislodged and most had been washed outby this area. Before the loose coal could be removed from the gangway, the overlaying loose coal was supported by installing three-piece timber sets. The pushed out coal pillar was causing pressure and weight, creating hazardous conditions.

In the meantime, cleanup progress in the monkey airway at about No. 16 chute became slow and difficult. Timber had been washed out, pillars pushed out and falls of roof had occurred, all of which resulted in the monkey airway being blocked solid with coal, rock and debris.

Schlumberger Well Services was employed to obtain more information about the immediate strata over the coal vein. They arrived on March 28, and surveyed hole Nos. 2, 5, 10, 12 and 14. The results indicated that the coal vein had not split.

When recovery work reached a point approximately midway between No. 18 chute and the face of the gangway, a body was sighted in loose coal above the gangway. An opening was made through lagging from the gangway, and as the loose material ran through this opening, the bodies of three of the victims came through the hole. These bodies were identified at about 8:20 p.m. on March 28, 1977, as John Moyer and Dennis Morgan, monkey airway face workers, and Ronald Herb, gangway face workman. The three bodies were transported to the surface, arriving at 10:57 p.m. on March 28, 1977.

Cleanup progress in the gangway continued around-the-clock until the face of the gangway was finally reached, at about 7 p.m. on March 29.

After the face of the gangway was reached, and not having found the two remaining bodies, the rescue crew returned to the same area where the three other bodies had been found, and again made an opening through the lagging from the gangway. Additional coal was drawn from this opening, and at 12:35 a.m. on March 30, 1977, the bodies of the last two victims, Mark Kroh, gangway face miner, and Timothy Grose, monkey airway face miner, were recovered. These bodies were transported to the surface, arriving at 1:45 a.m. on March 30. After the bodies of the last two missing miners were taken to the surface, rescue and recovery work and all other activity was temporarily discontinued. Plans were being formulated for inspection of the entire mine, upon request of the mine operator. Accordingly, a special inspection of the mine was made on March 31 and April 1, 1977, by teams of inspectors. Each team consisted of a MESA inspector, a State inspector and a company official. The same teams made a reinspection of the mine on April 5, 1977. At that time, all conditions pertaining to the 104(a) Order of Withdrawal issued on March 1, 1977, observed during the previous inspections had been corrected. The 104(a) Order was modified to permit the resumption of mining in all areas of the mine, except the West Skidmore South Dip conveyor gangway section. The 103(f) Order of Withdrawal, issued March 1, 1977, was terminated on April 5, 1977.

PART IV

INVESTIGATION, DISCUSSION AND EVALUATION

Public Hearings

The Administrator for Coal Mine Health and Safety, appointed a panel to conduct an investigation into the facts and circumstances surrounding the inundation. Public hearings were held in the American Legion Hall, Tower City, Pennsylvania, on June 7, 8 and 9, 1977. The names and titles of the panel members were:

Joseph O. Cook, Co-Chairman
Deputy Assistant Administrator
Coal Mine Health and Safety
Mining Enforcement and Safety Administration

Walter Vicinelly, Co-Chairman
Commissioner, Office of Deep Mine Safety
Pennsylvania Department of Environmental Resources

Jack E. Tisdale
Office of the Assistant Administrator
Coal Mine Health and Safety
Mining Enforcement and Safety Administration

James J. Shober, Jr.
Director
Bureau of Anthracite Deep Mine Safety
Pennsylvania Department of Environmental Resources

Robert J. Phares
Trial Attorney
Office of the Solicitor
United States Department of the Interior

Dennis Strain
Assistant Attorney General
Pennsylvania Department of Environmental Resources
Bureau of Legal Services

Transcripts of the hearings are available at MSHA Headquarters, 4015 Wilson Boulevard, Arlington, Virginia 22203.

Investigation

MESA personnel, in conjunction with representatives of the Office of the Solicitor, the Pennsylvania Department of Environmental Resources and Kocher Coal Company, conducted an investigation of the inundation disaster.

Because of the nature of the rescue and recovery operations, the investigation was ongoing from March 1, 1977, and continued until May 27, 1977. Members of the official investigation committee were:

Pennsylvania Department of Environmental Resources

Walter Vicinelly	Commissioner of Deep Mine Safety
James J. Shober, Jr.	Director, Bureau of Anthracite Deep Mine Safety
Arthur E. Hand	Anthracite Mine Inspector
Leonard W. Rogers, Sr.	Anthracite Mine Inspector
Joseph J. Halaburda	Anthracite Mine Inspector

Kocher Coal Company

Leon F. Richter	Vice-President
Samuel Klinger	Mine Foreman and Health and Safety Officer
Forrest Schucker	Mining Engineer

Mining Enforcement and Safety Administration

Jack E. Tisdale	Office of the Assistant Administrator, Coal Mine Health and Safety
John B. Shutack	District Manager, District 1
James R. Laird	Coal Mine Inspection Supervisor
Dean W. Updegrave	Coal Mine Inspector
James E. Schoffstall	Coal Mine Inspector
Frank P. Danna	Coal Mine Inspector
Vincent J. Yerabeck	Mining Engineer

MESA personnel, other than those listed above, who made significant contributions during the rescue and recovery operations, are listed in Appendix E.

Other Participating Organizations

Foster Miller Associates, Schlumberger Well Services, and Sperry-Sun Well Surveying Services participated throughout the rescue and recovery operations. Other organizations that provided assistance included the U.S. Bureau of Mines, the Independent Miners and Associates, Pennsylvania State Police, several local fire and ambulance associations, the American Red Cross and the Salvation Army. Recognition is also given to the electric utility and telephone companies for providing prompt and efficient service.

Development of the West Skidmore Section at the Time of the Inundation

Development of the West Skidmore South Dip conveyor gangway section was started in October 1975. At the time of the inundation, the section had been advanced 18 chutes, a distance of approximately 1,050 feet west of the main tunnel. Breast Nos. 1 through 15 were driven to their limit which varied from 325 to 535 feet up the pitch. Breast No. 16 was initially started, but was not developed due to poor roof conditions, and

the thickness and friable nature of coal in this area. Due to the large opening created after the first and/or second cut and the inability to hold the coal face intact, it was timbered, lagged and finally abandoned. The No. 17 chute was developed to the airway and advanced up the pitch beyond the airway, now referred to as No. 17 breast, a distance of approximately 20 feet. At that point, it was turned in a northeasterly direction, now referred to as No. 17 slant breast for the purpose of completing the air connection between Nos. 17 and 15 breasts. The No. 18 chute was completed from the gangway to the monkey airway, which was developed a distance of approximately 40 feet inby that chute. The gangway was developed to a point approximately 55 feet inby the west rib of No. 18 chute. Development of the section was accomplished by blasting coal (and rock in the gangway) off the solid in the gangway, chutes, monkey airway and breasts. Nineteen miners were working in this section at the time of the inundation. Three-person crews worked in the gangway, the monkey airway, No. 17 slant breast, and on pillar recovery between Nos. 11 and 13 breasts. Two miners were regulating the flow of coal from Nos. 12 and 13 chutes onto the chain conveyor. Three miners were assigned as chain conveyor attendants controlling the flow of coal from the gangway into the counter chute. Two miners were working at the car-loading station at the counter chute in the main tunnel. Due to the variable thickness of the vein, it was necessary at times to excavate bottom rock in order to maintain height in the gangway and proper alignment to facilitate installation of the air-driven chain conveyor. The bottom rock excavation varied in depth from 2 to 8 feet, depending on the thickness of the coal vein. The rock and coal were blasted simultaneously and hand-loaded onto the chain conveyor.

In addition to the development of the gangway, monkey airway and breasts, pillars were being extracted between Nos. 11 and 13 breasts. At the time of the inundation, pillar recovery had been completed between Nos. 4 and 11 breasts above the first miner heading which is the first heading (crosscut) above the monkey airway.

Activities on March 1, 1977, Prior to the Inundation

The West Skidmore South Dip conveyor gangway section was reportedly operating normally on the morning of Tuesday, March 1, 1977. Charles McGee was lead miner of the three-person crew at the face of the gangway on the evening shift. His testimony revealed that on the day before the inundation, the day-shift crew at the face, led by Philip Sabatino, had blasted a cut and cleaned up half of the coal. The other half was left for the second shift. After cleaning up the coal and timbering, McGee and his crew extended the chain conveyor and finished for the night. Thus, the day-shift crew at the face of the gangway on March 1 was ready to start the mining cycle again. That crew consisted of Philip Sabatino, Ronald Herb, and Mark Kroh.

Jan Kornaski testified that on March 1, he was at the face of the gangway approximately one hour before the inundation occurred. He had brought Philip Sabatino a box of blasting powder. At that time, he observed Sabatino drilling holes into the face in which to place the explosives.

He further testified that the "long" test holes had already been drilled, although he did not notice the location of the test holes. He did not notice if there was any test hole in the low rib.

Ronald Adley, Ralph Renninger, and Donald Shoffler were face workers in the No. 17 slant breast. Upon entering that area at the beginning of the shift on March 1, they checked the place and found it to be safe. Adley testified that they also found the preshift examiner's time, date, and initials, indicating that the working place had been preshifted. During the course of the working shift, they proceeded to drill ahead. Adley further testified that the last thing he could remember doing was to fire a "plugger" or "popper", a small explosive charge placed in a short drilled hole to blow down overhanging rock or coal. After firing the "plugger," he and his crew went down into the monkey airway to eat lunch. Adley also testified that he could not remember if there had been any blasting in the area of the gangway prior to the inundation.

However, Bruce Smith, who was attending the No. 2 chain conveyor, testified that it was his conclusion that the face of the gangway was fired the morning of March 1. He testified that he had visited the face during that morning and that "they were getting ready to go and fire a cut." He further testified that he later heard the blast at the face of the gangway approximately one hour before the inundation took place. He also remembered seeing coal come out from the face area on the conveyor.

Examination of the face, after rescue and recovery operations, revealed three test drill holes in the face area of the gangway as follows: A horizontal hole 13 feet 6 inches in depth and two flank holes in the high side rib, one 19 feet 6 inches in depth on a 45-degree angle located 5 feet 4 inches outby the face and the other 23 feet 2 inches in depth on a 40-degree angle located 12 feet 4 inches outby the face. Since the depths of the test holes were reportedly drilled 20 to 26 feet, and since a cut of coal taken from the face would be approximately 6 feet, it would seem probable that the face test hole was drilled to a depth of 20 feet before the face was blasted on the morning of the inundation.

During the investigation, it was determined that the floor of the gangway on the low side broke from the face for a distance of 26 feet outby, and the inrushing water entered through the break which was measured to be approximately 4 feet wide and 26 feet long. It was believed that, as this area of the mine floor was exposed during advancement of the gangway face, it became weaker and subsequently failed as a result of pressure from water impounded in the abandoned mine workings, as well as from blasting.

Mine Maps - Abandoned Workings

Testimony taken during public hearings disclosed that the source of the inrushing water was an abandoned coal mine originally developed in 1938 or 1939. The abandoned mine was operated as a partnership, consisting of Paul Bush, Clayton Bush, Ira Bush, Ray Bush, and Albert Bush. The Bush operation continued until 1944 when it was sold. Paul Bush testified that the Bush partnership received $300 in cash from Leon Kocher for all

rights to its operation, plus all mining equipment. There was no evidence to indicate that Leon Kocher was actually underground at the time he purchased the mine; however, testimony disclosed that the mine was worked for a few months following the sale by George Richert, John Deiter and an individual named Smeltz. This operation consisted entirely of pulling pillars left by the Bush operation.

The testimony of Gerald Curran, mining engineer, who was employed by Kocher Coal Company as a part-time consultant, revealed that he furnished Mr. Rissinger a map showing the Weaver Old Bootleg Slope Mine workings that were penetrated at the top end of the breasts from Nos. 8 to 15; that portion of the Bush Old Bootleg Slope Mine extended from the surface to a depth of approximately 250 feet; and, also a part of the Miller Old Bootleg Slope Mine. Curran testified that this mapping was furnished to Rissinger prior to his leaving the employ of the Kocher Coal Company, approximately two years prior to the inundation. This information was also noted on the mine map of the Skidmore vein furnished to MESA in February 1975. The mapping was shown in the West Skidmore South Dip vein stripping which was stripped and backfilled for the Philadelphia Reading Coal and Iron Company in the late 1940's and early 1950's.

Samuel Klinger testified that mine management was aware of the general presence of the abandoned Bush Old Bootleg Slope Mine years before the West Skidmore Section was developed, but was unaware of the extent of the workings. The "top lift" of the Bush Old Bootleg Slope Mine had been surveyed and its location was known to mine management. Samuel Klinger further testified that efforts were made by himself, Leon Richter and the mine engineer, Forrest Schucker, to contact individuals with knowledge of the extent of the old workings. Their primary source of information was an employee of the mine, Marlin Bush, with whom they had several discussions prior to the inundation. Klinger testified that he talked to Bush, who was previously an unpaid employee of the Bush Old Bootleg Slope Mine for approximately one month. Bush advised him that the Bush Old Bootleg Slope Mine had been driven approximately 800 feet. Klinger further testified that, based on the information furnished him by Marlin Bush and Clarence Miller, State Mine Inspector, the 800-foot slope was plotted on Kocher Coal Company mine maps.

Clarence Miller testified that, after the Weaver Old Bootleg Slope Mine was penetrated, he contacted Weaver for the purpose of determining the extent of mines adjacent to the Weaver Old Bootleg Slope Mine. It was determined that the other mines continued operating after the Weaver Old Bootleg Slope Mine was abandoned. Weaver was of the opinion that the other mines went deeper than the Weaver Old Bootleg Slope Mine.

Ray, Earl and Paul Bush, son, nephew and partner, respectively, of the Bush partnership, testified that the Bush Old Bootleg Slope Mine was driven to a depth of approximately 800 feet with 4 to 5 levels on lifts varying from 150 to 200 feet. Both Ray and Earl had been in the mine; Ray, on 20 to 30 occasions, as an 11 to 13 year old; Earl as an employee

for approximately five months. Both Ray and Earl furnished MESA with a sketch of the Bush Old Bootleg Slope Mine as they remembered it or as they had been told of the mine workings by others. Ray's sketch showed five levels, whereas the sketch furnished by Earl showed four levels. Both sketches showed the lower level gangway to extend approximately 100 to 150 feet east off of the slope. (See Appendix F, Figures 1 and 2.) Both Ray and Paul testified that they were never approached for information on the old workings prior to the inundation. Earl testified that he did not remember being approached by anyone for information on the old mines, nor could he remember if there were any chutes or breasts driven off the lower level. Although Ray and Earl testified that the abandoned Weaver, Bush and Miller Old Bootleg Slope Mines were interconnected, they were not certain as to the exact levels on which this occurred.

Marlin Bush testified that he was approached by Samuel Klinger for information on the Bush Old Bootleg Slope Mine, and reviewed a map with him dated 1940 on several occasions prior to the inundation, in an attempt to determine the location and extent of the Bush Old Bootleg Slope Mine. He also testified that he discussed the Bush Old Bootleg Slope Mine with Clarence Miller prior to the inundation. The testimony of Ray and Marlin Bush indicated that there was very little, if any, breast mining on the lower level due to insufficient air and an excess of water. However, Marlin Bush stated that the gangway at the lower level had advanced eastward in the direction of the Porter Tunnel Mine, a distance of approximately 150 feet.

A mine ventilation map of the Porter Tunnel Mine, submitted to MESA by Kocher Coal Company dated January 17, 1977, did not show any abandoned mine workings or adjacent mines above or to the west of the West Skidmore South Dip section. (See Appendix G, Figure 1, for a portion of the approved ventilation map.) However, a mine map of the same mine, submitted to MESA by Kocher Coal Company dated January 17, 1977, showed projections consisting of a series of broken lines which indicated that abandoned adjacent mine workings might be located above and to the west of the West Skidmore South Dip section. (See Appendix G, Figure 2, for a portion of the mine map.)

According to testimony, all of the supervisors and miners in the West Skidmore South Dip section were informed by mine officials of the possible existence of abandoned adjacent mine workings to the north and west of the section, which could contain water.

