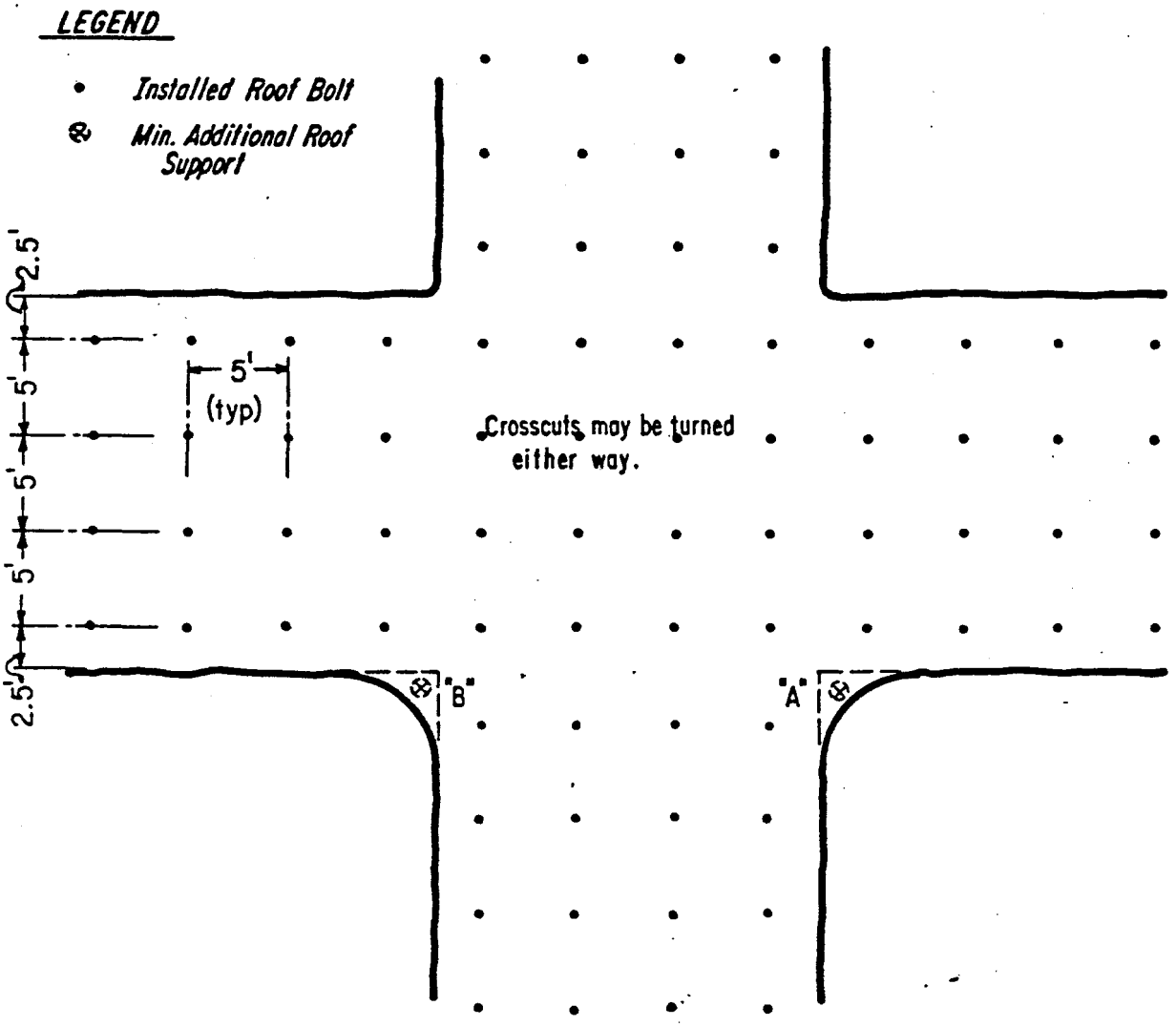
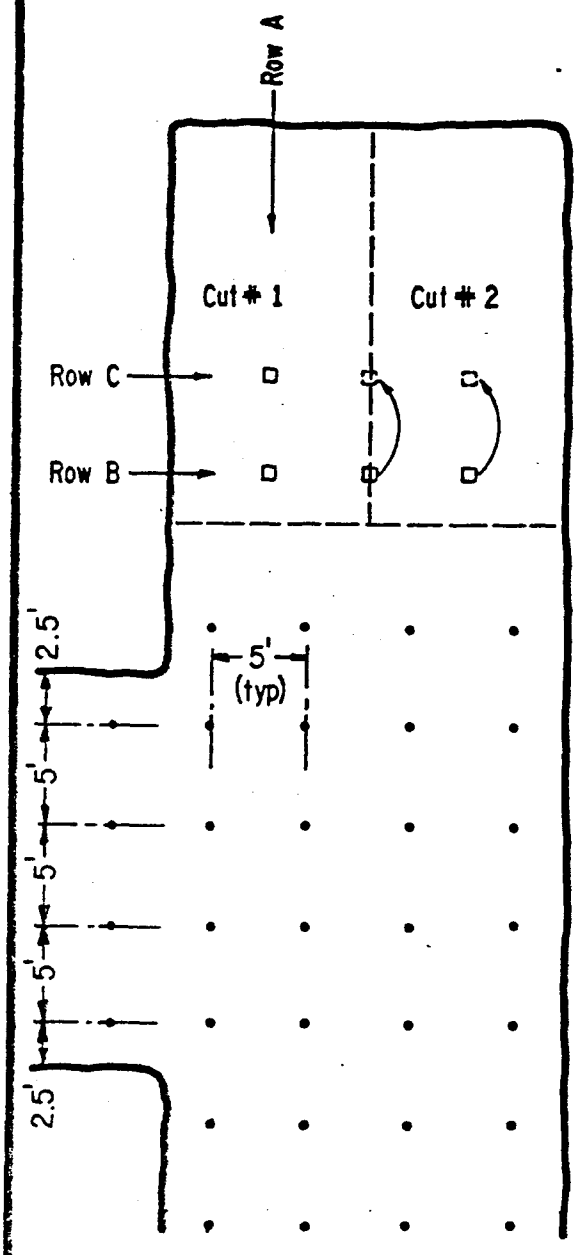


TYPICAL INTERSECTION

Notes:

1. *All entries and crosscuts shown are supported according to the roof control plan.*
2. *Due to the length of the continuous miners, it is necessary to cut a slight curve when turning a crosscut (see "A" & "B"). Additional roof support (roof bolts and/or timbers) will be placed in these areas.*
3. *Curves can be cut either to the right or left, and when necessary in both directions.*

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 25, 1981	SCOFIELD ROUTE
CHECKED: T.G.W	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W	
SCALE: 1" = 10'	TITLE TYPICAL INTERSECTION — DRAWING NO. A5-0020



Notes:

1. *Depth of sump cuts controlled by ventilation requirement, but the Continuous Mining Machine operator shall not be advanced beyond the last permanent roof support.*
2. *Temporary supports in row A installed promptly upon withdrawal of machine from cut #1. Row B to be set promptly upon withdrawal of machine from cut #2. Temporary supports in row B shall be advanced to row C after the first row of bolts are installed. This cycle shall continue until the entire cut is bolted.*

LEGEND

- □ *Temporary Supports*
- ⊡ *Future Temporary Supports*
- • *Installed Roof Bolts (5ft. centers)*

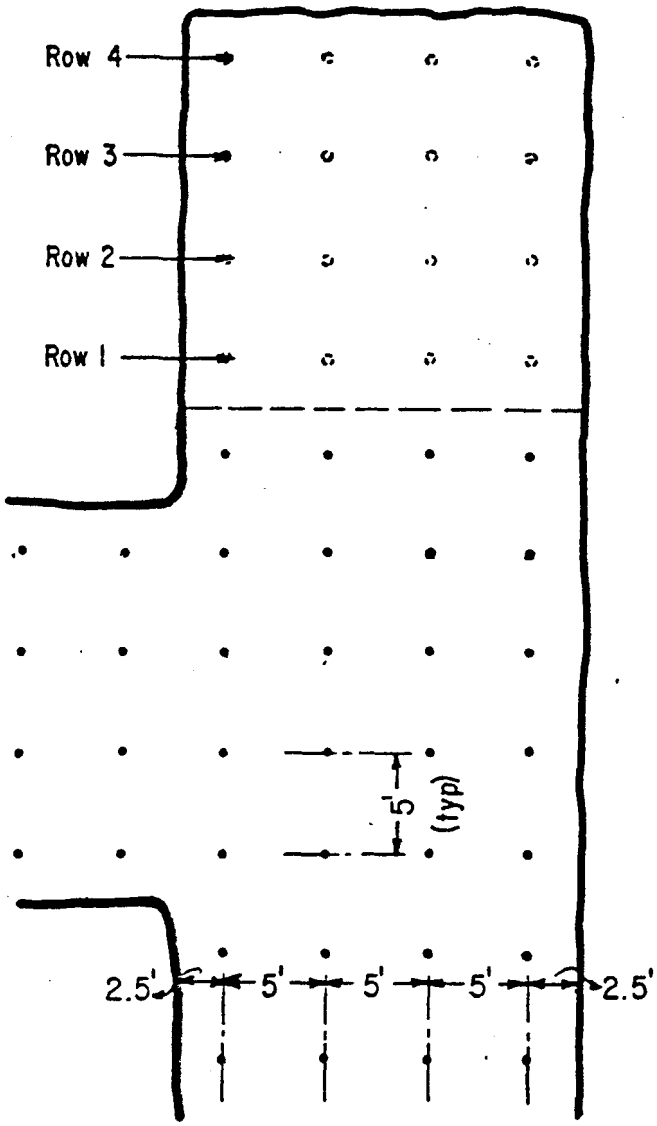
TEMPORARY SUPPORT PATTERN

for use

WITHOUT A.T.R.S. SYSTEM

(Full Roof Bolt Plan)

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 24, 1981	SCOFIELD ROUTE
CHECKED: TGW	KELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W.	
SCALE: 1" = 10'	TITLE: TEMPORARY SUPPORT PATTERN — DRAWING NO. A5-0023



Notes:

1. *Bolting sequence is by row number.*
2. *Standard procedure will be to install 3 roof bolts from each position. (Numbered)*
3. *Row 1 will be completed before bolting in row 2 will commence.*
4. *Bolting cycle may begin on right side depending upon conditions.*
5. *Temporary posts or jacks will be installed only where needed to make necessary tests or for ventilation purposes.*
6. *The Continuous Mining Machine Operator shall not be advanced beyond the last row of permanent roof support.*

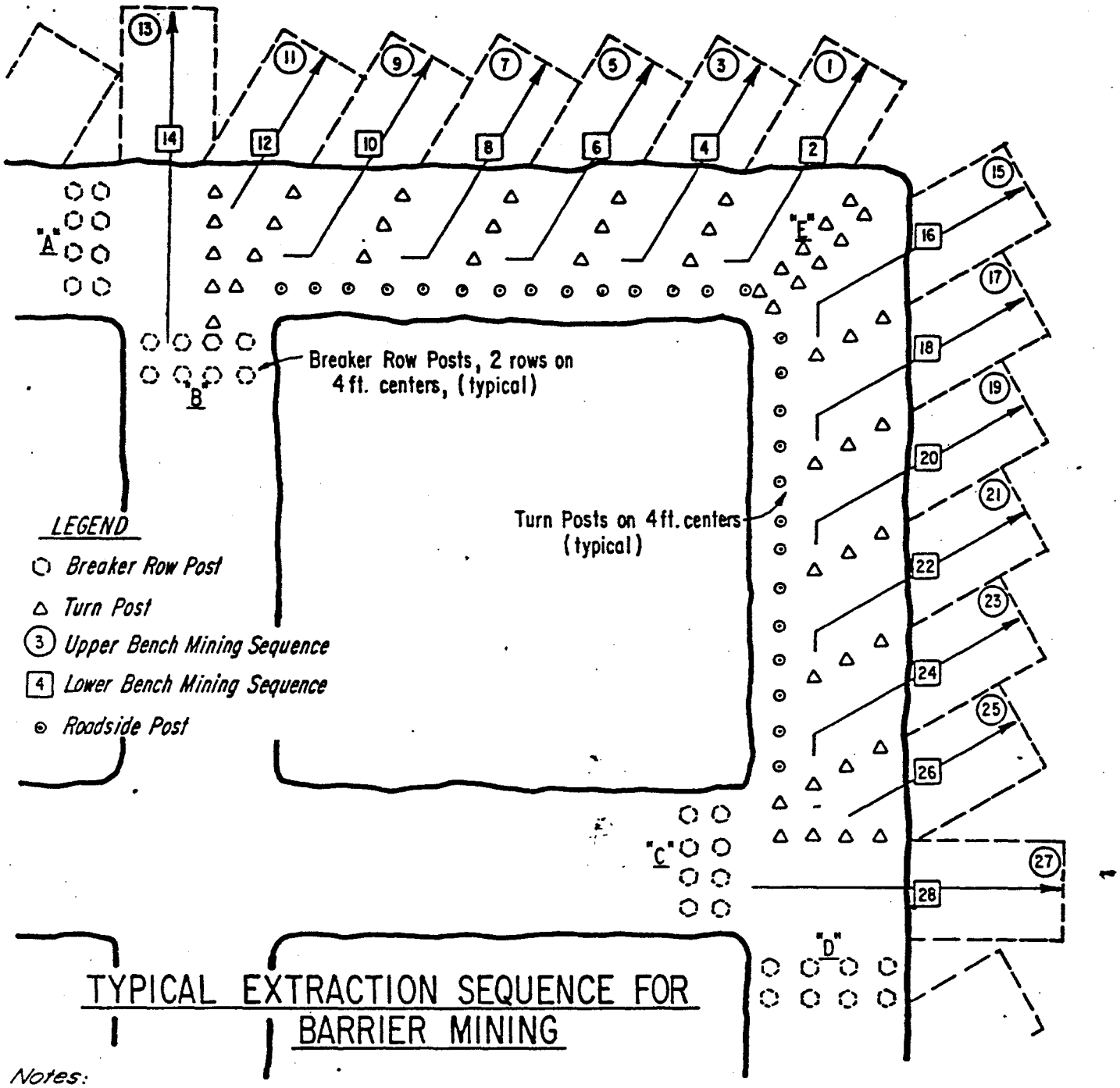
LEGEND

- • *Installed Roof Bolts*
- ○ *Future Roof Bolt Locations*

ROOF BOLT INSTALLATION SEQUENCE

for
Lee Norse Twin Boom Roof Bolters
with Temporary Roof Support System
Model No. TD-2-43-5-4E

