ITEM 3-1

PILLAR RECOVERY AND ROOF CONTROL PLAN

ROOF-CONTROL PLAN

General Information

Date February 12, 1986 Mine I.D. No. 42-01715

A. Company GENWAL COAL COMPANY

Address P.O.BOX 1201 HUNTINGTON, UTAH 84528
City State

B. Mine CRANDALL CANYON NO.1 MINE

Mine Location

HUNTINGTON EMERY UTAH 84528
City County State

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

1.5 Miles WEST Off Route No31

D. Type(s) of plan FULL BOLTING, COMBINATION

E. Area(s) of mine covered by the plan ALL

F. Maximum cover (Feet) 1500'

Main roof	SANDSTONE
Immediate roof	SANDSTONE AND SHALE
Coalbed	HIAWATHA
Bottom	MASSIVE SANDSTONE

G. _____ ENGINEER 2/12/1986
Company or mine official validating plan Title

Roof-control investigator(s) _____

Approved by _____ Date _____

Title _____

APRIL 15, 1986 MID TERM REVISIONS REPLACES FORMER ITEM 3-1

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H. ROOF-SUPPORT MATERIALS - ROOF BOLTS

Manufacturer CF&I CORP.
BIRMINGHAM BOLT CO.
MIKCO IND. OR EQUIVALENT

Manufacturer's Designation NONE

Minimum length 48"

Diameter 3/4"HS 5/8" EHS

Type steel HIGH STRENGTH

Type thread ROLLED

Length of thread 8" MAX.

Type head STANDARD
(Standard, Self Centering, Cone Neck)

Dimensions of bolt head: Nut 1 1/8" Flange 1 1/4" - 2"

I. BEARING PLATES

Manufacturer CF&I CORP.
MIKCO IND.
OR EQUIVALENT

Manufacturer's Designation NONE

Dimensions 6" X 6" X 3/16" MIN.

Shape EMBOSSED

Center Hole Size 1"

J. WASHERS

Manufacturer N/A

Manufacturer's Designation N/A

Type steel N/A

Size N/A

Shape
(Donut embossed, Bell embossed, Flat)

Hole Size

K. ANCHORAGE UNIT

Manufacturer BIRMINGHAM BOLT
OHIO BRASS
OR EQUIVALENT

Manufacturer's Designation NONE

Type EXPANSION

Size of Finished Hole 1 3/8" +.030" MINUS 0"

Method of drilling WET/DRY ROTARY

Dust Control WATER/AIR

Installed torque 150-240 ft-lbs.

L. MATERIALS USED IN CONJUNCTION WITH ROOF BOLTS

M. FACE EQUIPMENT AND SECTION HAULAGE EQUIPMENT ASSOCIATED WITH EACH:

1. JOY 12 CM MINER
2. JOY 10 SC, 21 SC AND IR 820 COAL HAULERS
3. LEE-NORSE TD1-43 , TD1-27
4. S&S 86 SCOOP
5. JOY 14 BU LOADER
6. JOY 15 RU CUTTING MACHINE

N. SEQUENCE OF MINING AND INSTALLATION OF SUPPORTS INCLUDING TEMPORARY SUPPORTS

Plan drawing showing sequence of mining including pillar mining where applicable, sequence of installation and spacing of supports including temporary supports and maximum width of entries, rooms, intersections, crosscuts, and pillar lifts are attached.

Entry width 20'

Entry centers 150' MAX. 60' MIN.

Crosscut width 20'

Crosscut centers 150'MAX. 60' MIN.

Room width 20'

Room centers 150' MAX. 60' MIN.

Room crosscut width 20'

Room crosscut centers 150' MAX. 60'MIN.

Slope width (anthracite) N/A

Gangway width (anthracite) N/A

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 4" X 12" MIN.

Wedges, size and shape 0-1" X 3 1/2" X 8" MIN.

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

The following resin grouted roof-support material is approved for use in lieu of conventional type roof bolts at the subject mine:

ROOF SUPPORT MATERIALS - RODS

Manufacturer: BIRMINGHAM BOLT
PATTEN-WEST
MIKCO IND. (OR EQUIVALENT)

Manufacturer's Designation: BIRMINGHAM EB-61

Minimum length: 48"

Diameter: 1" MIN.

Type steel: GRADE 40

Type head: STANDARD SQUARE

Minimum yield: 43,000 PSI

Dimensions of bolt head: Nut 1 1/8"

Flange: 1 1/2" - MIN.

BEARING PLATES

Manufacturer: CF&I CORP.
MIKCO IND.
OR EQUIVALENT

Manufacturer's Designation: NONE

Dimensions: 6" X 6" X 3/16" MIN.

Shape: EMBOSSED

Center Hole Size: 1 1/4" MAX.

RESIN

Manufacturer: DUPONT
CELITE
CARBOLY

Manufacturer's Designation: FAST LOC
MV001-37

Type: POLYESTER RESIN & CATALYST

Method of Drilling: WET/DRY ROTARY

Size of Finished Hole: 1" - #6 REBAR, 1 1/8" - #7 REBAR
+ .030" MINUS 0"

Dust Control: WATER/AIR

SEQUENCE OF MINING AND INSTALLATION OF SUPPORTS INCLUDING TEMPORARY SUPPORTS

PLAN DRAWINGS SHOWING SEQUENCE OF MINING INCLUDING PILLAR MINING WHERE APPLICABLE, SEQUENCE OF INSTALLATION AND SPACING OF SUPPORTS INCLUDING TEMPORARY SUPPORTS AND MAXIMUM WIDTH OF ENTRIES, ROOMS, INTERSECTIONS, CROSSCUTS AND PILLAR LIFTS ARE ATTACHED. SIGHT LINES SHALL BE ESTABLISHED TO ASSURE THAT MINING PROJECTIONS ARE FOLLOWED. CHANGES SHALL NOT BE MADE IN THE MINING SYSTEM UNTIL THE PLAN HAS BEEN REVISED ACCORDINGLY.

WHERE SECOND MINING IS BEING DONE, MANAGEMENT SHALL SHOW ON A MINE MAP THE SEQUENCE OF RECOVERING PILLARS. PILLARING METHODS SHALL MAINTAIN A UNIFORM PILLAR LINE THAT ELIMINATES PILLAR POINTS AND PILLARS THAT PROJECT INBY THE BREAKLINE. WHEN CONDITIONS DICTATE THAT CHANGES BE MADE IN THE SEQUENCE OF PILLAR RECOVERY, SUCH CHANGES SHALL BE AUTHORIZED BY THE SUPERINTENDENT OR GENERAL MINE FOREMAN AND SHALL INCLUDE ADDITIONAL PRECAUTIONARY MEASURES TO BE TAKEN TO COMPENSATE FOR THE ABNORMAL CONDITIONS ENCOUNTERED.