Test Hole Drilling Program and Drilling Practices

Samuel Klinger testified that during 1975, prior to the opening of the West Skidmore gangway section, a meeting was held between mine management and State mining inspector, Clarence Miller. Members of mine management who attended the meeting were Samuel Klinger, Leon Richter, and Forrest Schucker. The meeting concerned how the gangway would be developed in view of the fact that anticipated old workings and possibly impounded water would be encountered.

Samuel Klinger testified that the plan agreed to at the meeting was not reduced to writing at that time. Klinger stated there was a verbal understanding that the company would be required to comply with all State laws pertaining to such test drilling. Inspector Clarence Miller testified that ". . . I met with the officials, and we discussed this drilling program before they ever started the gangway." Miller also stated, "I let them know that they had to comply with the mining law. The mining law states that they must drill in all directions; up, down, and straight ahead." Miller stated that the test drill program was initiated at the No. 8 chute in the West Skidmore gangway. Samuel Klinger stated that it was agreed upon by mine management and Inspector Miller that the drilling program would be initiated between Nos. 7 and 8 breasts, and so instructed his section foremen. He stated that he felt confident that the test holes would not be needed until that point.

During the public hearings, copies of inspection reports prepared by Inspector Miller were marked as Exhibit Nos. 16-A through 16-I and made part of the record. These reports concerned several inspections made at the Porter Tunnel Mine beginning on October 27, 1975, and concluding on January 21, 1977.

One of the reports shows that Inspector Miller made an inspection of the West Skidmore section on March 29, 1976, and includes the following notation:

> Ordered test drill holes and sufficient flank holes to be kept at least twenty feet in advance of all working faces inby No. 10 breast in the South Dip West Skidmore Gangway due to the possibility of impounded water in uncharted, abandoned mines.

A report of inspection on June 2, 1976, disclosed the following notation:

> A test hole in No. 7 breast, off the S. Dip W. Skidmore Gangway has penetrated old abandoned mine workings which contain water. Ordered all work inby No. 7 breast to be stopped and the only men working in this section of the mine shall be the men needed to complete the de-watering of the abandoned mine.

A report of inspection by Inspector Miller on June 9, 1976, disclosed that the abandoned mine workings adjacent to Nos. 7 and 8 breasts had been "dewatered and an opening driven into the abandoned mine." Permission to resume mining in that area was given by Miller following the examination. During return inspections to the section on September 9, 1976, and January 18, 1977, Inspector Miller repeated his orders that test holes and sufficient flank holes be drilled at least 20 feet in advance of all working faces of the section until all abandoned mine workings in the area are located and dewatered.

Inspector Miller's inspection report indicates that the original drilling plan agreed upon by the company would not be initiated until the development of the section reached the No. 10 breast. The inspection report further notes an initial penetration of "old abandoned mine workings which

contain water" on June 2, 1976. This penetration took place in No. 7 miner heading between Nos. 7 and 8 breasts. Company officials did not report this penetration to MESA officials on the day of its occurrence. Federal Inspector Dean Updegrave did, however, receive this information through an anonymous telephone call at his residence during the evening of June 3, 1976. Consequently, Federal Inspector Earl Cawley went to the mine the following morning to investigate.

Cawley testified at the public hearings that when he went to the mine, he observed workers attempting to drain the abandoned workings by drilling holes. He observed no water actually draining at that time. It was subsequently determined that the impounded water was in an old gangway, developed in the abandoned mine, known as Weaver Old Bootleg Slope Mine.

Mine foreman Samuel Klinger was questioned at the public hearings regarding the penetration of the Weaver Old Bootleg Slope Mine and responded in the following manner:

> Mr. Cook: We have heard, on several occasions, as you have in the last two days, that at the No. 8 chute or breast, there was some conversation, or there was something that happened there in connection with the Weaver Mine, whether a place shot through into the old works or drilled through. Had you started your drilling patterns before that incident occurred?
>
> Witness Klinger: Yes sir, they were drilling before the Weaver Mine was first holed . . .

Raymond Reinoehl testified that he was working on the second shift, driving breasts during June 1976, when water from abandoned workings was first encountered in a miner heading off No. 8 breast. He was informed by the first-shift workers that a blast in the face failed to fire properly and that impounded water was suspected. When he went to the area, he saw that "it was wet" and drilled a hole to test for water. When water was encountered that day, the crew was sent home to permit the water to drain safely. Reinoehl further testified that, prior to this incident, the crew had been instructed to begin drilling test hole patterns at the No. 10 breast and that the maps indicated no need to drill test holes until then. Reinoehl stated that once water was encountered, the test holes were initiated.

Calvin Brown testified at the public hearings that he had worked in the West Skidmore section in the Nos. 1, 2 and 3 breasts and that the last place he worked was "up on the flat . . . up where the vein turned over" in the No. 14 chute. He testified further that he was working in the No. 8 breast when it cut into the Weaver Old Bootleg Slope Mine. He stated:

> Well, first they said when they came out that they fired, and the cut went the other way. So, when our shift went in and our Raymond Reinoehl drilled ahead and hit the water . . . When he hit the water, then Raymond Keefer told us that everybody should get out. We all got out and we went home then.

When asked if, to the best of his knowledge, test holes had been drilled in advance of the place that was shot and shot through, Brown replied, "Not to my knowledge, no!" He did, however, testify that long holes were being drilled in No. 14 breast, but with great difficulty because the "steels" were getting stuck.

In consideration of the testimony of Raymond Reinoehl, Calvin Brown, and the information provided by Dennis Shadle, it is theorized that the miners were not under instructions to utilize test drilling procedures at the time George Mace's crew made initial contact with the abandoned Weaver Old Bootleg Slope Mine on June 2 or 3, 1976. Rather, management did not expect to reach the old workings of the Weaver Old Bootleg Slope Mine until approximately No. 12 breast. Thus, the company and State inspector agreed that the miners would be instructed to begin the drilling program once No. 10 breast was reached. Once the water was encountered from Weaver Old Bootleg Slope Mine, mine management ordered the implementation of the drilling plan.

Mine foreman Samuel Klinger testified that he instructed the foremen working under him in the West Skidmore South Dip section, Palmer Merwine and Raymond Keefer, to begin drilling test holes "at No. 8 chute." The instructions were that a "three-way drilling program" was to be maintained. Klinger testified as follows:

> A drilling pattern was set up for a three-way drill, straight - in the breast straight up; one in each flank; in the heading, in the monkey heading, and in the gangway, straight in; one above and one below, at a minimum of 20 feet.

The purpose of the test holes was to probe for water while extending the gangway to the west. He testified that he observed lead miner Philip Sabatino drill several test holes in the low side rib of the gangway. He stated that he was certain that all the required safety holes were drilled and, specifically, that all test holes in the low side rib of the gangway were drilled. He stated that section foremen made certain that three holes were being drilled at all required places.

During the development of the West Skidmore South Dip gangway, three individuals performed the duties of "lead miner" working the face of the gangway. They were Philip Sabatino, George Madenford, and Charles McGee, with Sabatino and Madenford performing these functions on two shifts through the major portion of the gangway.

George Madenford testified that he worked in the face of the gangway from its beginning all the way to No. 18 chute, when he was "laid off" by the company on January 28, 1977. He worked as part of a three-person team with Sabatino and Walter Grose when the gangway was started. Sabatino was the lead miner when only one shift was working. Madenford became the lead miner when Sabatino was switched to the cross shift and two crews began working at the face. Madenford testified that he received instructions from section foreman Palmer Merwine, to drill test holes during the development of the gangway. Madenford testified that Merwine instructed him to

drill down the pitch, straight ahead, and up the pitch. He further testified that nobody ever asked him if down holes were being drilled. He stated "they (the foremen) checked the holes forward and checked the holes up the pitch, but nobody checked them down." His testimony was that no test holes were ever drilled in the low side rib at anytime on his shift. Madenford also testified that he did not drill a down hole because of the "nature of the coal" in the gangway. He noted that they were working in very soft coal, and that any attempt to drill a down hole would be almost impossible because the hole would not "clean out." He explained that in that type of coal, the drill bit would only go in a short distance before it "binded up."

During the testimony, Madenford was asked if the section foreman was ever present observing the drilling of test holes. Madenford replied that the section foreman was in the place usually twice a day, normally took the miners' word for the test holes, and did not actually measure them. When asked about the bottom holes, Madenford said that there was not any there for the section foreman to see. Madenford also stated that the section foreman knew that the bottom holes were not being drilled.

Jan Kornaski stated that while working at the top, "the breast and chutes," he was drilling holes in the face, the upper rib and the lower rib, and at times was drilling the hole ahead to a depth of about 36 feet.

Joseph Narcavage stated that it was known for workers to drill ahead and further stated that he, on one occasion, saw them drilling ahead and upper flank holes, but was not sure about the lower flank hole.

James McHale, Jr.'s, knowledge about the drilling program was that, although he did not observe them drilling test holes, he did understand that they were to drill ahead.

Irvin Schreffler testified, as lead miner working in the monkey, he was drilling one hole in the center of the face, one in the 45, and one in the floor. Although instructed to drill the holes 26 feet deep, he was drilling them 35 feet deep.

Calvin Brown testified that, when working in the breast, he always drilled 25 feet, one hole in the right flank, one in the left flank and one up through the middle.

Alvin Lubold, who worked in the monkey, testified that he was drilling test holes 25 to 28 feet. On occasion, when he worked in the gangway with Sabatino and Madenford, they would be drilling up and in, and that he was not instructed to drill down.

John Zanella testified that he worked at the face of the gangway from the No. 8 chute to the No. 13 chute. During this period, George Madenford performed the function of lead miner. He also worked with John Morgan during part of this period. Zanella testified that, during the time he worked in the face of the gangway, test holes were drilled straight ahead and "up the flank," but never down into the low side rib.

Dennis Shadle testified that he began working in the face of the gangway when the face had progressed to "around the No. 13 or 14" chute. He stated he worked with George Madenford, who was lead miner, until just prior to Madenford being laid off. He noted that the face was in about the No. 17 or 18 chute at that time. While Shadle was in the face of the gangway, he normally worked with Madenford and Charles McGee. Shadle testified that, when he worked in the gangway, test holes were drilled straight ahead and up the pitch, but never down the pitch into the low rib. He further testified that "once in awhile he (a foreman) was making his rounds, when we were drilling," and it was Shadle's opinion that the foremen knew the drilling pattern being followed.

Even though Shadle testified that bottom holes were never drilled, he nonetheless thought that they could have been drilled. When asked if it was possible to drill these holes in the bottom, he replied, "Definitely. I am not trying to be smart. How else do you think they sink slope?"

Ronald Adley testified that he worked mostly in the slant and up the pitch, but on certain occasions he worked in the gangway. On those occasions he testified that test holes were being drilled in a three-hole pattern, one straight ahead, one up the pitch and one down the pitch.

Charles McGee testified that he had worked in the West Skidmore gangway for about five months. Prior to this, he had a total of two and one-half years mining experience, all at Porter Tunnel. While in the gangway, he served as the lead miner, but had never served as a miner in a face area prior to this. His testimony indicated that he was drilling a three-test hole pattern; one straight ahead, one up the pitch and one down the pitch. These holes were all drilled to a depth of at least 26 feet. He stated that the left or bottom hole could not be found after cleaning up a cut because "all the debris just went in there and blocked it up."

Richard Steinhart testified that he worked at Porter Tunnel about ten and one-half years. He had only worked in the West Skidmore gangway section a period of two and one-half months with Charles McGee. Prior to that, he had been working on the motor and loading coal. When asked how the test holes were drilled, he stated, "We drilled one down 26 feet, one straight in 26 feet, and on up along the pitch." He claimed further that only minor difficulties were encountered in drilling these holes.

Harry Fishburn, Jr., testified that he worked with Philip Sabatino in the face of the gangway from No. 6 chute to approximately No. 12 chute. He further testified that Sabatino always drilled a three-hole pattern. He stated, "We would drill one flank hole up, one hole straight in, and then we would come down to the bottom of the face and drill a flank hole down, with all holes drilled 26 feet."

Bruce Smith testified that they were drilling down holes in the gangway.

MESA Inspectors Cawley, Klinger, and MESA Supervisor Laird, testified that the only information available to them prior to the inundation indicated

that all of the inaccessible abandoned workings were above the West Skidmore South dip conveyor gangway and monkey airway. Consequently, there was no cause to require down holes.

In summary, conflicting testimonies were presented regarding boreholes drilled on the low side rib of the advancing West Skidmore South Dip gangway.

MESA Inspections Prior to the Inundation

Numerous inspections were made at the Porter Tunnel Mine during the period from April 1970, through February 1977, which required a total of 299 workdays. (Inspection data covering this period is shown in Appendix A.)

There were four Health and Safety Inspections made during 1976. The most recent was a Health and Safety Inspection completed on February 17, 1977. Four of these five inspections were made during the period from June 1976, through February 1977.

Inspections of the West Skidmore South Dip conveyor gangway section revealed that test holes were being drilled in the advancing faces. Inspector Cawley testified that on September 2, 1976, while making an inspection of the West Skidmore South Dip conveyor gangway face area, he observed two test holes that were drilled in the face of the gangway, one straight ahead and one in the upper or high side rib. Both were measured to be approximately 27 feet deep. No down holes were observed as having been drilled. Further, Inspector Cawley testified that he never observed any holes being drilled in the low side rib of the gangway or monkey airway, and that he never observed any flank holes to the right being drilled as the breasts were advanced.

The next to the last inspection made prior to the inundation was a Health and Safety Inspection made by Inspector Charles C. Klinger, which was started in late November 1976 and completed in early December 1976. At the time of this inspection, the face of the West Skidmore South Dip conveyor gangway and airway had been developed to a point approximately 50 feet inby No. 15 chute. Although he did not witness the drilling of test holes in the face of the gangway, some were pointed out to him while he was there. There was no discussion of low side rib or down holes during the course of this inspection. Since there was nothing on the mine map that he reviewed at the mine to indicate abandoned workings ahead of the gangway, he was of the opinion that the practices being carried out were satisfactory.

The last inspection made prior to March 1, 1977, was a complete Safety and Health Inspection made by Inspector Klinger. This inspection was conducted February 7, 8, 10, 11 and 17, 1977. The West Skidmore South Dip conveyor gangway section was inspected during the second shift on February 10, 1977. At that time, the gangway and airway had been developed to about 50 feet beyond No. 17 chute. Also, No. 17 chute had been turned off the airway and about two cuts, each 6-feet deep, had been taken out. Pillar mining was in progress in No. 12 breast. Inspector Klinger observed two test

drill holes in the gangway; one straight hole about the center of the face of the gangway, and a flank hole in the right rib which was the high side rib. Klinger had the miners measure the depth of each hole, one was 30-feet and the other 35-feet deep. Klinger considered these holes to be simply precautionary. The mine map at the time of this inspection did not show any abandoned workings in the area, except those which had been penetrated at the top end of the breasts from Nos. 8 to 15. That portion of the Bush Old Bootleg Slope Mine extended from the surface to a depth of approximately 250 feet; and also a part of the Miller Old Bootleg Slope Mine. Consequently, Klinger did not believe that down holes in the low side ribs of the gangway or airway were required. Inspector Cawley, accompanied by James R. Laird, Supervising Inspector at Schuykill Haven Field Office, inspected the West Skidmore South Dip conveyor gangway section on September 2, 1976. At that time, the mine map did not show any abandoned workings, except those that had been penetrated at the top end of No. 8 breast as shown on the ventilation map of Porter Tunnel Mine dated July 8, 1976, and approved by MESA on August 24, 1976, according to testimony. MESA enforcement personnel in the Schuykill Haven Field Office had no knowledge of inaccessible abandoned workings in this general area, except the information that could be learned by studying maps of the mine and knowledge of those areas that had been penetrated.

Escapeways

Two separate and distinct travelable passageways were maintained to insure passage at all times of any persons, including disabled persons, from the working section to the surface. These designated escapeways, which were properly identified, consisted of: The West Skidmore gangway leading to the main tunnel and out of the mine portal, which is an intake air escapeway; and, the monkey airway (return airway), the first line of crosscuts above the gangway, which is at an elevation of approximately 40 feet above the gangway, and leads to the No. 1 breast in the East Skidmore South Dip gangway which, when ascending No. 1 breast, leads to a rock hole interconnecting the Skidmore Vein with the North Dip Middle Split Vein, from where the escapeway was driven to the surface.

