

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION

FINAL REPORT OF MULTIPLE FATAL ROPE FALL ACCIDENT

BERGER NO. 2 MINE (ID NO. 41543202)
BOY TRUCKING COMPANY, INC.
EVART HARLAN COUNTY, KENTUCKY

September 12, 1984

By

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INTRODUCTION

On Wednesday, September 12, 1984, at approximately 9:20 a.m., a massive roof fall occurred in the second set of entries off 1st right of the Berger No. 2 Mine, Bon Trucking Company, Inc., Evarts, Harlan County, Kentucky. The fall was located in the second crosscut.

Six miners were caught by the fall, four of whom were killed instantly. One miner was partially covered by the rock fall and sustained serious injuries. Another miner was also partially covered, but crawled to relative safety without sustaining serious injuries.

The accident occurred with little or no warning while repairs to a bridge conveyor, used with an auger-type continuous mining machine, were being made. A large portion of the roof, about 100 feet long, 30 feet or more wide, and 10 feet to a featheredge in thickness, fell and covered one bridge conveyor and part of the mining machine.

The work of recovering the four bodies was performed by miners from the Berger No. 2 Mine, miners from nearby mines, and personnel from the Kentucky Department of Mines and Minerals and the Mine Safety and Health Administration (MSHA). Recovery of the last body was completed at 1:45 a.m., Saturday, September 15, 1984. The names of the victims, their ages, occupations, and job experiences are listed in Appendix A.

GENERAL INFORMATION

The Berger No. 2 Mine (ID No. 15-13202) was owned by Bon Trucking Company, Inc., and was located in Possum Hollow on the west side of Little Black Mountain near Shields, Kentucky, approximately 4 miles east of Evarts, Harlan County, Kentucky. The names and titles of the operating officials were:

Harvey Napier	President
William Belcher	Safety Director
James R. Chasteen	Superintendent
A. Dale Williams	Superintendent, Berger No. 1 Mine
Alonzo Cornett	Secretary/Treasurer
Rick K. Ayers	Surveyor

According to MSHA's Controller Information Report, Mr. Harvey Napier is also controller of EHL Coal Company; CNC Coal Sales, Inc.; BTC Coal Company, which apparently operates Berger No. 1 Mine; Verda Coal Sales; and Bonanza Trucking Company. The Berger No. 2 Mine is on property owned by Eastover Mining Company, which leases the coal mining rights to Bon Trucking Company, Inc. Bon Trucking had subleased Berger No. 2 Mine to Shields Mining Company. On or about April 4, 1984, the sublease was terminated and Bon Trucking assumed control of Berger No. 2 Mine. The first set of entries to the right off 1st right was developed by Bon Trucking, except for the first two crosscuts.

The Kellioka coalbed averages 30 inches in thickness and was being mined by an auger-type continuous mining machine that was propelled by wire rope and drum. The raw coal was transported by bridge conveyors and belt haulage conveyors to the surface and trucked approximately 6 miles to the Verda Tipple (ID No. 15-11506) in Verda, Harlan County, Kentucky. The Verda Tipple was owned by the Bonanza Trucking Company, Evarts, Kentucky.

The immediate roof in this mine consisted of 10 feet of laminated, silty shale, while the main roof consisted of approximately 40 feet of sandy shale. The 50-inch thick Darby coalbed was about 50 feet above the Kellioka coalbed. The Darby coalbed had been extensively mined in this area from the 1930's through the 1950's. Old workings are located over the Berger No. 2 Mine, including the area of the accident scene, but there is no indication that they caused roof falls in the Berger No. 2 Mine.

The permeability of the main roof in the Berger No. 2 Mine contributed to the overall wet condition in the mine. Water dripped from the roof and accumulated in various swags in the mine floor from where it was either pumped into the abandoned area of the mine or to the outside. The coalbed dipped about one percent to the north-northeast, which allowed some of the accumulated water to flow out of the drift mouth.

The floor underlying the Kellioka coalbed consists of blue shale, averaging 30 feet in thickness. The Harlan coalbed is approximately 75 feet below the Kellioka coalbed. In the first half of this century, the Harlan coalbed had been mined extensively, including the area under the Berger No. 2 Mine, by

the Reese Coal Company and the Blue Coal Company. There is no indication that mining in the Harlan coalbed caused roof falls in the Berger No. 2 Mine.

At the time of the accident, the No. 1 entry was used as an intake air course and the No. 3 entry was used as a return air course. A fixed-blade fan induced approximately 35,000 cubic feet per minute of air. The No. 2 entry was used for belt conveyor haulage. Access into the mine was provided by scoop tractor traveling in the No. 1 entry. Sworn statements indicated, however, that the belt haulage conveyors were the normal mode of transportation for miners and supplies.

The mine normally operated 5 days per week with one section working one shift and producing from 100 to 150 tons of coal per day. The evening shift at the mine was normally a maintenance shift, but the miners had recently been transferred to positions on the day shift. On September 12, 1984, a total of 14 miners were present at the mine for the day shift. On that day, 13 miners were underground by 7:00 a.m. and coal production was started by 7:45 a.m.

The mine was developed by driving three entries in a southerly direction for about 1,150 feet from the drift mouth. About 1,000 feet inby the portal and in an easterly direction, three other entries were developed for approximately 400 feet. Mining in that area was stopped about one year before the fatal accident. Another set of entries, designated as 1st right by MSHA, about 900 feet inby the drift mouth had been developed in a westerly direction for approximately 900 feet. Two sets of entries were then mined to the right in a northwesterly direction. The first set consisted of three entries and was developed about 760 feet. These entries were then abandoned or, according to the mine map obtained from the mine office, the pillars were mined on retreat. The second set of entries had been advanced for approximately 500 feet. Sworn statements and the mine map indicate that the pillars in this set of entries had been partially or totally mined inby the second crosscut.

MSHA conducted an inspection of the entire mine during the period of June 18 to 26, 1984, while the first set of three entries to the right of 1st right were being developed. During that inspection, five citations were issued for the following conditions in the mine:

- (1) The methane monitor on the mining machine was inoperative;
- (2) The approved roof control plan was not complied with because loose roof was encountered in the belt haulage entry and additional support was not installed to supplement the posts;
- (3) The power cable for the mining machine contained one temporary splice which was within 25 feet of the machine;
- (4) A guard was not provided for the roller of the No. 2 belt haulage conveyor tailpiece; and

- (5) The operator on the mining machine was exposed to noise up to 104 decibels for 92 minutes.

During the period of August 7 to 13, 1984, an electrical spot inspection was performed at the mine. The second set of entries was being developed to the right off 1st right at the time. Six citations were issued for the following conditions observed in the mine:

- (1) A loose piece of rock was neither supported nor taken down in the No. 1 return entry;
- (2) The operator was not following the approved roof control plan because roof support was installed on greater than 4-foot centers in the face area and supports were installed further than 5 feet from the face;
- (3) The undervoltage relay was blocked out in the breaker supplying power for the section belt drive;
- (4) The section power center was not provided with a lock-out device;
- (5) The plugs and receptacle were not marked for identification on the section power center; and
- (6) The fail-safe ground check circuit for the cross entry belt drive and power supply was inoperative. The pilot wire and ground were jumpered out in the back of the receptacle.

MINING METHODS, CONDITIONS, AND EQUIPMENT

An auger-type continuous mining machine was used to extract coal from a single working section. The mining machine was connected to a two-section bridge conveyor that transported the coal to the section belt haulage conveyor. The coal reached the surface by the way of the main belt haulage conveyor system.

A roof control plan utilizing conventional support with supplemental roof bolting provisions for areas in the mine where subnormal roof conditions were encountered or anticipated had been submitted to MSHA and was approved. The plan specified that entries were to be driven on 50-foot centers. Intake and return air courses were to be driven 20 feet wide, and the belt conveyor haulage entries were to be driven 26 feet wide. Crosscuts were to be driven on 62 1/2-foot centers 26 feet wide, while rooms were to be driven on 55-foot centers 30 feet wide. The approved roof control plan is contained in Appendix J.

The investigation revealed that the entry and crosscut widths at various locations outby the accident scene exceeded the allowable widths as specified in the roof control plan. There were also areas outby the accident scene that did not have the required number of posts installed.

The investigation team relied on sworn statements, preshift and on-shift examination records, and mine maps in determining the mining methods used and the

conditions that existed inby the accident scene. Hazardous roof conditions prevented the investigation team from physically investigating the complete or total area of the accident.

Several nonmanagement miners stated that the required number of posts were not set in the areas inby the roof fall. The miners also stated that, while mining those areas, many of the posts available were either too long or too short to be used and that saws were not provided in the working place to cut the long posts. The miners further stated that robbing posts from mined areas in order to support the roof in active working places was a routine practice. Management employees, on the other hand, stated that the roof control plan was being complied with, that there was a sufficient number of usable posts provided on the section, and that saws were provided. Management employees also stated that posts were never robbed from mined areas.

The roof fall occurred in an area that was known by management to have unstable roof conditions. The outby edge of the fall followed a swag in the coalbed that traversed the second set of entries at the No. 2 crosscut. In addition, a small horseback was removed from the roof in the same area that that the roof fall occurred. The horseback was taken down in the belt conveyor haulage entry near the No. 2 crosscut during the development of the Nos. 1 and 2 entries. Roof bolts or other additional roof supports were not installed in this area.

The second set of entries was developed by driving two entries during advance mining and driving a third entry at the right off the belt entry while withdrawing from the set of entries. The size, shape, and location of the pillars developed on this second set of entries near the accident scene were very erratic. A portion of a mine map submitted by Bon Trucking Company, Inc., and a sketch of the accident scene are in Appendices F and H.

Several nonmanagement miners stated that the pillars inby the roof fall had been mined. Management employees, however, denied that any pillars had been partially or totally removed.

According to Rick Simpson, Jack Setter, Edwin Eugene Kinder, Section Foreman, and James Robert Chasteen, Superintendent, and confirmed by the on-shift examination record, an inundation by water occurred a few days prior to the fall. This inundation occurred when the mining machine cut through the barrier pillar between the active section and the first set of entries. The water settled in various swags, primarily in one depression at the intersection of the No. 2 entry and the No. 2 crosscut in the second set of entries. Reportedly the water in this swag was 1-foot deep. Production was interrupted for approximately three days and the accident was not reported to MSHA.

STORY OF ROOF FALL AND RECOVERY OPERATION

The information obtained from MSHA personnel's underground observations and the statements of the nonmanagement miners and management employees during the investigation suggested the following activities and sequence of events. Some

of the information about the activities on the section before the accident was conflicting.

Persons underground at the time of the accident are as follows:

David Carmack	Bridge Operator
James R. Chasteen	Superintendent
Jerry Freeman	Scoop Operator
Edwin E. Kinder	Section Foreman
Mike King (victim)	Timberman
John Lipfird (victim)	Continuous Mining Machine Operator
Bob Parker (injured)	Bridge Operator
Daniel E. Simpson, Jr. (victim)	Jack Setter
Danny Ray Simpson	Headpiece Operator
Rick Simpson (injured)	Jack Setter
Steven Simpson	General Laborer
William Worthington (victim)	Timberman
Oscar Wynn	Headpiece Operator

On September 12, 1984, at approximately 6:00 a.m., Kinder, King, and Carmack entered the mine early to rerail the bridge conveyor. At approximately 6:45 a.m., Chasteen and the nine other miners entered the mine by riding the belt haulage conveyor. Curtis Middleton, Foreman, was on duty, but stayed at the office on the surface. Steven Simpson was assigned pumping duties near the face of 1st right until Freeman needed assistance with rockdusting various outby areas. Wynn was assigned to operate the headpiece of the 1st right belt haulage conveyor while Danny Ray Simpson was assigned to operate the headpiece of the section belt haulage conveyor. Carmack and Parker were assigned to operate the bridge conveyors. Lipfird, Rick Simpson, Worthington, King, and Daniel E. Simpson, Jr., proceeded to the face. Coal production began about 7:45 a.m.

While management employees stated that no coal was being mined from the pillars, nonmanagement miners stated that most of the coal was mined from the pillar inby the No. 2 crosscut between Nos. 1 and 2 entries. The mining machine was then moved through the one foot of water in the swag in the No. 2 entry to the pillar inby the No. 2 crosscut between Nos. 2 and 3 entries. According to nonmanagement miners, coal was then removed from this pillar until only a small stump remained. According to management employees, the crosscut had been mined and the No. 3 entry was being mined when a problem with one of the bridge conveyors developed.

The mining machine had been shut down in order to repair the conveyor when, moments later, the posts began to break. Some miners had started running from the face area when the massive roof fall occurred. The fall covered the rear portion of the mining machine, the bridge conveyor attached to the machine, and six members of the mining crew. Just before the roof fall occurred, Rick Simpson was 2 feet from the face and Worthington was close behind him. Rick Simpson heard a post breaking behind him and quickly started outby. He gave a warning to the other crew members as he ran. Rick Simpson was knocked to the ground at the edge of the fall and his hard hat and cap lamp were knocked off.

After freeing himself, he crawled along the collapsed bridge conveyor. At that time, he saw Chasteen at the telephone. He sustained a cut on his head, but did not suffer any other injury.

Parker was partially covered by the fall between the discharge end of the inby bridge conveyor and the outby pillar of coal. Kinder was immediately outby the fall and Danny Ray Simpson was at the headpiece of the section belt haulage conveyor. Kinder and Simpson began efforts to rescue Parker immediately. They were able to free Parker after cutting his belt. Parker was carried to the section belt head by Chasteen, Kinder, and Danny Ray Simpson. He was brought to the surface in the scoop tractor at 10:30 a.m., transferred to an ambulance, and taken to the Harlan Appalachia Regional Hospital. Parker sustained serious injuries to his hip and pelvic area.

After Parker was removed from under the fall, Danny Ray Simpson crawled around to the mining machine through the No. 1 entry of the first set of entries trying to reach the other crew members. He observed a boot and a knee pad under the fall, but he did not hear a distress call. He became lost in that part of the mine because he did not recognize the area. He eventually heard the belt haulage conveyor being started and went in that direction.

MSHA was notified of the accident at 9:45 a.m. Sharon Wilson of Bon Trucking Company, Inc., notified Kenneth Fee, Supervisory Coal Mine Safety and Health Inspector, by telephone at the Harlan Field Office.