Entry Width	20'	Centers	60'MIN. feet
Crosscut Width	20'	Centers	60' feet MIN.
Room Width	20'	Centers	60, feet MIN.
Room Crosscut Width	20'	Centers	60' feet MIN.

TYPES OF FACE AND HAULAGE EQUIPMENT

- SEE PAGE 3 -

SAFETY PRECAUTIONS FOR FULL BOLTING AND COMBINATION PLANS

1. This is the minimum roof control plan and was formulated for normal roof conditions while using the mining system(s) described. In areas where subnormal roof conditions are encountered, indicated, or anticipated, the operator shall provide additional support where necessary. If changes are to be made in the mining system that necessitates any change in the roof control plan, the plan shall be revised and approved prior to implementing the new mining system.

2. All personnel required to install roof supports shall be trained by a qualified supervisor designated by mine management before being assigned to perform such work. This training shall insure that such persons are familiar with the functions of the support being used, proper installation procedures, and the approved roof control plan.

   Supervisors in charge and miners who install supports shall be informed of an approved roof control plan and any changes in a previously approved roof control plan not later than their first working shift following receipt of the approved plan. As soon as possible but no later than three weeks after receipt of this approved plan, all provisions contained herein shall be fully explained to all miners whose duties require them to be on a "working section." All new miners shall have the hazards of mine roof and ribs and the content of this plan explained to them before they start to work.

3. (a) Upon completion of the loading cycle, a reflectorized warning device, such as a "stop" sign, shall be conspicuously placed to warn persons approaching any area that is not permanently supported. It is to be emphasized that the warning device has been placed to cause the person to stop, examine, and evaluate the roof and rib conditions prior to entering the area--even after temporary supports have been installed.

   (b) Where required, temporary supports shall be installed immediately after the loading cycle is completed unless roof bolting machines are equipped with acceptable automated temporary supports.

   (i) Except when the District Manager has determined that more than 5 minutes are needed, "immediately" is inerpreted to mean that the installation of such temporary supports shall be started no later than 5 minutes after mining of the cut is completed and, after the installation of such supports is started, the installation of supports shall be continued until at least the minimum number are installed as required in the approved plan. If the installation of permanent supports is not started within 30 minutes after the loading cycle is completed, temporary supports shall be installed in the entire cut on 5 foot centers.

(c) Only those persons engaged in installing temporary supports shall be allowed to proceed beyond the last row of permanent supports until temporary supports are installed. Before any person proceeds inby permanently supported roof, a thorough visual examination of the unsupported roof and ribs shall be made. If the visual examination does not disclose any hazardous condition, persons proceeding inby permanent supports for the purpose of testing the roof by the sound and vibration method and installing supports shall do so with caution and shall be within 5 feet (less if indicated on Sketch Nos.P.20) of a temporary or permanent support. If hazardous conditions are detected, corrective action shall be taken to give adequate protection to the workmen in the area involved.

4. When installing permanent supports, temporary supports may be repositioned in the sequence indicated on the attached sketch (Nos.P.20). However, if it is necessary to remove temporary supports (other than those specified above) before permanent supports are installed, such temporary supports shall be removed by some remote means, or another temporary support shall be installed in such a manner that the workman removing the support remains in a supported area. Means of removal of such supports shall be approved by the District Manager.

5. Work such as extending line curtains, other ventilating devices or making methane tests inby the roof bolts shall not be done unless a minimum of two temporary supports are 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. Other methods of providing temporary supports for this work will be accepted if equivalent protection is provided.

6. Where rehabilitation work is being done, the following temporary support pattern shall apply:

   a. Where bolts are being replaced in isolated instances (such as where equipment has knocked bolts loose) one temporary support shall be installed within a radius of 2 feet from each bolt to be replaced.

   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 not more than 5 foot centers across the place so that the work in progress is done between the installed temporary supports and adequate permanent supports in sound roof.

7. (a) 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 miner and the material being taken down unless such work can be done from an area supported adequately by permanent roof supports.

(b) To enable miners to perform their duties from a safe position without exposure to falling material, a bar of suitable lenght and design shall be provided on all mobile face equipment, except haulage equipment, and such bar shall be used when prying down loose material. (The length of bar shall be suitable for the area involved in its use, i.e., construction areas, rooffall areas, and other mining areas require a bar of suitable length.)

8. All metal jacks shall be installed with a cap block between the jack and the roof unless an oversize bearing plate of not less than 36 square inches is provided.

9. In each active working place where roof bolts are installed, at least one roof bolt hole shall be drilled to a depth of at least 12 inches above the anchorage horizon of the bolts being used to determine the nature of the strata. Such test holes shall be drilled at intervals not to exceed 200' feet. The test hole shall be either left open for examination or a roof bolt of a length equal to (or greater than) the required test hole depth may be installed and tightened provided adequate anchorage is obtained.

10. (a) Sidecuts shall be started only in areas that are supported with permanent roof supports. Where the installation of additional supports is required prior to starting the sidecut, such supports shall be shown on a sketch. Once the sidecut has been completed, the sidecut shall be supported by either temporary or permanent supports prior to working in the intersection.

(b) During development, except where old workings are involved, mine openings shall not be holed through into unsupported areas. When a mine opening holes through into a permanently supported entry, room, or crosscut, the intersection so created shall be considered unsupported and no work shall be done in or inby such intersection until either:

(i) The newly created opening is permanently supported as indicated in the approved roof control plan, or;

(ii) The newly created opening is timbered off with at least two rows of posts installed on not more than 4 foot centers across the opening.

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 in operation.

12. Immediately after the first bolt is installed in each place, the torque shall be tested and thereafter at least one roof bolt out of every four shall be tested by a qualified person. If any of the bolts tested do not fall within the required torque range, the remaining previously installed bolts on this cycle shall be tested.

If the majority of the bolts still fall outside the required torque range, necessary adjustments shall be made immediately. If, after these adjustments are made, the required torque ranges are still not obtained, supplementary supports such as different length roof bolts with adequate anchorage, posts, cribs, or crossbars shall be installed.

13. A spot-check on torques shall be made during each 24-hour period on at least one roof bolt out of every ten from the outby corner of the last open crosscut to the face. Such torque checks are necessary only in advancing sections in working places producing coal during any portion of the aformentioned 24-hour period.

    The results of these tests shall be recorded in the onshift examination book. The record shall show the number of bolts tested and number above and below the required range.