The force of the inrushing water caused considerable damage in the gangway (intake side escapeway), the monkey airway (return side escapeway) and the main tunnel in the vicinity of the counter chute. The gangway was not travelable immediately after the inundation; and, the monkey airway was completely blocked inby No. 10 chute. However, since the monkey airway was at an elevation of approximately 40 feet above the gangway and the miner headings (crosscuts) above the monkey airway were at still a higher elevation, and since these miner headings at and inby No. 10 were travelable, the miners were able to cross over after the water had receded, come down No. 10 breast to the monkey airway and proceed to the surface in the return air emergency escapeway. Miners working in the vicinity of the counter chute in the main tunnel who were able to get out, came out by way of No. 1 breast (a designated escapeway) in the East Skidmore South Dip conveyor gangway, which is on the same elevation as the main tunnel.

Inrush of Water

An examination of the face area of the gangway and monkey airway inby No. 18 chute revealed no evidence to indicate that the inrush of water came from these faces. Consequently, MESA, State and company officials probed the face area using a 1/2-inch-diameter pointed steel pipe, on the low side rib of the gangway. They were able to insert the probe in the bottom debris to a depth of 37 feet from a point 1 foot outby the face and tapered outwards and upwards to the floor at a point 41 feet outby the face of the gangway. Evaluation of this information and visual observation of the breach indicated that it extended to a point approximately 26 feet outby the face of the gangway.

On April 4, 1977, Foster Miller Associates returned to the drill site and relowered the television scanning equipment in the No. 12 borehole from the surface, in an effort to determine if a breakthrough had occurred in the face area of the monkey airway. The camera scan revealed some evidence of a void due to pillar running in this area; however, due to the poor visibility caused by the foggy atmosphere in this area, the presence of a breakthrough to the old abandoned workings could not be determined. The face area of the monkey airway was visually observed on April 7, 1977, with the aid of powerful search lights, placed by MESA officials Shutack and Laird, who climbed atop the timber in the gangway. The results of this observation also proved to be negative.

In an attempt to locate and delineate the abandoned workings in the area where the water broke through, a probe hole drilling program, conducted jointly by MESA, State and company personnel, began on March 31 and completed on April 29, 1977. This program consisted of drilling a total of 22 holes at various angles with the coal vein in the face area, 7 of which hit a void, the beginning and end of which was plotted and outlined. (See Appendix G, Figure 7.) The breakthrough distances and the angles at which the holes were drilled indicated that there were abandoned workings in advance of the working face. The point of the void nearest to the face was approximately 21 feet below the face, as determined by a hole drilled down pitch on an angle of 44 degrees. A horizontal hole, drilled into the face of the gangway, hit the void at a depth of 71 feet. The width of the void in this area was measured to be 15.3 feet. Another hole drilled up pitch on an angle of 24 degrees, intersected the void at a distance of 87.5 feet. The width of the void at this location was measured to be 9.0 feet.

Geophysical Surveys, Incorporated, was employed to conduct a radar survey in the face area of the West Skidmore South Dip conveyor gangway to attempt to locate the abandoned mine workings with electromagnetic radar techniques. The procedure consisted of using a mobile radar unit, taken into the face area, to conduct a radar camera scan around the face area of the gangway and for a short distance outby in the low rib side of the gangway. Printout sheets were produced during this survey, and interpretations of these data by Geophysical Surveys, Incorporated, revealed the presence of several anomalies and permutations in the face area, as well as along the low rib which "could" indicate a void area. A "shadow" also appeared on the

printout which "could" indicate a rock roll or a solid rib, or a slant chute. This shadow appeared to be approximately 30 feet below the low rib of the gangway and was calculated to be rising at an angle of approximately 27 degrees in the outby direction of the gangway. (Due to the size of the prints, the survey printout data sheets are not included in this report; however, they are available for review in District 1 by interested parties.) Three drill holes were drilled in this area which indicated that a fault zone was encountered. The actual presence of void areas was substantiated when several drill holes broke through this void, both ahead of and below the gangway face area.

A water mark observed in the No. 15 breast off the West Skidmore South Dip conveyor gangway section on a line curtain extended from the second miner heading to a point where the breast penetrated the Weaver Old Bootleg Slope Mine some months prior to the inundation, indicated that after the water had been broken in, it had risen to a point 21 feet above the second miner heading, a distance of approximately 181 feet, as measured along the pitch of the vein above the gangway, and about 93 feet above the slant breast where Ronald Adley was entrapped.

A high water mark, observed across a door in the East Skidmore South Dip gangway off the main tunnel, revealed the water in the main tunnel in the counter chute area had reached a vertical height of 6 feet. The main tunnel is about 8 feet high and 14 feet wide with a drainage ditch on the west side about 3 feet deep and 5 feet wide. Evidence, by virtue of a high water mark observed on the rib in No. 17 slant breast, revealed that the water reached a point 6 feet below the face.

The inrush of water caused extensive damage and destruction to the West Skidmore South Dip conveyor gangway and monkey airway for a distance of about 1,050 feet in the gangway, and from the face to No. 10 chute in the monkey airway. (See Appendix D, Photographs - Figures 1 through 12.) The gangway had been completely blocked from a point midway between Nos. 12 and 13 chutes to the face, a total distance of about 385 feet. The monkey airway had been completely blocked from inby No. 10 chute to the face, a total distance of about 500 feet, because most of the original timbers had been dislodged and portions of the coal ribs had been washed off by the force of the inrushing water. The two chain conveyor drive-units and some conveyor pans in the gangway were damaged and inoperable. Timber sets placed almost skin-to-skin with forepoles above and lagging on the high side rib, from about No. 12 chute and inby to the face, were required to replace the original timbering in the gangway. The airway was retimbered with single props, three-piece sets and high rib lagging from No. 10 chute inby to No. 16 chute. The coal pillar between the gangway and the monkey airway inby No. 18 chute, a distance of about 55 feet, was pushed out and was laying loose on a 48-degree pitch. Most of the pillar at the counter chute had been washed out due to the supporting timbers being dislodged by the inrushing water. The steps leading to the gangway from the tunnel had been washed out. The main tunnel in the area of the counter chute was covered with coal and debris to a depth of about 5 feet. Debris was deposited in the main tunnel for approximately 525 feet outby from the counter chute.

A trip of loaded mine cars in the main tunnel was derailed by the force of the inrushing water. There was extensive damage in many of the chutes between the gangway and monkey airway due to the washing out of props, timber and coal pillars in these areas.

Locating Test Drill Holes Drilled Prior to March 1, 1977

During all phases of rescue and recovery work underground, and the ensuing investigation, a search for test drill holes continued. An extensive effort was made to locate test drill holes in the low side rib of the gangway from No. 14 chute inby to the breached area by utilizing the following methods: Blowing the loose material from the low side rib with compressed air, washing with water and brushing by hand. No holes were found. (All company-drilled test holes found in the West Skidmore South Dip conveyor gangway section are shown in Appendix G, Figure 6.)

On March 31, 1977, a search was made by MESA, State and company officials for test drill holes that were, reportedly, drilled on the low side rib of the West Skidmore South Dip conveyor gangway. Present were the following persons: Clarence Miller, Arthur Hand, Joseph Halaburda, and Leonard Rogers, Sr., Pennsylvania Department of Environmental Resources; Samuel Klinger, Forrest Schucker, Palmer Merwine, and Roy Coleman, Kocher Coal Company; and Vincent J. Yerabeck and Dean W. Updegrave, MESA. The ditch was cleaned from a point at the west rib of No. 17 chute inby to a point 18 feet outby No. 18 chute. No test holes were found. On April 1, 1977, another search was conducted in the same general area, by many of the same persons, from approximately No. 14 chute inby to No. 18 chute, and again no test holes were found.

On April 14, 1977, an additional attempt was made by the Pennsylvania Department of Environmental Resources to locate drill holes on the low side rib of the West Skidmore South Dip conveyor gangway. The following persons were present: Clarence Miller, Arthur Hand, Leonard Rogers, Sr., and Joseph Halaburda, Pennsylvania Department of Environmental Resources; Samuel Klinger, Forrest Schucker, and three miners, Robert Long, James McHale, and Lloyd Dunmoyer, Kocher Coal Company; and Dean W. Updegrave, MESA. A 2-inch air-operated pump was installed in the breached area to divert the flow of water from the ditch. No drill holes were found during this investigation. Because of the extensive damage caused by the inrushing water, some areas could not be examined for test holes; however, to insure that as many holes were found as possible, especially flank holes on the high ribs, it was necessary to carefully examine these ribs while replacement timbers were being installed and before rib lagging was put in place.

During the MESA investigation, test holes were found in the face area of the gangway as follows: A horizontal hole 13 feet 6 inches deep in the solid face of the gangway; a flank hole in the high side rib, 5 feet 4 inches outby the face, 19 feet 6 inches deep on a 45-degree angle; and a flank hole in the high side rib, 12 feet 4 inches outby the face, 23 feet 2 inches deep on a 40-degree angle. However, the spacing, depth and

angles of all holes found during the investigation indicated that the pattern of drilling generally was not uniform. Flank hole spacing on the high side ribs varied from 3.5 feet to a distance in excess of 22.5 feet; hole depth varied from 1.2 feet to a depth in excess of 31.5 feet; and, the angle of the holes varied from 30 to 90 degrees.

Copies of Citations and Orders of Withdrawal issued during and following the investigation are included in Appendix A.

PART V

FINDINGS OF FACT

The findings in this part are derived from the following sources: Conditions observed in the mine by MESA personnel during rescue and recovery operations following the inundation; information obtained from mine rescue personnel and other persons taking part in the rescue and recovery operations; information obtained from probe hole drilling, television camera viewing and radar surveys previously discussed; and, information received from company officials, miners and witnesses, in the form of sworn statements at the public hearings conducted at Tower City during June 1977. After analysis of all available evidence, MESA investigators have summarized their findings as set forth below:

1. The Porter Tunnel Mine had been operated by the Leon E. Kocher Coal Company, renamed the Kocher Coal Company, since 1968. The West Skidmore South Dip conveyor gangway section was started in October 1975.

2. Prior to development of the West Skidmore South Dip section, mine management had obtained a copy of a tracing of a mine map. This indicated the presence of three abandoned mines in the area into which the West Skidmore South Dip section would be developed. The map showed: (a) The Weaver Old Bootleg Slope Mine workings which were later penetrated at the top of the Nos. 8 to 15 breasts; (b) that portion of the "Old Bush Slope" extending from the surface to a depth of approximately 250 feet; and, (c) a portion of the Miller Old Bootleg Slope Mine. The map depicted a survey of the three mine workings and three slopes only to the first horizontal gangway.

3. Mine management assumed that many of the old workings of these abandoned mines had probably filled with water over the years. In anticipation of encountering the water-filled workings of the abandoned mines during development of the West Skidmore South Dip section, mine management met with State Inspector Miller in 1975, and agreed that test drill holes would be kept at least 20 feet in advance of all working faces inby No. 10 breast. A "three-way" drilling pattern was adopted, which required a test hole straight up and in each flank of the breasts, and a test hole straight ahead and in each flank of the gangway, monkey airway and miner headings.

4. According to testimony and records presented at the public hearings, State Inspector Miller made an inspection of the West Skidmore South Dip section on March 29, 1976. He issued written orders which required the mine operator to initiate the test hole drilling program agreed to in the 1975 meeting, in all faces in the West Skidmore South Dip section inby No. 10 breast.

5. During a Federal inspection of the mine completed in September 1976, by Inspector Cawley, two test drill holes were observed in the West Skidmore South Dip gangway. One test drill hole was drilled straight ahead in the face of the gangway and the other was in the high side rib. Both holes were measured to be approximately 27 feet in depth. No test drill holes were observed in the low side rib of the gangway or monkey airway during this inspection. Inspector Cawley stated that the mine map he was shown at the mine, during this inspection, did not show any abandoned workings ahead of the West Skidmore South Dip section.

6. During the last two Federal inspections of the mine completed in December 1976, and February 1977, by Inspector Klinger, test drill holes were being drilled straight ahead and in the high side rib of the West Skidmore South Dip gangway. Two test drill holes were measured to be approximately 30 and 35 feet deep. Test drill holes were not observed in the low side rib. Inspector Klinger stated that he thought these test hole drilling practices were satisfactory and were only extra precautionary measures. He also stated that he did not believe that test drill holes were required to be drilled in the low side rib of the gangway or monkey airway, because the mine map he was shown during these inspections did not show or otherwise indicate that abandoned workings were located ahead of the gangway.

7. On June 2 or 3, 1976, a work crew consisting of George Mace, Harry Fishburn, Jr., and Randy Slodysko, attempted to blast the face of the No. 7 miner heading off No. 8 breast. For reasons uncertain, some of the explosives did not fire and the blast failed to blow the coal from the face. When the miners returned to the face, the area was wet. Mace and his crew did not drill test holes prior to the blast. Mace drilled another hole into the face in an attempt to locate impounded water. During the succeeding shift, a work crew, led by Raymond Reinoehl, finished the hole begun by Mace and located impounded water approximately 11 to 12 feet in front of the face. It was later determined that the impounded water came from the Weaver Old Bootleg Slope Mine.

8. Following this incident at No. 8 breast, mine management ordered that the drill plan be implemented immediately in the West Skidmore South Dip section. The practice of drilling test holes from the advancing breasts below the Weaver Old Bootleg Slope Mine continued until all the water was tapped from an area near the No. 8 breast, to and including the area above No. 15 breast.

9. On Tuesday, March 1, 1977, at approximately 11:50 a.m., an inrush of water occurred near the face of the gangway, causing the death of nine workers, injuries to three others and entrapment of one, who was later rescued.

10. Eighty-four persons were present in the mine when the inundation occurred. Nineteen miners were working in the West Skidmore section. Six miners in the inundated area escaped safely by traveling up the emergency escapeway to the surface. The three injured workers were subsequently assisted through this emergency escapeway. All of the workers in the other sections of the mine were able to escape unharmed.

11. Water that had accumulated in the workings of the abandoned Bush Old Bootleg Slope Mine broke through the floor in the face area of the advancing West Skidmore South Dip gangway. The break in the floor, approximately 4 feet in width, extended from near the face to a point approximately 26 feet outby.

12. The force of the inrushing water caused extensive damage and destruction in the gangway, monkey airway, and counter chute. The monkey airway was completely blocked from No. 10 chute inby to the face, and the gangway was blocked from a point approximately 20 feet outby No. 13 chute inby to the face. The force of water dislodged timber, washed off coal ribs, and lifted and twisted the chain conveyors in the gangway, rendering them inoperable.

13. During the inrush, water rose to a point 181 feet, as measured along the pitch of the vein, above the gangway and reached a vertical height of 6 feet in the main tunnel in the vicinity of the counter chute. Large amounts of debris were deposited in the gangway and monkey airway, as well as in the main tunnel, for a distance of approximately 525 feet outby the West Skidmore South Dip conveyor gangway counter chute.

14. On the day of the inundation, mining was being conducted in the West Skidmore South Dip section which was advancing toward and was in close proximity to uncharted and unsurveyed workings of an adjacent abandoned mine known as the "Old Bush Slope." The Bush Old Bootleg Slope Mine was operated for several years and reportedly was abandoned during the period of 1943 to 1944. During this period, mine enforcement agencies did not require "small mine operators" to conduct surveys and submit mine maps of their mine workings. Consequently, surveys and accurate mine maps of the "Old Bush Slope" Mine were never made. Therefore, at the time of the inundation, management of the Kocher Coal Company did not know the exact location nor the extent of the mine workings of the Bush Old Bootleg Slope Mine.

15. Prior to and during development of the West Skidmore conveyor gangway section, management personnel at the Porter Tunnel Mine made inquiries to determine the extent of the workings of the Bush Old Bootleg Slope Mine and discussed the presence of the abandoned workings with several persons who were familiar with that mine. Marlin Bush, an employee of the Kocher Coal Company, and formerly an unpaid employee of the Bush Old Bootleg Slope Mine, advised Samuel Klinger, mine foreman, that the Bush Old Bootleg Slope Mine had been driven approximately 800 feet. He further advised Klinger that a gangway had been developed off the bottom of the slope in an easterly direction toward what was later to become the Porter Tunnel Mine. Marlin Bush estimated that the gangway extended approximately 150 feet in an easterly direction.