Ginger T. Lorenz, Coal Mine Safety and Health Inspector, was in the area of the mine and was notified at 9:50 a.m. She proceeded to the mine and issued a Section 103(k) Order at 10:15 a.m. Fee and Coal Mine Safety and Health Inspectors Roger C. Pace and Larry L. Rigney left the office at 10:15 a.m. and arrived at the mine site at about 11:00 a.m. Elmer H. Smith, Supervisory Coal Mine Safety and Health Inspector, arrived at the mine at approximately 1:00 p.m.

Recovery personnel installed additional posts and erected numerous cribs immediately outby the roof fall using available material and material brought in from the surface. At approximately 2:00 p.m., MSHA personnel from the Barbourville District Office arrived to help coordinate the rescue effort. Roof support material and hydraulic jacks were transported to the scene of the accident by scoop tractor. The section belt haulage conveyor was cut to allow the scoop tractor to haul material closer to the fall. Pieces of rock had to be removed or raised with hydraulic jacks during recovery operations.

King and Daniel Simpson were recovered on Thursday, September 13, 1984, at approximately 2:50 a.m. and 5:50 a.m., respectively. On September 14, 1984, at approximately 7:25 p.m., Lipfird was recovered. Worthington was recovered on Saturday, September 15, 1984, at approximately 1:45 a.m. by tunneling under the fall.

The Kentucky Department of Mines and Minerals, under the direction of Willard Stanley, Commissioner, conducted public hearings into the causes of the accident on September 24 and 25, 1984. MSHA took voluntary sworn statements on

September 27 and 28, 1984. Thirteen individuals were requested to appear and give statements with regard to the fatal accident. Five nonmanagement employees and one former employee voluntarily answered questions concerning the mine, mining practices, and the events of September 12, 1984. Parker was hospitalized and did not appear.

Five management employees of Bon Trucking Company, Inc., chose not to answer questions relating to the accident during the taking of statements on September 27 and 28. MSHA was subsequently notified that management employees would volunteer to be questioned relative to the accident. The statements of five management employees, one nonmanagement employee, and one consultant employed by the mine operator were taken by MSHA on November 7 and 8, 1984.

INVESTIGATION OF THE CAUSE OF THE ROOF FALL

List of persons furnishing information and/or present during the investigation.

Bon Trucking Company, Inc., Management Employees

Rick K. Ayers	Surveyor
James R. Chasteen	Superintendent
Edwin E. Kinder	Section Foreman
Curtis Middleton	Foreman
A. Dale Williams	Superintendent, Berger No. 1 Mine

Bon Trucking Company, Inc., Nonmanagement Employees

David Carmack	Bridge Operator
David Hensley	Scoop Operator, Berger No. 1 Mine
Danny Ray Simpson	Headpiece Operator
Michael W. Simpson	General Laborer, Berger No. 1 Mine
Rick Simpson	Jack Setter
Steve Simpson	General Laborer
Oscar Wynn	Headpiece Operator

Former Bon Trucking Company, Inc., Employee

James T. Sargent	Belt Head Operator
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Lee W. Coal Company, Inc.

Claude Wilson	Mine Operator
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CNC Coal Sales

Willie Mack Yount	Superintendent
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Consultant

Dr. David K. Hylbert	Professor of Geosciences, Morehead State University
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United Mine Workers of America

John R. Bowyer	District Representative
Leonard Fleming	Safety and Health Representative
Hugh Jones	Safety and Health Representative

Kentucky Department of Mines and Minerals

Wayne Collett	Analyst
Dave Disney	Inspector
James E. Gilbert	Inspector
Dale Halcomb	Inspector
Charles Sargent	Inspector

Mine Safety and Health Administration

James P. Begley	District Manager
Kenneth Fee	Supervisory Coal Mine Safety and Health Inspector
Norris W. Furgerson	Safety and Health Specialist, Roof Control
Robert E. Jones	Coal Mine Safety and Health Inspector
Lawrence L. Layne	Special Investigator
Ginger T. Lorenz	Coal Mine Safety and Health Inspector
Edward R. Morgan	Special Investigator
Roger C. Pace	Coal Mine Safety and Health Inspector
John M. Pyles	Safety and Health Supervisor, Roof Control
Lawrence L. Rigney	Coal Mine Safety and Health Inspector
Elmer H. Smith	Supervisory Coal Mine Safety and Health Inspector
Lawrence Spurlock	Supervisory Coal Mine Safety and Health Inspector
James D. Carter	Supervisory Mining Engineer
Dale R. Cavanaugh	Mechanical Engineer
Clifford E. Ellis	Mine Safety & Health Specialist
W. Roger Schmidt	Hydrologist

Office of the Solicitor

James B. Crawford	Legal Advisor to MSHA Investigation Team
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Summary of Findings: Conditions observed in the mine during recovery operations and during the accident investigation together with the sworn statements provided credible information in determining the cause of the roof fall. The findings of the MSHA investigators are summarized as follows:

1. The mine roof was generally firm. Poor roof conditions did exist, however, where there were slips, horsebacks, swags, or changes in the coalbed height. Dr. David K. Hylbert, Professor of Geosciences, Morehead State University, confirmed this in his statement. A. Dale Williams, Superintendent, Berger No. 1 Mine, stated that at four locations horsebacks were removed or supported in the 1st right entries and entries driven to the right off 1st right. Williams also stated that one horseback had to be taken down at the swag in the No. 2 entry at the No. 2 crosscut of the second set of entries during development of the entries. The roof in that area (accident scene) received no additional support and the accident occurred after further coal extraction on September 12, 1984.
2. According to the approved roof control plan, a conventional roof support system consisting of posts was employed as the primary roof support system. Spot roof bolting was approved in the roof control plan, but was seldom used. There were no roof bolts installed in the second set of entries to the right off 1st right. Widths of the belt haulage conveyor entry and crosscuts were not to exceed 26 feet. The widths of air courses were not to exceed 20 feet. Entry centers and crosscut centers were to be 50 feet and 62 1/2 feet, respectively. Generally, three rows of posts were required in the places 26 feet in width and two rows of posts were required in the places 20 feet in width. Rooms and crosscuts between rooms were not to exceed 30 feet in width with 4 or 5 rows of posts. Room and crosscut centers were to be 55 feet and 45 feet, respectively.

According to projections and mine workings on all mine maps, entries rather than rooms were being mined; consequently, No. 1 and No. 3 entries should have been 20 feet wide, and the belt haulage entry and crosscuts should have been 26 feet wide. Williams, according to his statements, was aware that a mine opening more than 600 feet deep is considered to be an entry. The projections for the first set of entries off 1st right that were on the mine map (Exhibit No. 5) submitted with the ventilation system and methane and dust control plan indicated that these entries would be developed at least 875 feet from 1st right. Presumably, the mine operator included these projections on the ventilation plan mine map because 30 CFR 75.316-1(a)(6) requires projections for anticipated mine development for one year. The projections for the second set of entries to the right off 1st right were on the mine map located in the mine office at the time of the accident (Exhibit No. 2) and indicated intent to mine 1,070 feet. A description of the exhibits used during the taking of sworn statements and copies of the relevant portions of the exhibits are contained in Appendices B through H.

Curtis Middleton, Section Foreman, stated that he developed the first set of entries off 1st right in by the No. 2 crosscut on 55-foot centers with crosscuts on 62 1/2-foot centers and that Williams told him to do so. Williams stated that both sets of entries to the right off 1st right were driven on 45-foot centers with crosscuts on 55-foot centers. The width of some entries and crosscuts near the accident scene exceeded the allowable widths and did not have the roof support required by the roof control plan.

3. According to all mine maps received from the mine operator after the accident, second mining had taken place inby the accident scene. Three maps were given to MSHA by Bon Trucking Company, Inc., each showing a different method of mining the pillars in the second set of entries inby the accident location. On the mine map (Exhibit No. 2) obtained from the mine office, the outline of the pillars inby the accident scene and in the first set of entries off 1st right were shaded in. According to Middleton and Williams, this shading would normally indicate that the pillars were mined. Edwin Kinder, Section Foreman, stated that under his supervision John Lipfird, Continuous Mining Machine Operator, updated the map at the mine office daily. A portion of Exhibit No. 2 is in Appendix D.

A second map (Exhibit No. 3) was provided to the accident investigators by Bon Trucking Company, Inc., later in the investigation. The outby two thirds of the outline of the pillars on this map were covered by cross-hatch which indicated at least two-thirds of each pillar was mined. Markings on a third map (Exhibit No. 4) containing a certified area just outby the accident scene indicated that the pillars inby the roof fall had been split. Portions of Exhibit Nos. 3 and 4 are in Appendices E and F.

Rick Ayers, Surveyor, stated that he prepared Exhibit No. 3 from information received in a telephone conversation with Kinder after the accident. Ayers also stated that Williams came to the Bon Trucking Company, Inc., engineering office and instructed him on how to prepare Exhibit No. 4. Williams denied having any input into the development of these two maps. In addition to the indications on the mine maps, several miners stated that second mining was performed in the second set of entries off 1st right. Although Kinder, Williams, and James Chasteen, Superintendent, stated that there was compliance with the roof control plan, Rick Simpson, Jack Setter; David Carmack, Bridge Operator; Danny Ray Simpson, Headpiece Operator; James Sargent, Belt Head Operator; Steve Simpson, General Laborer; and Michael Wayne Simpson, General Laborer, Berger No. 1 Mine; stated that pillars were partially or totally mined inby the roof fall. The mined area east of the fall and slightly outby the fall indicates that extensive mining, in addition to development mining was performed in that area. This extensive area was over 75 feet in width with only a small triangular-shaped, 60-square-foot pillar left for support. Second mining was not approved in the roof control plan or the ventilation system and methane and dust control plan.

4. According to Ayers, mine workings in the Berger No. 2 Mine were not surveyed and spads were installed only in belt conveyor haulage entries. Mine workings were plotted on the maps by using dimensions from the approved roof control plan and information received verbally from mine supervisors.
5. Several nonmanagement employees stated that preshift and on-shift examinations were not performed or at least the employees had never seen

the examinations performed. Management personnel, however, said all the required examinations were conducted. Carmack stated that on the day of the accident he entered the mine early (6:00 a.m.) with Kinder and Mike King, Timberman and victim, to repair the bridge conveyor. Kinder stated that he went underground alone at 6:00 a.m. to make his preshift examination.

6. Hylbert examined the roof fall from the outby side and stated that, in his opinion, the fall was a large horseback. Hylbert said that he did not measure or see the width of the fall, but that Williams had told him the fall was 30 feet wide. Hylbert stated that he saw Williams climb up to the top of the fall and make the estimate. Williams, however, stated that he did not go up on the fall. Hylbert also stated that the roof in the mine was good, except where horsebacks are present.

Cause of the Roof Fall: The following conditions and practices contributed to the cause of the accident and are violations of Title 30, Code of Federal Regulations.

1. 30 CFR 75.200

The operator was not following the approved roof control plan because the width of the No. 1 entry for 130 feet inby the first crosscut in the set of entries mined northwesterly from survey station No. 114 ranged from 24 feet to 51 feet. The width of the belt haulage conveyor entry mined northwesterly from survey station BS ranged from 28 feet to 42 feet beginning 26 feet inby survey station BS for a distance of 80 feet. Also, the first right crosscut inby survey station BS ranged from 28 feet to 40 feet in width. The roof control plan stipulates on page No. 3 that the width of air courses will be 20 feet, crosscut widths will be 26 feet and belt entry width will be 26 feet.

2. 30 CFR 75.200

The operator was not following the approved roof control plan because permanent supports were not installed in the No. 1 entry in the set of entries mined northwesterly from survey station No. 114, from the beginning of the entry inby for a distance of approximately 30 feet. There were no permanent roof supports in the No. 2 entry of the set of two entries mined northwesterly from survey station BS starting at the beginning of this entry inby for a distance of approximately 30 feet. There were no permanent roof supports in the No. 1 entry in the set of 2 entries mined northwesterly from survey station BS starting at the beginning of the entry inby for a distance approximately 30 feet. The approved roof control plan specified that permanent supports shall be installed as stipulated on page No. 15, sketch No. 3 of plan.

Reportedly some supports were dislodged during recovery work.

3. 30 CFR 75.200

The mine operator was second mining pillars according to the mine maps and the testimony of most miners. The mine operator did not include procedures for second mining or supporting the roof during second mining in the roof control plan approved by MSHA.

4. 30 CFR 75.200

The mine operator was not complying with paragraph No. 1, page No. 8, of the approved roof control plan which requires that additional roof support be used when horsebacks or other unsafe roof conditions are known to exist. The swag in the mine floor and the unusually high coal-bed described by Williams indicated that subnormal roof conditions existed. A small horseback had previously been taken down in the No. 2 entry at the No. 2 crosscut according to Williams and the on-shift examination record for July 30, 1984.

5. 30 CFR 75.200

The approved roof control plan was not being complied with because an additional supply of supplementary roof support material was not provided at the dumping point or within 500 feet of the faces as required by the approved roof control plan. According to the approved roof control plan, this supplementary material should have included 20 roof bolts at least 12 inches longer than the bolt length being used, a minimum of 20 posts of proper length with sufficient cap pieces and wedges, and a minimum of six crossbars.

6. 30 CFR 75.201

Miners in the second set of entries off 1st right were exposed to unusual dangers from roof falls caused by faulty pillar recovery methods. Entries and crosscuts were developed excessively wide and pillars were completely extracted, or nearly so, with few posts being installed during and after mining.

7. 30 CFR 75.303

A preshift examination was not performed on September 12, 1984, prior to two miners and a foreman entering the mine at 6:00 a.m. A thorough preshift examination should have revealed the subnormal roof conditions that existed in the area where the accident occurred.

8. 30 CFR 75.1200

An accurate and up-to-date map of the mine was not provided on the surface of the mine. The surveyor employed by the mine operator stated that no measurements were made to locate the coal ribs or faces. The operator's ability to effectively control the mine roof was severely limited because the size and location of pillars and the widths and location of entries and crosscuts could not be readily determined.

The following is a summary of violations of Federal regulations that were not directly related to the roof fall. They were issued during spot inspections that were conducted concurrently with the accident investigation.

1. 30 CFR 50.20

The mine operator failed to report an unplanned inundation by water of the working section that occurred on or about September 5, 1984.

2. 30 CFR 75.202

Dislodged posts were allowed to accumulate along both sides of the main intake roadway for a distance of about 1,350 feet, beginning at the portal and heading inby to the active section.

3. 30 CFR 75.316

The approved ventilation and methane and dust control plan was not being complied with because a permanent seal was damaged which allowed air circulation into and out of the sealed area. This seal was located to the left of the No. 1 entry sixteen crosscuts inby the main intake portal across from the 1st right belt head drive.