    If the results show that the majority of the bolts are not maintaining at least **150 / *120 foot-pounds of torque or have loaded up to where they exceed 250 foot-pounds or 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 cracked, broken, or susceptible to sloughing shall have a wooden cap block, plank, or crossbar between the post 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 and on solid footing. 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. (Each plan shall specify the location for the supply of such materials.)

**Plates directly against roof.
*Plates against wood.

18. 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.

19. (a) Where roof falls have occurred and at all overcasts, boom holes, and other construction sites that require removal of mine roof material, (e.g., by blasting, by ripping with a continuous mining machine, by cutting with a cutting machine, or any other means), the roof shall be considered unsupported. If miners are required to enter such areas, either to travel over the fallen material, to clean it up, or to perform other duties, the roof shall be supported adequately. Mine management shall devise and have posted in writing at the scene of such unsupported roof a plan incorporating the following procedures:

(i) Such work shall be under the direct and, unless the miners are specially trained to do such work, constant supervision of a certified person.

(ii) 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.

(iii) Temporary support mentioned above shall be replaced by permanent supports (roof bolts and/or posts) and advanced as cleanup work progresses.

(iv) 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.

(v) Where necessary to load material before support can be set, such loading shall be done from areas of permanent under supported roof at all times.

(vi) Where feasible, permanent supports shall be placed in the entire fall area before loading starts.

(b) All roof falls and other areas in the active workings where the mine roof material has been removed from its natural location by any means and is not being cleaned up shall be posted off at each entrance to the area by at least two rows of posts (or the equivalent) installed on not more than 5-foot centers across the opening.

20. On haulageways, all crossbars or beams shall be installed with some means of support that will prevent the beam or crossbar from falling in the event the supporting legs are accidently dislodged. (The District Manager may utilize this requirement, or waive this requirement on a mine-by-mine basis.)

21. Permanent roof supports shall not be recovered unless the operator has included a detailed system for such recovery in the approved roof control plan.

22. Devices such as spherical washers, angle washers, or slotted wood wedges, should be used to compensate for the angle when roof bolts are installed at nagles greater than 5° from the perpendicular to the roof line.

23. All roof bolt materials shall be stored and handled in such a manner that will minimize rusting and/or damaging.

SAFETY PRECAUTIONS FOR RESIN GROUTED RODS

1. Persons responsible for installation of resins shall be instructed in safe handling precautions for such materials.

2. The relationship between the hole dimensions, rod size, and the size and number of resin cartridges is critical; therefore, adequate training and supervision shall be provided to assure proper installation.

3. All safety precautions required in the regular roof control plan shall apply--except Nos. _____. (The torque checks specified for conventional roof bolts do not apply.)

4. Resin grouted rods shall be installed as soon as possible (to be determined on a mine-to-mine basis--normally not more than 8 hours) after the working place is exposed. Where required, temporary supports shall be installed immediately after the loading cycle is completed unless roof bolting machines are equipped with acceptable automated supports.

   (a) Except when the District Manager has determined that more than 5 minutes are needed, "immediately" is interpreted to mean that the installation of such temporary supports shall be started not later that 5 minutes after mining of the cut is completed and, after the installation of such supports is started, the installation of supports shall be continued until at least the minimum number are installed as required in the approved plan.

5. Resin grouted rods and conventional roof bolts shall not be intermixed unless they are either used as supplementary support or a systematic plan has been approved by the District Manager for combining the two roof support systems.

6. Drill steel shall be equivalent in length to the rods used or adequately marked to assure the proper hole depth. Each drill hole shall be filled the entire length with resin.

7. (a) All resin grouted rods shall be used with bearing plates approved for use at the mine.

   (b) Bearing plates shall be installed tight against the mine roof.

8. (a) The resin shall not be used if manufacturer's recommended shelf life is exceeded.

   (b) Resin packages shall be protected form excessive heat and cold during storage, and shall not be used in areas where the ambient temperature falls outside the range recommended by the manufacturer.

(c) Broken cartridges of resin or cartridges that show signs of deterioration shall be removed from the underground portion of the mine.

(d) Resin grouted rods shall be installed in accordance with the manufacturer's recommendations.

9. For test purposes the first resin grouted rod installed in each cycle in each working place, after a minimum curing time of 10 minutes, shall be checked with a torque wrench after installing the first line of permanent support and prior to removing any temporary supports. The torque applied should be 150 foot-pounds. Should the rod turn in the hole, a second rod shall be tested in the same manner. If this rod also turns, resin installation shall be discontinued until reasons for failure of the resin is determined. (A click type torque wrench is recommended for this test.)

SAFETY PRECAUTIONS--SPECIAL ROOF CONTROL PLAN

Because the number of mines having a special roof control plan is minimal and the latitude of variation in requirements peculiar to special roof control plans is so great, it is believed that safety precautions to be included in such plans shall be formulated on a mine-to-mine basis.

AUTOMATED TEMPORARY ROOF SUPPORT (ATRS) SAFETY PRECAUTIONS

A.

Roof Bolter Manufacturer	Model Number	Serial Number	Minimum Load Carrying Capacity
1. LEE NORSE	TD1-43	3624	8000
2. LEE NORSE	TD1-27	40011748	8000
3.			
4.			
5.			

B. A registered professional engineer shall certify that each ATRS is capable of supporting the above minimum load carrying capacities. Evidence of the certification shall be furnished by attaching a plate, label, or other appropriate marking to the ATRS system. Written evidence of this certification shall be retained by the operator

C. Two safety jacks must be kept on the bolting machine at all times to be used when adverse roof conditions are encountered and the automated support does not supply adequate protection for the bolter operator.

D. No one shall proceed inby the automated temporary support system unless a minimum of 2 temporary supports are installed. This minimum is applicable only if the supports are not more than 5 feet apart, within 5 feet of permanent support, face, or rib and the work is done between such supports and the nearest face or rib.

E. Holes will not be drilled or bolts will not be installed to the left or right of the outer roof contact points of the automated temporary support system unless the coal rib or a temporary support is within 5 feet of these contacts.

F. The automated temporary support system shall be placed firmly against the roof not more than 5 feet inby the last row of permanent supports, before any person proceeds inby permanent support.

G. There will be no installation of roof bolts inby the temporary roof support.

H. The controls necessary to position and set the automated support shall be located in such a manner that they can be operated from under permanent support.