16. In consideration of the available information, Samuel Klinger concluded that it was necessary to drill test holes in advance of the face of the advancing gangway and headings to probe for impounded water in the workings of the Bush Old Bootleg Slope Mine. The drilling pattern in this area included 20-foot test holes in both flanks at a 45-degree angle. Klinger so instructed the appropriate section foremen working under him. The section foremen, in turn, appropriately instructed most, if not all, of the lead miners that worked in the West Skidmore South Dip section of the required test hole drilling pattern.

17. Company-drilled test boreholes were observed in the high side rib in several areas in the West Skidmore South Dip conveyor gangway section. However, the drilling was not carried out in the prescribed manner. There were no test boreholes observed in the face and ribs of the Nos. 1 and 2 miner headings west off No. 15 breast. The spacing, location and depth of many of the holes observed in the section were not in accordance with Title 30, Code of Federal Regulations, (30 CFR), Section 75.1701. (See Appendix G, Figure 6.)

18. The probe hole drilling program, conducted by MESA during the investigation in the face and face area of the West Skidmore South Dip gangway, showed that there were abandoned workings in advance of and below the gangway. Some of the probe holes that were drilled horizontally and angularly broke through into voids at distances as close as 21 feet ahead and below, 71 feet straight ahead and 87-1/2 feet ahead and above the face. Probes in the floor of the face area revealed a breach in the floor. The breach, approximately 26 feet in length and 4 feet in width, was determined to be about 37 feet deep at a point 1 foot outby the face. (See Appendix G, Figure 7.)

19. Television scanning equipment was used to determine whether a breach had occurred in the face area of the West Skidmore South Dip monkey airway. The camera did not reveal a breakthrough in this area. The face of the monkey airway was examined by MESA personnel and found to be intact.

20. A radar survey, conducted during the investigation in the face area of the West Skidmore South Dip section, revealed the presence of several anomalies and permutations which "could" indicate the presence of voids. The probe hole drilling program conducted by MESA revealed the presence of a void, both ahead and below the face area of the gangway.

21. A map of the Porter Tunnel Mine, referred to as the ventilation map, dated January 17, 1977, submitted to MESA by Kocher Coal Company, as required by 30 CFR 75.316-1, did not show nor give any indication that abandoned adjacent mine workings were or might be located to the west of the West Skidmore South Dip section. (See Appendix G, Figure 1.)

22. A review of the Porter Tunnel Mine map dated January 17, 1977, submitted to MESA's District 1 Office by Kocher Coal Company, revealed that the "Old Bush Mine" was depicted on the mine map by a series of broken lines that extended for a distance of approximately 800 feet. This indicated that the West Skidmore South Dip section was advancing toward uncharted and unsurveyed adjacent abandoned mine workings. This mine map also showed (again by broken lines) abandoned workings of the "Weaver Mine" located above the West Skidmore South Dip Section. (See mine map in Appendix G, Figure 2.)

23. According to testimony by Federal Coal Mine Inspectors, the Porter Tunnel Mine map presented for review during inspections of the mine conducted September 1, 2, 10, 16 and 17, 1976, and February 7, 8, 10, 11 and 17, 1977, did not show or otherwise indicate that the West Skidmore South Dip section was advancing toward abandoned adjacent mine workings. Also, according to MESA inspectors' testimony, mine management did not discuss nor mention information at that time which indicated that the West Skidmore South Dip section might be advancing toward the abandoned adjacent workings of the "Old Bush Slope."

24. Inspections of the underground workings of the West Skidmore South Dip section during the investigation, and a review of the Porter Tunnel Mine map in use at the mine on March 1, 1977, disclosed that the mine map was not kept up-to-date by means of temporary notations.

25. According to testimony at the public hearings, a mine map showing the designated escapeways from the working section to the main escapeway, was not posted in the West Skidmore South Dip section on March 1, 1977.

26. Sketches of the abandoned Bush Old Bootleg Slope Mine were furnished to MESA by Earl and Ray Bush, relatives of the former owner of the Bush Old Bootleg Slope Mine, who had knowledge of this mine. (See Appendix F, Figures 1 and 2.)

PART VI

CONCLUSIONS

MESA investigators concluded that:

1. Accurate information concerning the extent of the workings in the adjacent Bush Old Bootleg Slope Mine was not readily available to management of Porter Tunnel Mine. Mine management did, however, have sufficient information concerning the approximate location of the old workings to initiate a program in the West Skidmore South Dip conveyor gangway section. This program required the drilling of three-way test holes in the working faces and included the drilling of 26-foot test holes in the low side rib of the advancing gangway, to probe for impounded water below the gangway.

2. Testimony by miners employed by Porter Tunnel Mine, at the public hearings held at Tower City on June 7, 8 and 9, 1977, disclosed serious difficulties in drilling the 26-foot test holes in the low side rib. Notwithstanding evidence that a water hazard may exist, and rather than discontinue development of the section until some other methods of detecting the precise location of abandoned workings could be implemented, mine management discontinued full enforcement of its existing drilling program. Accordingly, prior to and at the time the water broke through the floor into the face area, miners working at the face were not drilling the 26-foot test holes in the low side rib.

Contributing Factors

1. The mine map reviewed by MESA inspectors at the mine during inspections in September, November, and December 1976, and February 1977, was inaccurate. It did not show all of the known abandoned adjacent mine workings of the Miller, Bush, or Weaver Old Bootleg Slope Mines. Of particular significance was that the map did not indicate the abandoned adjacent workings of the Bush Old Bootleg Slope Mine, suspected by management to be located ahead of and below the West Skidmore South Dip conveyor gangway section.

2. The probe hole drilling conducted in the West Skidmore South Dip gangway, as part of the investigation into the cause of the inundation, provided some evidence as to the location of the abandoned adjacent workings in relation to the active working section. However, the forces created by the inrush of water from the abandoned mine workings eroded the coal pillar separating the gangway from the

abandoned mine to the extent that the exact dimensions of this coal pillar could not be definitely determined until the abandoned mine was penetrated sufficiently to permit an engineering survey of the area.

Respectfully submitted,

John B. Shutack
District Manager

Vincent J. Yerabeck
Mining Engineer

Approved by:

Joseph A. Lamonica
Administrator
for Coal Mine Safety and Health

APPENDIX A

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Safety	04/13/70	104(b)		317(s)	04/13/70	07/14/70
		104(b)		303(b)	04/13/70	07/29/70
		104(b)		317(l)	04/13/70	08/14/70
		104(b)		303(b)	04/13/70	10/14/70
		104(b)		314(a)	04/13/70	10/14/70
		104(b)		317(n)	04/13/70	10/14/70
Spot Safety	07/29/70	104(b)		303(d)(1)	07/29/70	09/25/70
		104(b)		303(c)	07/29/70	10/14/70
		104(b)		302(a)	07/29/70	10/29/70
		104(b)		303(o)	07/29/70	10/29/70
		104(b)		202(a)	07/29/70	12/04/70
Spot Safety	09/25/70	104(b)		303(f)	09/25/70	10/29/70
		104(b)		107(d)	09/25/70	10/29/70
		104(b)		303(t)	09/25/70	10/29/70
Spot Safety	10/14/70	0				
Health & Safety	01/15, 18 & 20/71	104(b)		75.1404	01/20/71	03/14/72
Safety	04/22-23/71	104(b)		75.1702	04/22/71	04/23/71
		104(b)		75.1704	04/23/71	04/23/71
Health & Safety	04/29-30/71	0				
Spot Safety	05/18/71	0				
Roof Control Evaluation and Training Survey	09/13-14/71	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Safety	09/16/71	0				
Health & Safety	09/22-23 & 27/71	0				
Health	09/24-29/71	0				
Health & Safety	11/01-02/71	0				
Health	11/02-05/71	0				
Spot Health	11/12/71	104(b)		70.507	11/12/71	11/22/71
Spot Safety	11/17/71	0				
Spot Safety	11/22/71	0				
Spot Safety	11/30/71	0				
Spot Safety	12/08/71	0				
Safety	12/14-15/71	0				
Health	12/14 & 16/71	0				
103(i)	12/17/71	0				
103(i)	12/23/71	0				
103(i)	12/30/71	0				
103(i)	01/05/72	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
103(i)	01/10/72	0				
Health & Safety	01/18-20/72	0				
103(i)	01/21/72	0				
103(i)	01/27/72	0				
103(i)	02/02/72	0				
103(i)	02/09/72	0				
Haulage Survey	02/09/72	0				
103(i)	02/15/72	0				
103(i)	02/24/72	0				
Safety	02/24/72	0				
103(i)	02/29/72	0				
Roof Control Evaluation and Training Survey	03/01-02/72	0				
103(i)	03/03/72	0				
103(i)	03/06/72	0				
Spot Safety	03/10/72	104(b)		77.410	03/10/72	04/14/72

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Safety	03/14/72	104(b)		77.1301	03/14/72	02/21/74
103(i)	03/23/72	0				
103(i)	03/28/72	0				
103(i)	04/05/72	0				
Spot Health	04/12/72	0				
Safety	04/14/72	104(b)		77.1607(x)	04/14/72	06/15/74
Spot Safety	04/25/72	0				
Spot Safety	05/16/72	0				
Spot Health	05/17/72	0				
Haulage Survey	05/25/72	0				
Spot Safety	06/05/72	0				
Spot Health	06/06/72	0				
Health & Safety	06/12-13 & 15/72	0				
Spot Safety	06/15/72	0				
Spot Safety	06/19/72	0				
Spot Safety	06/24/72	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Safety	06/27/72	0				
Spot Health	06/29/72	0				
Ventilation	07/05-07/72	0				
Electrical	07/07 & 10/72	104(b)		77.705 77.701 77.508	07/10/72 07/10/72 07/10/72	09/14/72 09/14/72 09/19/72
103(i)	07/12/72	0				
103(i)	07/18/72	0				
103(i)	07/24/72	0				
103(i)	07/31/72	0				
Roof Control Evaluation and Training Survey	07/25, 28, 31 & 08/01/72	0				
Spot Safety	07/31/72	0				
103(i)	08/09/72	0				
103(i)	08/18/72	0				
103(i)	08/25/72	0				
Spot Safety	08/28/72	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Health & Safety	08/28-29/72	104(b)		71.400	08/29/72	12/06/72
103(i)	09/01/72	0				
103(i)	09/06/72	0				
Spot Safety	11/07/72	0				
103(i)	11/09/72	0				
Spot Safety	11/15-16/72		104(a)		11/15/72	04/24/73
		104(b)		75.316	11/16/72	01/11/73
		Notice to Provide Safeguard		75.316-2(b)	11/16/72	12/07/72
103(i)	11/16/72	0				
Mine Transportation System Evaluation and Training Survey	11/21-22/72	Notice to Provide Safeguard		75.1403-10(e)	11/22/72	12/27/72
103(i)	11/22/72	0				
Spot Safety	11/24/72	0				
103(i)	11/28/72	0				
Spot Electrical	11/30/72	0				
103(i)	12/06/72	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Safety	12/07/72	0				
Health & Safety	12/11-12 & 14/72	0				
103(i)	12/12/72	0				
103(i)	09/14/72	0				
103(i)	09/19/72	0				
Spot Health	09/21/72	0				
Spot Safety	09/27/72	0				
103(i)	09/28/72	0				
103(i)	10/05/72	0				
103(i)	10/12/72	0				
103(i)	10/18/72	104(b)		70.510	10/18/72	03/29/73
Spot Safety	10/26/72	0				
103(i)	10/27/72	0				
Spot Safety	11/01/72	0				
103(i)	11/02/72	0				
Spot Safety	11/03/72	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
103(i)	12/19/72	0				
Haulage Survey	12/21-22/72	0				
Violation Follow-up	12/22/72	0				
103(i)	12/29/72	Notice to Provide Safeguard		77.216	12/29/72	04/13/73
Spot Health	01/04/73	0				
Spot Electrical	01/04/73	0				
Violation Follow-up	01/11/73	0				
Roof Control Evaluation and Training Survey	01/16-17 & 19/73	0				
Spot Electrical	01/26/73	0				
Spot Safety	01/29/73	0				
Spot Safety	01/31/73	0				
Spot Safety	01/01/73	0				
Spot Safety	01/08/73	0				
Spot Safety	01/28/73	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Health & Safety	03/05-07/73	0				
Spot Safety	03/30/73	0				
Spot Health	04/05/73	0				
Spot Safety	04/23/73	0				
Safety	04/23-25/73	0				
Spot Safety	04/24/73	0				
Spot Safety	04/25/73	0				
Health & Safety	05/14-16 & 18/73	104(b)		75.1307	05/14/73	05/14/73
		104(b)		75.302-1	05/14/73	05/14/73
		104(b)		75.1403-10(f)	05/14/73	05/14/73
		104(b)		75.303	05/14/73	05/15/73
		104(b)		75.1712-6	05/14/73	05/15/73
		104(b)		75.1714-2	05/14/73	05/15/73
Spot Health	06/04/73	0				
Violation Follow-up	06/15/73	104(b)		75.316	06/15/73	01/14/73
		104(b)		75.1200	06/15/73	01/28/74
Roof Control Evaluation and Training Survey	06/25-26/73	0				
Spot Health	07/10/73	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Health	07/20/73	0				
Health & Safety	07/23-26/73	0				
Spot Health	08/13/73	0				
Safety	08/21-23/73	0				
Electrical	09/17-18/73	0				
Health & Safety	09/25-28/73	0				
Spot Health	10/16/73	0				
Spot Safety	10/26/73	0				
Safety	10/26, 30, 31 & 11/1-2/73	0				
Spot Safety	10/30/73	0				
Spot Safety	10/31/73	0				
Spot Roof Control	11/01/73	0				
Spot Safety	11/01/73	0				
Spot Safety	11/02/73	0				
Technical Assistance Roof Control	11/27/73	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Safety	12/03/73	0				
Spot Health	12/13/73	0				
Spot Safety	12/19/73	0				
Spot Health	12/19/73	0				
Safety	12/19-21/73	104(b)		75.1704	12/21/73	01/14/74
Spot Safety	12/21/73	0				
Spot Safety	12/27/73	0				
Violation Follow-up	01/14/74	104(b)		75.1704	01/14/74	02/22/74
Health & Safety	01/28-30/74	0				
Spot Safety	01/28/74	104(b) 104(b) 104(b)		75.1100-2(d) 75.1720(a) 75.301	01/28/74 01/28/74 01/29/74	01/29/74 02/22/74 01/30/74
Spot Safety	01/29/74	0				
Spot Safety	01/30/74	0				
Spot Safety	01/31/74	0				
Spot Health	02/13/74	0				
Violation Follow-up	02/22/74	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Safety	03/25/74	0				
Spot Safety	04/24/74	0				
Health & Safety	04/24 & 26 & 29-30/74	0				
Spot Safety	04/25/74	0				
Spot Safety	04/26/74	0				
Spot Safety	04/29/74	0				
Spot Safety	04/30/74	0				
Spot Health	05/07/74	0				
Electrical	06/21/74	0				
Electrical	06/25/74	0				
Spot Safety	07/16-17/74	104(b)		75.301	07/16/74	08/19/74
Health & Safety	07/16-19 & 22-24/74	104(i)		70.100(b)	07/24/74	08/16/74
Spot Safety	07/18-19/74	104(b)		75.301	07/18/74	07/24/74
Spot Safety	07/18/74	0				
Spot Safety	07/19/74	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Violation Follow-up	08/12/74	0				
Violation Follow-up	08/16/74	0				
Violation Follow-up	08/19/74	0				
Ventilation Survey	08/26, 28, 30 & 09/03/74	0				
Health	09/10/74	0				
Safety	09/12-13 & 16/74	104(b)		75.316-2(b)	09/16/74	12/03/74
Spot Safety	10/21/74	0				
Health & Safety	10/21-24/74	104(b)		75.1303	10/23/74	10/23/74
Spot Safety	10/22/74	0				
Spot Safety	10/23/74	0				
Spot Safety	10/24/74	0				
Violation Follow-up	12/03/74	0				
Spot Safety	12/30/74	0				
Health & Safety	02/19, 21 & 24/75	0				
Spot Ventilation	02/24/75	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Spot Health & Safety	03/18/75	0				
Spot Health	04/07/75	0				
Health	04/24-25/75	0				
Spot Ventilation	04/28/75	0				
Spot Haulage	05/07/75	0				
Health & Safety	05/28, 30 & 6/02/75	0				
Spot Health & Safety	06/27/75	0				
Electrical	07/07 & 14/75	0				
Spot Health & Safety	07/28/75	0				
Health & Safety	07/28-31/75	0				
Spot Health & Safety	07/29/75	0				
Spot Health & Safety	07/30/75	0				
Spot Health & Safety	08/13/75	0				
Spot Health & Safety	08/19/75	0				
Health & Safety	10/07, 10, 14 & 16-17/75	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Technical Respirable Dust	11/07 & 10/75	0				
Spot Health & Safety	12/29/75	0				
Health & Safety	02/06, 9-10, 13 & 18/76	104(b)		75.1715	02/09/76	02/18/76
Spot Health & Safety	03/17/76	0				
Operator Contact	05/10/76	0				
Technical Ventilation	05/13/76	0				
Health & Safety	06/01, 02, 04, 10 & 14-15/76	0				
Technical Ventilation	06/13/76	0				
Spot Health & Safety	06/30/76	0				
Spot Health & Safety (Saturation)	07/28/76	104(b)		75.301 75.1714 75.1715 75.301 75.1600-2(a) 75.301	07/28/76 07/28/76 07/28/76 07/28/76 07/28/76 07/28/76	07/28/76 08/17/76 08/17/76 08/17/76 08/17/76 09/17/76
Operator Contact	08/17/76	0				
Operator Contact Ventilation	08/23/76	0				