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 24, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: WLW	
SCALE: 1" = 10'	TITLE ROOF BOLT INSTALLATION SEQU. — DRAWING NO. A5-0024

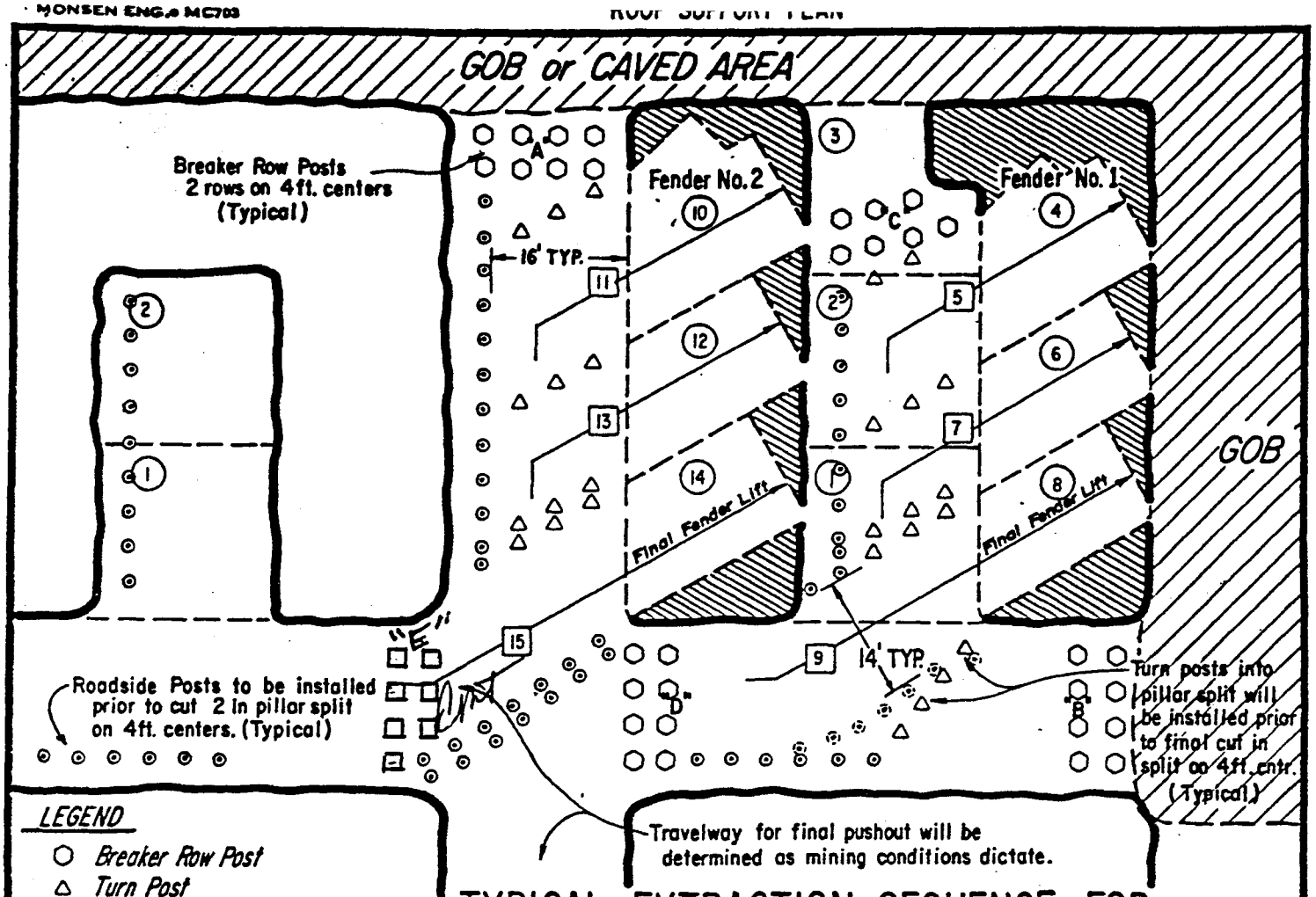


TYPICAL EXTRACTION SEQUENCE FOR BARRIER MINING

Notes:

1. *Pillar breaker rows A, B, C, & D shall be installed upon completion of inby mining.*
2. *Turn posts shall be installed on 4' centers on the inby side of subsequent lifts.*
3. *Prior to starting cut #1, install turn posts in double row "E".*

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 18, 1981	SCOFIELD ROUTE
CHECKED: T.G.W.	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W.	
SCALE: 1" = 20'	TITLE BARRIER EXTRACTION — DRAWING NO. A5-0011



LEGEND

- ○ Breaker Row Post
- △ Turn Post
- ⊙ Roadside Post
- (4) Upper Bench Mining Sequence
- [5] Lower Bench Mining Sequence
- ☐ Breaker Row Post

TYPICAL EXTRACTION SEQUENCE FOR PILLAR MINING

Notes:

1. Typical as to mining sequence and post installation.
2. All entries, crosscuts, rooms and intersections shall be bolted in accordance with the approved roof control plan before starting pillar splits.
3. Final cut in pillar split, not to exceed 20 ft. in depth, will not be bolted.
4. Pillar breaker rows "A" & "B" shall be installed adjacent to pillared area prior to initial cut in pillar split.
5. Pillar breaker row "C" will be installed upon completion of pillar split.
6. Pillar breaker row "D" will be installed upon completion of mining fender No. 1.
7. The width of travelway leading to a final fender lift shall be reduced to 14 ft. by a double row of posts on each side.
8. Pillar breaker Row "E" will be installed before The Pillar split is complete in Pillar No. 2.

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Aug. 12, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1" = 20'	TITLE PILLAR EXTRACTION — DRAWING NO. A5-0010 Rev. 3

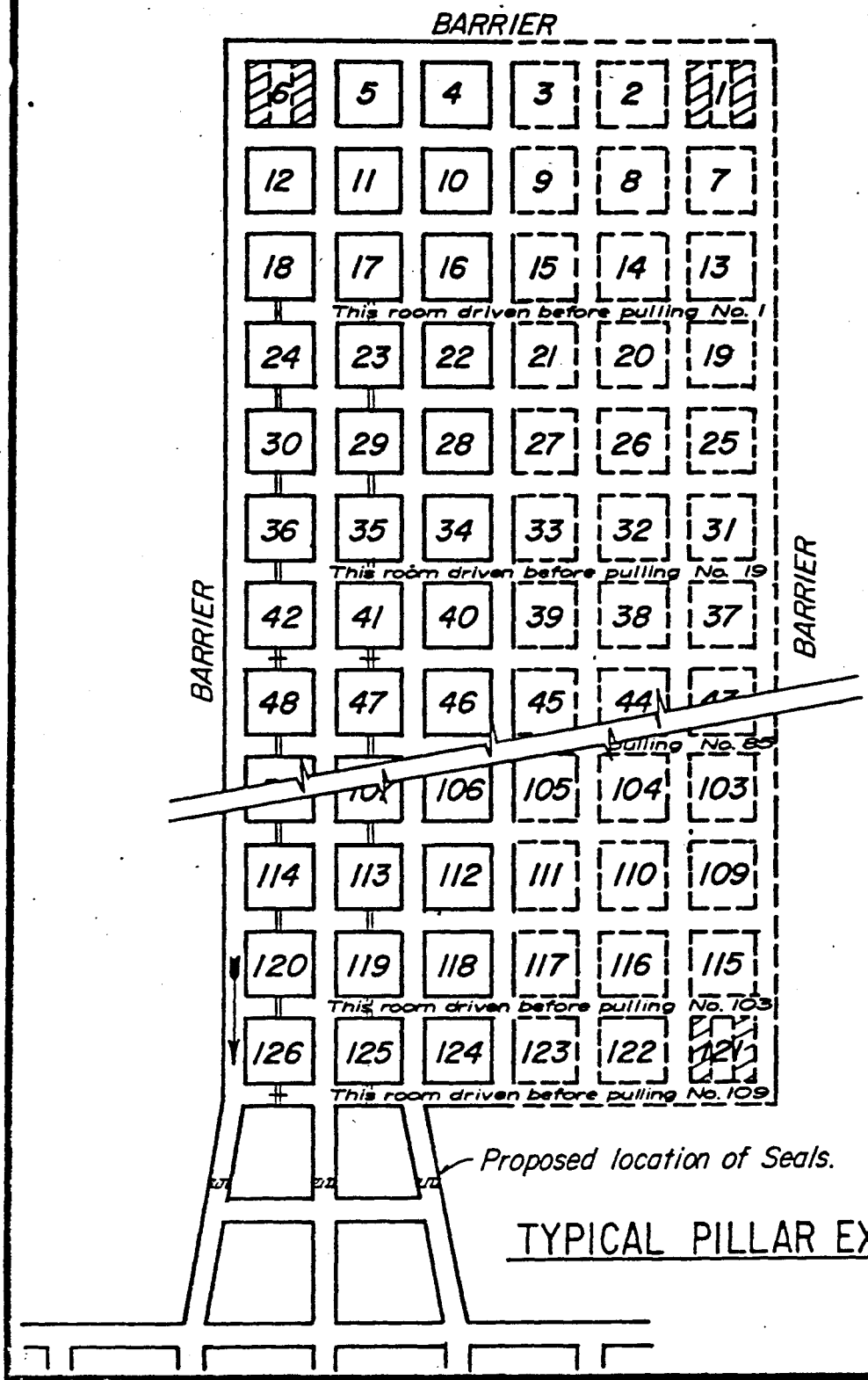
PILLAR & BARRIER MINING:

1. Lifts shall not exceed 15 feet in width.
2. During pillar mining, the miner operator shall not advance beyond the last row of permanent support.
3. Turn posts shall not be cut out when lower bench is being mined.
4. The size of the outby pillar stump left subsequent to extraction of the final fender lift of each pillar fender indicated shall be initially as shown in Dwg. No. A5-0010, but shall be adjusted to accomodate requirements of roof control in the area of the final fender lifts, influence on subsequent developments and extraction, and height of pillar stump and seam thickness extracted.
5. All personnel assigned to sections extracting pillars and/or barriers will be instructed in "Pillar Extraction Procedures" by a qualified person, designated by mine management, before being assigned to perform such duties.

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: AUG. 12, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: "NONE"	TITLE GENERAL NOTES, Pillar Mining — DRAWING NO. A5-0008A

NOTES:

1. This is a typical pillar sequence for the Belina No. 1 Mine. Mining conditions may dictate the application of alternate sequence.

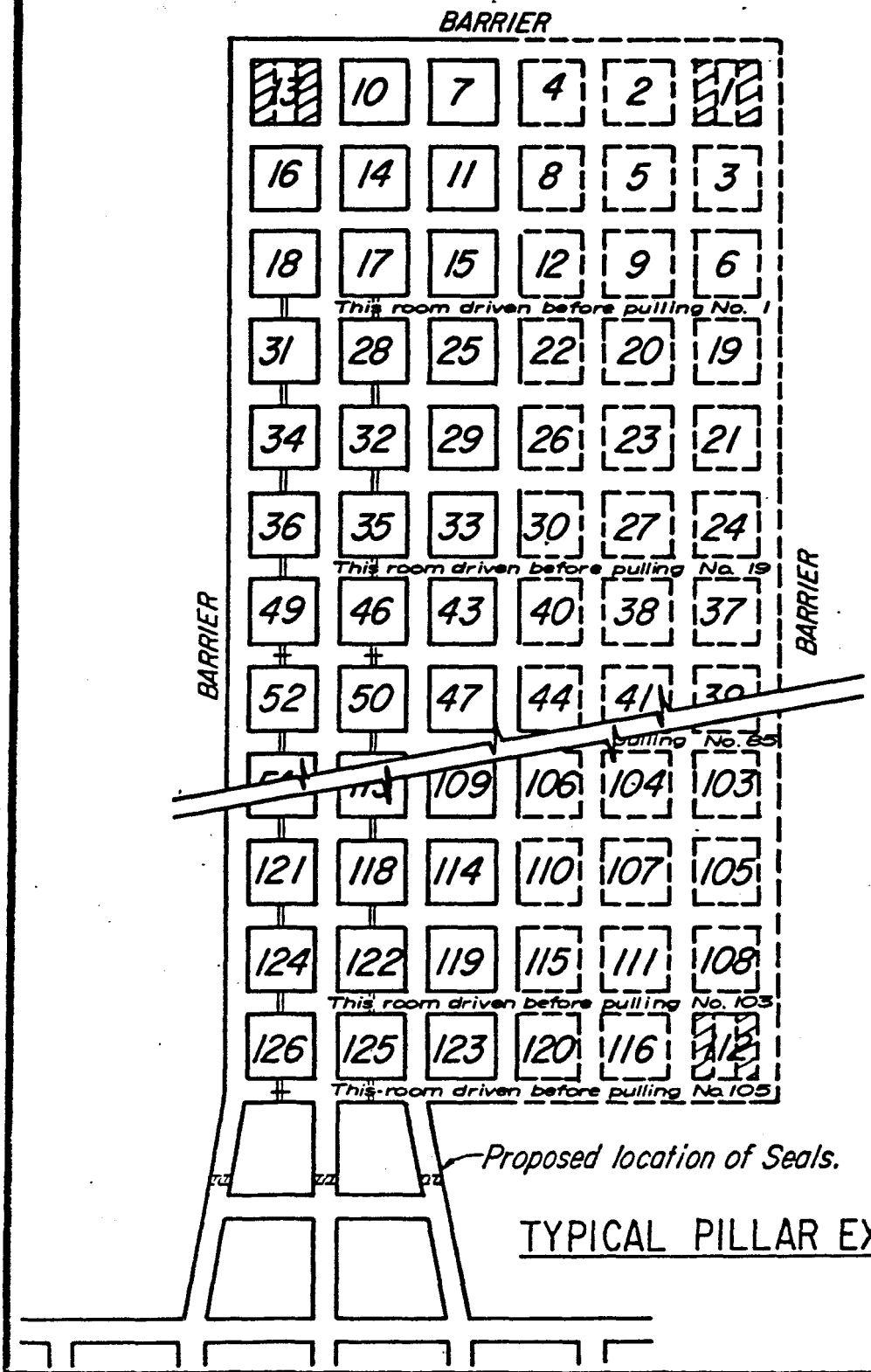


TYPICAL PILLAR EXTRACTION SEQUENCE

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 18, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W	
SCALE: NONE	TITLE 90° PILLAR SEQUENCE — DRAWING NO. A5-0006