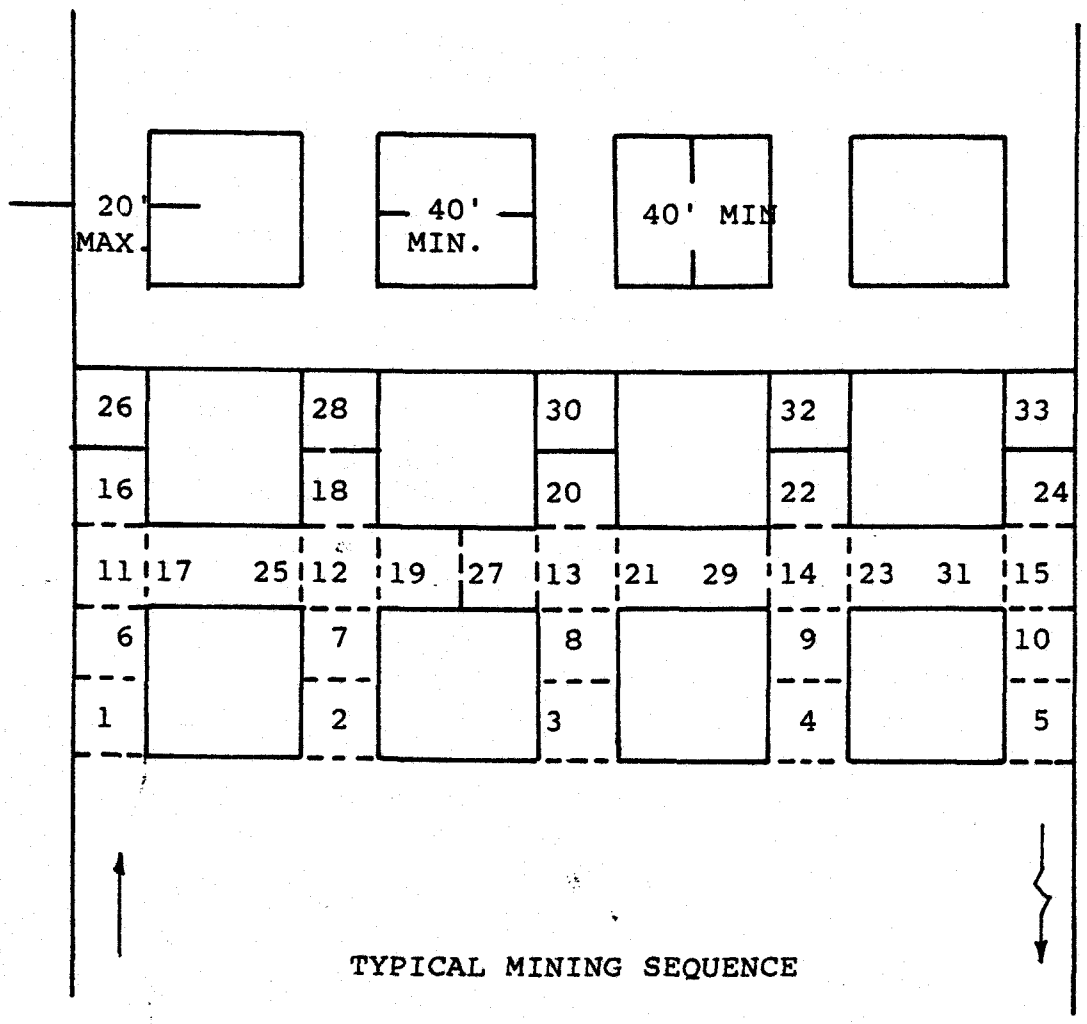
I. A check valve or equivalent protection shall be incorporated in the automated temporary support system to eliminate the danger of collapse through sudden loss of hydraulic fluid from a broken hose.

J. The temporary roof supports as required in the approved roof control plan do not apply where the roof bolting machine is equipped with the acceptable ATRS system. This does not preclude the use of temporary supports where needed to make necessary tests or for ventilation purposes.

K. The drawing in figure P.19 shows how the ATRS system shall be positioned and re-positioned as bolting progresses, and shows the sequence of installation of roof bolts in a typical face area.

L. The drawing in figure P.19 shows in plan view, the ATRS safety arm support and roof contact devices, with dimensions.

M. It should be noted that certification or approval of an ATRS by equipment manufacturers does not constitute approval of an ATRS system in lieu of temporary supports. Only the District Manager or his representative can approve an ATRS system in lieu of temporary supports.