4. 30 CFR 75.316-1(a)(6)

The approved ventilation and methane and dust control plan was not being complied with because the projection for the second set of entries off 1st right was not shown on the mine map (ventilation plan).

5. 30 CFR 75.323

The mine superintendent or assistant superintendent of Berger No. 2 Mine did not countersign 48 preshift mine examiner's reports and 47 daily and on-shift reports between July 9, 1984, and September 12, 1984.

6. 30 CFR 75.701

The Kersey battery charger located between the No. 1 and No. 2 portals was not provided with a frame ground clamp to be used when charging scoop batteries.

7. 30 CFR 75.807

The telephone line and belt control cable were not guarded at several locations along the belt conveyor haulage entry where they crossed over the 4,160-volt, transmission line. Also, the high-voltage transmission line was not guarded at various locations along the belt entry to afford protection where miners regularly passed over the cable. This area

extended from the portal of the belt entry to the section belt haulage conveyor drive, a distance of approximately 1,300 feet.

8. 30 CFR 75.902

The 440-volt resistance grounded AC system supplying the water pump located approximately six breaks in by the portal in the belt entry was not provided with a fail-safe ground check monitor to assure continuity.

9. 30 CFR 75.903

The 440-volt AC water pump located approximately six breaks in by the portal of the belt entry was not equipped with a device to provide visual evidence when the power was disconnected.

10. 30 CFR 75.1101

The deluge-type water spray system for the 1st right belt drive was disconnected and not working.

11. 30 CFR 75.1103-9

Five hundred feet of fire hose was not provided within 300 feet of the 1st right belt drive.

12. 30 CFR 75.1203

The mine operator failed to furnish to the Secretary or his authorized representative a copy of the certified mine map of Berger No. 2 Mine pursuant to a written request dated September 20, 1984.

RECOMMENDATIONS

The following recommendations are submitted in the belief that their implementation will reduce the number and severity of injuries to miners.

1. Establish a multifaceted safety system that will provide, but not be limited to, assistance to mine operating personnel in the area of regulation compliance.
2. Improve mine surveying and mapping services to enable operating personnel to improve mining operations, particularly in the area of roof control. Specifically, spads should be set frequently in all entries and rooms and the location and size of coal pillars should be mapped from accurate underground measurements.
3. A training program should be implemented that specifically instructs and trains all supervisors on the approved roof control plan and the particular roof fall hazards and necessary precautions associated with required mining methods and practices at the Berger No. 2 Mine. The

training should cover the safe use of the auger-type continuous mining machine when mining entries and withdrawing from such entries, the special roof control measures that must be taken in light of these methods and practices, and the propensity of horsebacks and other geological roof conditions at the mine. On site familiarization of these methods and practices should be also a part of such training as well as mandatory health and safety regulation review.

4. The roof control conditions and practices at the Berger No. 2 Mine should be examined and evaluated on a regular basis to determine continued effectiveness and applicability of the roof control plan.

Respectfully submitted,


James D. Carter

Supervisory Mining Engineer



Dale R. Cavanaugh
Mechanical Engineer

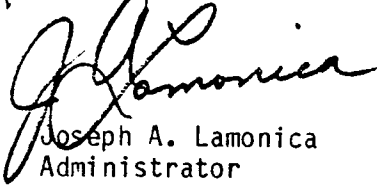


Clifford E. Ellis
Mine Safety and Health Specialist



W. Roger Schmidt
Hydrologist

Approved by:


Joseph A. Lamonica

Administrator
for Coal Mine Safety and Health

APPENDICES

Appendix A

Victim Data Sheet

<u>Name</u>	<u>Age</u>	<u>Occupation</u>	<u>Job Experience</u>
Mike King	19	Timberman	4 weeks at mine
John Lipfird	34	Continuous Mining Machine Operator	2 months at mine
Daniel E. Simpson, Jr.	27	Jack Setter	4 months at mine
William Worthington	24	Timberman	4 1/2 months at mine

Appendix B

Description of Exhibits

The six exhibits referred to during the taking of sworn statements are as follows:

Exhibit Number 1 is a one inch equals 20-foot sketch of most of the mine workings west of coordinate east 14,000 of the Berger No. 2 Mine, Bon Trucking Company, Inc., and was drawn by Dale R. Cavanaugh and W. Roger Schmidt, MSHA. The sketch was prepared by scaling original coal rib locations from a mine map delivered to Elmer Smith, MSHA, by Rick Ayers, Bon Trucking Company, Inc., on or about September 18, 1984. This exhibit was used to better identify locations in the accident area. See Appendix C.

Exhibit Number 2 is a mine map of Berger No. 2 Mine, Bon Trucking Company, Inc., obtained from the Berger No. 2 Mine office by James P. Begley, MSHA, on or about September 12, 1984. See Appendix D.

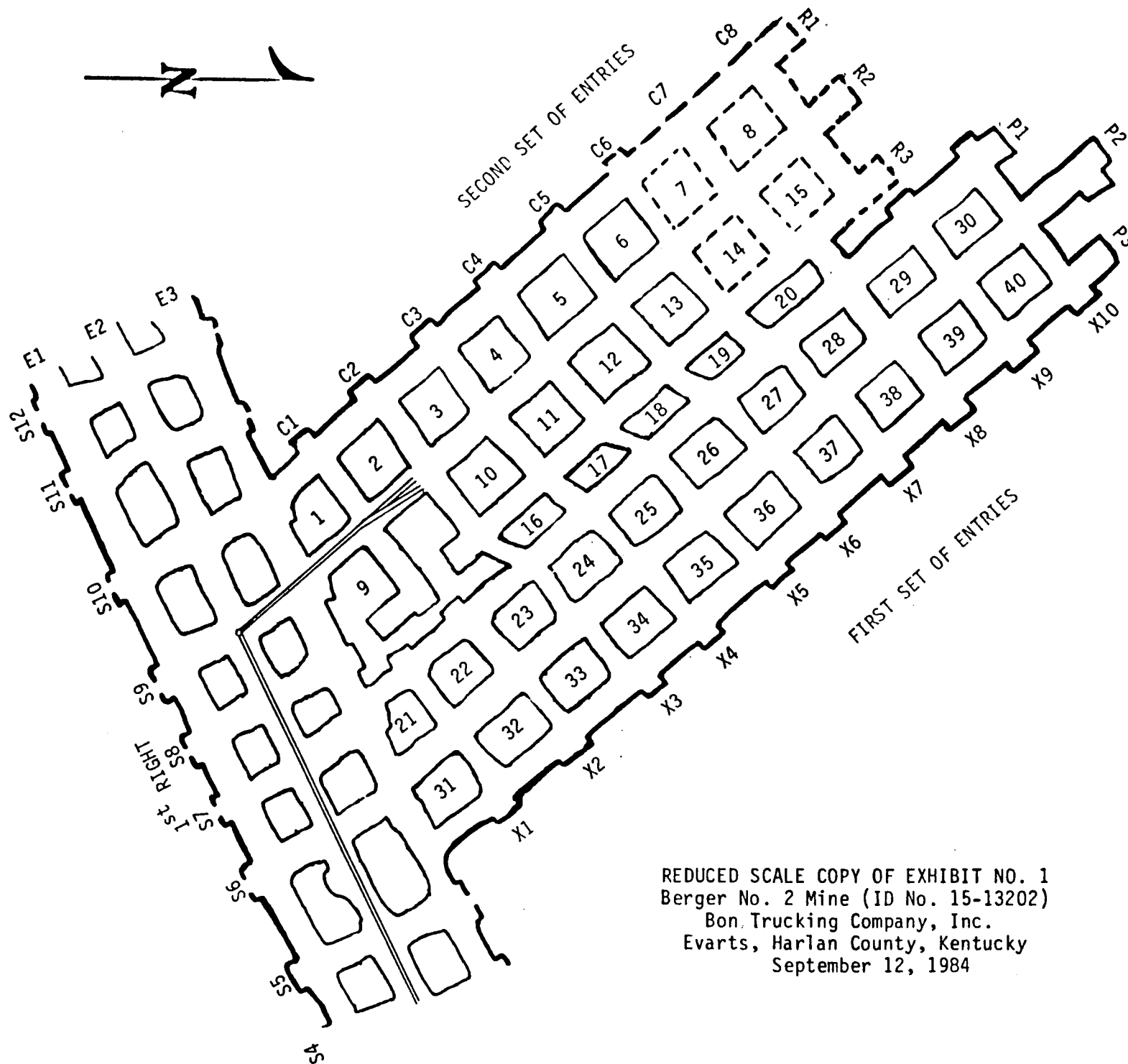
Exhibit Number 3 is a mine map of Berger No. 2 Mine, Bon Trucking Company, Inc., received from Rick Ayers, Bon Trucking Company, Inc., by Elmer H. Smith, MSHA, on or about September 18, 1984. See Appendix E.

Exhibit Number 4 is a mine map of Berger No. 2 Mine, Bon Trucking Company, Inc., delivered by Rick Ayers, Bon Trucking Company, Inc., to Elmer H. Smith, MSHA, at approximately 2:00 p.m. on September 21, 1984. See Appendix F.

Exhibit Number 5 is a ventilation system and methane and dust control plan map of Berger No. 2 Mine, dated April 24, 1984. See Appendix G.

Exhibit Number 8 is a one-inch equals ten-foot sketch of the immediate accident scene showing the approximate location of the continuous mining machine, bridge conveyor, belt haulage conveyor, and the roof fall. This sketch was drawn from measurements taken during the underground investigation on September 19 to 21, 1984. See Appendix H.

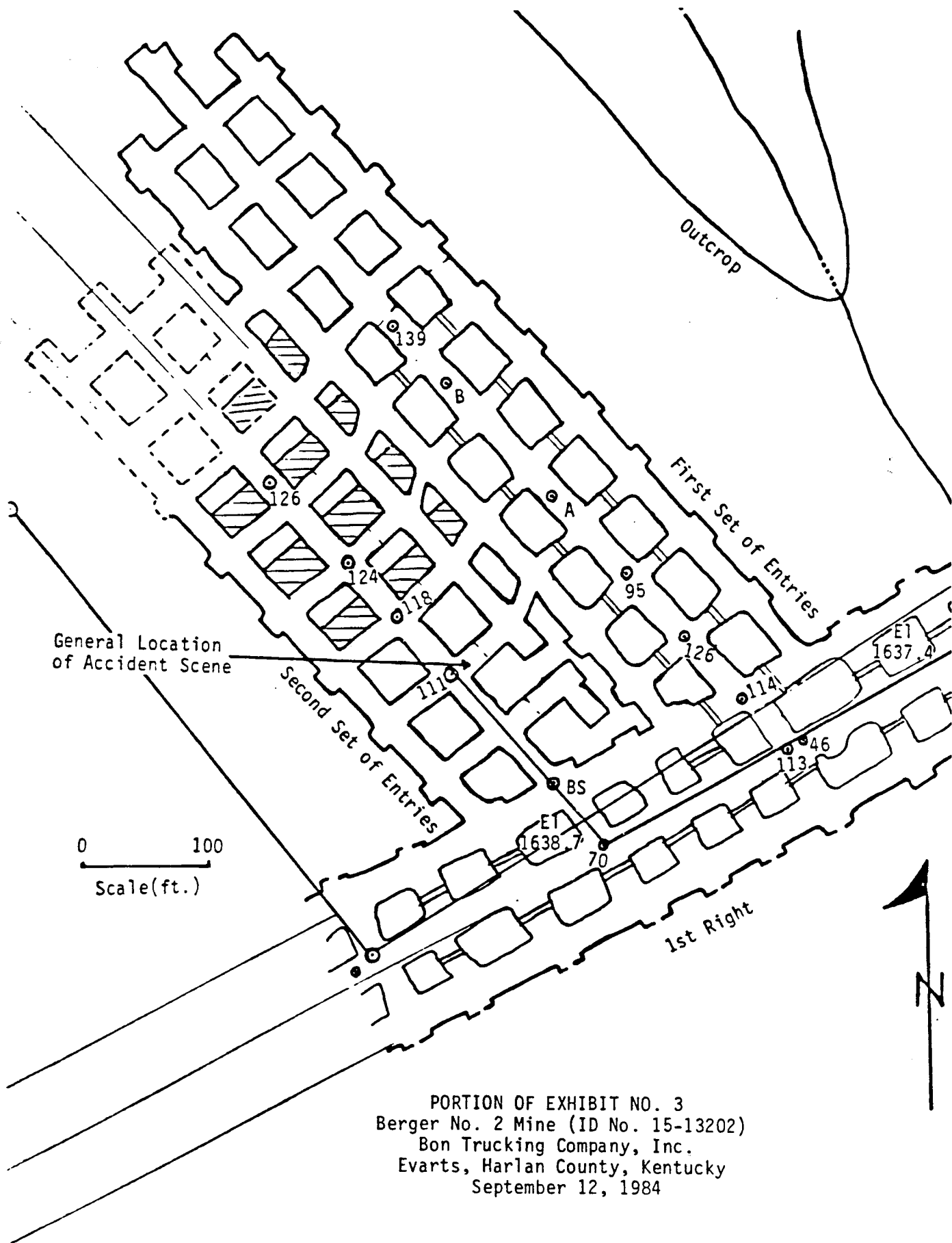
Exhibits Numbers 6 and 7 were not used.