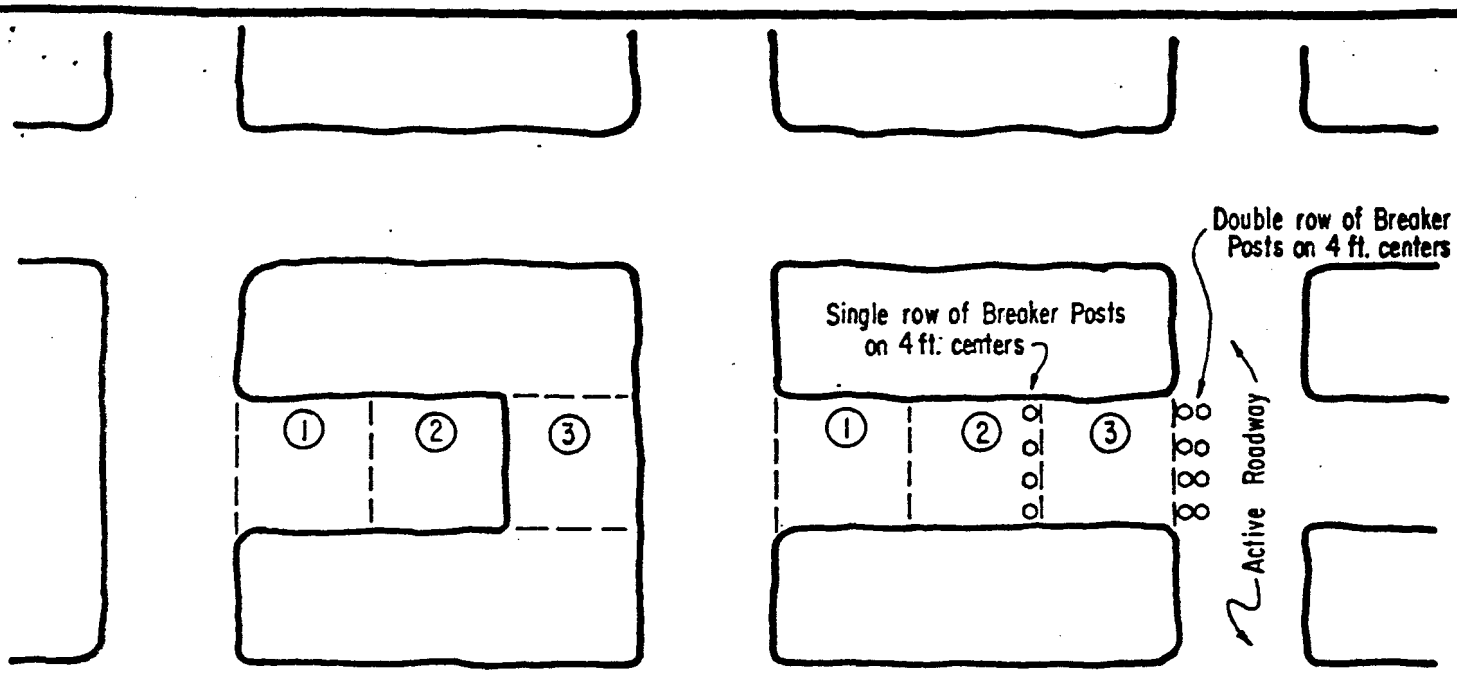
NOTES:

1. This is a typical pillar sequence for the Belina No. 1 Mine. Mining conditions may dictate the application of an alternate sequence.



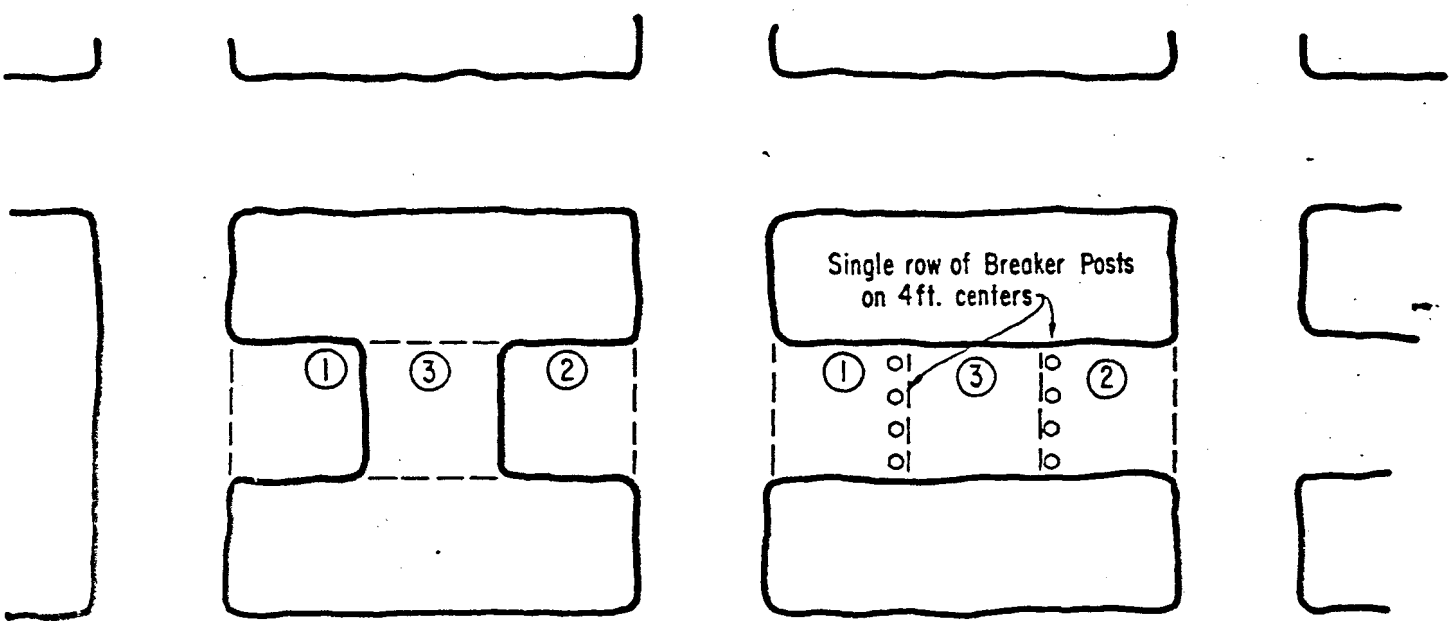
TYPICAL PILLAR EXTRACTION SEQUENCE

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 18, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W	
SCALE: NONE	TITLE 45° PILLAR SEQUENCE — DRAWING NO. A5-0012



PILLAR SPLITTING METHOD 1

Note: For additional information see General Notes. (A5-0008B, pg. 24)



PILLAR SPLITTING METHOD 2

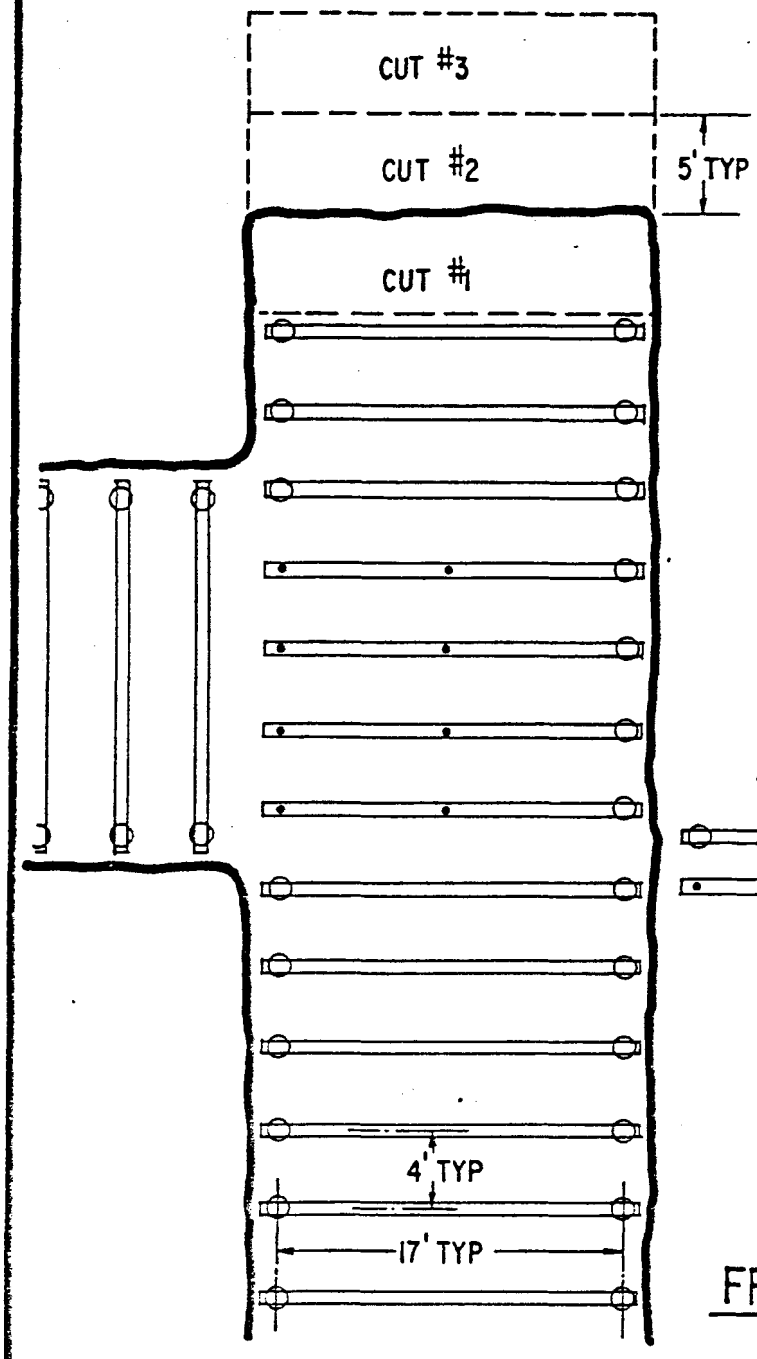
Note: For additional information see General Notes. (A5-0008B, pg. 24)

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 19, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: WLW	
SCALE: 1"=30'	TITLE PILLAR SPLITTING SEQUENCE — DRAWING NO. A5-0013

PILLAR SPLITTING:

1. Splits will be bolted according to the approved plan with the exception of cut #3, which will have one row of posts set across the opening. (see drawing No. A5-0013)
2. If the pillar split is to be used as a roadway, all 3 cuts will be roof bolted as per approved plan.
3. Timbers set across the openings of cut #3 will be set on 4 ft. centers and will be installed promptly upon completion of mining the cut.
4. In areas where cut #3 is left on timbers and is adjacent to an active roadway, a double row of posts will be set across the opening on the roadway side.
5. In places where cut #3 is timbered off, access into such areas will be properly restricted by the use of "Danger" signs.
6. Mining conditions may dictate an alternate cutting sequence.

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.	
DATE: Aug. 12, 1981	SCOFIELD ROUTE	
CHECKED:	HELPER, UTAH 84526	
APPROVAL:		
APPROVAL:		
SCALE: "NONE"	TITLE GENERAL NOTES, Pillar Splitting	DRAWING NO. A5-0008B



Notes:

1. *Depth of each cut controlled by roof conditions, but mining machine operator shall not advance beyond last permanent support.*
2. *Crossbars will be installed promptly upon completion of cut #1, before cut #2 is made.*

LEGEND

Crossbar on Support Posts

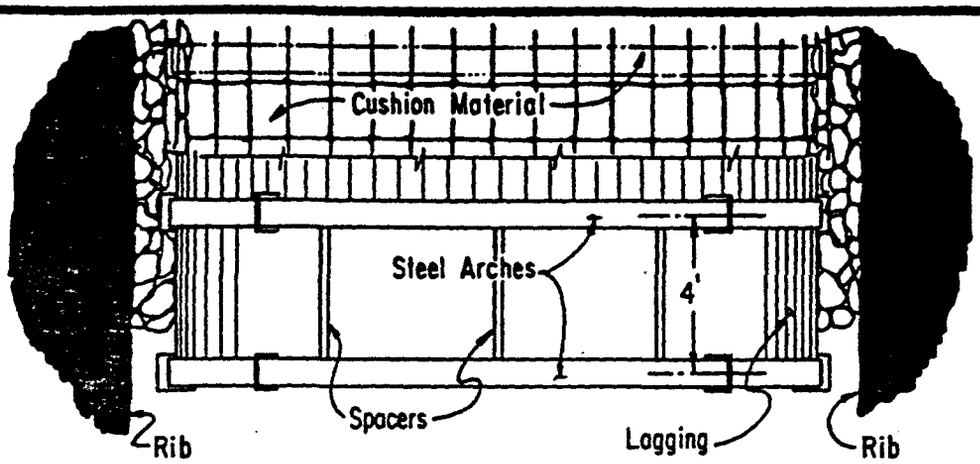
Crossbar bolted to Roof

TYP. CROSSBAR PLAN

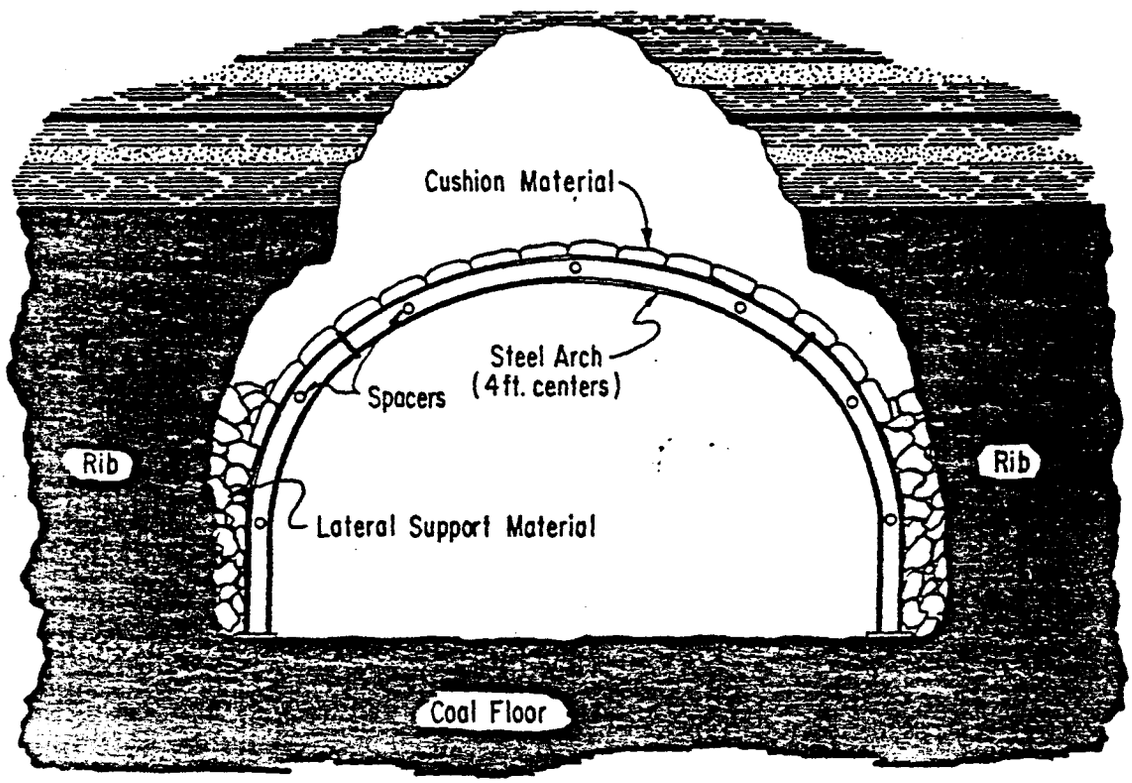
for

FRACTURED or HEAVY ROOF AREAS

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: July 20, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1" = 10'	TITLE TYP. CROSSBAR PLAN — DRAWING NO. A5-0014



TOP VIEW



FRONT VIEW

Notes:

1. *Steel Arches will be used as mining conditions and roof strata dictate.*
2. *Lateral support will be installed up to a minimum of 4' as per manufacture's specifications.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: Mar. 23, 1981	**SCOFIELD ROUTE**
CHECKED: TGW	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L.W	
SCALE: 1"=5'	TITLE: TYP. STL. ARCH INSTALLATION — DRAWING NO. A5-0016

VALLEY CAMP OF UTAH, INC.