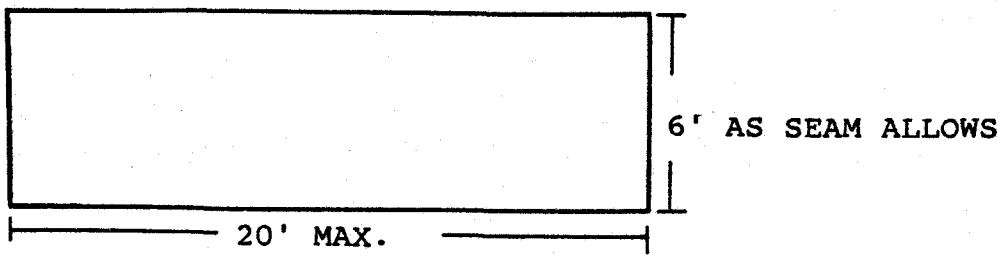


TYPICAL MINING SEQUENCE

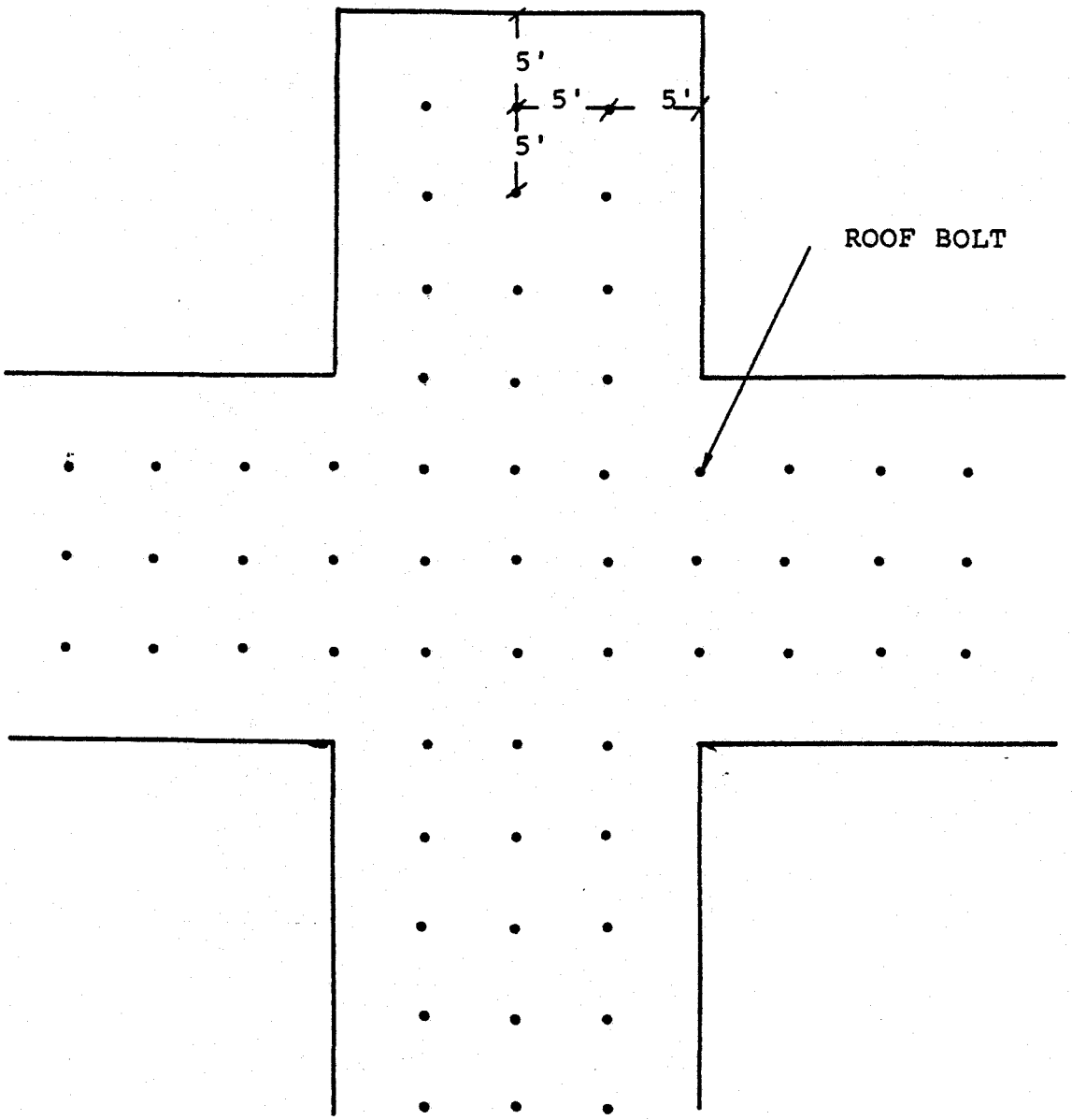
ROOF BOLTING WILL BE IN ACCORDANCE W/APPROVED ROOF CONTROL PLAN.

NOTES:
1. ON LARGER PILLARS MORE CUTS WILL BE NECESSARY AND PLACED WHERE NEEDED
2. MINING MAY PROCEED IN MIRROR IMAGE

SCALE 1"=50'



GENWAL COAL COMPANY
CRANDALL CANYON MINE
P.O.BOX 1201 HUNTINTTON, UT
FEBRUARY 17, 1986



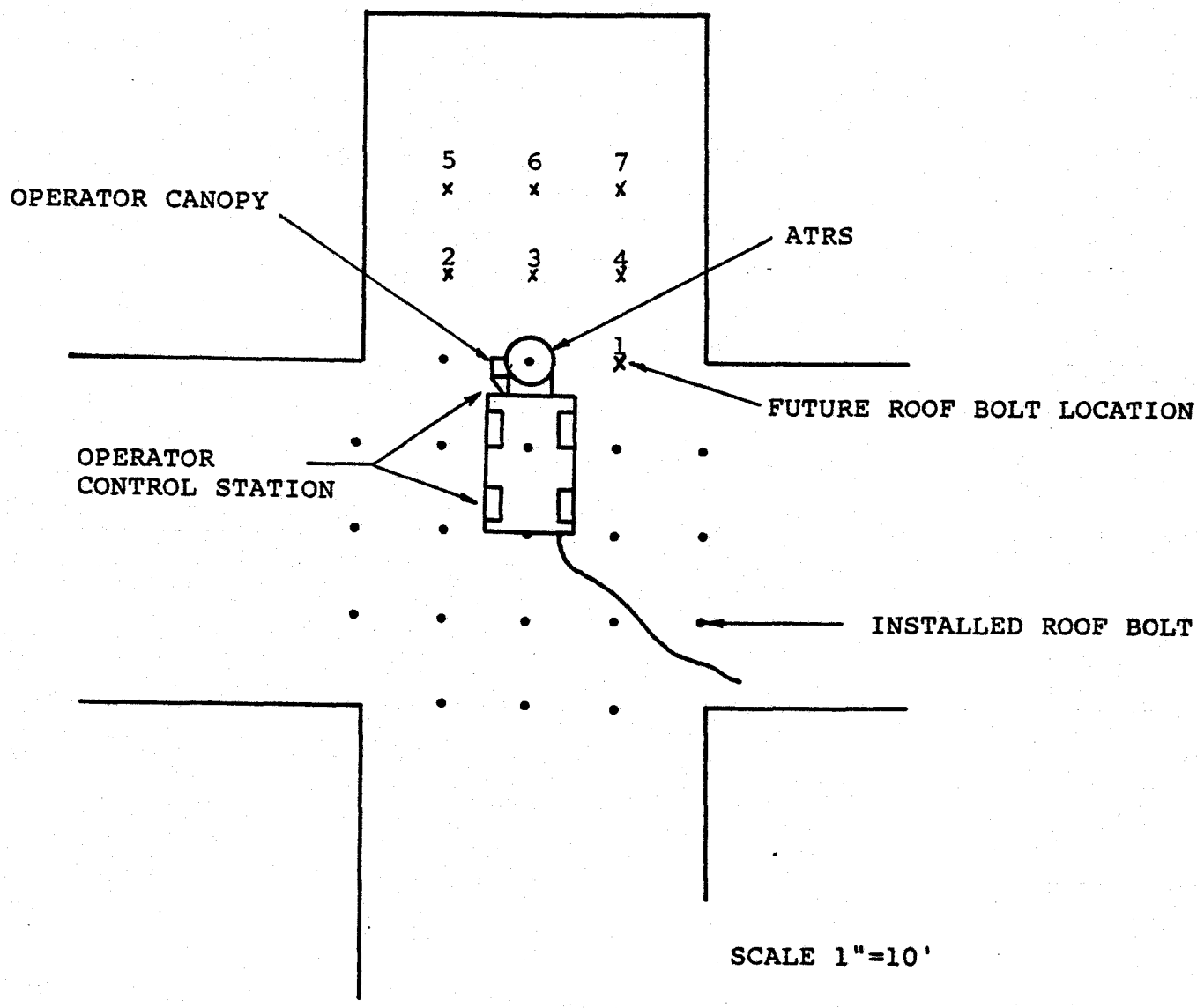
MINIMUM TYPICAL FACE ROOF SUPPORT

SCALE 1"=10'