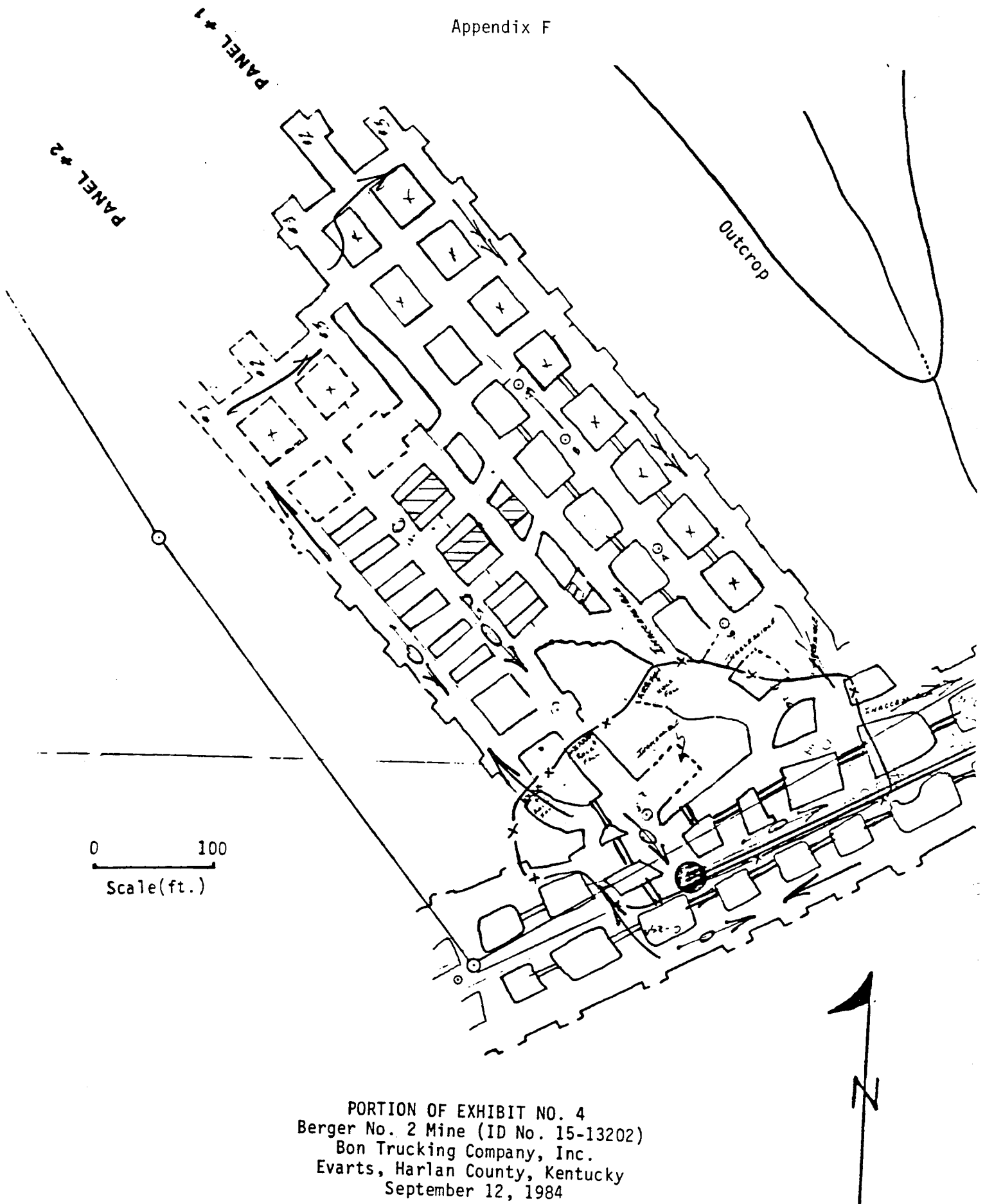
REDUCED SCALE COPY OF EXHIBIT NO. 1
 Berger No. 2 Mine (ID No. 15-13202)
 Bon Trucking Company, Inc.
 Evarts, Harlan County, Kentucky
 September 12, 1984

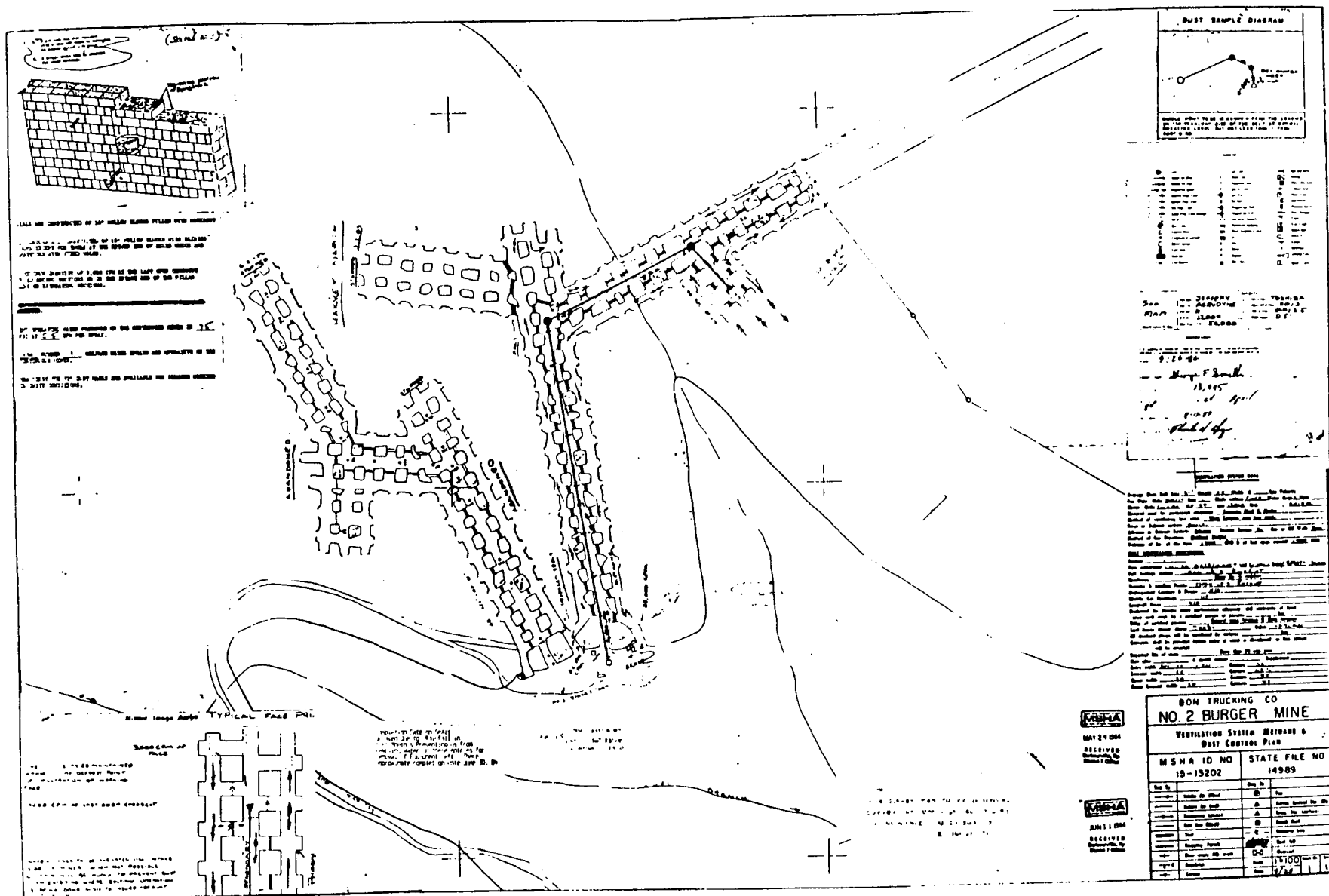
PORTION OF EXHIBIT NO. 2
Berger No. 2 Mine (ID No. 15-13202)
Bon Trucking Company, Inc.
Everts, Harlan County, Kentucky
September 12, 1984

Appendix E

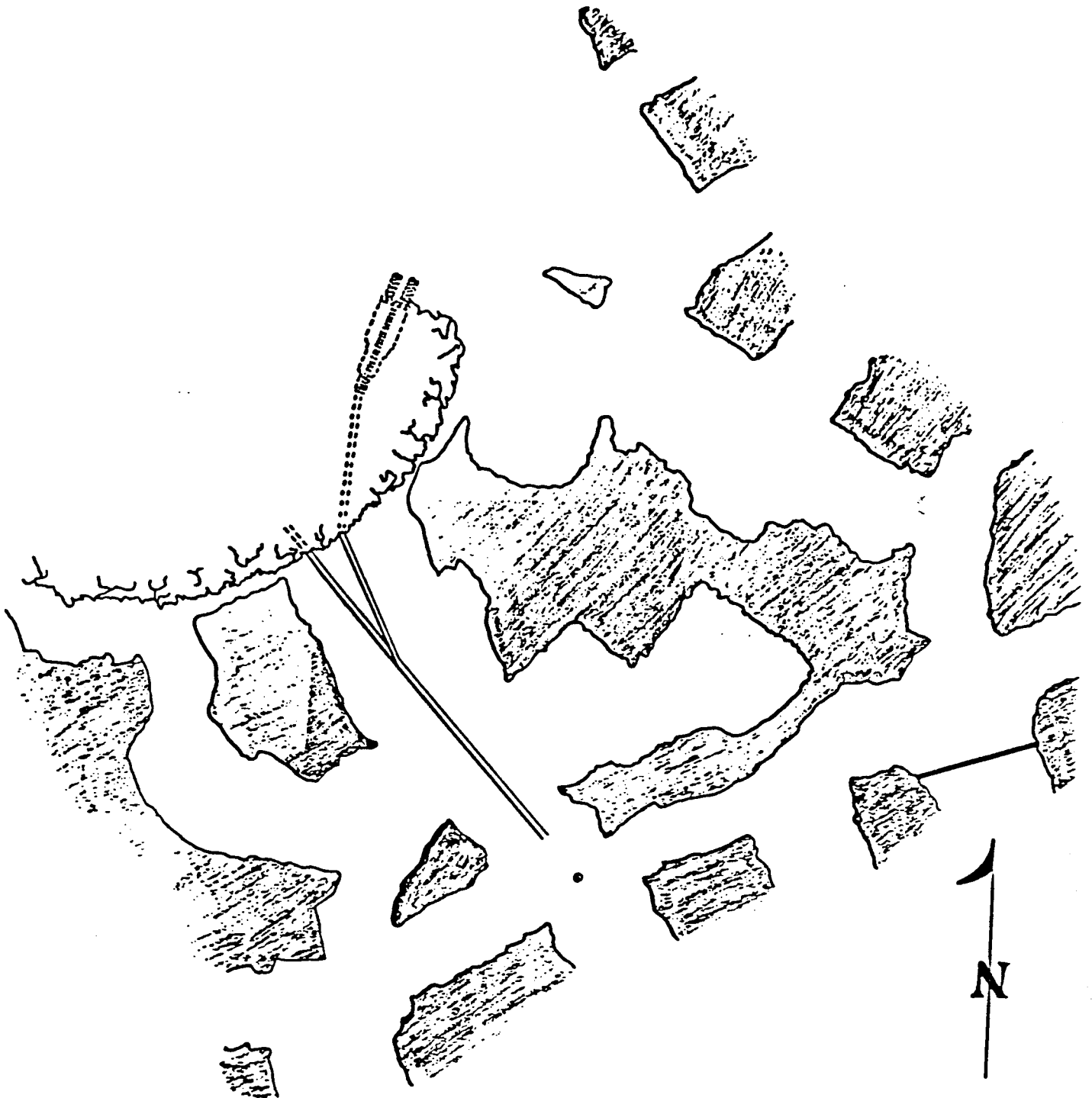


Appendix F



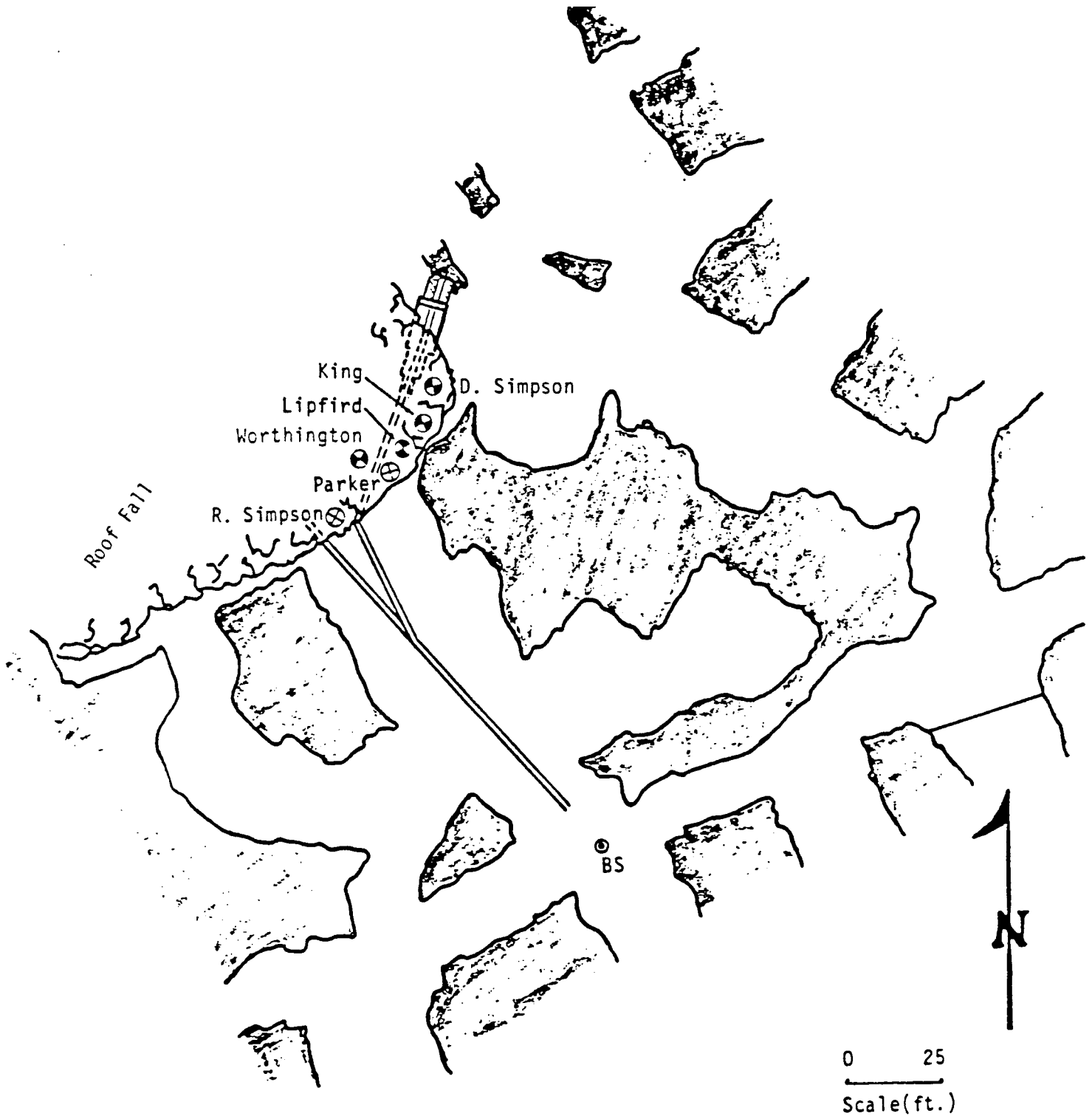


Appendix H



REDUCED SCALE COPY OF EXHIBIT NO. 8
Berger No. 2 Mine (ID No. 15-13202)
Bon Trucking Company, Inc.
Evarts, Harlan County, Kentucky
September 12, 1984


Appendix I



SKETCH OF MULTIPLE FATAL ROOF FALL ACCIDENT
Berger No. 2 Mine (ID No. 15-13202)
Bon Trucking Company, Inc.
Evarts, Harlan County, Kentucky
September 12, 1984

U. S. Department of Labor

Mine Safety and Health Administration
PO Box 572
Barbourville, Kentucky 40906

UNDERGROUND MINE FILE	
DATE FWD.	5/15/84
INITIALS	JS
	

6-1-84
SHS

May 15, 1984

Mr. Harvey Napier, President
Berger No. 2 Mine, ID No. 15-13202
Bon Trucking Co., Inc.
Route 1, Box 234
Evarts, Kentucky 40828

*filed
6-1-84
Bue*

Dear Mr. Napier:

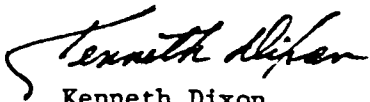
The enclosed approved Roof-Control Plan (25 pages) covers the minimum standards for roof support for the above mine. The approval is based upon an investigation of the roof conditions and roof control practices in the mine by a representative of MSHA.