Scofield Route

Helper, Utah 84526

VENTILATION, METHANE AND DUST CONTROL PLAN

FOR

BELINA NO. 1 MINE

I.D. #42-01279

JUNE 3, 1977

REVISED OCTOBER 1, 1978

REVISED SEPTEMBER, 14, 1979

REVISED APRIL 1, 1981

REVISED MARCH 25, 1982

VALLEY CAMP OF UTAH, INC.

Scofield Route
Helper, Utah 84526

25 March 1982

VENTILATION PLAN

I. GENERAL INFORMATION

A. Mine and Company Data:

Mine Name:	Belina No. 1 Mine, U.S.B.M. I.D. #42-01279
Company:	Valley Camp of Utah, Inc.
Address:	Scofield Route, Helper, Utah 84526
Mine Location:	Approximately 2.0 miles South of Scofield Town Site, Thence 3.2 miles Southwest of Route 96.
Telephone:	(801) 448-9413
Operator:	W. H. Haynes, Jr.
Title:	Vice President
Address:	640 Terrace Hill Drive Salt Lake City, Utah 84103
Telephone:	(801) 363-9061

B. Life of Mine is anticipated to be more than one year.

C. Number of Employees: Surface 65

Underground 245

Total 310

D. Main Fan Installation:

Two Jeffery Aerodyne 8HU-84 exhaust-type fans with eight blades, full laod ratings: 310,000 CFM; 9.2 inch water gauge; 575 HP General Electric Induction Motor: 1200 RPM.

Note: At present, only one Jeffery Fan is installed and is operating at 0.8 inches water gauge, with 8 blades, at 250,000 CFM; 150 HP General Electric Induction Motor.

II. MAIN FANS

A. The main fans will be installed according to the requirements of Section 75.300 - 2. Should it be necessary to deviate from these requirements, the substitution will provide no less than the same measure of protection to the miners and the District Manager will be contacted for approval.

B. The main fans will operate according to the following criteria:

1. Kept in continuous operation except for the following:

   (a) Idle days and/or idle shifts.

   (b) Fan adjustments on days when all men other than those performing evaluations or adjustments are withdrawn from the mine.

   (c) Power failure.

   (d) Uncontrolled failure or fan failure.

2. Upon restoration of the ventilation after a scheduled stoppage, and after the fan has been in operation for at least 15 minutes with a normal water gauge, a pre-shift examination will be made of the entire mine. Such examination will be within 3 hours prior to the time the men are permitted to enter the mine, and before any power lines leading underground are energized.

3. If an unusual variance in the mine ventilation pressure is observed, or if an electrical or mechanical deficiency of the fan is detected, the mine foreman will be notified immediately, and appropriate action or repairs will be instituted promptly.

C. Inspection, examinations and records of fan operation will be conducted and kept by a qualified person in accordance with Section 75.300 - 4.

III. AUXILIARY FANS

A. Galis Permissible Fan Model 1520 Self-Propelled with trickle duster 16,000 CFM at 5.0 w.g., 440 Volt A.C. certified Galis starter.

Joy Permissible Fan Model H-72-42V, with MSA Trickle Duster, 400 Volt A.C.

The auxiliary fans will be used in production work when required. The fans will be located and operated to avoid any re-circulation of air. When operating, the auxiliary fans will be inspected by a certified person once every four hours, and the examiner will place his initials, date and time, near the auxiliary fans when his examination is complete.

B. The auxiliary fans will be operated according to the requirements of 75.302 - 4, and as follows:

1. Operated primarily for the purpose of dust control and in conjunction with the approved method of face ventilation; i.e., line brattice, check curtains, etc.

2. The auxiliary fans will operate exhausting, with a free discharge capacity of at least 6,000 cubic feet per minute. When using auxiliary fans, they will be re-located when necessary, and used in the faces from which coal is being cut, mined, or loaded. They may also be used for the abatement of respirable dust (when required) in faces in which roof bolting operations are in progress.

3. Various sized vent tubing will be used from the face area to the intake side of the fan. Thirty inch vent tubing will be used on the exhaust side, only when people are working on the exhaust side of the fan.

4. Exhausting fans will be installed in the return air current from the place to be ventilated by the fans, and volume of positive intake air current available at the entrance to the place to be ventilated with exhaust fans will be greater than the free discharge capacity of the fan.

IV. METHANE AND DUST CONTROL PROCEDURES AT FACE AREAS

A. An auxiliary exhaust fan with Trickle Duster mounted on fan exhausting from area where coal is being mined, or an auxiliary fan located in area where coal is being mined with a conventional type (MSA) Trickle Duster located in a return air course exhausting simultaneously with the auxiliary fan.

B. All continuous miners in all working areas will have at least 26 water sprays, uniformly spaced across the head of the miner with 90% of the sprays working at all times, with a minimum pressure of 85 P.S.I.

C. Water sprays are installed at loading points (breaker-feeders) with 6 sprays at approximately 10 GPM at line pressure. The line pressure is approximately 50 P.S.I. Water sprays will not be required when the coal contains a significant amount of moisture to prevent the raising of excessive amounts of dust.

D. "Line brattice or any other approved device used to provide ventilation to the working face from which coal is being cut, mined or loaded, will be installed at a distance no greater than 15 feet from the area of deepest penetration, to which any portion of the face has been advanced." (As per Drawing No. A5-0030).

E. "A minimum quantity of 6,000 cubic feet a minute of air will reach each working face from which coal is being cut, mined or loaded."

F. "The minimum mean entry face velocity as specified in Section 75.301-4, 30 CFR 75, will be 60 feet a minute in all working places where coal is being cut, mined or loaded."

G. "The minimum quantity of air reaching the last open crosscut in any pair or set of developing entries or rooms will be at least 12,000 cubic feet a minute, and the minimum quantity of air reaching the intake end of the pillar line will be at least 12,000 cubic feet a minute."

H. When the miner is withdrawn from the working face, the face will then be classified as a working place, and will require only a perceptible movement of air for ventilation until electrical equipment is taken inby the last open crosscut. Prior to taking any electrical equipment inby the last open crosscut, a check for methane will be made, and a line brattice will be installed in accordance with 75.302.1.

I. In areas where roof bolting is being done, a minimum quantity of 3,000 cubic feet per minute of air will be maintained over the machine and workers. In addition, an approved dust collection system or a wet drilling system (water) will be used to control dust from drilling. During roof bolting, the line curtain or vent tubing shall be maintained to within 15 feet of the face.

V. GENERAL METHANE AND DUST CONTROL PRACTICES

A. Methane examinations.

1. Pre-shift examinations will be made on a daily basis by a certified person in accordance with the requirements of Section 75.303.

2. At least once during each coal producing shift, and more often, if necessary, for safety, each working face will be examined by a certified person in accordance with the requirements of Section 75.304.

3. At least once during the week, or more often if necessary, the mine will be examined by a certified person according to the requirements of Section 75.305.

4. Methane tests will be made at each working face at the start of each shift, prior to energizing electrical equipment. Also, examinations for methane shall be made at intervals not to exceed twenty (20) minutes while electrical equipment is being operated in a working place.

5. Methane accumulations in face areas will be dealt with according to the requirements of Section 75.308.

6. Persons making methane examinations in working places, will make such examinations from the protection of the last row of either temporary or permanent roof supports.

B. Methane content in any return air course other than air courses returning the split of air from a working section (as provided in Section 75.309 and 75.310) shall not exceed 2.0 volume per centum. The methane content in the air in active workings shall be less than 1.0 volume per centum. If at any time, the air in any active working contains 1.0 volume per centum or more of methane, changes or adjustments shall be made at once in the ventilation in the mine so that the air shall contain less than 1.0 volume per centum of methane.

C. Each working section will be placed on a separate split of air by the use of overcasts/ undercasts, stoppings and regulators.

D. The air that travels the neutral split of the conveyor entry shall be bled directly to the return via small pipe or equivalent means.

E. All ventilating devices such as stoppings, overcasts, undercasts, and shaft partitions shall be of substantial and incombustible construction, installed in a workmanlike manner and maintained in a condition to serve the purpose for which they were intended, and any stopping leaking air excessively shall be repaired immediately.

F. The ventilation of each entry, room or crosscut, shall be in accordance with the drawings enclosed. In the event a connection cannot be made between entries or rooms, and a dead end is left, line brattice shall be installed within 15 feet of the face before the area is abandoned.

G. Sealants to be used on one side of all ventilation controls, stoppings, regulators, overcasts, undercasts, etc., shall be any of those approved by MSHA.

H. Self-closing, fire-proof, man doors shall be located at intervals not to exceed 500 feet, alternating sides between the intake air and belt line and intake air and return air.

I. Water sprays installed for dust suppression will be maintained and operated at the indicated volume and water pressure in the plan during mining operations.

J. Belt transfers will be cleaned and rock dusted, as needed.

K. Shuttle car haulageways will be kept well sprinkled.

L. Rock dust will be applied as required as faces are advanced, and along haulageways and belt lines, as required.

M. Conveyorways will be approximately 5 feet to 23 feet in height, and no more than 20 feet wide.

N. No underground crushers or dumps are anticipated.

O. Coal shall not be permitted to accumulate at the outby end of the face equipment to the extent that ventilation of the working face is restricted.

VI. PERMANENT STOPPINGS

Materials and methods for required construction:

A. Permanent stoppings shall be constructed of mortar and 8" x 8" x 16" cinder or concrete blocks form-fitted to the riblines. One side of the stoppings shall be sealed to minimize leakage. (See Drawing No. A5-0017 for typical).

B. Material used for overcasts and undercasts will be either cinder or concrete blocks and mortar, or steel or tin or treated wood.

C. Permanent stoppings, where required, shall be erected between the intake and return air courses, and shall be erected to and including the third connecting crosscut outby the faces of the entries. Construction to begin when the third crosscut is completed, and continued in a reasonable and diligent manner until completed.

D. Regulators shall be constructed of masonry, wood or metal similar to stoppings (see Subpart No. 1). To control air flow, sliding doors or removable wooden or metal slats over a framed opening will be used. Small air flow requirements may be controlled by removing a few blocks, rather than installing the regulator components.

VII. TEMPORARY STOPPINGS

Materials and methods for construction:

A. Temporary stoppings shall be used for belt line and return air isolation in short-lived panels, such as entries developed for room and pillar activities. Such areas shall not have over 40 stoppings and length of service per stopping shall not exceed 18 months. (See Drawing No. A5-0031).

B. Temporary stoppings shall also be used to separate the intake and the temporary returns during development of entries, which after development, become common entries. Such installations shall be limited to a maximum service time of 12 months per stopping, and no more than 30 stoppings will be used in any one phase of development. Permanent belt line isolation in these areas will be obtained by the use of permanent type stoppings.

C. Temporary stoppings will be constructed of Kennedy type stopping material with the joints coated or cinder blocks dry stacked and coated with at least ¼" of sealant on the intake side.

D. Any wooden materials used to assist in the installation of these stoppings shall be treated with an approved retardant.

VIII. SEALS AND BULKHEADS

Materials and methods for construction:

A. Seals will be installed in all side panels as soon as possible after the panel is mined out. Permanent seals shall be constructed of solid concrete blocks, which will withstand a minimum static load of 20 PSIG.

B. The permanent seal location shall not be less than 10 feet from the nearest corner of a pillar and in an area as stable as possible. Prior to installation, all loose materials shall be removed from ribs, roof and floor for at least 3 feet from either end of the proposed location of the seal, and questionable roof shall be properly supported.

C. A vent pipe shall be installed through at least one seal of each set in each panel and extend into a return air course. This pipe shall be less than 8" in diameter and will have a strength equal to Schedule 40 steel pipe. It shall be packed with coarse gravel or minus 1" crushed stone with fines removed for at least 10 feet or provided with an equivalent flame arrestor. The pipe will be located near the roof, at least 4 feet from a rib and not on center line of the seal, and shall be closed at each end with perforated caps or equivalents. This pipe will be installed only if required by the District Manager.

D. At least one seal of each set of seals will be fitted with a surveillance tube to permit sampling of gases. This tube shall be ¼" copper tubing, ½" Schedule 40 pipe, or equivalent, and shall be sealed at the accessible outlet end with a valve. The tube and valve shall be capable of withstanding a minimum of 75 PSIG pressure.

E. Where necessary, a pipe for water drainage shall be installed in at least one seal of each set of seals. The pipe shall be located at the floor level in the

lowest seal of each set and shall be of corrosion resistant material, not less than 4 inches in diameter, equal in strength to Schedule 40 steel pipe. This pipe shall terminate on the accessible side at a pump or check valve at the bottom of a sump not less than 500 gallon capacity, and not less than 2 feet deep. It shall be sealed with a cap if water is not present.

F. In sealed adjoining intake airways (none anticipated), a pre-shift exam for methane shall be made in the passageway adjoining the seals.