GENWAL COAL COMPANY
CRANDALL CANYON MINE
HUNTINGTON, UTAH
FEBRUARY 17, 1986

ACK

ATRS PLACEMENT AND BOLTING
SEQUENCE



GENWAL COAL COMPANY
CRANDALL CANYON MINE
HUNTINGTON, UTAH
FEBRUARY 17, 1986
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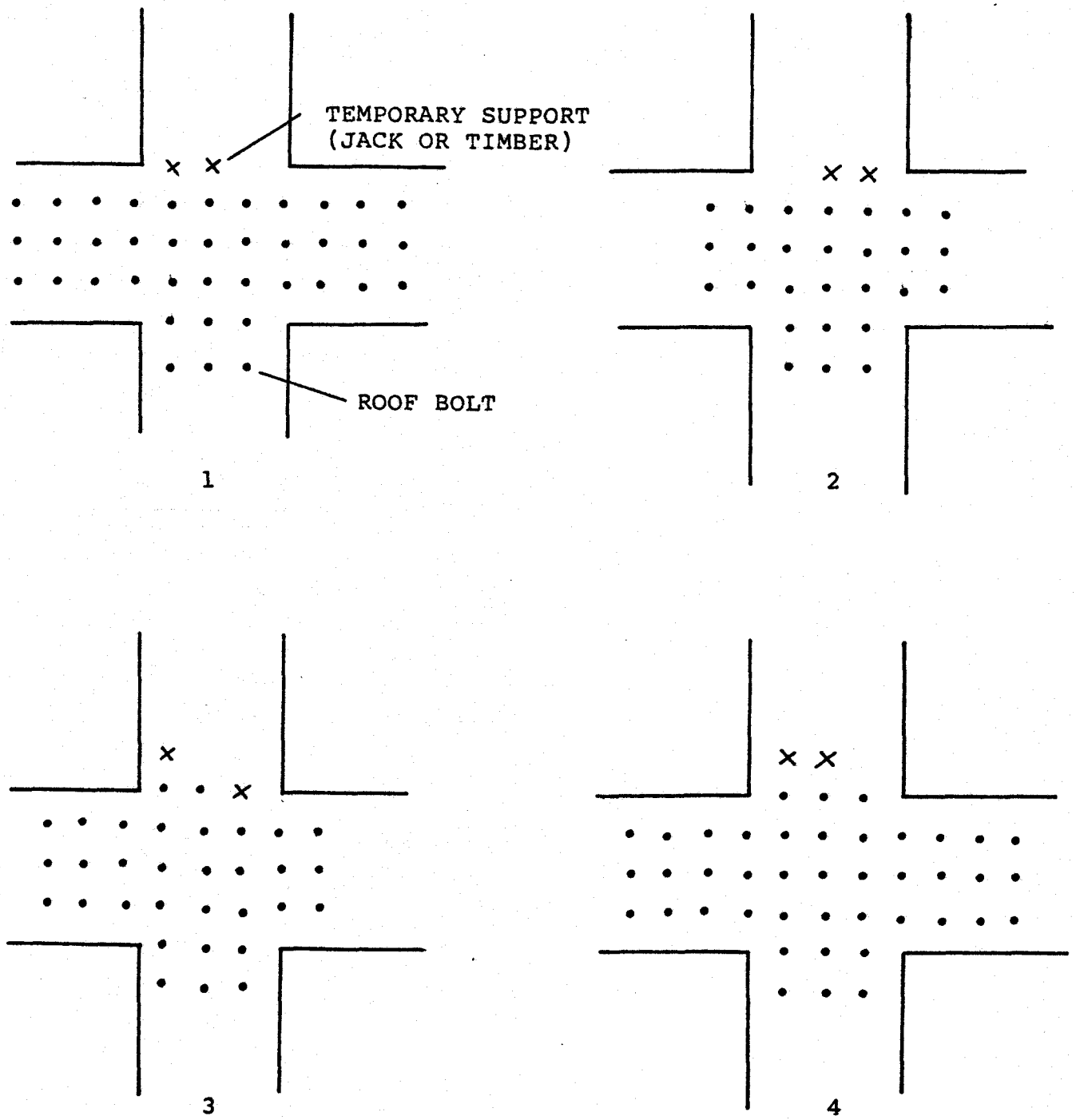
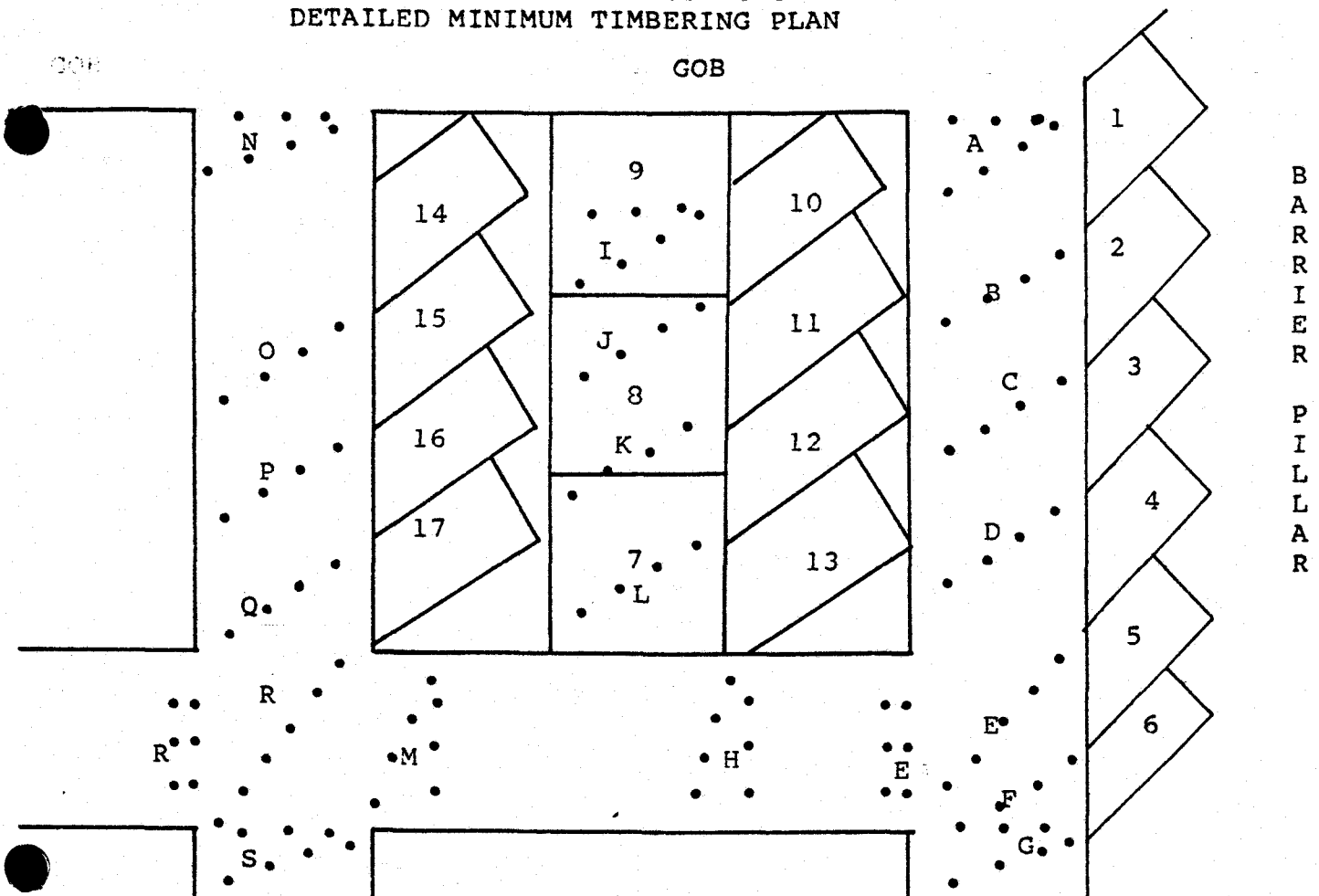
TEMPORARY SUPPORT PLACEMENT WHEN ATRS
IS NOT IN USE DURING BOLTING CYCLE