All unintentional roof falls defined in Title 30, CFR Part 50 shall be investigated and the results of the investigation recorded in a book provided for that purpose. Such falls shall also be shown on a map of the mine.

If changes are to be made in the approved roof support plan or mining system they shall be submitted to and approved by the District Manager before being implemented.

This plan supersedes all previous Roof-Control Plans for this mine.

Very truly yours,



Kenneth Dixon
Acting District Manager
District 7

William O. Belcher
06-01-84

A COPY OF THIS ROOF-CONTROL PLAN SHALL BE POSTED ON THE MINE BULLETIN BOARD

UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
MINIMUM ROOF-CONTROL PLAN

Date May 15, 1984 Mine Berger No. 2 ID Number 15-13202

Company Bon Trucking Co., Inc.

Address Route 1, Box 234, Evarts, Kentucky 40828
(Street, Route or PO Box) (City) (State) (Zip)

Mine Location Shields Harlan Kentucky
(Town) (County) (State)

Location (Reference to nearest highway route, direction and distance)

1/4 Miles SE Off Route No. 38

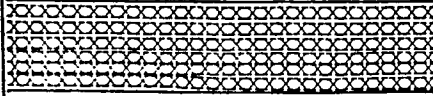
Type(s) of roof-control plan(s) Conventional timbering with spot bolting

Area(s) covered by this plan Entries, rooms and crosscuts

Coalbed being mined Kellioka

Coalbed(s) being mined above or below present mining operations None

Depth of cover over coalbed Max. 1600'

		Thickness
Main roof	Sandy shale	<u>35'</u>
Immediate roof	Slate	<u>10'</u>
Coalbed		<u>30"</u>
Bottom	Blue slate	<u>30'</u>

Harvey Napier President
Company official Title

Roof-Control Investigator(s) _____

Approved by _____
(District Manager) (Date)

The roof-control plan approved this date hereby supersedes all previously approved plans.

ROOF-SUPPORT MATERIALS - ROOF BOLTS

Manufacturer	H.K. Porter	Manufacturer's Designation	
	Valley Steel		
	Birmingham Steel		
Minimum length	*30"	Diameter	5/8"
Type steel	High strength	Type thread	Rolled
Length of thread	4"	Type head	Standard
Dimensions of bolt head:	Nut	Flange	

*All bolts to be long enough to anchor at least 12" in firm material.

BEARING PLATES

Manufacturer	Same as above	Manufacturer's Designation	
Dimensions	6" x 6" x 1/4" embossed donut		
	6" x 6" x 5/16" flat steel		
Shape		Center Hole size	

WASHERS - (Washers shall be through hardened to a hardness of 35 to 45 as measured on the Rockwell C Scale.)

Manufacturer	Same as above	Manufacturer's Designation	
Type steel	High strength	Size and shape	Round 2"
		Hole size	7/8"

Square hardened washers shall be used with bell embossed plates having a 1-1/8 - 1-3/8-inch center hole. Round washers shall be used with donut embossed plate.

ANCHORAGE UNIT

Manufacturer	H.K. Porter	Manufacturer's Designation	
	Valley Steel		
	Ohio Brass		
Type	Expansion	Size of finishing bit	1-3/8" ±0.030 inch

(Finishing bits shall be easily identifiable by sight or feel.)

Installed torque 120 - 160

MATERIALS USED IN CONJUNCTION WITH ROOF BOLTS

Roof-bolt components other than shown on the plan may be used provided this office is notified in writing and the components comply with the American National Standards Institute - "Specifications For Roof Bolting Materials In Coal Mines."

All roof bolts and components shall be stored and handled in such a manner that will minimize rusting and/or damaging. Roof bolts or expansion shell shall not be used unless the shell can be run the entire length of roof bolt thread by hand.

PLAN DRAWINGS SHOWING SEQUENCE OF MINING, SEQUENCE OF INSTALLATION AND SPACING OF SUPPORTS INCLUDING TEMPORARY SUPPORTS AND MAXIMUM WIDTH OF ENTRIES, ROOMS, INTERSECTIONS AND CROSSCUTS ARE ATTACHED. PERMANENT ROOF SUPPORTS SHALL NOT BE RECOVERED UNLESS RECOVERY IS DONE AS OUTLINED IN AN APPROVED PLAN. SIGHT LINES SHALL BE ESTABLISHED TO ASSURE THAT MINING PROJECTIONS ARE FOLLOWED DURING MINING. CHANGES SHALL NOT BE MADE IN THE MINING SYSTEM UNTIL THE PLAN HAS BEEN REVISED ACCORDINGLY.

Room Crosscut Centers 45'

Elkhorn scoop tractor

3

O. ROOF-SUPPORT MATERIALS - CONVENTIONAL OR TEMPORARY AND SUPPLEMENTAL

Length of post As required

Diameter of post 1 inch for each 15 inches in length but not less than 4 inches - Split posts shall have a cross-section area equal to that required for round posts of equivalent length.

Type of post Round or split of solid straight grain wood with the ends sawed square and free from defects which would affect their strength.

Cap blocks, size and shape 2" x 6" x 16" flat parallel sides

Wedges, size and shape 0-1" x 4" x 10" tapered

Crossbars, type Straight grain solid wood

Crossbars, size A minimum of 3 inches by 8 inches of varying length.

Planks, size A minimum of 1 inch by 8 inches of varying length

Cribbing blocks, size A minimum of 30 inches in length of varying cross section.

Crossbars to be used when pots, slips, horsebacks or hillseams are encountered. A minimum of 2 crossbars to be used at each location. At least one post to be used under each end of the crossbars and the posts are not to be more than 14 feet apart. Crossbars to be installed on 4-foot centers, and the foreman in charge shall determine when the installation of crossbars is to be discontinued.

Steel straps predrilled on not more than 4-foot centers and installed with roof bolts on not more than 4-foot centers may be used in lieu of wood crossbars, as stated above, in areas where the roof structure is of such nature that it will provide adequate anchorage for roof bolts.

In areas where steel straps have been utilized in lieu of wood crossbars the area shall be supported with cribs, and/or posts set on 4-foot centers on each side of a 14-foot wide roadway.

FOR INITIAL DEVELOPMENT PLAN
and adverse conditions as
referred to on sketches.

SAFETY PRECAUTIONS FOR FULL BOLTING AND COMBINATION PLANS

1. This is the minimum roof control plan and was formulated for normal roof conditions and the mining system(s) described. When subnormal roof conditions are encountered, indicated or anticipated, additional roof support such as longer and/or additional roof bolts, posts, or crossbars, shall be installed.
2. Before being assigned to install roof support, all personnel shall be trained in the function of support being installed, proper installation procedures, and the approved roof-control plan. Such training will be performed by a qualified supervisor.
3. When wooden material such as planks, header blocks, or crossbars are used between the bearing plate and the roof for additional bearing surfaces, the use shall be limited to short-life openings (not to exceed 3 years) unless treated. Bearing plates used in conjunction with wooden materials shall be not less than 4-inches square or of equivalent area.
4. When testing roof or installing temporary supports in the face area, the workmen shall be within five feet (less if indicated on sketch) of a temporary or permanent support and rib or face and travel shall be limited to the area between supports and rib or face.
5. Where it is necessary to perform any work such as extend line curtains or other ventilating devices in by the roof bolts or to make methane tests in by the roof bolts, a minimum of two temporary supports shall be installed. These supports shall be installed within five feet of the face or rib and the work shall be done between such supports and the nearest face or rib.
6. Where rebolting work is being done or crossbars are being installed the following temporary support patterns shall be followed:
 - a. Where bolts are being replaced in isolated instances (such as where equipment has knocked bolts loose), one temporary support for each bolt to be replaced shall be installed.
 - b. Where crossbars or roof bolts are being installed in an area where roof failure is indicated a minimum of two rows of temporary supports shall be installed on 5-foot centers across the place.
 - c. Where crossbars are being installed in permanently supported area that does not show general roof failure, temporary supports will not be required.
7. Where loose material is being taken down, a minimum of two temporary supports on not more than 5-foot centers shall be installed between the workmen and the material being taken down unless such work can be done from an area supported adequately by permanent roof supports.
8. All metal jacks shall be installed with a cap block between the jack and the roof unless an oversize bearing plate is provided. (Not less than 36 square inches.)

9. During each production shift at least one roof-bolt hole in each active working place shall be drilled to a depth of at least 12 inches above the anchorage horizon of the bolts being used shall either:
- a. Be left open;
 - b. Be plugged with a readily removable plug; or
 - c. A roof bolt compatible in length with the depth of the hole shall be installed and the plate shall be encircled with a paint distinctively different in color from the roof.
10. Before side cuts are started, the roof in the area from which it is turned shall be supported with permanent supports according to the approved plan.
11. An approved calibrated torque wrench that will indicate the actual torque on the roof bolts by a direct reading shall be provided on each roof bolting machine.
12. The torque on the first and one out of every four roof bolts installed thereafter at any location shall be checked by a qualified person. Such tests shall be made immediately after each bolt to be tested is installed, and if the torque on any bolt tested is not within the approved torque range, the reason shall be determined and necessary corrections made immediately. If the required torque cannot be obtained, supplementary supports such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.
13. On a daily basis, spot-check on torques shall be made on at least one roof bolt out of every ten from the outby corner of the last open crosscut to the face. The results of these tests shall be recorded in the onshift examination book. The record shall show the number of bolts tested and the number above and below the required range. If the results show that the majority of bolts are not maintaining at least 70 foot-pounds of torque with plate against wood 100 foot-pounds with plate against roof) or have loaded up to where they exceed 240 foot-pounds of torque, supplementary support such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.
14. Posts installed under roof that is disturbed or susceptible to sloughing shall have a wooden cap block, plank or crossbar between them and the roof. Where crossbars or planks are installed they shall be blocked to equally distribute the load across their length.
15. Posts shall be installed tight on solid footing and at least one but not more than two wooden wedges shall be used to install a post.
16. A supply of suitable roof support material including temporary supports sufficient to support the roof during one complete cycle of mining shall be provided as close as practicable to each working face.

17. An additional supply of supplementary roof support material consisting of 20 roof bolts, at least 12 inches longer than the bolt length being used, and a minimum of 20 posts of proper length with sufficient cap pieces and wedges, shall be provided at the dumping point or within 500 feet of the faces, whichever is closer. Tools and equipment necessary to install such support shall also be available within this distance.

18. A bar of a length suitable for prying down loose material shall be provided on all mobile face equipment, except haulage equipment.

19. A suitable roof sounding device shall be provided with all mobile face equipment, except haulage equipment. If face workmen who are not operators or helpers on such equipment do not carry a roof sounding device, such device shall be available within 50 feet of their working area.

20. The roof where falls have occurred shall be considered unsupported, and if persons are required to enter such areas, either to travel over the fall or clean it up, the roof shall be supported. Where falls or blasted roof materials are cleaned up, management shall devise and have in writing at the scene of the fall a plan incorporating the following procedures:

- a. Such work shall be under the direct, and unless the workmen are specially trained to do such work, constant supervision of a properly trained company official.
- b. Adequate temporary support on not more than 5-foot centers shall be set at the edge of the fall where work is to be started. A minimum of four posts or jacks shall be used.
- c. Temporary support mentioned above shall be replaced by permanent supports (roof bolts and/or posts) and advanced as cleanup work progresses.
- d. Bolting or timbering shall proceed from permanently supported roof to the temporary supports before other work is performed and roof supports shall be advanced as the cleanup work progresses.
- e. Where necessary to load material before support can be set, such loading shall be done from areas of permanent support with the operator and other persons in the area under supported roof at all times.
- f. Where feasible, permanent supports shall be placed in the entire fall area before loading starts.

CONVENTIONAL SAFETY PRECAUTIONS

1. This is the minimum roof control plan and was formulated for normal roof conditions and the mining system(s) described. When subnormal roof conditions are encountered, indicated or anticipated, additional roof support such as longer and/or additional roof bolts, posts, cribs, or crossbars, shall be installed.
2. Before being assigned to install roof support, all personnel shall be trained in the function of support being installed, proper installation procedures, and the approved roof-control plan. Such training will be performed by a qualified supervisor.
3. Only those persons engaged in installing temporary supports shall be allowed to proceed beyond permanent supports until such temporary supports are installed, and such persons shall examine the roof visually and by the sound and vibration method before proceeding to install temporary supports.
4. Where it is necessary to extend line curtains and other ventilating devices inby the permanent supports or to make methane tests inby the permanent supports, a minimum of two temporary supports on not more than 5-foot centers shall be installed. This minimum is applicable only if they are within 5 feet of the face or rib and the work is done between such supports and the nearest face or rib.
5. Where loose material is being taken down, a minimum of two temporary supports on not more than 5 foot centers shall be installed between the workmen and the material being taken down, unless such work can be done from an area supported by permanent roof supports installed in sound roof.
6. All metal jacks shall be installed with a cap block between the jack and the roof, unless an oversize bearing plate is provided. (Not less than 36 square inches.)
7. The roof in the face of an entry or roof shall be supported according to the approved plan before any sidecuts are started.
8. All posts installed under roof that is disturbed or susceptible to sloughing shall have a wooden cap block, plank, or crossbar between them and the roof. Where crossbars or planks are installed they shall be blocked to equally distribute the load across their length.
9. All posts shall be installed on tight footing and not more than two wooden wedges shall be used to install a post.
10. An additional supply of supplementary roof support materials shall be provided at the dumping point or within 500 feet of the faces, whichever is closer. Such supplementary support shall consist of at least 20 posts with sufficient cap pieces and wedges and a minimum of two crossbars for each active place or at least six per section.
11. A bar of a length suitable for prying down loose material shall be provided on all mobile face equipment, except haulage equipment.