APPENDIX A (Continued)

MESA INSPECTION AND NOTICE AND ORDER RECORD

Type Inspection	Inspection Date(s)	Notice(s)	Order(s)	Section Violated	Date Issued	Date Abated
Health & Safety	09/01, 02, 10 & 16-17/76	0				
Technical Respirable Dust	09/14/76	0				
Health & Safety	11/22-23 & 12/02-03 & 06-07/76	0				
Technical Noise	11/24/76	0				
Spot Health & Safety	12/28/76	0				
Technical Respirable Dust	01/21/77	0				
Electrical	02/01/77	0				
Health & Safety	02/07-08, 10-11 & 17/77	104(b) 104(b)		75.1704 75.516-2(b)	02/10/77 02/10/77	02/17/77 02/17/77

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

[X] CITATION (SEE REVERSE) [ ] ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK) — 0611702

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36 - 01892 - ___ (CONTRACTOR)

TYPE OF ACTION 104-(a)-___,___-___-___ VIOLATION OF SECTION ___-___-___ OF THE ACT OR

PART AND SECTION 75.1202-_____ OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 3-3-80

TYPE OF INSPECTION AFA [X] S AND S (SEE REVERSE) [ ] WN CODES C/A 1 L 4 21 ATD 3/5/80

CONDITION OR PRACTICE The mine map in use at the mine of the West Skidmore South Dip conveyor gangway section on March 1, 1977, was not kept up-to-date by temporary notations. The location of the face of each working place was not noted as required. The following development had been accomplished without being noted on the mine map: The gangway had been advanced approximately 98 feet from a point 20 feet inby the west rib of No. 17 chute, No. 18 chute had been holed through to the monkey airway and the monkey airway had been

AREA OR EQUIPMENT

INITIAL ACTION [ ] NOTICE [ ] CITATION [ ] ORDER NO. _____ DATED ___/___/___ (MO/DA/YR)

TERMINATION DUE DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK) SIGNATURE ▶ John B Shuler 2-0101 AR

ACTION TO TERMINATE The mine map was being kept up-to-date with temporary notations.

DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK) SIGNATURE ▶ John B Shuler 2-0101 AR [X] SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3a (Jun 78)

(original issue) DATED 2 / 20 / 80 No 0611702 -___

[ ] SUBSEQUENT ACTION [X] CONTINUATION [X] CITATION [ ] ORDER DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36 - 01892 - ___ (CONTRACTOR)

JUSTIFICATION FOR ACTION CHECKED BELOW advanced approximately 30 feet inby the west rib of No. 18 chute, and No. 17 slant breast had been advanced easterly approximately 60 feet toward the first miner heading in the west rib off No. 15 breast. This violation was observed during an inspection conducted as part of the accident investigation into the March 1, 1977, inundation.

[ ] EXTENDED TO: DATE ___/___/___ TIME _____ (24 HR CLOCK) [ ] VACATED OFFICE USE ONLY CODES C/A 1 L 4 21 ATD 3/5/80

[ ] TERMINATED [ ] MODIFIED [ ] SEE CONTINUATION FORM DATE 3-3-80

TYPE OF INSPECTION AFA SIGNATURE ▶ John B Shuler 20101 AR

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

[X] CITATION (SEE REVERSE) [ ] ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2/20/80 TIME 1020 (24 HR CLOCK) — 0612743

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-____ (CONTRACTOR)

TYPE OF ACTION 104-(a)-_____ VIOLATION OF SECTION ____-____-____ OF THE ACT OR

PART AND SECTION 75.1200-_____ OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 4/14/80

TYPE OF INSPECTION AFA [X] S AND S (SEE REVERSE) [ ] WN CODES C,11,P,24 ATD 3/8/80

CONDITION OR PRACTICE The mine map of the West Skidmore South Dip conveyor gangway section in use at the mine on March 1, 1977, was inaccurate in that it showed one more miner heading above the monkey airway than was actually mined between Nos. 8 and 13 breasts. In addition, a crosscut not shown on the mine map was found to exist in the pillar above the gangway between Nos. 1 and 2 breasts. This violation was observed during an inspection conducted as part of the accident investigation into the March 1, 1977, inundation.

AREA OR EQUIPMENT

INITIAL ACTION [ ] NOTICE [ ] CITATION [ ] ORDER NO. _____ DATED __/__/__ (MO/DA/YR)

TERMINATION DUE DATE 04/21/80 TIME 0900 (24 HR CLOCK) SIGNATURE ▶ [signature] 2-0101 AR

ACTION TO TERMINATE

DATE __/__/__ (MO/DA/YR) TIME ____ (24 HR CLOCK) SIGNATURE ▶ [signature] 2-0101 AR [ ] SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3a (Jun 78)

(original issue) DATED 02/20/80 No 0612743-1

[X] SUBSEQUENT ACTION [ ] CONTINUATION [X] CITATION [ ] ORDER DATE 04/02/81 TIME 1300 (24 HR CLOCK)

SERVED TO LEON F. RICHTER, VICE-PRESIDENT OPERATOR KOCHER COAL COMPANY

MINE PORTER TUNNEL MINE I.D. 36-01892-____ (CONTRACTOR)

JUSTIFICATION FOR ACTION CHECKED BELOW

TO PERMIT THE COMPANY ENGINEER TIME TO OBTAIN THE MEASUREMENTS REQUIRED TO MAKE THE CHANGES ON THE MINE MAP OF THE WEST SKIDMORE SOUTH DIP CONVEYOR GANGWAY.

[X] EXTENDED TO: DATE 04/13/81 TIME 1030 (24 HR CLOCK) [ ] VACATED OFFICE USE ONLY CODES E,11,5,7 ATD 04/14/81

[ ] TERMINATED [ ] MODIFIED [ ] SEE CONTINUATION FORM DATE 4-6-81

TYPE OF INSPECTION CAA

SIGNATURE ▶ [signature] 2-0115 AR

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION (original issue) DATED 02 / 20 / 80 No 0612743 - 2
MSHA FORM 7000-3a (Jun 78) SENT CERTIFIED MAIL

[X] SUBSEQUENT ACTION [ ] CONTINUATION [X] CITATION [ ] ORDER DATE 04 / 13 / 81 TIME 1600 (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36 - 01892 - (CONTRACTOR)

JUSTIFICATION FOR ACTION CHECKED BELOW The map of the west skidmore south dip conveyor gangway has been corrected and updated.

[ ] EXTENDED TO: DATE ___ / ___ / ___ TIME ___ (24 HR CLOCK) [ ] VACATED

[X] TERMINATED [ ] MODIFIED

[ ] SEE CONTINUATION FORM

OFFICE USE ONLY CODES 411 5 9 ATD 041481

DATE 4-14-81

TYPE OF INSPECTION F F A

SIGNATURE Vincent J. Galeck 20115 AR

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

[X] CITATION (SEE REVERSE) [ ] ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK) — 0611704

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR)

TYPE OF ACTION 104-(d)-(1)___-___-___ VIOLATION OF SECTION ___-___-___ OF THE ACT OR

PART AND SECTION 75.316 - 1(a)(1) OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 3-3-80

TYPE OF INSPECTION AFA [X] S AND S (SEE REVERSE) [ ] W N CODES C/A 13 PL 22 ATD 3/5/80

CONDITION OR PRACTICE The ventilation system map of the mine submitted to MESA on August 24, 1976, and February 8, 1977, did not include all known underground workings bordering the mine above and below and on adjacent properties in the vicinity of the West Skidmore South Dip conveyor gangway section. This violation was observed during an inspection conducted as part of the accident investigation into the March 1, 1977, inundation.

AREA OR EQUIPMENT

INITIAL ACTION [ ] NOTICE [ ] CITATION [ ] ORDER NO. ___ DATED ___/___/___ (MO/DA/YR)

TERMINATION DUE DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK) SIGNATURE ▶ John B Shelton 2-0101 AR

ACTION TO TERMINATE The ventilation system map was corrected and now includes all of the missing data indicated above.

DATE 2 / 20 / 80 TIME 1020 (24 HR CLOCK) SIGNATURE ▶ John B Shelton 2-0101 AR [ ] SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

[X] CITATION (SEE REVERSE) [ ] ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2 / 20 / 80 TIME 1015 (24 HR CLOCK) — 0611709

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR)

TYPE OF ACTION 104-(a)-___ VIOLATION OF SECTION ___-___-___ OF THE ACT OR

PART AND SECTION 75.1704-2(d) ___ OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 3-3-80

TYPE OF INSPECTION AFA [X] S AND S (SEE REVERSE) [ ] W N CODES C/A 11 PL 23 ATD 3 / 5 / 80

CONDITION OR PRACTICE According to testimony obtained from miners who worked in the West Skidmore South Dip conveyor gangway section, a map of the mine showing the designated escapeways from the working section to the main escapeway system was not posted in the working section at a location where all miners could acquaint themselves with the main escape system on or prior to March 1, 1977. This violation was disclosed during the accident investigation into the March 1, 1977, inundation.

AREA OR EQUIPMENT

INITIAL ACTION [ ] NOTICE [ ] CITATION [ ] ORDER NO. ___ DATED ___ / ___ / ___ (MO / DA / YR)

TERMINATION DUE DATE 2 / 20 / 80 TIME 1015 (24 HR CLOCK) SIGNATURE ▶ John Shuttleworth 2-0101 AR

ACTION TO TERMINATE A map of the mine showing designated escapeways was posted in the West Skidmore South Dip conveyor gangway section.

DATE 2 / 20 / 80 TIME 1015 (24 HR CLOCK) SIGNATURE ▶ John Shuttleworth 2-0101 AR [ ] SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

☐ CITATION (SEE REVERSE) ☒ ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2 / 20 / 80 TIME 1025 — 0611713

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR)

TYPE OF ACTION 104-(d)-(1)___-___-___ VIOLATION OF SECTION ___-___-___ OF THE ACT OR

PART AND SECTION 75.1701-___ OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 3-3-80

TYPE OF INSPECTION AFA ☒ S AND S (SEE REVERSE) ☐ WN CODES 0/34/30 ATD 3/5/80

CONDITION OR PRACTICE Working places in the West Skidmore South Dip conveyor gangway section were within 200 feet of inaccessible abandoned workings of an adjacent mine. However, boreholes were not found in the high-side rib of the gangway pillar for a distance of approximately 22.5 feet inby the west rib of No. 16 chute. The distance from the west rib of No. 17 chute inby to a rib hole in the high-side of the gangway pillar was approximately 10 feet. The distance from the east rib of No. 18 chute outby to a rib hole in the high

AREA OR EQUIPMENT West Skidmore South Dip conveyor gangway section.

INITIAL ACTION ☐ NOTICE ☒ CITATION ☐ ORDER NO. 0611704 DATED 2/20/80

TERMINATION DUE DATE ___/___/___ TIME ____ (24 HR CLOCK) SIGNATURE ▶ John B. Shuttleworth 2-0101 AR

ACTION TO TERMINATE

DATE ___/___/___ TIME ____ (24 HR CLOCK) SIGNATURE ▶ 2-0101 AR ☒ SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3a (Jun 78) (original issue) DATED 2/20/80 No 0611713-___

☐ SUBSEQUENT ACTION ☒ CONTINUATION ☐ CITATION ☒ ORDER DATE 2/20/80 TIME 1025 (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR)

JUSTIFICATION FOR ACTION CHECKED BELOW side of the gangway was approximately 17.0 feet. Spacing of the boreholes located in the west rib of the pillars in the No. 15 breast varied from approximately 16.0 feet to 20.5 feet. Furthermore, no boreholes were found in the low-side rib of the gangway between No. 16 and No. 18 chutes. According to testimony from miners who worked in the West Skidmore South Dip conveyor gangway section, boreholes were not drilled in the low-side rib in the gangway between No. 16 and No. 18 chutes. This violation was observed during an inspection conducted as part of the accident investigation into the March 1, 1977, inundation.

☐ EXTENDED TO: DATE ___/___/___ TIME ____ (24 HR CLOCK) ☐ VACATED OFFICE USE ONLY CODES 0/34/30 ATD 3/5/80

☐ TERMINATED ☐ MODIFIED ☐ SEE CONTINUATION FORM DATE 3-3-80

TYPE OF INSPECTION AFA SIGNATURE ▶ John B. Shuttleworth 2-0101 AR

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-2a (Jun 78)

(original issue) DATED 2 / 20 / 80 (MO / DA / YR) No 0611713 - 1

[X] SUBSEQUENT ACTION [ ] CONTINUATION [ ] CITATION [X] ORDER DATE 2 / 20 / 80 (MO / DA / YR) TIME 1025 (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36 - 01892 - - - (CONTRACTOR)

JUSTIFICATION FOR ACTION CHECKED BELOW To permit monitoring of the borehole drilling program required by the reopening plans.

[X] EXTENDED TO: DATE 02 / 20 / 81 (MO / DA / YR) TIME 0900 (24 HR CLOCK) [ ] VACATED

[ ] TERMINATED [X] MODIFIED

TYPE OF INSPECTION A F A

OFFICE USE ONLY CODES EM, 34431 ATD 3 / 5 / 80

[ ] SEE CONTINUATION FORM DATE 3-3-80

SIGNATURE John B Shubert 2-0101 AR

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

☐ CITATION (SEE REVERSE) ☒ ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2 / 20 / 80 TIME 1025 (24 HR CLOCK) — 0611706

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR)

TYPE OF ACTION 104(d)(1)_____ VIOLATION OF SECTION ___-___-___ OF THE ACT OR

PART AND SECTION 75.1701-_____ OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 3-3-80

TYPE OF INSPECTION AFA ☒ S AND S (SEE REVERSE) ☐ W N CODES 0/34/25 ATD 3/5/80

CONDITION OR PRACTICE Boreholes were not drilled in the West Skidmore South Dip conveyor gangway section in the upper rib of No. 1 heading off No. 15 breast. Boreholes were not drilled in adyance of the face or in the upper and lower ribs of No. 2 heading off No. 15 breast. Boreholes were not drilled in advance of the face or in the lower ribs of No. 3 heading off No. 15 breast. Boreholes drilled in the upper rib of No. 3 heading off No. 15 breast were not drilled at an angle of 45° nor was the spacing maintained at not more than

AREA OR EQUIPMENT West Skidmore South Dip conveyor gangway section.