G. Before bulkheads are constructed, the return air from the area to be sealed shall be examined for carbon monoxide. If detectable concentrations of carbon monoxide are present in the atmosphere, bulkheads shall be constructed in accordance with procedures approved by the Secretary or his authorized representative.

H. Bulkheads and adjoining entries shall be examined in accordance with Section 75.322 following any change in ventilation which materially affects the main current or any split thereof.

I. The bulkheads shall not be used to impound water in the sealed areas unless approved by the Secretary or his authorized representative.

J. Seals shall be of solid concrete blocks (average minimum compressive strength of 1800 PSI tested in accordance with A.S.T.M. C-140-70) and mortar (1 part cement, 3 parts sand, and not more than 7 gallons of water per sack of cement). Seals shall be installed in the following manner: the bulkhead shall be recessed at least 12 inches deep in the rib, and at least 6 inches deep in the floor (no recess shall be made in the roof). The blocks shall be at least 6 inches high, except in the top course, and 8 inches wide. The blocks shall be laid in mortar, in a transverse pattern. In the bottom course, the blocks shall be laid with a long axis parallel to the rib. The long axis in succeeding courses shall be perpendicular to the long axis of the block in the preceding course. An interlaced pilaster shall be constructed in the approximate center of the bulkhead.

K. Sequence of seal construction will be as follows:

(1) Belt entry;

(2) Intake entries

(3) Return entries.

Return entries will be done simultaneously, when possible.

IX. DIESEL EQUIPMENT

A. The manufacturer's operating instructions and maintenance manuals will serve as guidelines for compliance.

B. The exhaust from operating diesel equipment shall be sampled daily with the engine running; if the analysis of the samples exceed 5 parts per million nitrogen dioxide, or 50 parts per million of carbon monoxide, or both, corrective measures will be taken immediately. Sampling device will be a DRAGER MULTI-GAS DETECTOR unit or equivalent.

C. The atmosphere returning from any working place where diesel powered equipment is being used, shall be tested at least once each shift while the equipment is in operation, and if the analysis of the samples exceeds 5 parts per million nitrogen dioxide or 50 parts per million carbon monoxide, or both, corrective measures shall be taken immediately.

D. The date, time, machine identification, and results of analysis of samples, will be recorded in a book maintained for this purpose.

X. BLEEDER SYSTEM

Forasmuch as this mine, as well as this area, has a history of being "gas free", the use of bleeder systems is not anticipated. In lieu of a bleeder system, panels will be sealed immediately upon completion of mining. See Drawing No. A5-0035 for typical.

XI. DESIGNATED AREA SAMPLING

A. Pursuant to 30 CFR 75.316 (amended), respirable dust levels in the mine atmosphere, in active areas where miners normally work or travel, will be maintained so as to prevent the average concentration from exceeding 2.0 milligrams per cubic feet of air.

B. Designated area sampling will be done in the following areas, and in other areas where miners may be exposed to respirable dust concentrations greater than 1.0 mg/m ^{3} as indicated by prior MSHA or operator samples.

1. Belt haulage:

   (a) Places where the air in the belt entry is regulated into the return airway. This applies only to areas where the major volume of air is being regulated into the return airway.

   (b) Along belt lines at locations which represent no more than four (4) dust generation sources (transfer points).

   (c) At locations upwind of the points where different splits of air join into a common return airway.

C. Dust sampling instruments shall be positioned within designated areas so that the measurements are indicative of the highest level of dust exposure to personnel who are required to work or travel in that area. General positioning of dust sampling instruments shall be as follows, and as more fully described on page numbers 28, 29, & 30.

1. Within 10 to 40 feet downwind of the dust generating source.

2. In belt entries, approximately 50 feet upwind (opposite direction of airflow) from the center of each intersection where air is directed into a return airway.

3. At normal breathing levels, but not less than one (1) foot from the roof or rib.

4. More than two (2) feet from any obstruction and placed in a manner where it will not be directly behind an obstruction which would affect the airflow around a sampling device.

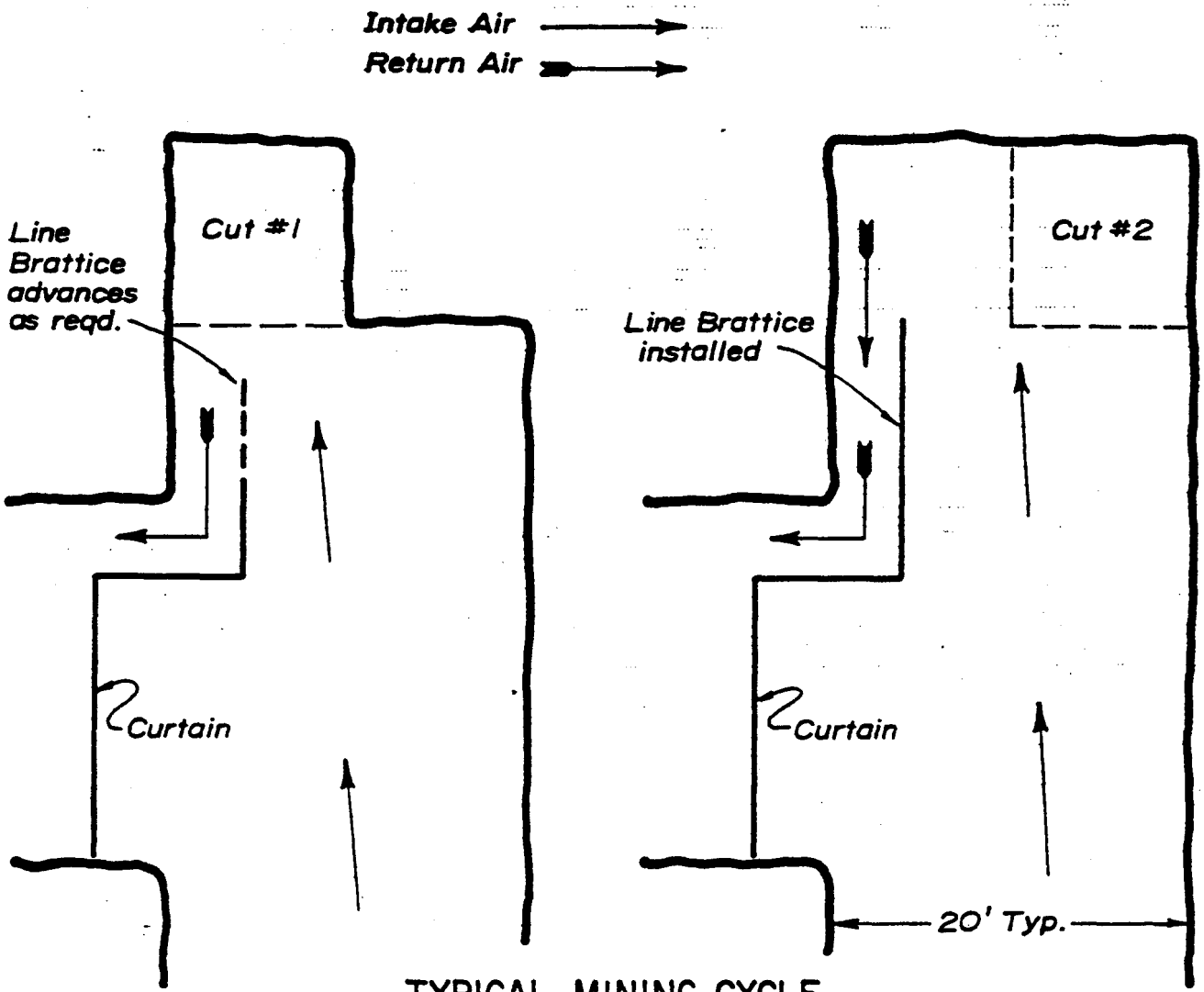
5. Within 36 inches of the operator's control station or normal work position, such as trackless haulage equipment operators.

D. Additional designated area sampling will be conducted as the mining progresses, and additional dust generation sources are developed.

E. Designated area sampling requirements may be eliminated at locations where results of valid respirable dust samples taken during a one (1) year period show a concentration at or below 1.0 mg/m 3. The District Manager may also remove the sampling requirements if valid respirable dust samples taken by MSHA during or after one (1) year also reveal that such area is at or below the 1.0 mg/m 3 concentration level. Also, a minimum of five (5) valid (combination of MSHA and operator) dust samples shall have been taken in that area. These provisions apply only to individual designated areas.

F. In the event of a citation or order, any corrective action will be in accordance with Section 70.201(d).

G. Each designated area is sequentially numbered in its respective category and code, as per MSHA guidelines. Page 27 is a one line diagram of our presently proposed designated area sampling locations. Pages 28, 29 and 30 are written descriptions of the sampling locations.



TYPICAL MINING CYCLE

Notes:

1. *Maximum sump cut of Continuous Miner shall be 10 feet.*
2. *Brattice shall be maintained to within 15 ft. of the face.*
3. *The minimum mean air velocity shall be 60 ft. per minute.*
4. *Brattice line will be extended as cut progresses.*

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 16, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W. L. WRIGHT	
SCALE: 1" = 10'	TITLE TYPICAL MINING CYCLE — DRAWING NO. A5-0030

LEGEND

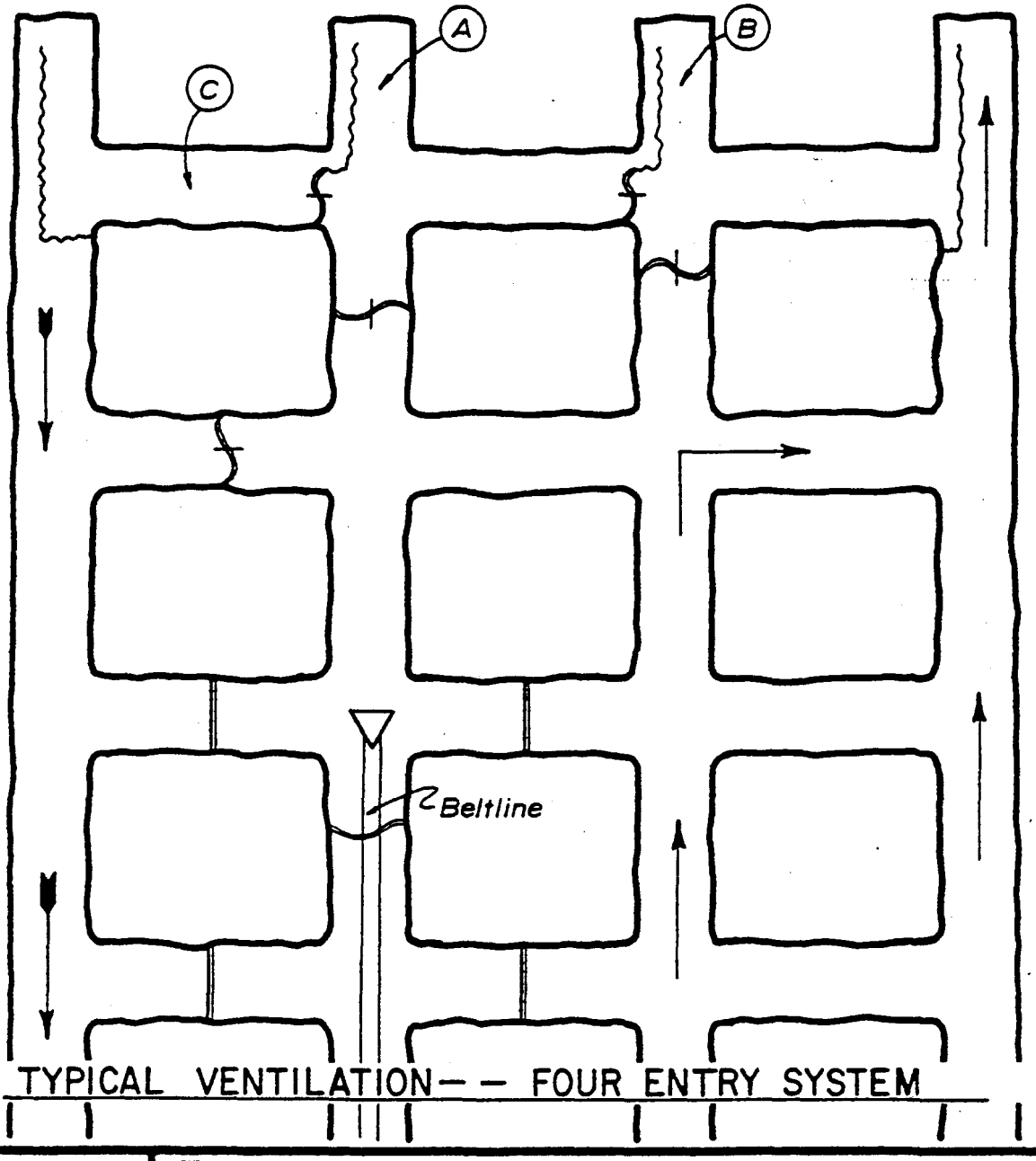
- Line Brattice
- Curtains
- Temporary Stoppings
- Intake Air
- Return Air