SCALE 1"=20'

GENWAL COAL COMPANY
CRANDALL CANYON MINE
HUNTINGTON, UTAH
FEBRUARY 17, 1986
ACK

PILLAR PLAN 80'X 80' C-C
DETAILED MINIMUM TIMBERING PLAN



NOTES:

1. NO PART OF A MINERS BODY OR LIMB WILL PROCEED INBY THE LAST PERMANENT ROOF SUPPORT, EXCEPT TO PREFORM DUTIES ASSOCIATED WITH PLACING TEMPORARY SUPPORT.
2. TIMBERS WILL BE PLACED ON 5' C-C AND WITHIN 5' OF THE RIB. (THEREFORE TIMBERS SHOWN WILL VARY DEPENDING UPON ENTRY WIDTH.)
3. FINAL PUSH ON PILLAR WILL BE TIMBERED TO A 16' ROADWAY WIDTH.
4. ANGLE OF CUTS MAY VARY, RESULTING IN DIFFERING NUMBERS OF CUTS IN FENDERS, THESE WILL BE PLACED WHERE NEEDED AND TIMBERED AS CUTS SHOWN.
5. CUT SEQUENCE IS ONLY RELATIVE TO PILLAR SHOWN. (SEE GENERAL SEQUENCE FOR ENTIRE LINE.)
6. WHEN BARRIER PILLAR IS NOT MINED DELETE CUTS 1-6 AND AND TIMBERS B-F.

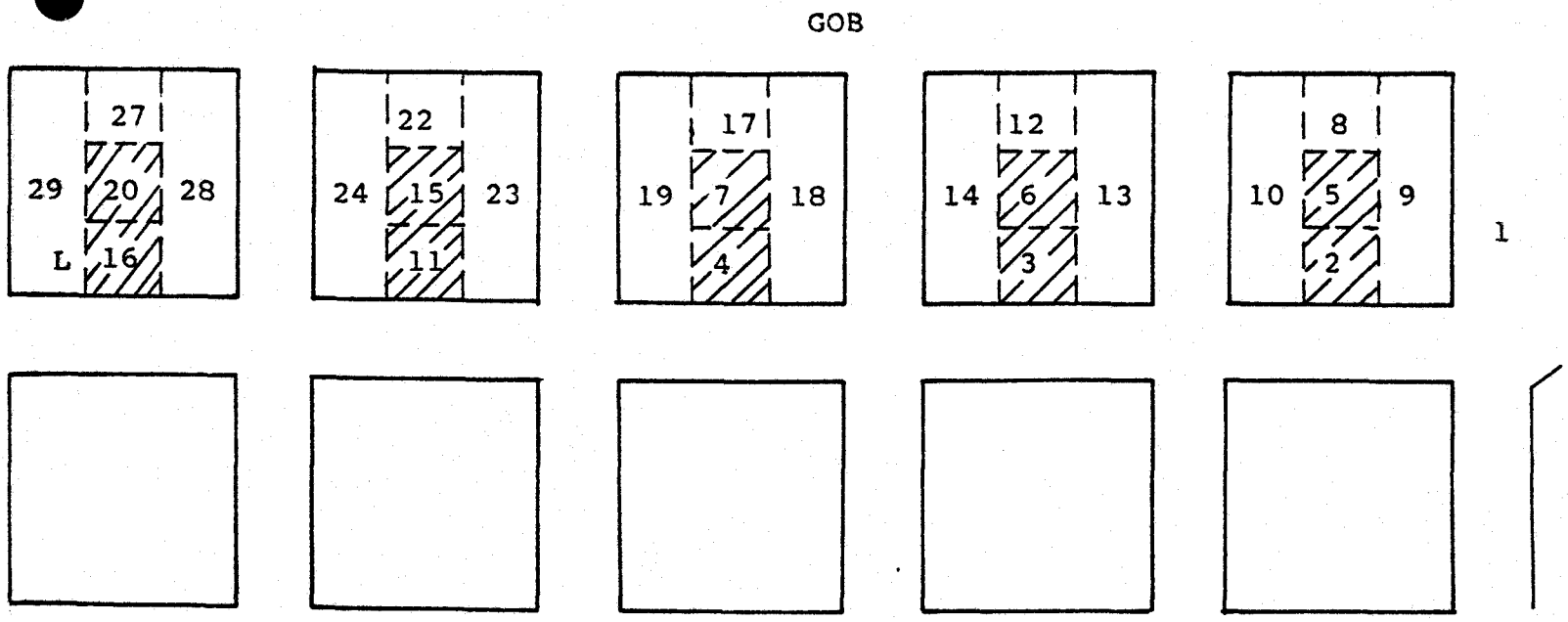
SEQUENCE:

A. A,1,B,2,C,3,D,4,E,5,F,6,G,H,7,8,9,I,10,J,11,K,12,L,13,M,N,14 O,15,P,16,Q,17,R,18,S.
B. A,G,H,7,8,9,.....SAME AS ABOVE.

SCALE 1"=20'

GENWAL COAL COMPANY
CRANDALL CANYON MINE
HUNTINGTON, UTAH

TYPICAL PILLAR EXTRACTION SEQUENCE



CUT SEQUENCE: OPTION 1 (3 PILLARS)- CUTS 1-29 AS SHOWN
NOTE- CUT 21,25,26 NOT SHOWN, LOCATED ON ADJOINING PILLARS.