INITIAL ACTION ☐ NOTICE ☒ CITATION ☐ ORDER NO. 0611704 DATED 2/20/80 (MO/DA/YR)

TERMINATION DUE DATE __/__/__ (MO/DA/YR) TIME ____ (24 HR CLOCK) SIGNATURE ▶ John S Shuler 2-0101 AR

ACTION TO TERMINATE

DATE __/__/__ (MO/DA/YR) TIME ____ (24 HR CLOCK) SIGNATURE ▶ 2-0101 AR ☒ SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3a (Jun 78) (original issue) DATED 2/20/80 No 0611706-___

☐ SUBSEQUENT ACTION ☒ CONTINUATION ☐ CITATION ☒ ORDER DATE 2/20/80 (MO/DA/YR) TIME 1025 (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR

JUSTIFICATION FOR ACTION CHECKED BELOW 8 feet apart. The spacing was from 6 to 12 feet apart. The working places were within 200 feet of inaccessible workings of an abandoned adjacent mine. This violation was observed during an inspection conducted as part of the accident investigation into the March 1, 1977, inundation.

☐ EXTENDED TO: DATE __/__/__ (MO/DA/YR) TIME ____ (24 HR CLOCK) ☐ VACATED OFFICE USE ONLY CODES 0/34/25 ATD 3/5/80

☐ TERMINATED ☐ MODIFIED ☐ SEE CONTINUATION FORM DATE 3-3-80

TYPE OF INSPECTION AFA SIGNATURE ▶ John S Shuler 21-1 AR

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3a (Jun 78)

(original issue) DATED 2 / 20 / 80 No 0611706 - 1
MO / DA / YR

[X] SUBSEQUENT ACTION [ ] CONTINUATION [ ] CITATION [X] ORDER DATE 2 / 20 / 80 TIME 1025
MO / DA / YR (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36 - 01892 - ___ (CONTRACTO

JUSTIFICATION FOR ACTION CHECKED BELOW To permit monitoring of the borehole drilling program required by the reopening plans.

[X] EXTENDED TO: DATE 02 / 20 / 81 TIME 0900 (24 HR CLOCK)
MO / DA / YR

[ ] VACATED

OFFICE USE ONLY
CODES FM,34 PLAT 27 ATD 3 / 5 / 80

[ ] TERMINATED [X] MODIFIED

[ ] SEE CONTINUATION FORM DATE 3-3-80

TYPE OF INSPECTION A F A

SIGNATURE John B Shuttleworth 2-0101
AR

U.S. DEPARTMENT OF LABOR—MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3 [Jun 78]

☐ CITATION (SEE REVERSE) ☒ ORDER OF WITHDRAWAL (SEE REVERSE) DATE 2 / 20 / 80 TIME 1030 (24 HR CLOCK) — 0611710

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR)

TYPE OF ACTION 104-(d)-(1)___-___-___ VIOLATION OF SECTION ___-___-___ OF THE ACT OR

PART AND SECTION 75.1200-___ OF TITLE 30 CODE OF FEDERAL REGULATIONS: OFFICE USE ONLY DATE 3-3-80

TYPE OF INSPECTION AFA ☒ S AND S (SEE REVERSE) ☐ W N CODES 01A34 PL 428 ATD 3/5/80

CONDITION OR PRACTICE The mine map in use at the mine and reviewed by MESA personnel during inspections of the mine on September 2, 1976, November 22, 1976, and February 17, 1977, was not accurate in that it did not show all adjacent abandoned mine workings within 1,000 feet of active workings in the West Skidmore South Dip conveyor gangway section. This mine map was reviewed with Samuel Klinger, mine foreman, on February 17, 1977, while conducting a regular Health and Safety Inspection of the mine. This violation was observed during

AREA OR EQUIPMENT West Skidmore South Dip conveyor gangway section.

INITIAL ACTION ☐ NOTICE ☒ CITATION ☐ ORDER NO. 0611704 DATED 2 / 20 / 80

TERMINATION DUE DATE ___ / ___ / ___ TIME ___ (24 HR CLOCK) SIGNATURE ▶ 2-0133 AR

ACTION TO TERMINATE The mine map was corrected to show all adjacent abandoned mine workings within 1,000 feet of active workings.

DATE 2 / 20 / 80 TIME 1035 (24 HR CLOCK) SIGNATURE ▶ Charles C. Klinger 2-0133 AR ☒ SEE CONTINUATION FORM

U.S. DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MSHA FORM 7000-3a (Jun 78)

(original issue) DATED 2 / 20 / 80 No 0611710-___

☐ SUBSEQUENT ACTION ☒ CONTINUATION ☐ CITATION ☒ ORDER DATE 2 / 20 / 80 TIME 1050 (24 HR CLOCK)

SERVED TO Leon F. Richter, Vice-President OPERATOR Kocher Coal Company

MINE Porter Tunnel MINE I.D. 36-01892-___ (CONTRACTOR

JUSTIFICATION FOR ACTION CHECKED BELOW an inspection conducted as part of the accident investigation into the March 1, 1977, inundation.

☐ EXTENDED TO: DATE ___ / ___ / ___ TIME ___ (24 HR CLOCK) ☐ VACATED OFFICE USE ONLY CODES 01A34 PL 428 ATD 3/5/80

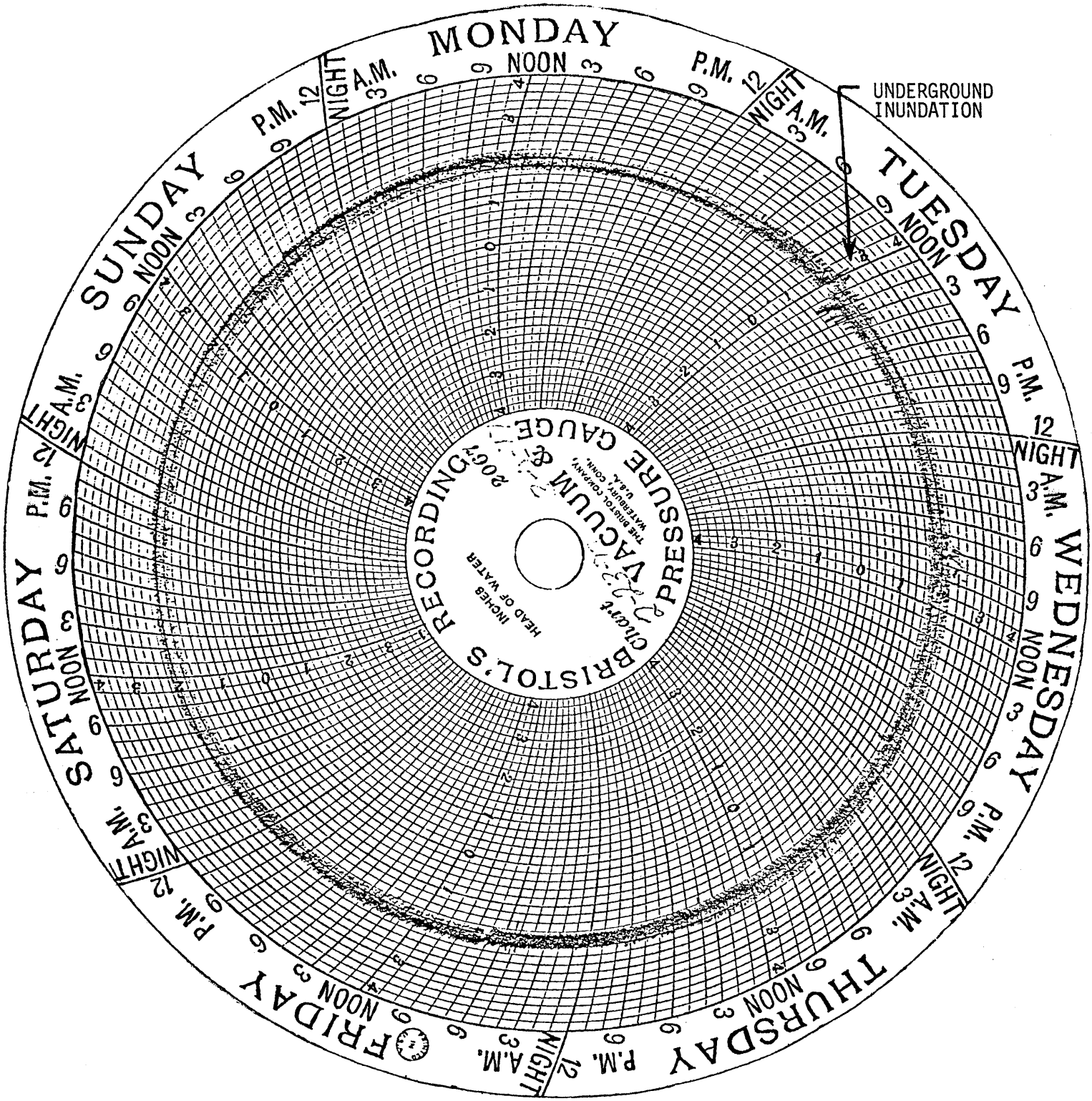
☐ TERMINATED ☐ MODIFIED ☐ SEE CONTINUATION FORM DATE 3-3-80

TYPE OF INSPECTION AFA SIGNATURE ▶ Charles C. Klinger 2015 AR

MAIN SURFACE FAN PRESSURE RECORDING CHART

APPENDIX B

FEBRUARY 23, 1977 TO MARCH 2, 1977



APPENDIX C

VICTIMS OF INUNDATION ON MARCH 1, 1977
PORTER TUNNEL MINE (ID NO. 36-01892)
KOCHER COAL COMPANY

NAME	SSN	AGE	SEX	JOB CLASSIFICATION	EXPERIENCE AT THIS CLASSIFICATION	TOTAL MINING EXPERIENCE	TRAINING
Gary L. Klinger	165-48-5862	19	M	Laborer	7 months	7 months	On-the-job training
Philip Sabatino	204-20-7643	50	M	Miner	25 years	25 years	First-aid Gas detection, Self-rescue
Donald E. Shoffler	203-30-0911	41	M	Miner	19 months	6 years	First-aid Gas Detection Self rescue
Ralph H. Renninger	170-30-7328	40	M	Miner	15 months	20 years	First-aid Gas detection Self rescue
Ronald Herb	208-34-7256	32	M	Miner	10 months	8 years	On-the-job training
Dennis Morgan	168-36-4772	30	M	Miner	21 months	10 years	First-aid Gas detection Self rescue
John Moyer	189-26-5825	44	M	Miner	3 years, 5 months	20 years	First-aid Gas detection Self rescue
Mark H. Kroh	207-28-1131	38	M	Miner	10 months	25 years	On-the-job training
Timothy L. Grose	165-48-5750	19	M	Laborer	11 months	11 months	On-the-job training

FIGURE 1 - Photo showing the start of the rescue tunnel with a MESA inspector at the inby end.

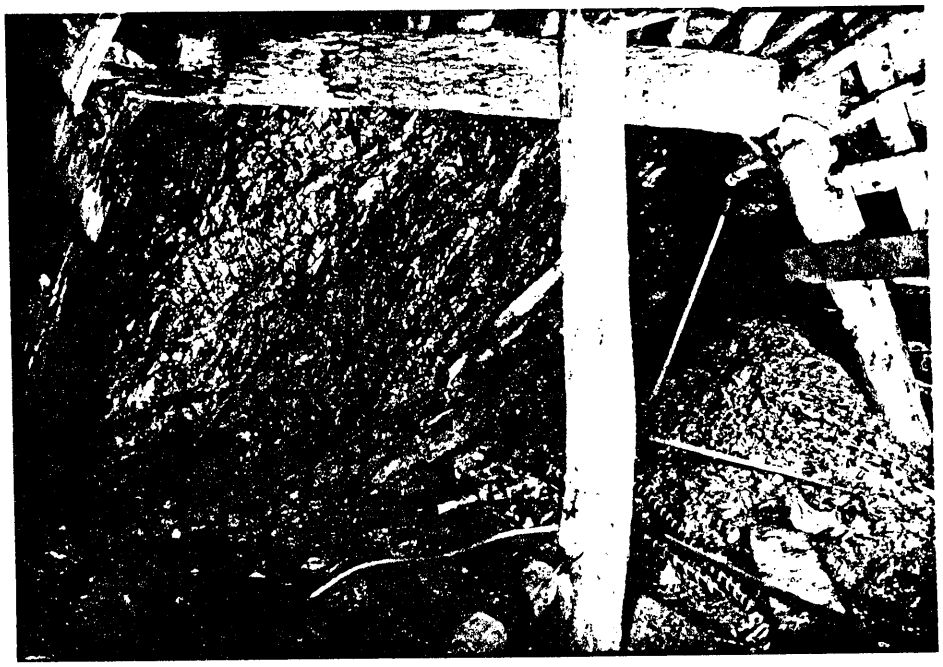


FIGURE 2 - Photo showing the face of the gangway upon completion of the rescue and recovery operations. View looking west.

FIGURE 3 - Photo showing the condition before cleanup between Nos. 12 and 13 chutes in the gangway. View looking west.

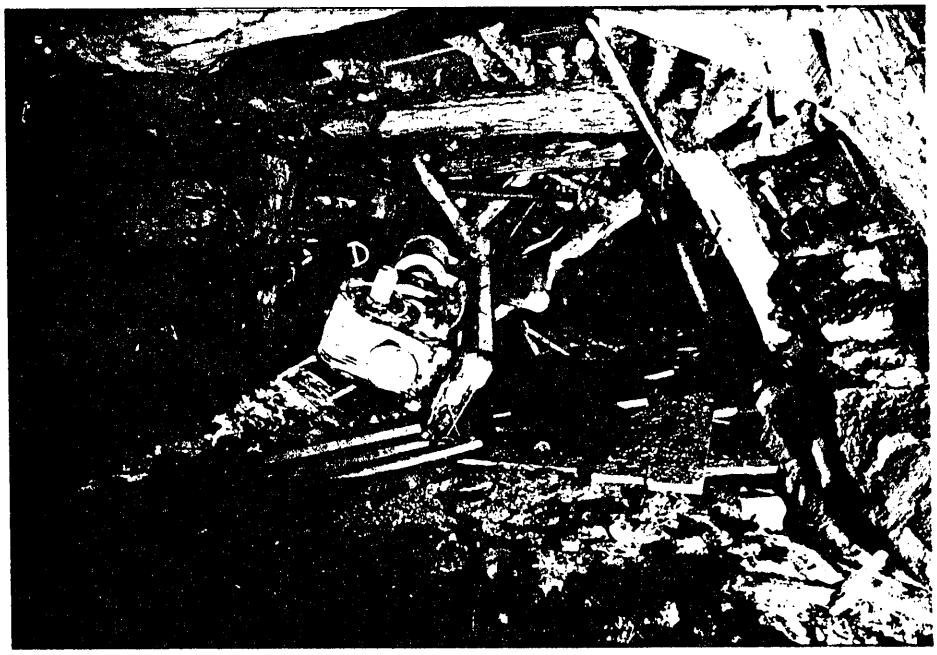


FIGURE 4 - Photo showing the overturned condition of the No. 2 conveyor drive unit located between Nos. 11 and 12 chutes in the gangway. View looking west.

FIGURE 5 - Photo showing the blocked condition in the gangway 25 feet inby No. 13 chute. View looking west.

FIGURE 6 - Photo showing dislodged props, debris and loose coal in the monkey airway at No. 12 chute. View looking west.

FIGURE 7 - Photo showing the face of the monkey airway inby No. 13 chute.

FIGURE 8 - Photo showing cleanup progress in the main tunnel in the vicinity of the West Skidmore South Dip conveyor gangway counter chute.

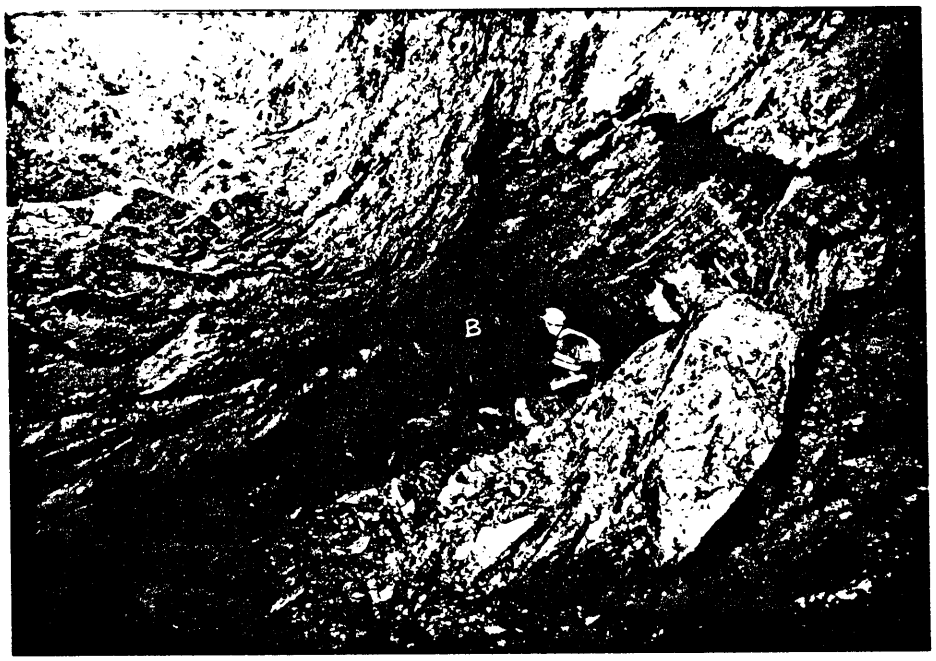


FIGURE 9 - Photo showing the condition of the monkey airway at No. 13 chute. View looking west.