12. A suitable roof sounding device shall be provided with all mobile face equipment, except haulage equipment. If face workmen who are not operators or helpers on such equipment do not carry a roof sounding device, such device shall be available within 50 feet of their working area.

13. When an opening is no longer needed for storing of supplies or for travel of equipment, the roof at the entrance of all such openings along travelways shall be supported by extending the post line across the opening.

14. The roof where falls have occurred shall be considered unsupported, and if persons are required to enter such areas, either to travel over the fall or clean it up, the roof shall be supported. Where falls or blasted roof materials are cleaned up, management shall devise and have in writing at the scene of the fall a plan incorporating the following procedures:

- a. Such work shall be under the direct and, unless the workmen are specially trained to do such work, constant supervision of a company official.
- b. Adequate temporary support on not more than 5-foot centers shall be set at the edge of the fall where work is to be started. A minimum of four posts or jacks shall be used.
- c. Temporary support mentioned above shall be replaced by permanent supports (roof bolts and/or posts) and advanced as cleanup work progresses.
- d. Bolting or timbering shall proceed from permanently supported roof to the temporary supports before other work is performed and roof supports shall be advanced as the cleanup work progresses.
- e. Where necessary to load material before support can be set, such loading shall be done from areas of permanent support, with the operator and other persons in the area under supported roof at all times.
- f. Where feasible, permanent supports shall be placed in the entire fall area before loading starts.

Spot Bolting Safety Precautions To Be Taken

1. Spot roof bolting shall be used only as a supplement to the approved roof control plan.
2. Roof bolts (spot bolting) shall be installed in accordance with roof conditions, but in no case shall spacing exceed 4 feet lengthwise and crosswise.
3. Where spot bolts are installed, roof bolting shall begin under safe roof and continue for the length of the adverse roof condition until safe roof is again encountered.
4. All components of the roof bolt assembly shall comply with the American National Standards Institute "Specifications for Roof Bolting Material in Coal Mines".
5. When wooden material such as planks, header blocks, or crossbars are used between the bearing plate and the roof for additional bearing, the use shall be limited to short-life openings (not to exceed three years) unless treated. Bearing plates used in conjunction with wooden materials shall be not less than four inches square or of equivalent area.
6. Finishing bits shall be easily identifiable by sight or feel and the diameter shall be within a tolerance of plus 0.030 inch minus zero of the manufacturer's recommended hole diameter for the anchor used.
7. An approved calibrated torque wrench that will indicate the actual torque on the roof bolts by a direct reading shall be provided on each roof bolting machine or in the place where bolts are being installed.
8. The torque on the first bolt in an area where spot bolting is being done and at least one roof bolt out of every four shall be tested by a qualified person. Such tests shall be made immediately after each bolt to be tested is installed, and if the torque on any bolt tested is not within the approved torque range, the reason shall be determined and necessary corrections made immediately. If the required torque cannot be obtained, supplementary supports such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.
9. When roof bolts (spot bolting) are installed in by the outby corner of the last open crosscut, spot-check on torques shall be made on a daily basis on at least one roof bolt out of every ten from the outby corner of the last open crosscut to the face. The results of these tests shall be recorded in the onshift examination book. The record shall show the number of bolts tested and the number above and below the indicated

range. If the results show that the majority of the bolts are not maintaining at least 70 foot-pounds of torque with plate against wood (100 foot-pounds with plate against roof) or have loaded to where they exceed 240 foot-pounds of torque, supplementary support such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs or crossbars shall be installed.

10. At least two temporary supports on not more than 5-foot centers shall be installed before roof bolts are installed at spot locations.

11. The following items are to be incorporated into the plan, either on a sketch or in the sheet listing the materials to be used:

- a. Bearing plates used directly against the mine roof shall be not less than 6 inches square or of equivalent area. In exceptional cases where the mine roof is firm and not susceptible to sloughing, bearing plates 5 inches square or of equivalent area may be used.
- b. Roof bolts shall be installed as close as possible to, but not more than 5 feet from the rib before a sidecut is started.
- c. Roof bolts shall be installed as close as possible to, but not more than 5 feet from the face before starting conventional cutting or a continuous miner run, except where the bolter is an integral part of the mining machine.
- d. Devices shall be used to compensate for the angle when roof bolts are installed at angles greater than 5° from the perpendicular to the roof line.

12. All unintentional roof falls defined in Title 30, CFR Part 50 shall be investigated and the results of the investigation recorded in a book provided for that purpose. Such falls shall also be shown on a map of the mine.

13. The approved roof control plan shall be posted on the mine bulletin board and be available to the miners.

14. When it becomes necessary to remove permanent timbers to provide space for travel or storage of material, an examination of the roof in the area shall be made. If the examination reveals any signs of roof failure or fault condition, equivalent support shall be provided before the original permanent timbers are removed. When the examination reveals no sign of roof failure the permanent timbers shall be removed remotely.

SEQUENCE OF MINING AND INSTALLATION OF SUPPORTS

Mining proceeds with line posts to be advanced as clearance of space allows. *Except to install supports, no workmen shall proceed inby permanent supports unless safety posts are set on not more than 5-foot centers in the area involved.

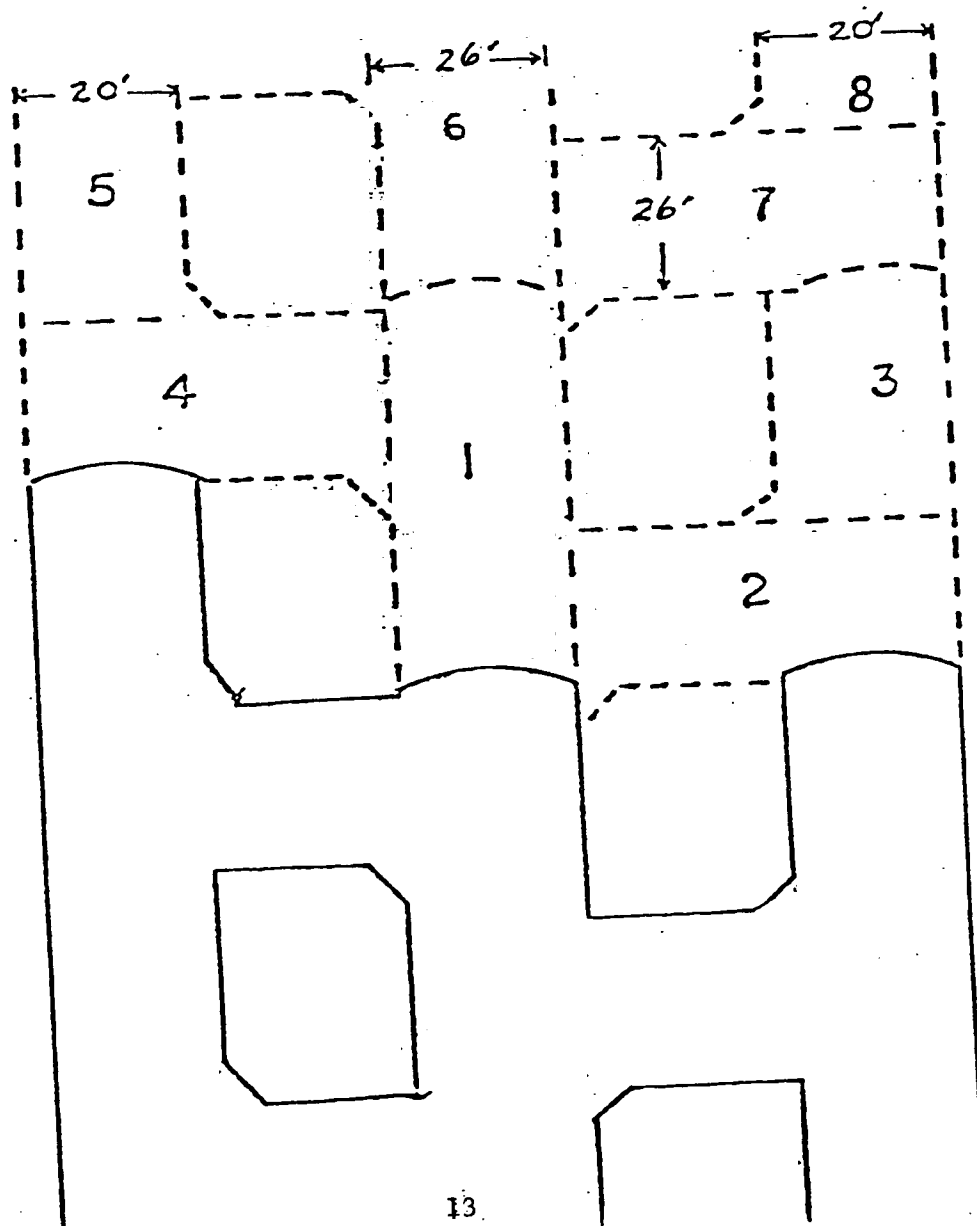
Before and during each operation the place shall be timbered as shown in attached sketches except when such support must be moved to perform the operation. A replacement post shall be set at a nearby location prior to the removal of such posts.

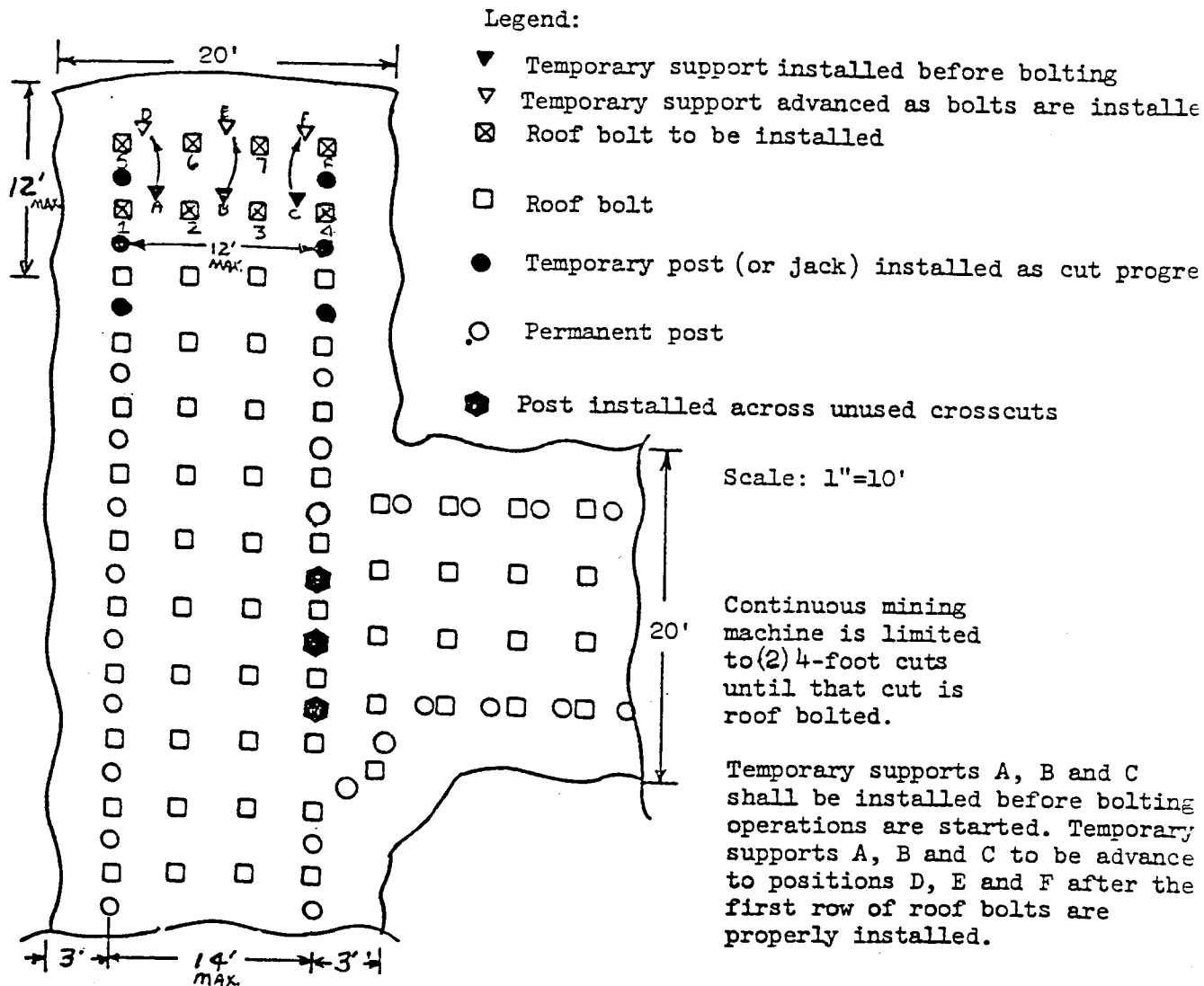
*NOTE: When installing supports in the face area, the workmen shall be within 5 feet of a temporary or permanent support.

NOTE: When retreating miner from the face of any place and roof supports are required to be removed, at least one post shall be set before another post is removed to retain a minimum of exposed roof.