EXPLANATION

(A) 6,000 cfm – Mining
Perceptible Movement – Idle

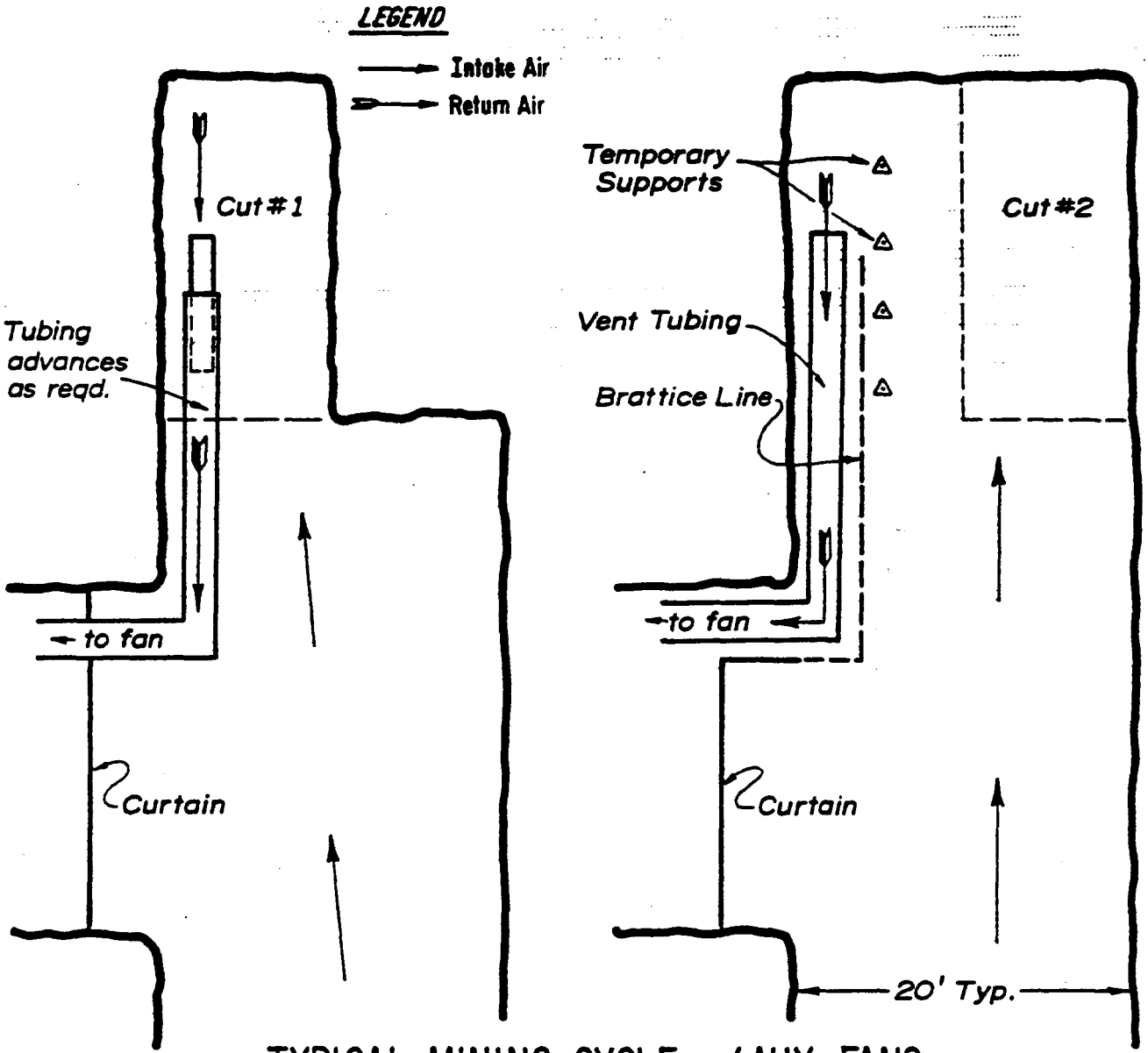
(B) 3,000 cfm – Bolting
Perceptible Movement – Idle

(C) 12,000 cfm – Mining
3,000 cfm – Bolting



TYPICAL VENTILATION-- FOUR ENTRY SYSTEM

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 16, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W. L. Wright	
SCALE: None	TITLE 4 ENTRY VENTILATION SYS. / DRAWING NO. A5-0031



TYPICAL MINING CYCLE w/ AUX. FANS

Notes:

1. *Vent Tubing will be maintained to within 10 feet of the face during mining. This will be accomplished by extending a slip tube out of the primary vent tube as mining progresses. Slip tube shall be 2" smaller (O.D.) than vent tube.*
2. *Line Brattice will be installed; after the mining cycle is completed, or during unscheduled fan stoppages; or idle shifts; to within 15 feet of the face.*
3. *The minimum mean air velocity shall be 60 ft. per minute.*
4. *The minimum quanity of air reaching each working face from which coal is being cut, mined or loaded will be 6,000 CFM.*
5. *Maximum depth of sump cut by Continuous Miner shall be 20 ft.*

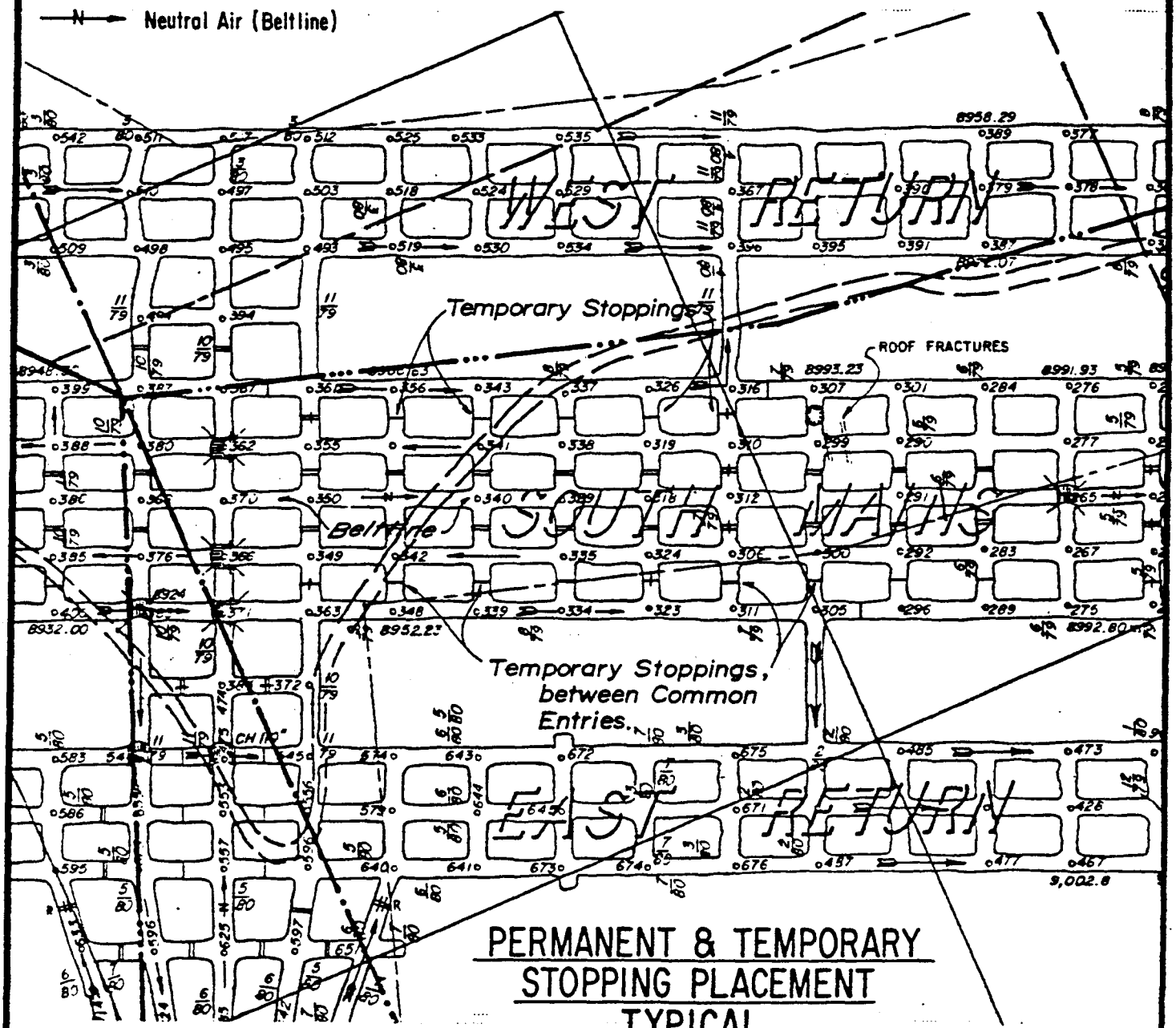
DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 22, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. Wright	
SCALE: NONE	TITLE MINING CYCLE, w/ AUX. FAN — DRAWING NO. A5-0036

LEGEND

- Permanent Stopping
- Temporary Stopping
- Stopping w/door
- Overcast
- Intake Air
- Return Air
- Neutral Air (Beltline)

Notes:

1. *Temporary Stoppings may be used in areas where entries are, or will be, common.*
2. *Where beltlines are to be in use for long periods of time, (South Mains) isolation stoppings will be permanent type.*



PERMANENT & TEMPORARY STOPPING PLACEMENT TYPICAL

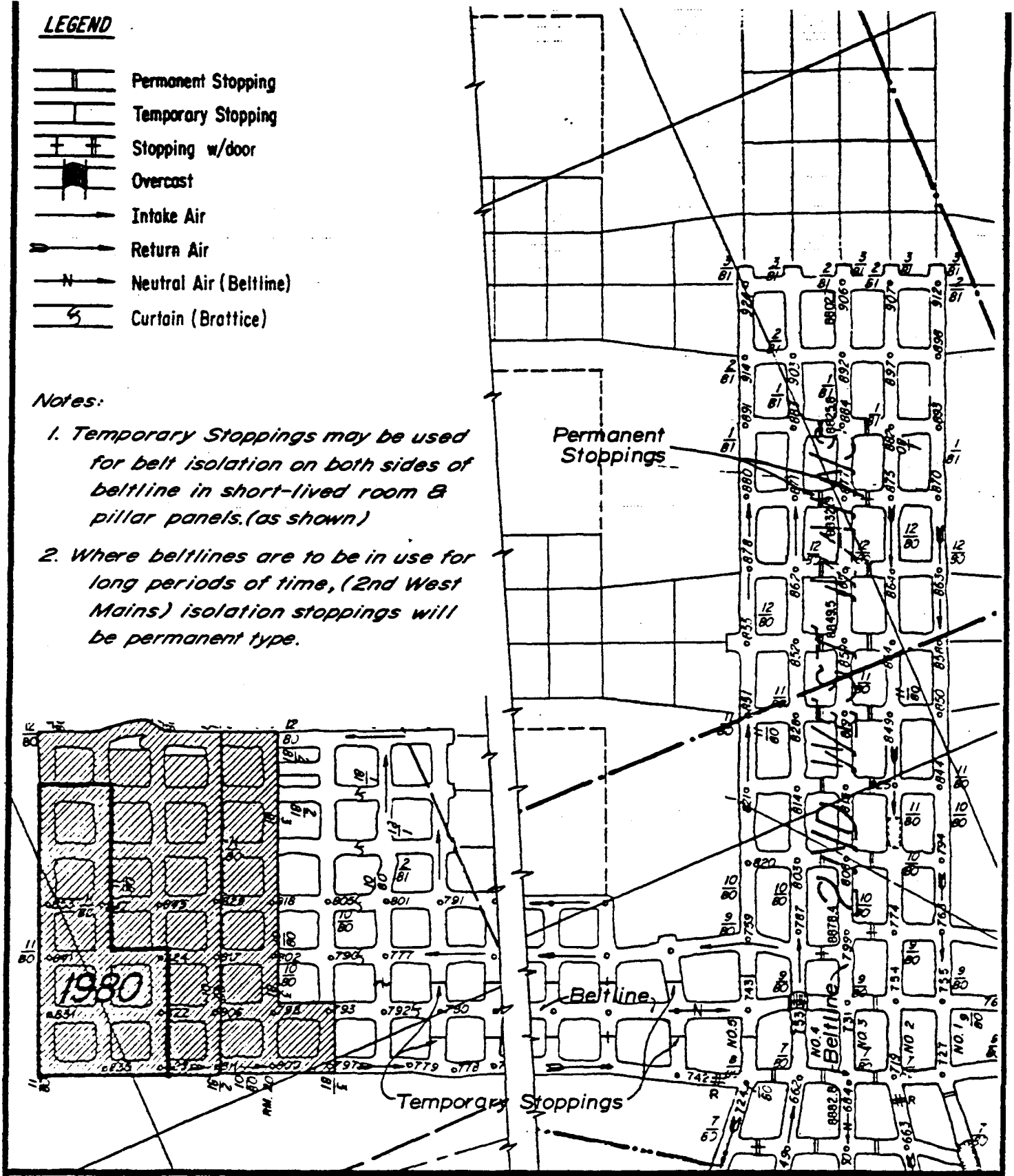
DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 21, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. L. WRIGHT	
SCALE: NONE	TITLE STOPPING PLACEMENT, TYPICAL — DRAWING NO. A5-0033

LEGEND

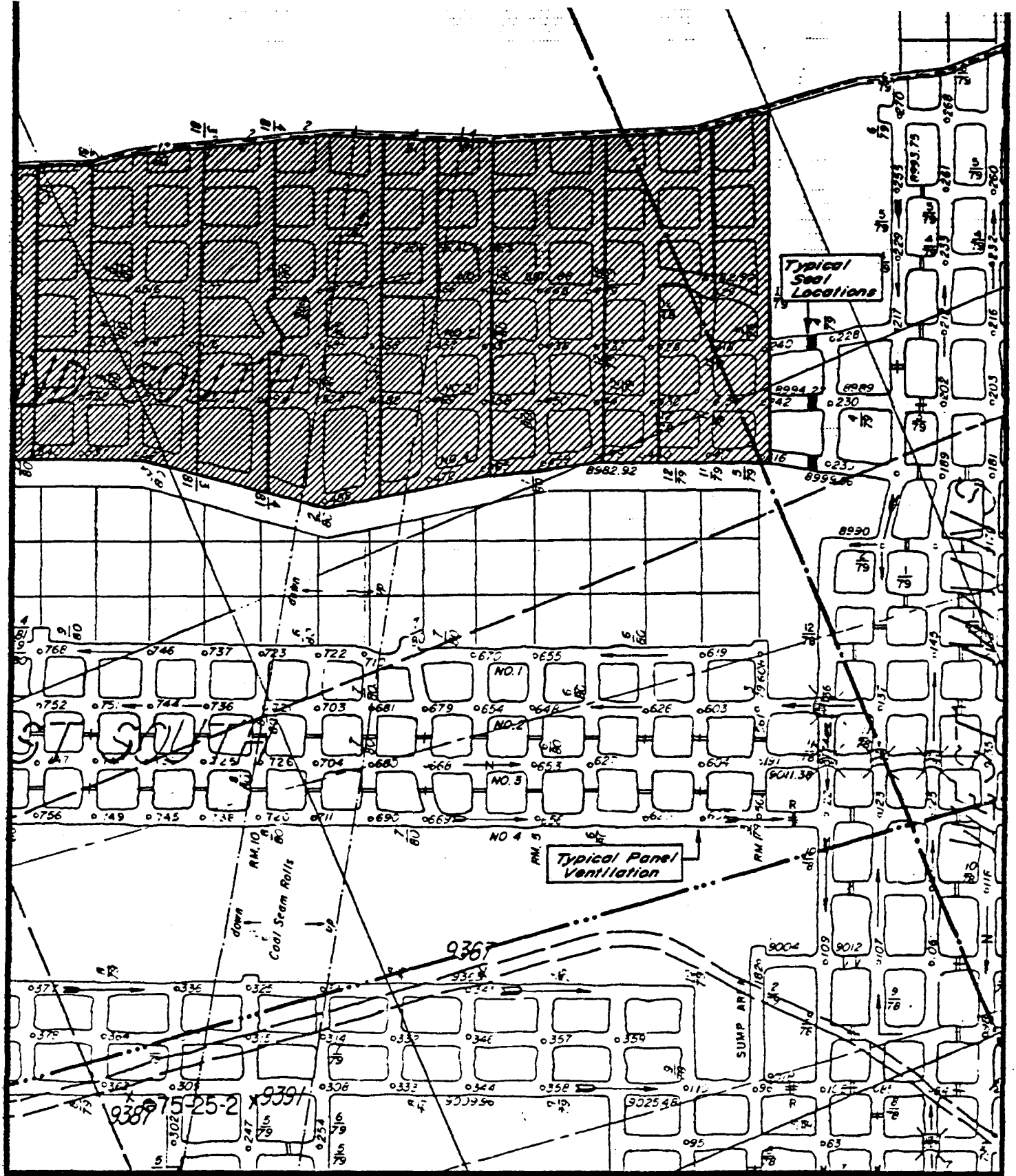
- Permanent Stopping
- Temporary Stopping
- Stopping w/door
- Overcast
- Intake Air
- Return Air
- Neutral Air (Beltline)
- Curtain (Brattice)