Figure 10 - Photo showing the condition of the monkey airway between No. 13 and 14 chutes. View looking west.

FIGURE 11 - Photo showing the debris laden void over the counter chute in the gangway.

FIGURE 12 - Photo showing the timber and forepoles placed in the face area of the gangway during the rescue and recovery operations. View looking west.

APPENDIX E

The following persons participated in the rescue and recovery operations:

Kocher Coal Company, Officials

Raymond Keefer	Section Foreman
Samuel Klinger	Mine Foreman and Health and Safety Officer
Palmer Merwine	Section Foreman
John Messaros	Chief Clerk
Leon F. Ritcher	Vice-President
Forrest A. Schucker	Mining Engineer

Kocher Coal Company, Employees

Harold Betz, Jr.	Miner
Albert Carl	Miner
George Feester	Miner
James Fetterhoff	Miner
Jan Kornaski	Miner
Melvin Krise	Miner
Robert Long	Miner
Leroy Manhart	Miner
Charles McGee	Miner
Richard Nahodil	Miner
Thomas Profit	Miner
Richard Schaeffer	Miner
Randy Slodysko	Miner
Ivan Sweinhart	Miner
John Zanella	Miner

Pennsylvania Department of Environmental Resources

Joseph J. Halaburda	Anthracite Mine Inspector
Arthur E. Hand	Anthracite Mine Inspector
Clarence E. Miller	Anthracite Mine Inspector
Leonard W. Rogers, Sr.	Anthracite Mine Inspector
James J. Shober, Jr.	Director, Bureau of Anthracite Deep Mine Safety
Walter Vicinelly	Commissioner, Deep Mine Safety

No. 1 Contracting Company

Al Roman	Vice-President

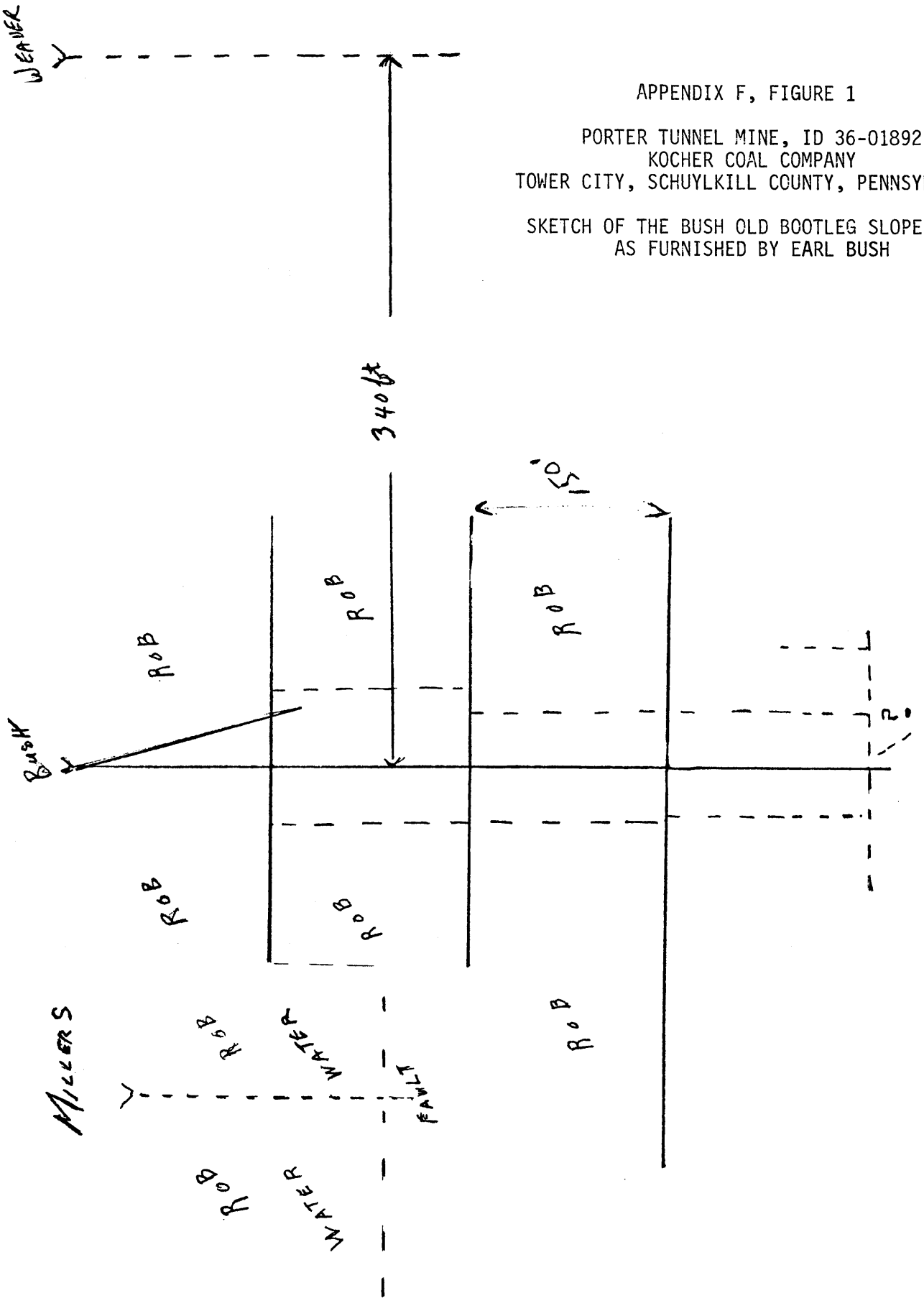
Mining Enforcement and Safety Administration

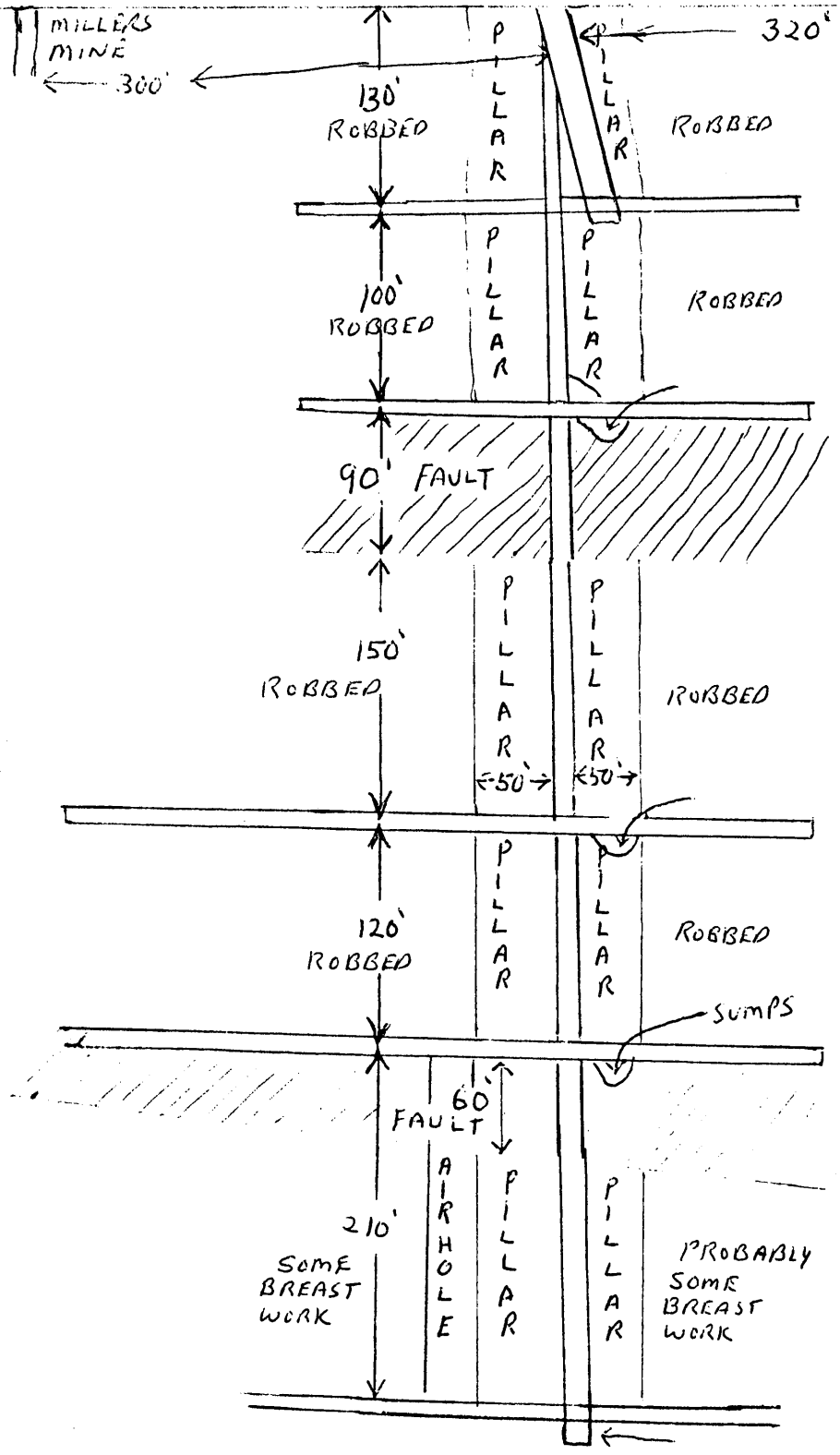
Jerome M. Buchinski	Coal Mine Inspector
Earl J. Cawley	Coal Mine Inspector
Edward C. Connor	Supervisory Coal Mine Technical Specialist (Health)
Joseph O. Cook	Deputy Assistant Administrator for Coal Mine Health and Safety
Robert W. Dalzell	Chief, Division of Health Technology
Frank P. Danna	Coal Mine Inspector
Derwood DeHaven	Assistant District Manager
Richard J. Duszewski	Coal Mine Inspector
Joseph W. Fisher	Mining Engineering Technician
Lee E. Gottschall	Mining Engineering Technician
Peter A. Gregas	Coal Mine Inspector
James D. Harman	Coal Mine Inspector
Ralph S. Johnson	Coal Mine Inspector
Charles C. Klinger	Coal Mine Inspector
Jeffrey H. Kravitz	Chief, Mine Emergency Operations Branch
James R. Laird	Coal Mine Inspection Supervisor
Donald Markle, Jr.	Coal Mine Inspector
Charles R. Martin	Coal Mine Inspector
Victor G. Mickatavage	Coal Mine Inspector
Robert G. Peluso	Deputy Assistant Administrator, Technical Support
Leonard W. Rogers, Jr.	Mining Engineering Technician
Michael C. Scheib	Coal Mine Inspector
Anthony F. Schetroma	Coal Mine Inspector
James E. Shoffstall	Coal Mine Inspector
Edward P. Scotko	Coal Mine Inspector
John B. Shutack	District Manager
Vincent J. Stella	Coal Mine Inspector
Benjamin J. Thomas	Coal Mine Inspector
Jack E. Tisdale	Representative, Office of the Administrator, Coal Mine Health and Safety
Dean W. Updegrave	Coal Mine Inspector
Charles M. Weimer	Coal Mine Inspector
Anthony M. Yamulla	Coal Mine Inspector
Alfred A. Yavorosky	Coal Mine Inspector
Albert F. Zegley	Coal Mine Inspector

APPENDIX F, FIGURE 1

PORTER TUNNEL MINE, ID 36-01892
KOCHER COAL COMPANY
TOWER CITY, SCHUYLKILL COUNTY, PENNSYLVANIA

SKETCH OF THE BUSH OLD BOOTLEG SLOPE MINE,
AS FURNISHED BY EARL BUSH





APPENDIX F, FIGURE 2

PORTER TUNNEL MINE, ID 36-01892
KOCHER COAL COMPANY
TOWER CITY, SCHUYLKILL COUNTY, PENNSYLVANIA

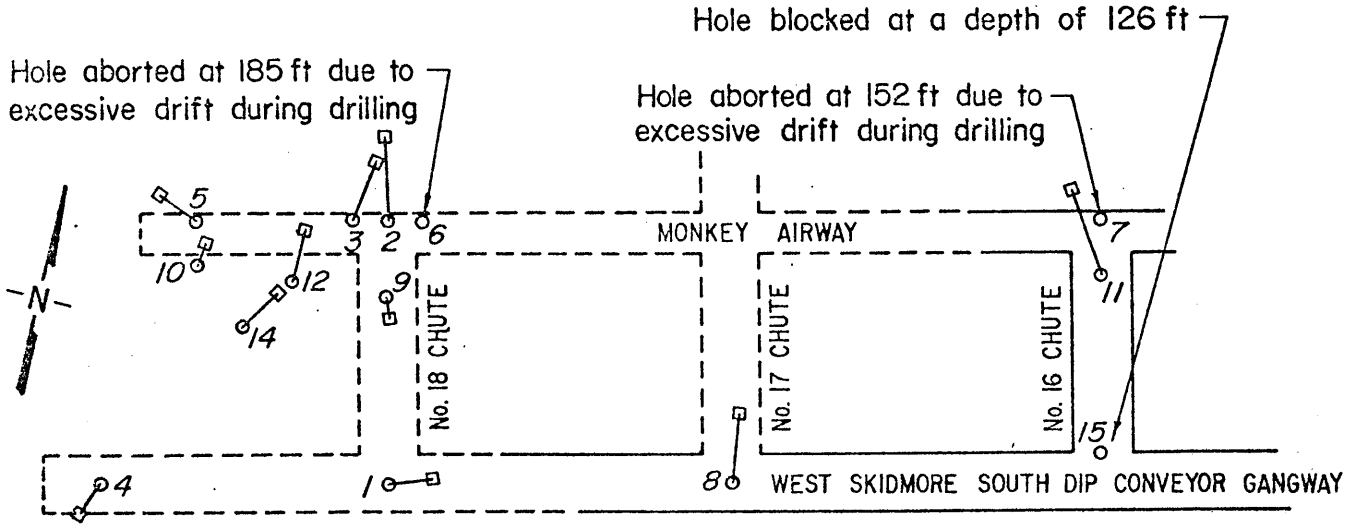
SKETCH OF THE BUSH OLD BOOTLEG SLOPE MINE,
AS FURNISHED BY RAY BUSH

NOTES

1. THIS IS TO THE BEST OF MY RECOLLECTION BUT NOT GUARANTEED TO BE ACCURATE.
2. COAL THICKNESS VARIED FROM 8' TO 18' EXCEPT FOR 2' IN FAULTS.
3. BEST OF ROCK TOP
4. NO TIMBER IN SLOPE EXCEPT FOR TOP 30'
5. GANGWAY HAD TIMBER ONLY ON RIB (SINGLE)
6. MILLERS MINE HAS DANGEROUS SUPPLY OF WATER
7. WEAVERS MINE WORKED LOWER THAN MILLERS
8. PITCH OF THIS MINE 10° AT VERY TOP PROGRESSIVELY INCREASING TO 40 OR 45° AT BOTTOM.
9. NO AIR HOLE THRU TOP FAULT SO I ASSUME IT CONNECTED TO WEAVERS BELOW FIRST FAULT.
10. I WAS NOT ALLOWED TO ENTER LOWER LEVEL AFTER GAS WAS DISCOVERED, BUT BASED ON THE PAY CHECKS THAT MY FATHER HAD, HE MUST OF HAD SOME BREASTS GOING
11. LAST LEVEL DEPTH 800'
12. POWER BY GASOLINE ENGINE & GENERATOR.
13. MINE INSPECTORS HAD VISITED THIS MINE
14. SOLD BY MY FATHER & OPERATED FOR SEVERAL MONTHS LATER.
15. HEARD ABOUT BOTTOM LEVEL AIR HOLE (THRU FAULT) BUT I NEVER SAW IT
16. SLOPE WIDTH APPROX 10'
17. GANGWAY WIDTH ABOUT 9' AT BASE
18. THIRD & FOURTH LEVEL GANGWAYS MORE THAN 150' TOWARD MILLERS BUT DISTANCE IS UNKNOWN
19. HAD TWO WAY AIR