OPTION 2 (2 PILLARS)- CUTS 1,2,3,5,6,8,9,10,4,12,13, 14,7,11,17,18,19,15,16,22,23, 24,20,(21),27,28,29
NOTE- CUT 21 NOT SHOWN. CUTS 25,26 EXIST ON NEXT PILLAR

OPTION 3 (2 PILLARS)- 1,2,3,5,6,8,9,10,4,12,13,14,11,7, 15,17,18,19,16,22,23,24,(21),20, (25),27,28,29
NOTE- CUT 21 NOT SHOWN. CUTS 25,26 EXIST ON NEXT PILLAR

NOTES:
1. SHADED PILLAR SPLITS BOLTED ACCORDING TO PLAN
2. SEQUENCE MAY PROCEED IN MIRROR IMAGE.
3. AS ROOF CONDITIONS DICTATE SEQUENCE MAY BE ALTERED TO FULLY EXTRACT A PILLAR BEFORE PROCEEDING TO NEXT PILLAR
4. AS ROOF CONDITIONS WARRANT DRWGS. PAGE 22 AND PAGE 23 MAY BE USED TOGETHER.
5. PILLARS WILL BE TIMBERED IN ACCORDANCE WITH DRWG PAGE

SCALE 1"=50'

GENWAL COAL COMPANY
CRANDALL CANYON MINE
HUNTINGTON, UTAH
FEBRUARY 17,1986
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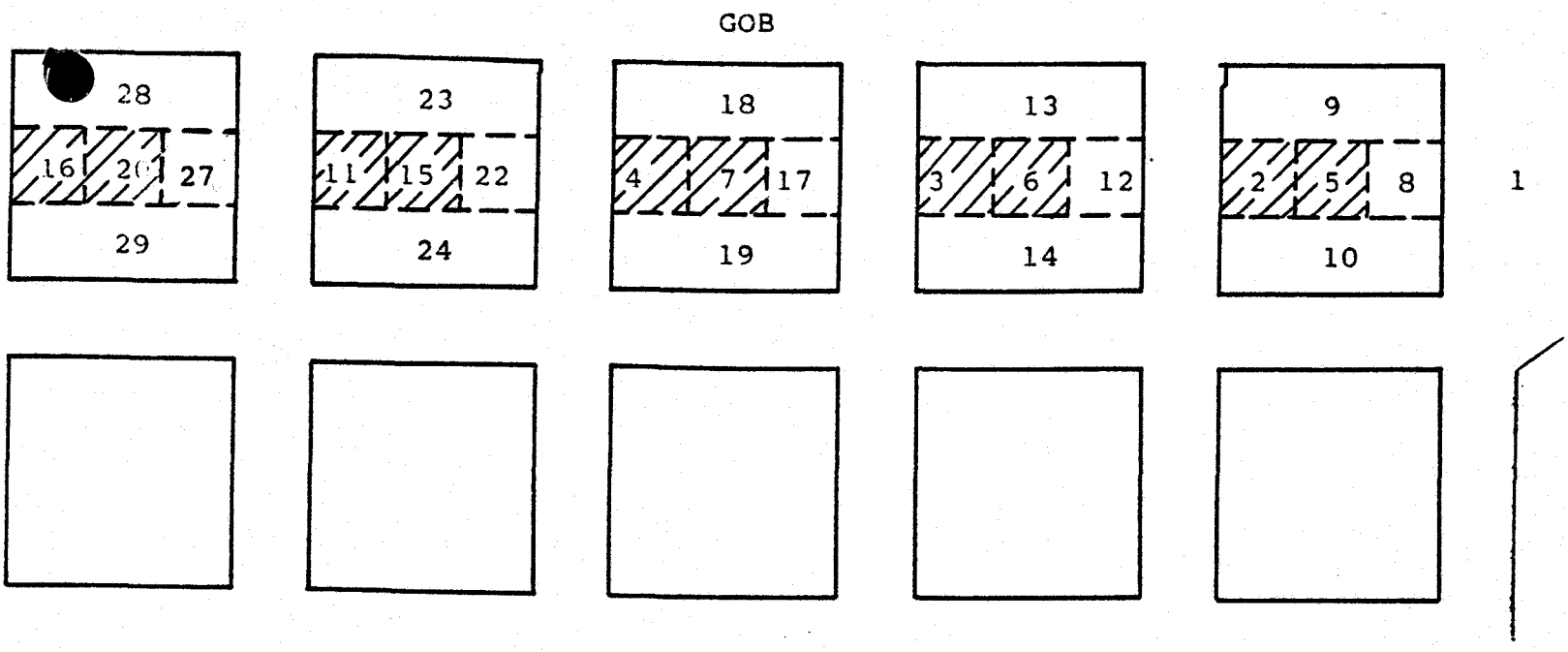
ALTERNATE PILLAR EXTRACTION SEQUENCE



CUT SEQUENCE: OPTION 1 (3 PILLARS)- CUTS 1-29 AS SHOWN

OPTION 2 (2 PILLARS)- CUTS 1,2,3,5,6,8,9,10,4,12,13,14,7 11,17,18,19,15,16,22,23,24,20,(21), 27,28,29

OPTION 3 (2 PILLARS)- CUTS 1,2,3,5,6,8,9,10,4,12,13,14,11 7,15,17,18,19,16,22,23,24,(21),20, 25,27,28,29

NOTE: CUT 21,25,26 NOT SHOWN

NOTES:

1. SHADED PILLAR SPLITS BOLTED ACCORDING TO PLAN
2. SEQUENCE MAY PROCEED IN MIRROR IMAGE
3. AS ROOF CONDITIONS DICTATE SEQUENCE MAY BE ALTERED TO FULLY EXTRACT A PILLAR BEFORE PROCEEDING TO NEXT PILLAR.
4. AS ROOF CONDITIONS WARRANT DRWGS. PAGE 22 AND PAGE 23 MAY BE USED TOGETHER.
5. PILLARS WILL BE TIMBERED IN ACCORDANCE WITH DRWG. PAGE
6. THIS PLAN WILL BE USED WHEN ADVERSE CONDITIONS PRECLUDE THE USE OF DRWG. PAGE 22 .
7. NO PART OF LIMB OF A MINERS BODY WILL PROCEED INBY THE LAST PERMANENT ROOF SUPPORT WITH THE EXCEPTION TO PERFORM DUTIES ASSOCIATED WITH PLACEMENT OF TEMPORARY SUPPORTS.

SCALE 1"=50'

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