Notes:

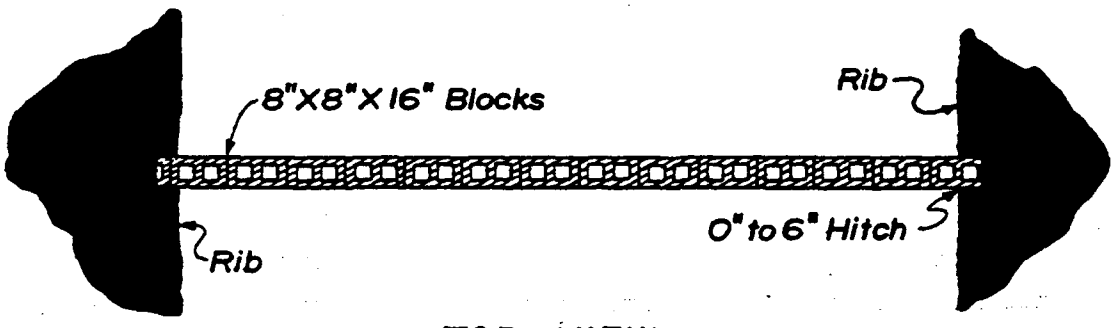
1. *Temporary Stoppings may be used for belt isolation on both sides of beltline in short-lived room & pillar panels. (as shown)*
2. *Where beltlines are to be in use for long periods of time, (2nd West Mains) isolation stoppings will be permanent type.*



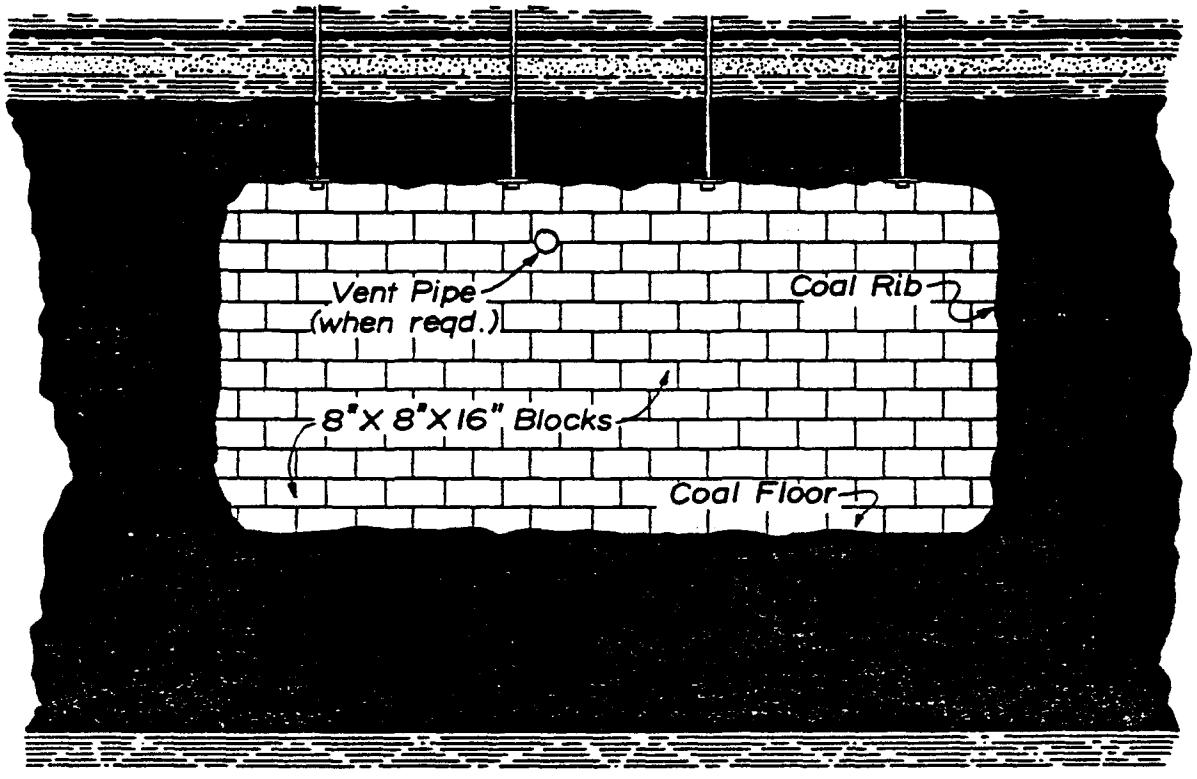
DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 21, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L. Wright	
SCALE: NONE	TITLE PANEL VENTILATION, TYPICAL — DRAWING NO. A5-0034



DRAWN BY: ED SANDERSON	**VALLEY CAMP OF UTAH, INC.**
DATE: JUNE 18, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL:	
SCALE: NONE	TITLE PANEL VENT. & SEALING, TYP. — DRAWING NO. A5-0035



TOP VIEW

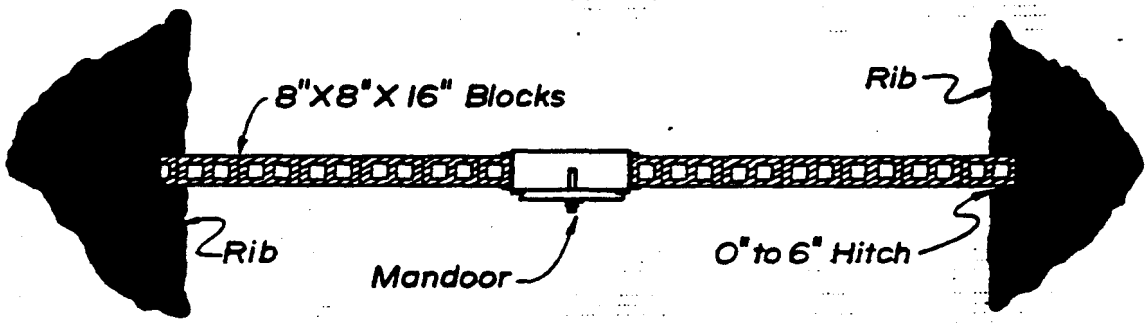


FRONT VIEW

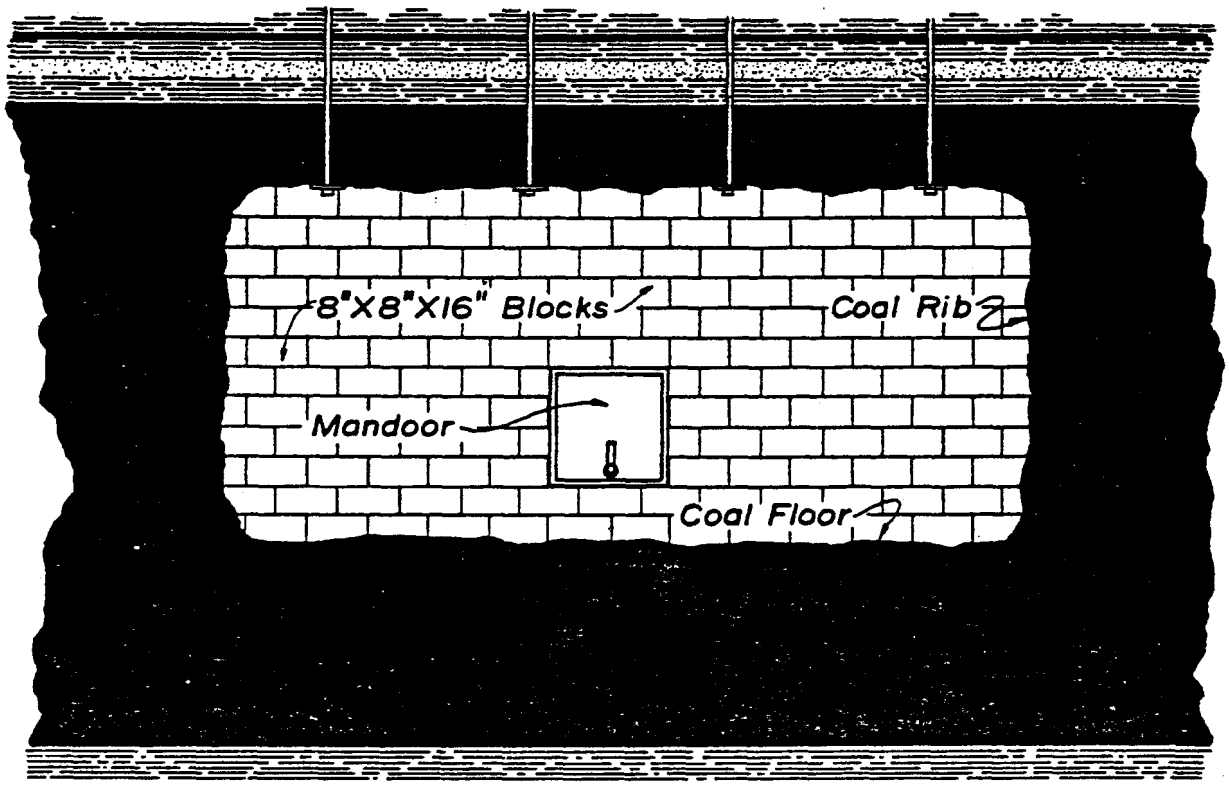
Notes:

1. *All stoppings (permanent) shall be made with 8"X8"X16" Blocks and sealed on one side with an approved sealant.*
2. *Ventilation pipe for belt lines when necessary.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 8, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. L. Wright	
SCALE: 1" = 5'	TITLE PERMANENT STOPPING, TYP. — DRAWING NO. A5-0017

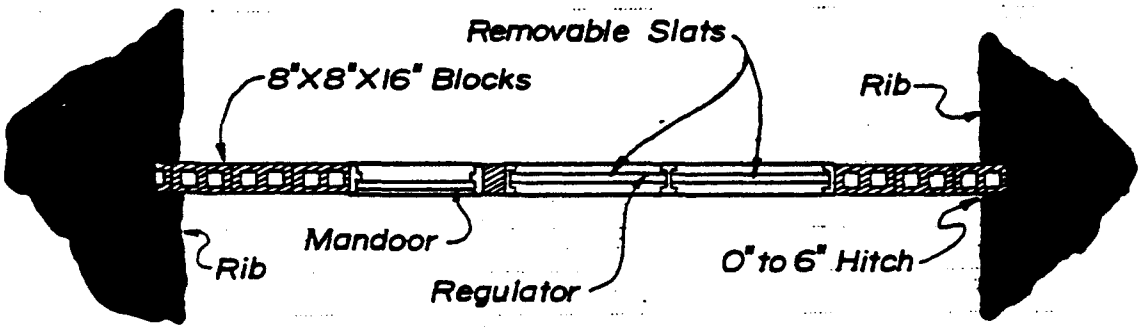


TOP VIEW

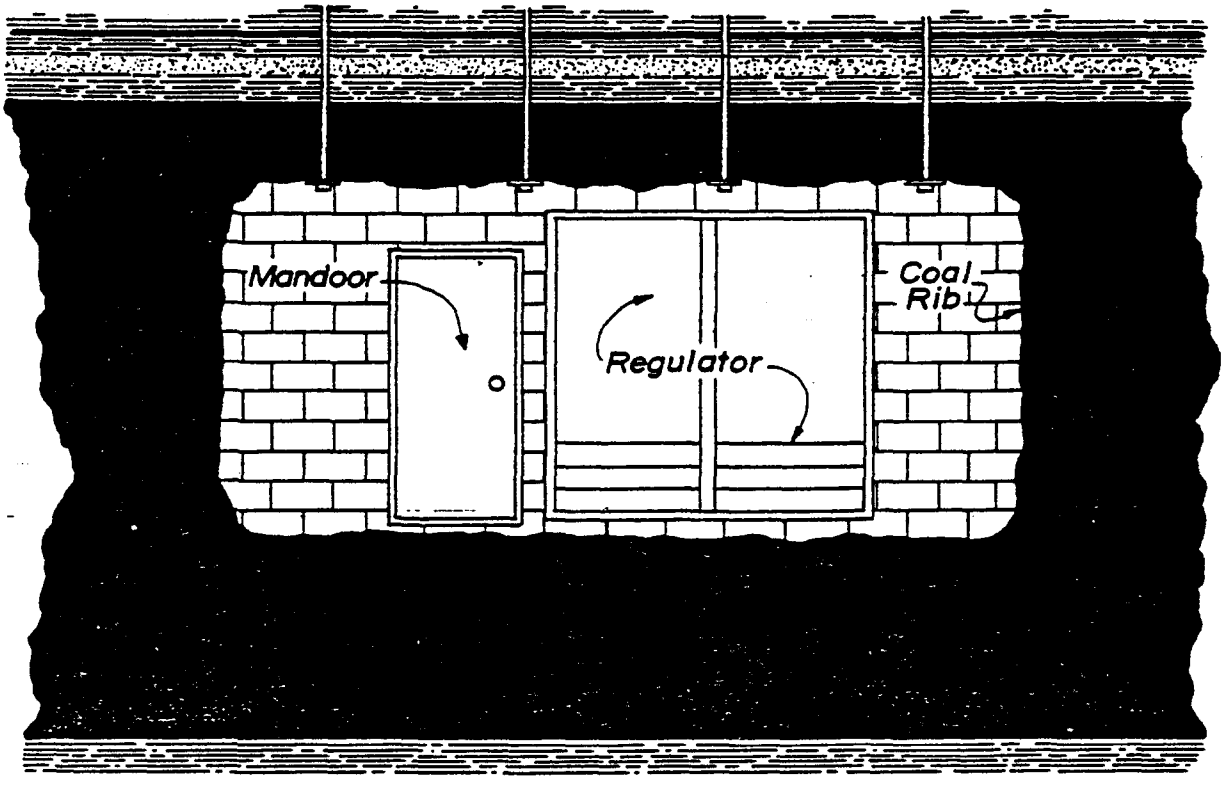


FRONT VIEW

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**	
DATE: April 13, 1981	**SCOFIELD ROUTE**	
CHECKED:	**HELPER, UTAH 84526**	
APPROVAL:		
APPROVAL: W. I. WRIGHT		
SCALE: 1" = 5'	TITLE STOPPING W/ MANDOOR, TYP.	DRAWING NO. A5-0026