RECORD OF PROBE HOLES FROM SURFACE

HOLE No.	STARTED	DEPTH OF HOLE	REMARKS
1	March 4, 1977	432 ft	
2	March 8, 1977	399 ft	Missed desired location
3	March 10, 1977	423 ft	Missed desired location
4	March 11, 1977	439 ft	
5	March 11, 1977	435 ft	Missed desired location
6	March 11, 1977	185 ft	Hole aborted
7	March 12, 1977	152 ft	Hole aborted
8	March 12, 1977	425 ft	
9	March 12, 1977	398 ft	
10	March 13, 1977	448 ft	
11	March 13, 1977	360 ft	
12	March 14, 1977	422 ft	
13			Not drilled
14	March 15, 1977	385 ft	
15	March 15, 1977	405 ft	Hole aborted



LEGEND

- o Surface location of hole
- □ Underground location of hole

0 40
Scale, ft

APPENDIX G, FIGURE 5
PORTER TUNNEL MINE ID 36-01892
KOCHER COAL COMPANY
TOWER CITY, SCHUYLKILL COUNTY, PENNSYLVANIA

Map showing the location of the surface probe holes drilled into the West Skidmore South Dip conveyor gangway section

S-1203

APPENDIX H

MINING METHODS, CONDITIONS AND PRACTICES

Mining Methods

The breast-and-pillar system of mining was followed in the West Skidmore South Dip conveyor gangway section, as well as in all other South Dip sections of the mine. Gangways were normally driven 12 feet wide, with chutes 8 to 10 feet in width, being turned on 60-foot centers and driven approximately 35 feet up the pitch to the monkey airway, which averaged 6 feet in width. Breasts were driven up the pitch 6 to 20 feet in width and were extended to their limit, which varied from 325 to 535 feet. Miner headings connected the breasts at about 60-foot intervals.

The West Skidmore South Dip conveyor gangway and monkey airway had been advanced approximately 1,050 feet westerly from the main tunnel. Advancement was accomplished by blasting coal (and rock in the gangway) off the solid. Three-person crews worked in the gangway, the monkey airway and the slant breast being driven from Nos. 17 to 15 breasts. Due to the variable thickness of the coal veins, it was generally necessary to excavate bottom rock in order to maintain height in the gangway and, in some cases, alignment to facilitate installation of the air-driven chain conveyor. This bottom rock excavation varied in depth from 2 to 8 feet, depending on the thickness of the coal vein. The rock and coal were blasted simultaneously and then hand-loaded onto the chain conveyor.

In addition to the development of the gangway, airway and breasts, pillars were also being extracted in the West Skidmore South Dip conveyor gangway section. Pillar extraction had been completed between Nos. 4 and 11 chutes above the first miner heading.

Pillars were being extracted by utilizing either the split or skip method. The coal and rock from the gangway was hand-loaded onto the chain conveyor. Coal from the monkey airway, the slant breast and the pillar area was loaded by gravity onto the two air-driven chain conveyors being operated in tandem. The conveyor dumped into a counter chute from which the material was loaded into mine cars on the main tunnel track for transportation to the surface.

An approved roof-control plan, consisting of various methods, was utilized to control the roof and ribs in the Porter Tunnel Mine. In the South Dip sections, the East Primrose, West Skidmore and East Top Split Mammoth veins were being mined. These veins ranged between the horizontal and 48 degrees. Three-piece timber sets were used in the 12-foot-wide gangways, as they were advanced. Chutes were projected on 50-foot centers, to be driven a minimum distance of 35 feet to the monkey airway. The plan required that single props on centers, not exceeding 5 feet in each direction, be used in the chutes. These props were to be lined with boards in order to provide a protected travelway. Breasts were driven 6 to 20 feet in width and props were installed on 5-foot centers each way. The monkey airways were driven 6 feet in width, with props installed on 5-foot centers for roof and rib support.

Explosives

Blasting in the Porter Tunnel Mine was done with permissible explosives manufactured by Atlas Powder Company. Cartridges, 1-1/4 inches by 8 inches of Coalite, were used for blasting coal and the same size cartridges of 40 percent Gelcoalite were used for blasting rock. The storage magazine on the surface was of cinder block construction with a storage capacity of 10,000 pounds. For distribution underground, the explosives were loaded from the surface magazine directly into specially constructed mine cars which transported the explosives into the mine. The explosives were then transferred from the car to the section storage boxes. The explosives and detonators were stored in separate boxes. A one-day supply was taken into the working place in separate containers and was prepared in the face area prior to blasting. Electric detonators, manufactured by Atlas Powder Company, and permissible blasting units were used. Incombustible material was used for stemming, and blasting was done when needed during the working shift. All blasting done in the West Skidmore South Dip conveyor gangway was off the solid. Usually, from 10 to 14 holes for blasting were drilled about 5 feet deep in the gangway face, and the charged holes were detonated with electric detonators. A similar procedure was followed in all other working places in this section. The number of holes for blasting in each place was determined by the width of the place and the thickness of the coal.

Ventilation and Gases

The mine was ventilated by a continuously operated Jeffrey (5- by 10-foot) centrifugal fan installed on the surface. The fan was driven by a 200 horsepower motor. The fan was operated blowing and produced 130,000 cubic feet of air a minute (cfm) with a 2-inch positive water gauge pressure. This fan ventilated all areas of the mine, including active working sections in the Primrose vein, the Holmes vein, the Top Split and the Middle Splits of the Mammoth and Skidmore veins. Splitting of the air was accomplished by regulators. Short-circuiting of the ventilating air current was prevented by the installation of stoppings between the intake and return airways and by two automatically operated doors, forming an airlock in the main tunnel, approximately 1,000 feet inby the portal. The air returned to the surface by way of the various return airways, as well as by an extensive bleeder system, which in some instances, consisted of openings to the surface. At the time of the last Federal inspection of this mine completed on February 17, 1977, there was 24,000 cfm entering the West Skidmore South Dip conveyor gangway with 2,170 cfm at the face of the gangway; 1,575 cfm at the face of No. 17 breast; 5,880 in the immediate section return; and, 37,200 cfm in the main return from the South Dip sections off the main tunnel. A petition for modification granted July 24, 1975, pursuant to Section 301(c) of the Act, permitted operation of this mine with 1,500 cfm at the working face and 5,000 cfm in the last open crosscut. As of September 16, 1976, the mine was liberating 13,000 cubic feet of methane per day (24 hours). (A reproduction of a portion of the ventilation map, approved by MESA on February 9, 1977, showing the West Skidmore South Dip section is in Appendix G, Figure 1.)

Preshift examinations were made by certified examiners before the first operating shift. Preshift examinations for succeeding shifts were made by certified examiners during their regular on-shift tour of duty. The preshift examiner's record book indicated that preshift examinations were made throughout the mine immediately prior to the beginning of the first working shift on Tuesday, March 1, 1977. The usual starting time for the first working shift was approximately 6 a.m. Company records show that Palmer Merwine, section foreman, made the preshift examination of the West Skidmore South Dip conveyor gangway section at approximately 3:30 a.m. on March 1, 1977. Upon completion of the balance of the preshift examination, he proceeded to the main tunnel where he met the oncoming shift workers at 5:30 a.m. at the counter chute leading to the West Skidmore South Dip conveyor gangway section. He also made an on-shift examination of the gangway face area at 9:30 a.m., and he completed the on-shift examination of the section and returned to the main tunnel at 11 a.m.

Transportation

The coal from the West Skidmore South Dip conveyor gangway was transported approximately 1,050 feet by two compressed air-driven chain conveyors which discharged the coal into a counter chute from which it was loaded by gravity into steel mine cars fitted with automatic couplers. The cars were transported to the surface by battery-powered or diesel locomotives, where they were dumped by a hydraulically-powered end dumper. The main line haulage track, as well as the track in the gangways, consisted of 90-pound steel rails installed on wooden crossties. Miners were transported underground and to the surface in covered mantrip cars. A two-way communication system was provided in the mine and between the surface and underground by means of a 24-volt pager telephone system.

Check-in and Check-out System

A check-in and check-out system was maintained at the mine. The system consisted of a board situated in the lamphouse upon which was listed the name and identification number of each employee, both surface and underground, which corresponded to the identification stamped on a brass tag and securely fastened to the employee's belt. Further identification was provided by a corresponding number which was stamped on the employee's cap lamp.

Electricity

Electric power, at 66,000 volts alternating current, was purchased from the Pennsylvania Power and Light Company and was reduced by transformers to 110, 220, 440 and 2,300 volts alternating current for use only on the surface. Other than the 24 volts for the telephone system, the only electricity used underground was storage battery-operated locomotives which were charged on the surface.

Escapeways

Two separate and distinct travelable passageways were maintained to insure passage at all times of any persons, including those disabled, from working sections to the surface. These designated escapeways, one of which was ventilated with intake air, were properly marked.

Personnel Training

Company records indicated that mandatory training of qualified and certified persons was provided.

Mine Water Drainage

The main tunnel and gangways were developed on a slight positive grade to facilitate natural drainage, and pumping was not required.

GLOSSARY OF TERMS

Breast

The room or chamber driven up the pitch at a right angle to and immediately off of the monkey airway. Breasts are normally driven from 15 to 24 feet in width, on centers ranging from 40 to 60 feet. The breasts are the major portion of coal extraction.

Breast Pillar

Local terminology. The pillars formed or left between the individual breasts and miner headings, as opposed to gangway pillar which is the pillar that lays between the gangway and monkey airway and is formed by the intersection of the chutes with these two entries.

Bench, Top Bench, Bottom Bench

One of two or more divisions of a coal seam; sometimes separated by slate, or by the process of cutting or mining the coal. If the bench adjacent to the bottom rock is left intact, the mining is considered to be performed in the top bench. If the bench is adjacent to the top, or roof rock is left intact, the mining is considered to be performed in the bottom bench.

Chamber

A working place in a mine, also referred to as a room or breast.

Chute

The passage or connection between the gangway and monkey airway. Chutes are driven up the pitch at a right angle to the gangway. They are normally 8 to 10 feet in width and are spaced on centers ranging from 40 to 60 feet. It is from the chutes that the coal is loaded into the haulage medium on the gangway.

Counter Chute

The opening driven from the main tunnel level to the West Skidmore South Dip conveyor gangway which is driven at a higher elevation. The main purpose of this counter chute is to convey the coal from the higher to the lower elevation.

Crossbar, Cap, Collar

These are equivalent terms, all denoting the horizontal or top member of a timber set.

Face, Working Face

(a) The solid surface of the unbroken or uncut portion of the coalbed or vein at the advancing end of the working place; (b) A point at which coal is being worked away in a gangway, chute, monkey airway, heading or breast.

GLOSSARY OF TERMS - Continued

Flank Hole

A small diameter hole drilled from an underground working place when approaching old workings to ascertain the proximity of those workings and to determine the presence of water, gas or other dangers. Flank holes are usually driven from the sides or ribs of the working place at the angle (normally 45 degrees) with the center line of that working place.

Floor

(a) The upper surface of the stratum underlying a coal seam or vein;
(b) The bottom of a coal seam or any other mineral deposit.

Folded Strata, Fold

The structure of rocks or strata that have been bent into a dome (anticline), a basin (syncline), a terrace (monocline) or a roll. Observed mainly in mountainous regions and is characteristic of both the altered and unaltered sedimentary rocks. Strictly, a strong flexure of a stratum, with steeply inclined sides.

Forepoles, Forepoling

The driving of poles or 2-inch planks above the collars or caps of 3-piece timber sets to hold up weak roof until a permanent timber set can be installed. Forepoles are also driven ahead of the vertical members (legs) of timber sets to support weak or friable ribs until the next permanent timber set can be installed.

Gangway

The initial or main entry driven in a vein or seam of coal. It is usually driven 10 to 12 feet in width and serves as the main air intake, as well as the travel haulageway. Haulage can be either track, belt, or chain conveyor.

High Side Rib

The highest side or rib of a gangway, monkey airway, or miner heading and is the side pitching uphill away from the point of reference.

Intake Airway

The passage or entry by which the ventilating current enters the mine or section of the mine.

GLOSSARY OF TERMS - Continued

Lagging

Pieces of timber approximately 6 feet in length and between 2 and 6 inches in diameter used to support and secure the roof and ribs behind the main timber sets. Lagging wedges and secures the supports against the rock or coal and provides early resistance to pressure.

Miner Heading

The crosscut or passage connecting parallel and adjacent breasts. Miner headings are driven at right angles to the breasts on centers ranging from 40 to 60 feet and are normally from 6 to 10 feet in width. The main purpose of the miner heading is to conduct the ventilating air current.

Monkey Airway

Local terminology. The air course or entry driven immediately above and parallel to the gangway. It is usually driven from 8 to 10 feet in width and is the entry from which the breasts are started.

Mucking Machine

A machine operated by compressed air or electricity used to load blasted coal or rock from the working face into mine cars or conveyors.

North Dip, South Dip

Terms used to describe the direction of the downward slope of the coal vein. These terms are in direct opposition to north rise and south rise which describe the upward slope or pitch of the coal vein.

Pillar

(a) An area or block of coal or ore left to support the overlayng strata;
(b) The part of the coal left between the individual rooms or breasts and entries in room and pillar mining.

Pillar Run

A condition wherein a coal pillar either entirely or partially crushes out and slides down the pitch. The crushing out is usually due to excessive pressure being exerted by the overlying strata.

Pitch

(a) The angle at which a coal seam inclines below a horizontal line;
(b) The grade of an incline or the rise of a seam.

GLOSSARY OF TERMS - Continued

Return Airway

Portion of the ventilation system of the mine through which contaminated air is withdrawn and evacuated to the surface.

Rock Hole, Rock Chute

A short staple entry or connection driven from a lower to a higher coal seam and used for the gravity transfer of coal to the haulage road in the lower seam. Also used as a travelway for miners and to conduct ventilating air currents.

Rock Hole-To-Rock Hole

The act of traveling from one rock hole to another to gain access to or make egress from a mine secion.

Roof

The rock immediately above a coal seam. In the anthracite area, it can range from shale to slate sandstone, and sometimes conglomerate, but is usually softer than similar rocks higher up in the roof strata.

Slant Breasts

Sometimes referred to as the slant chute. Similar to a miner heading, with the exception that the slant breast or chute connects two parallel breasts at an oblique angle, rather than at a right angle. The slant breast is usually equipped with a sheet iron chute and is used to convey coal from one breast to the other.

Timber Set

A timber frame used to support the roof sides and sometimes the floor of mine haulage or roadways. The simplest timber set consists of a crossbar, cap, or collar, supported on two upright posts or legs with round or board lagging extending to adjacent sets over the collar and behind either leg. The timbers are usually between 6 and 12 inches in diameter and are erected on centers ranging from 2 to 6 feet.

Two-Piece Set

A timber often used in heavily pitched seams, where only one vertical member or leg is used to support the collar or cap. The other end of the collar is box hitched into either the top or bottom rock.

Three-Piece Set

The more conventional timber set where the collar, cap, or crossbar is supported on both ends by upright and vertical members called legs or posts.

GLOSSARY OF TERMS - Continued

Vein or Seam

A stratum coalbed or other mineral, generally applied to large deposits of coal. In geological terms, it is a thin layer or stratum of rock. Vein of coal, coalbed, and coal seam are equivalent terms. The term "bed" is preferred by the U.S. Geological Survey, the U.S. Bureau of Mines, State geologists, and coal authorities. It indicates all the coal, partings, and seams which lay beteen a distinct roof and floor.