SKETCH NO. 1
Sequence of mining entries

Wilcox Miner Section
When mining with entries on 50-foot centers and crosscuts on $62\frac{1}{2}$ -foot centers

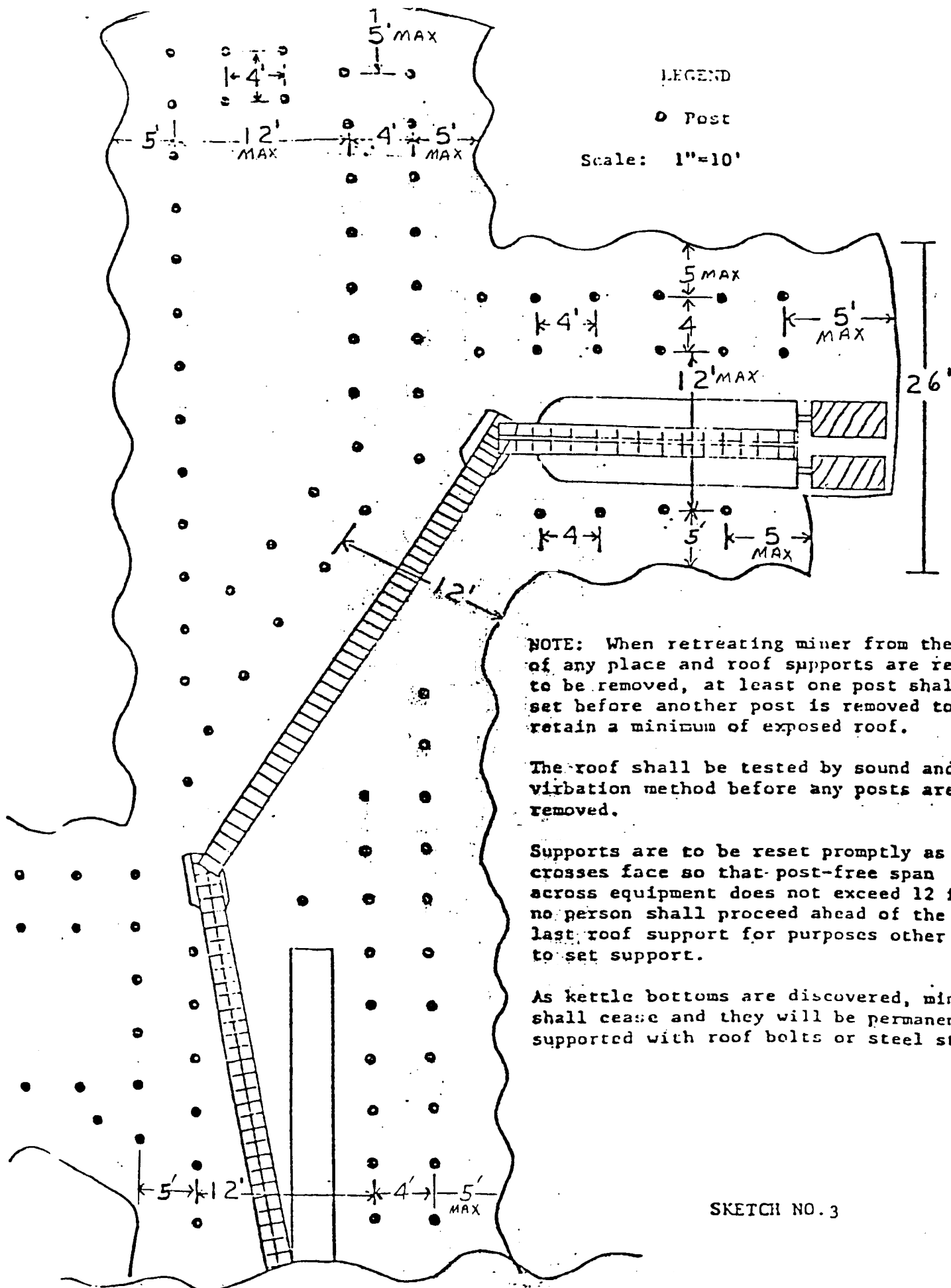




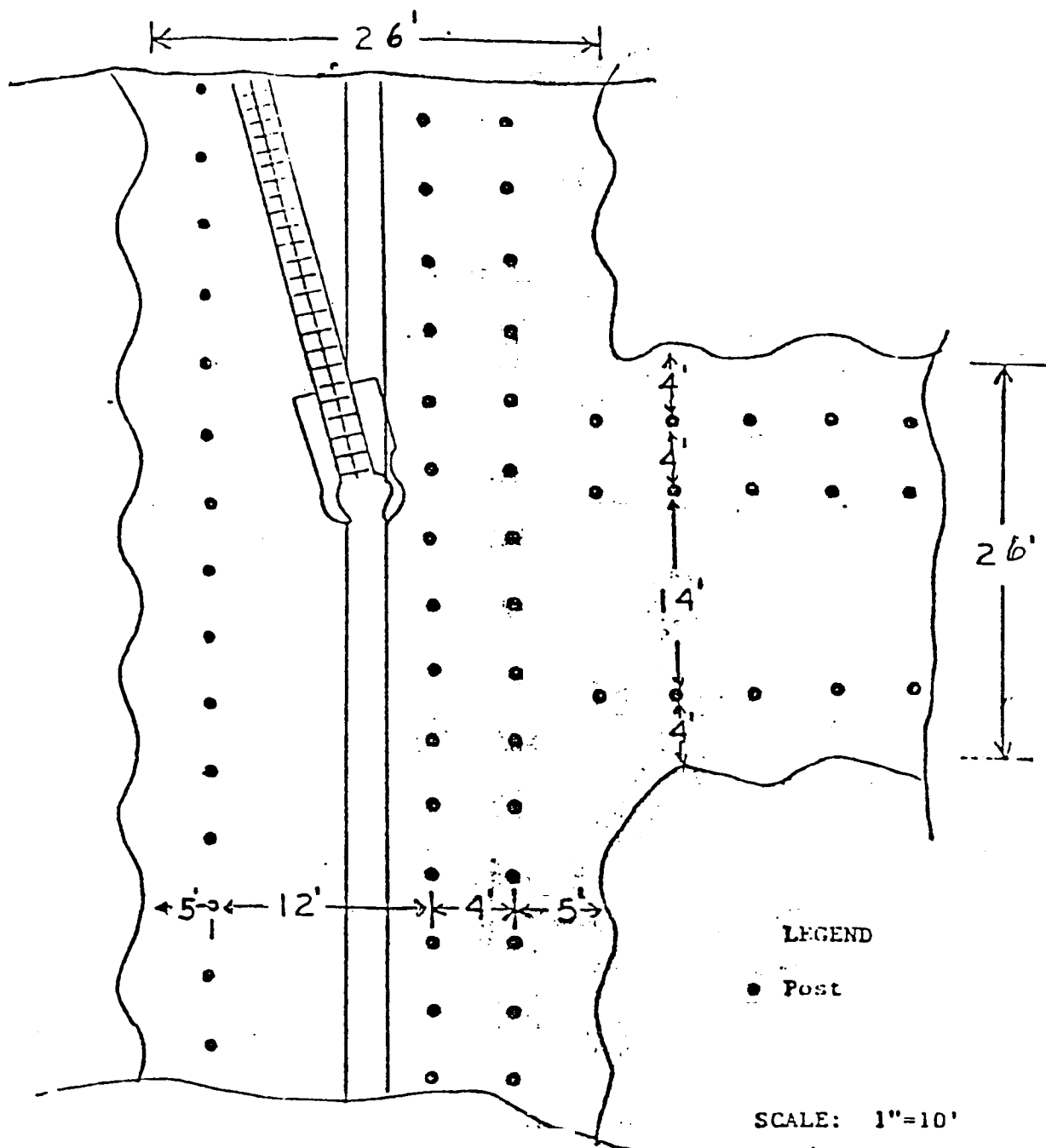
Temporary supports reset promptly as miner crosses face so that post-free span across equipment does not exceed 12 feet, and until temporary supports per sketch are set, no person shall proceed ahead of the last roof support for purposes other than to set support.

This is a minimum roof control plan and will be used for initial development from the highwall and remain in effect until an underground investigation has been made by a MSHA Representative (using auger-type miner).

SKETCH NO. 2



SKETCH NO. 3



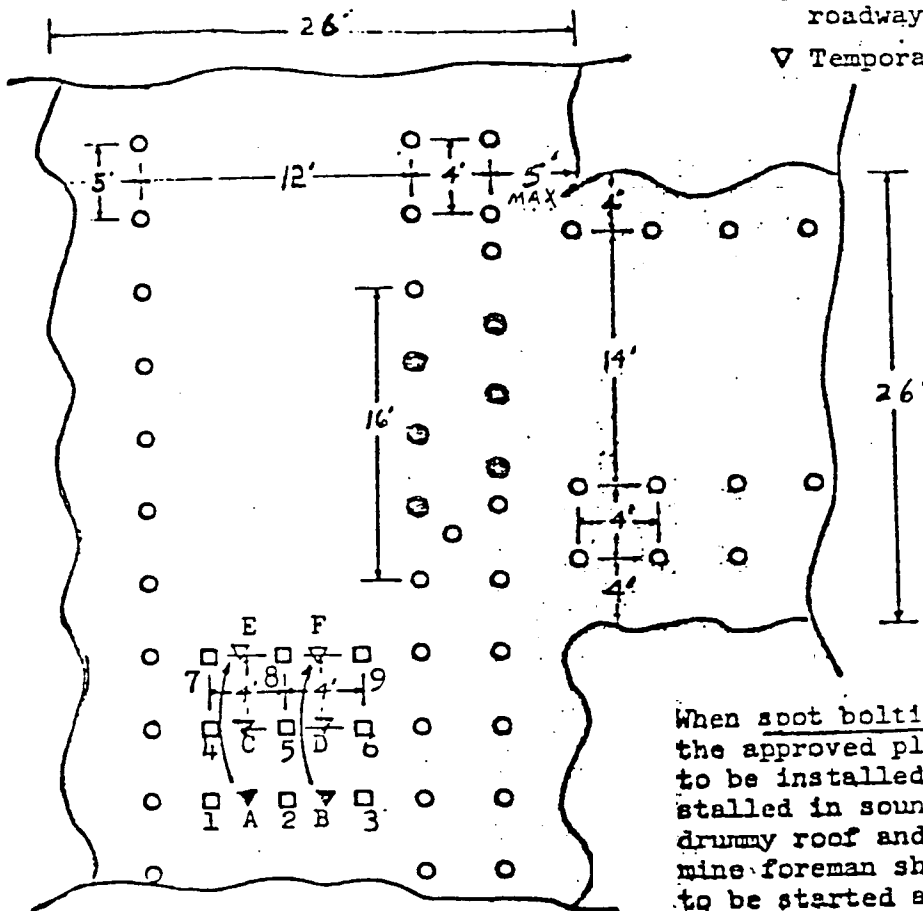
The roadway over the conveyor from the bridge conveyor dumping point a: outby shall not be more than a maximum of 12 feet wide as shown on ske (roadway may be on either side of conveyor).

SKETCH NO. 4

LEGEND:

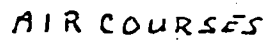
- Permanent post
- Roof bolts
- ⊙ All unused crosscuts along active roadways to be posted off
- ▽ Temporary support

Scale: 1"=10'



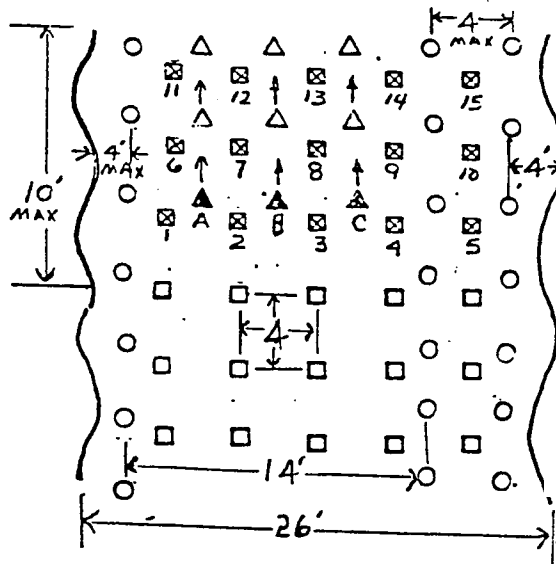
When spot bolting plan is used to supplement the approved plan, a minimum of 9 bolts are to be installed. Roof bolts are to be installed in sound roof through the loose or drummy roof and into sound roof again. The mine foreman shall determine when bolting is to be started and discontinued.

Temporary supports A, B C & D shall be installed before No. 1 bolt is installed. Temporary supports shall not be removed until bolts are properly torqued as required in Item 8 Page 10.



Scale: 1"=10'

SKETCH NO. 6



Legend:

- ☒ Roof bolts to be installed
- ☐ Roof bolts previously installed
- ▽ Temporary supports installed before roof bolting operations are started
- ▽ Temporary supports to be installed
- Post installed during development

This sketch to be used when adverse conditions are encountered as referred to on Sketches 8 and 9. In Item No. 3 bolts not to exceed 5' from rib. Four (4) rows of bolts to be used in 20' entries and 2 rows of posts.

Posts adjacent to bolt Nos. 1, 4 and 5 to be installed may be used as temporary supports.

Mirror Image Applies

SKETCH NO. 7

Before bolting operations are started, temporary supports A, B and C shall be installed. Temporary supports to be advanced as shown. Temporary support shall not be advanced until roof bolts are properly torqued as required.

[illegible]

- Permanent post
- Temporary support
- △ Unused crosscuts to be timbered off

Drawing for entries, rooms and crosscuts using Wilcox Mark 21 auger-type miner equipped with remotely positioned anchor jacks.

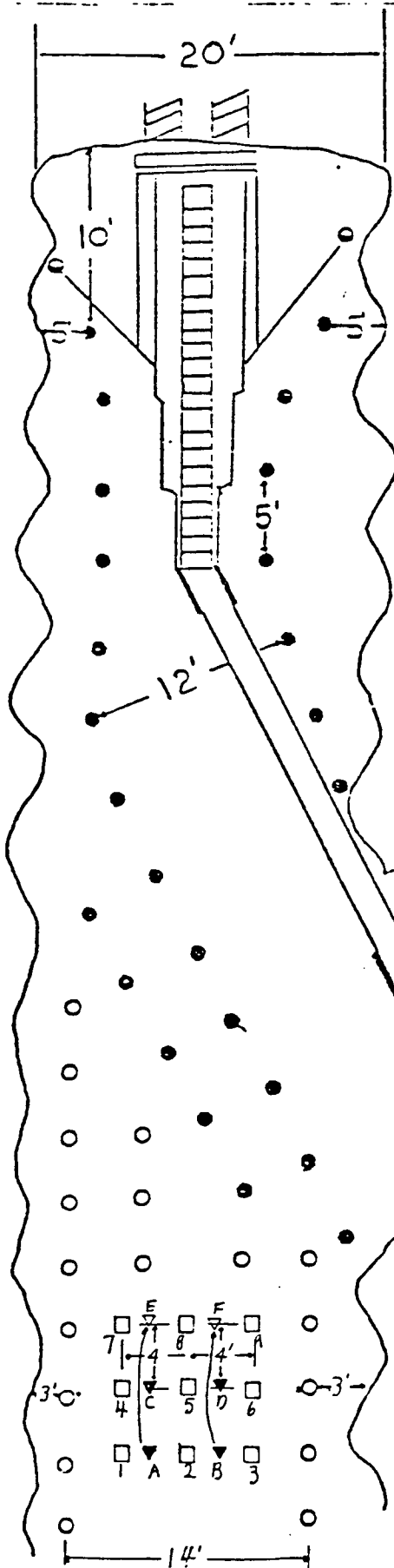
- A minimum of two rows of supports, as shown on each s. of mining machine, shall be maintained inby the operator controls at all times during continuous mining operation. The miner operator shall not advance the controls of the machine inby the second row of supports as shown

3. When broken, loose or drummy roof or draw rock is encountered in the face area, the area will be roof bolted on 4-foot centers lengthwise and crosswise from rib to rib, in addition to the conventional supports shown, and a maximum of 10 feet of advancement will be permitted until sound roof is again encountered.

Page 20

to where future set ups are to be made.

Drawing for entries, rooms and crosscuts using Wilcox Marx 21 auger-type miner equipped with remotely positioned anchor jacks.



1. Temporary supports are to be installed and maintain to within 10 feet of the face as the miner moves across the face. Spacing of temporary supports is not to exceed five feet lengthwise and crosswise; however, temporary supports near the face may be removed or repositioned to facilitate operation of equipment provided equivalent supports are installed prior to removal and distance between supports and rib does not exceed 12 feet across the miner.

A minimum of one row of supports, as shown on each side of mining machine, shall be maintained in by the operator controls at all times during continuous mining operation the miner operator shall not advance the controls of the machine in by the second row of supports as shown.

2. Permanent posts are to be installed as space permit as miner advances.

3. When broken, loose or drummy roof or draw rock is encountered in the face area, the area will be roof bolted on 4-foot centers lengthwise and crosswise from rib to rib in addition to the conventional supports shown, and a minimum of 10 feet of advancement will be permitted until sound roof is again encountered.

NOTE: No person will be allowed in by temporary supports at any time.

Crosscut shall not hole through into the air course before posts are installed within 4 feet of face when cut through made.

When spot bolting plan is used to supply the approved plan, roof bolts are to be installed in groups of 6 or 9 minimum. Roof bolts are to be installed in sound roof through the loose or drummy roof and into sound roof again.

Temporary supports A, B, C, and D shall installed before No. 1 bolt is installed. Temporary supports shall not be removed until bolts are properly torqued as required in Item 8 Page 10.

LEGEND:

□ Spot bolt

▽ Temporary support for spot bolt

○ Permanent post

● Temporary support

● Remotely positioned anchor jacks

SKETCH NO. 9

Mirror image applies

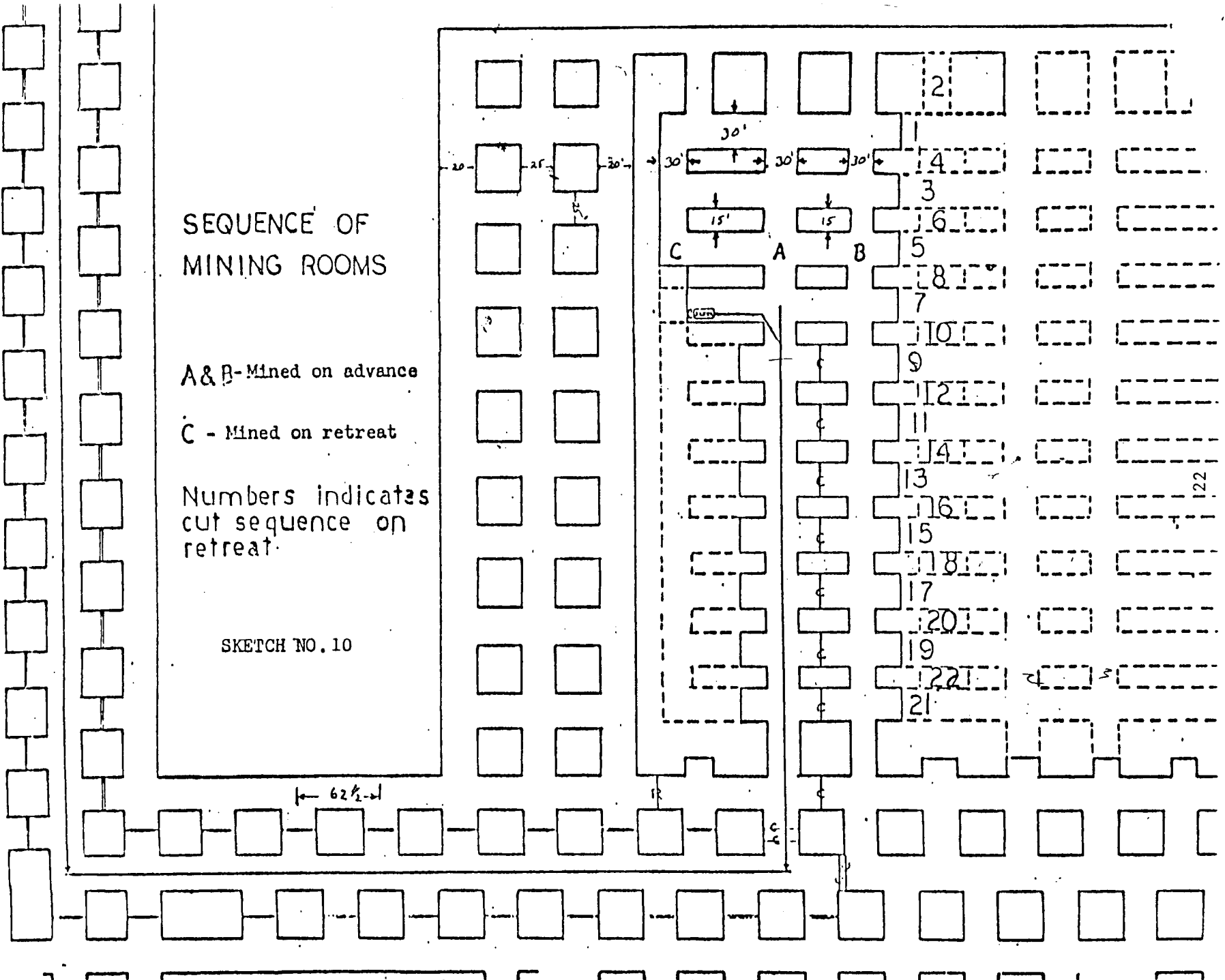
SEQUENCE OF MINING ROOMS

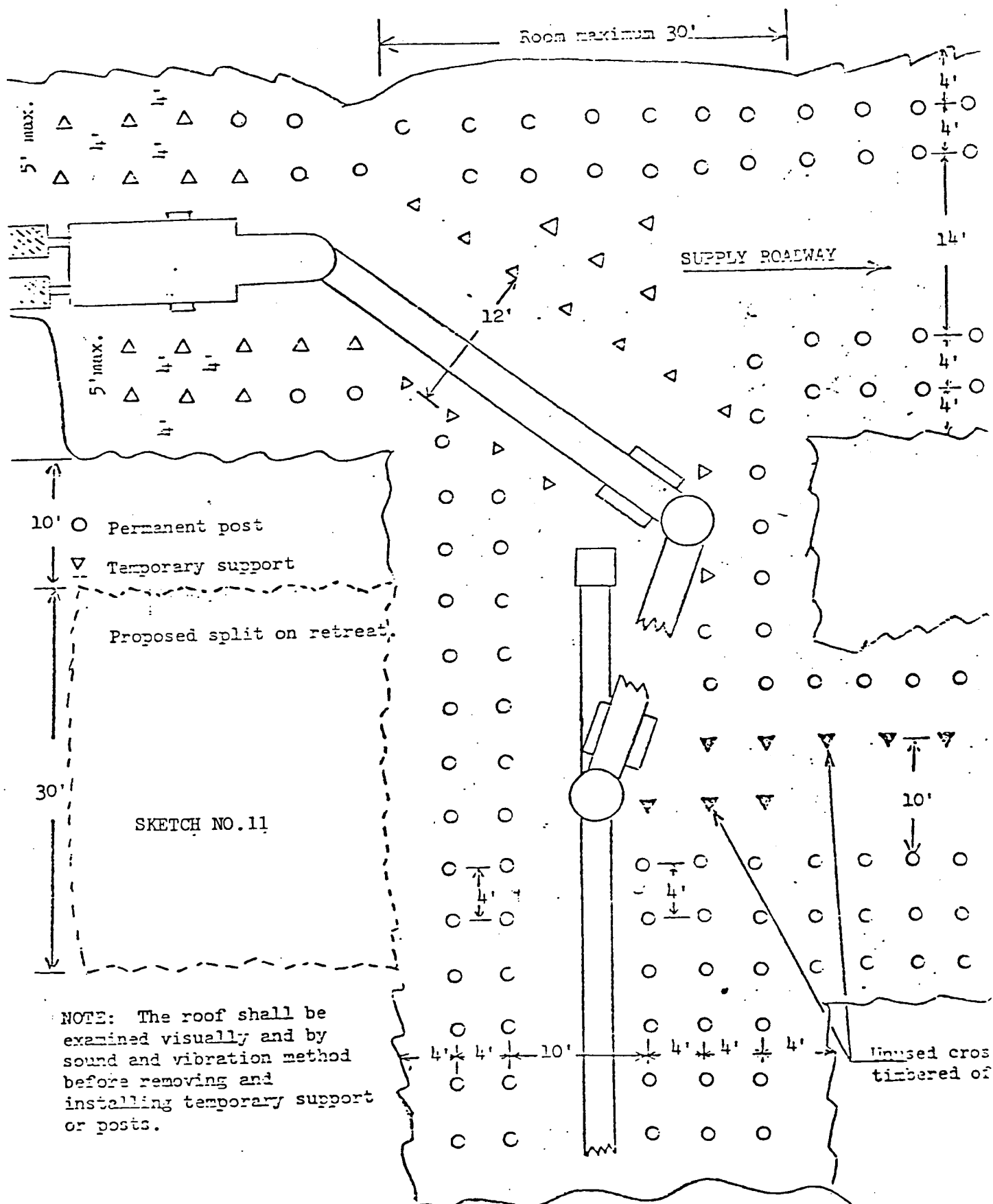
A & B - Mined on advance

C - Mined on retreat

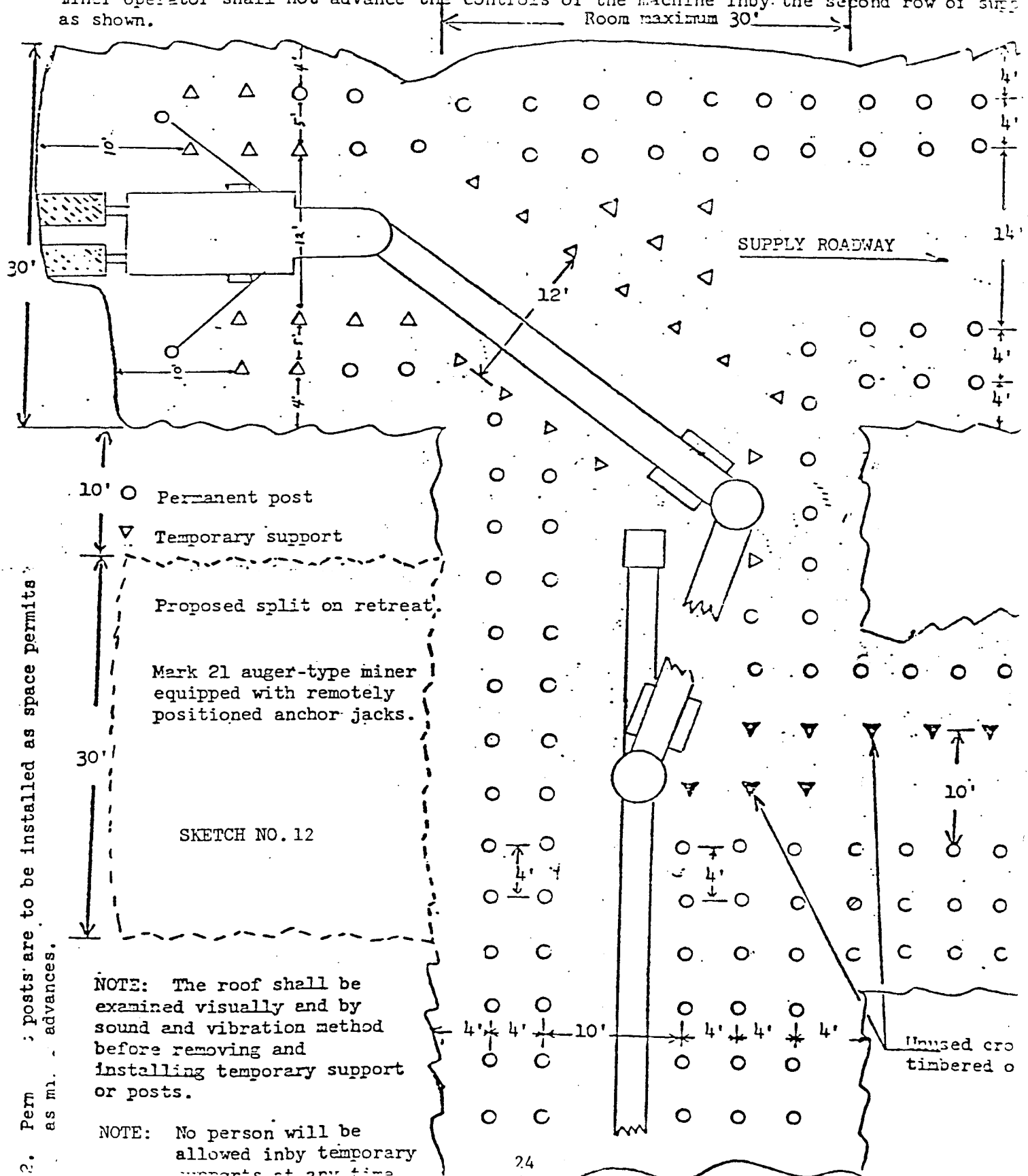
Numbers indicates
cut sequence on
retreat.

SKETCH NO. 10





1. Temporary supports are to be installed and maintained to within 10 feet of the face as miner moves across the face. Spacing of temporary supports is not to exceed 5 feet 10" and crosswise; however, temporary supports near the face may be removed or repositioned to facilitate operation of equipment provided equivalent supports are installed prior to removal and distance between supports and rib does not exceed 12 feet across the miner. A minimum of two rows of supports, as shown on each side of mining machine, shall be maintained in by the operating controls at all times during continuous mining operations. Miner operator shall not advance the controls of the machine in by the second row of supports as shown.



SKETCH NO. 13