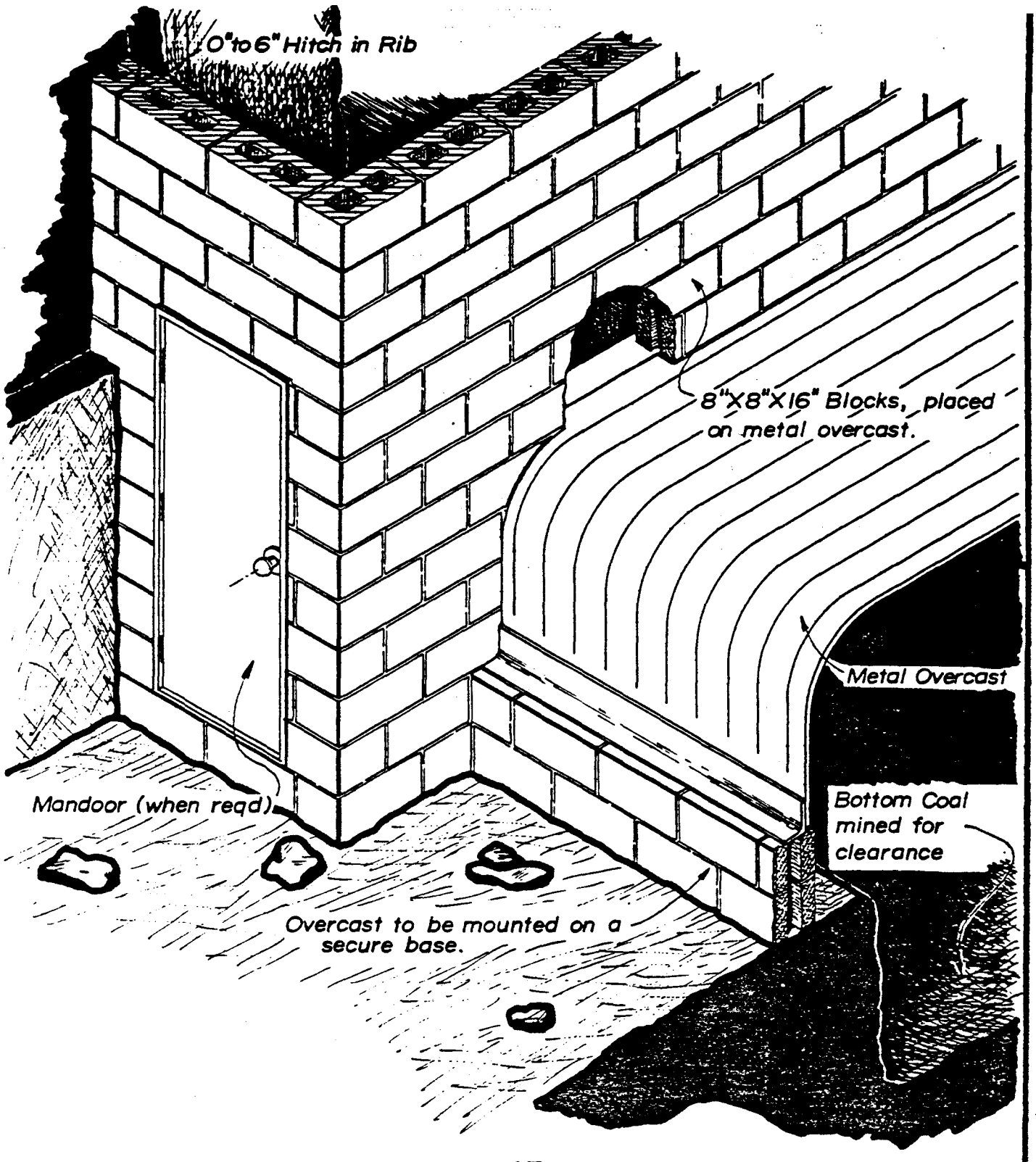


TOP VIEW



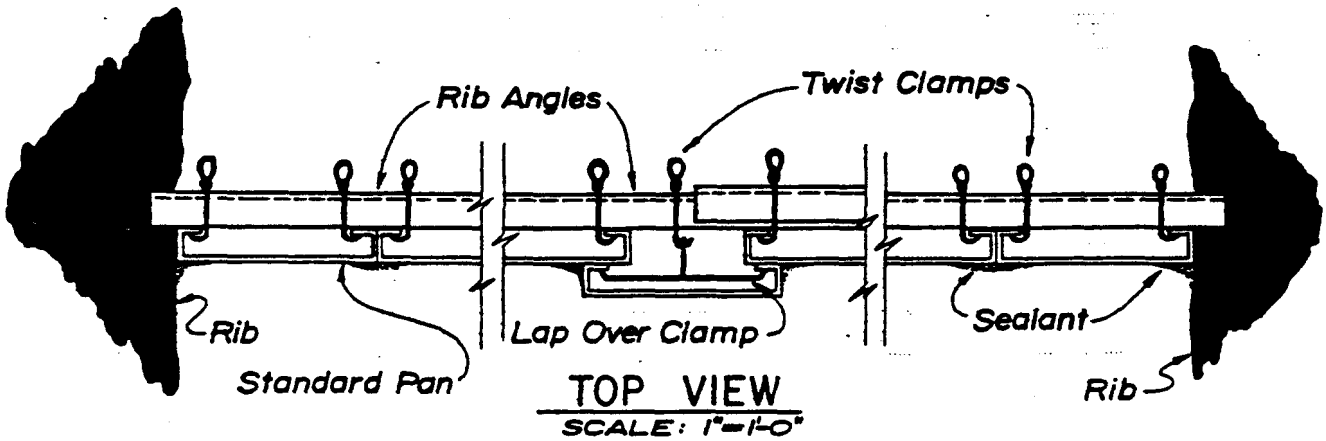
FRONT VIEW

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 13, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1" = 5'	TITLE REGULATOR, TYPICAL — DRAWING NO. A5-0019

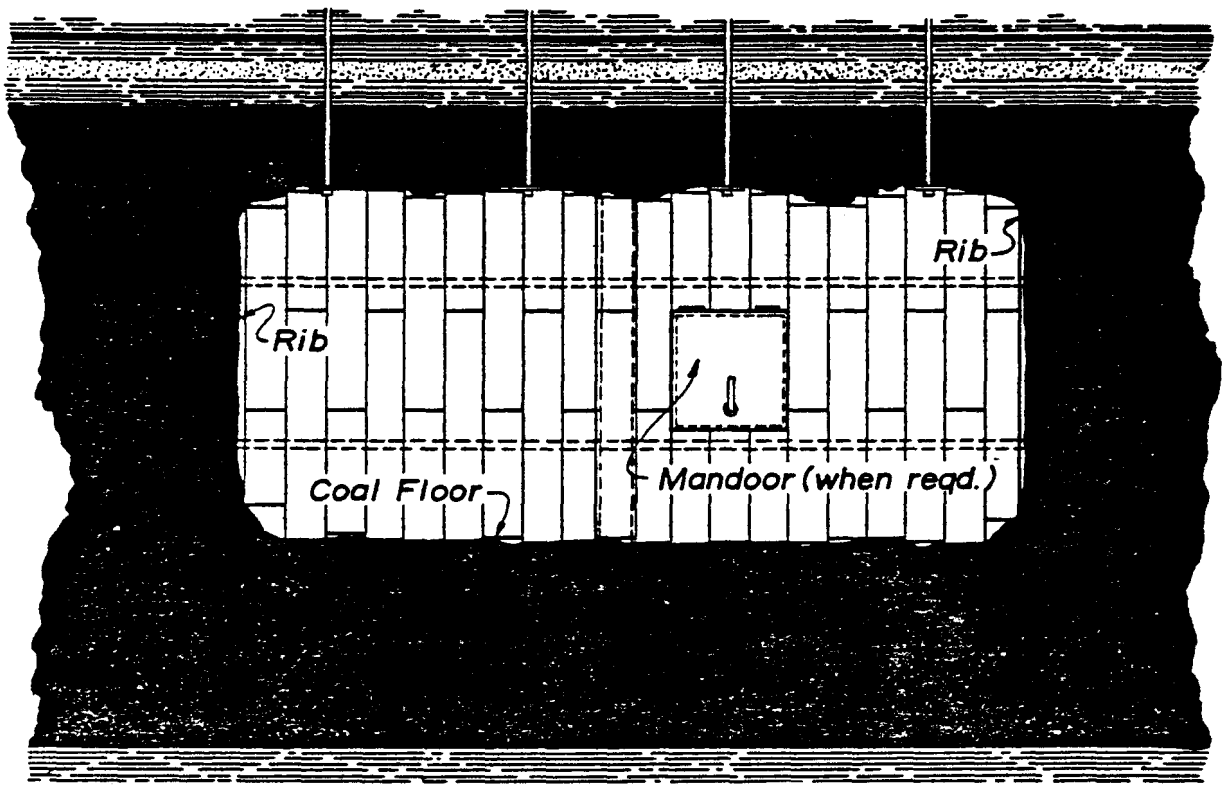


TYPICAL OVERCAST

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 14, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W. Wright	
SCALE: 1/2" = 1'-0"	TITLE TYP. OVERCAST CONSTRUCTION — DRAWING NO. A5-0027



TOP VIEW
SCALE: 1"=1'-0"

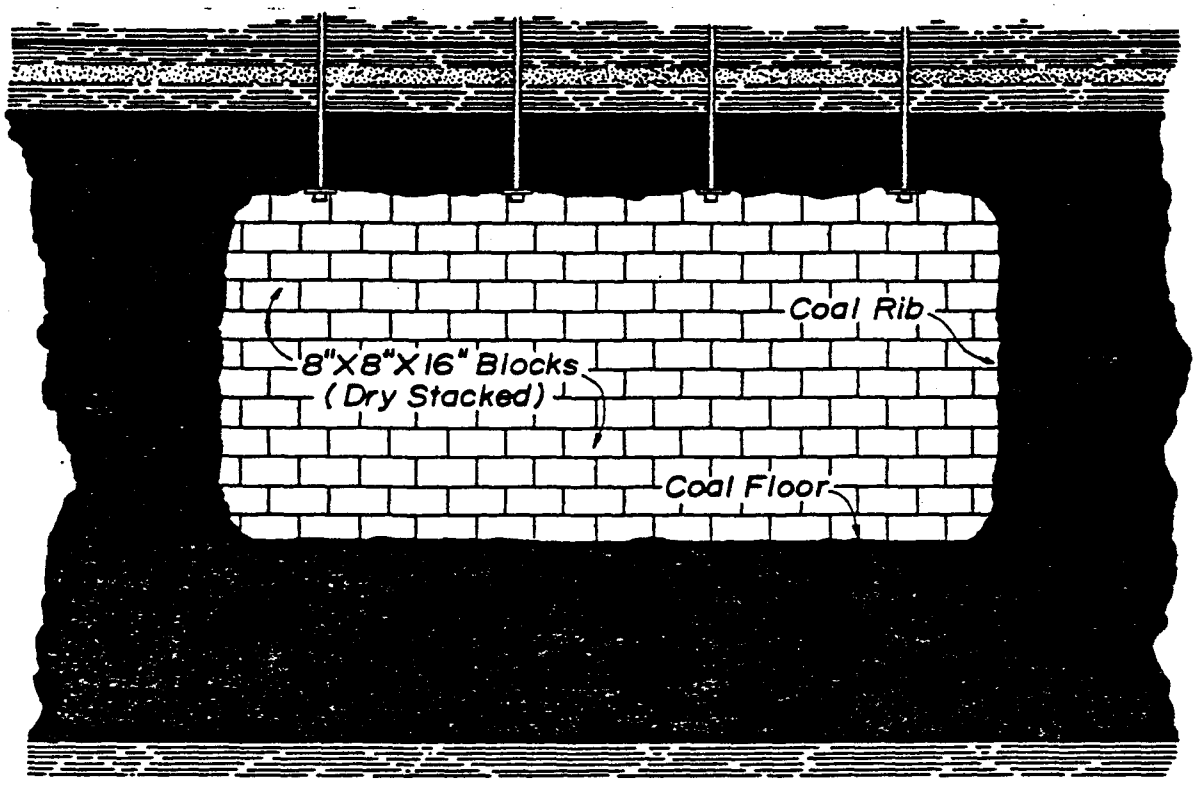


FRONT VIEW
SCALE: 1"=5'

Notes:

1. *Temporary stoppings to be constructed of standard packaged Kennedy Panels and accessories.*
2. *All irregular holes to be filled with approved materials.*
3. *Joints to be coated with an approved sealant.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 14, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. L. WEIGHT	
SCALE: "as noted"	TITLE: TEMPORARY STOPPING, Kennedy — DRAWING NO. A5-0028

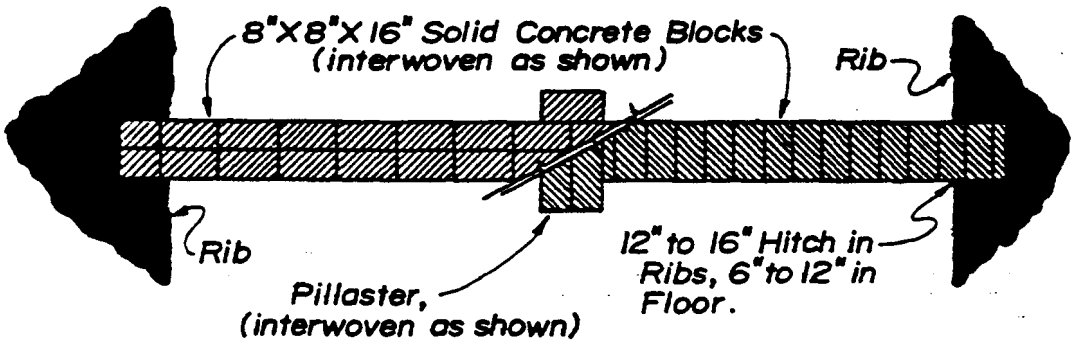


FRONT VIEW

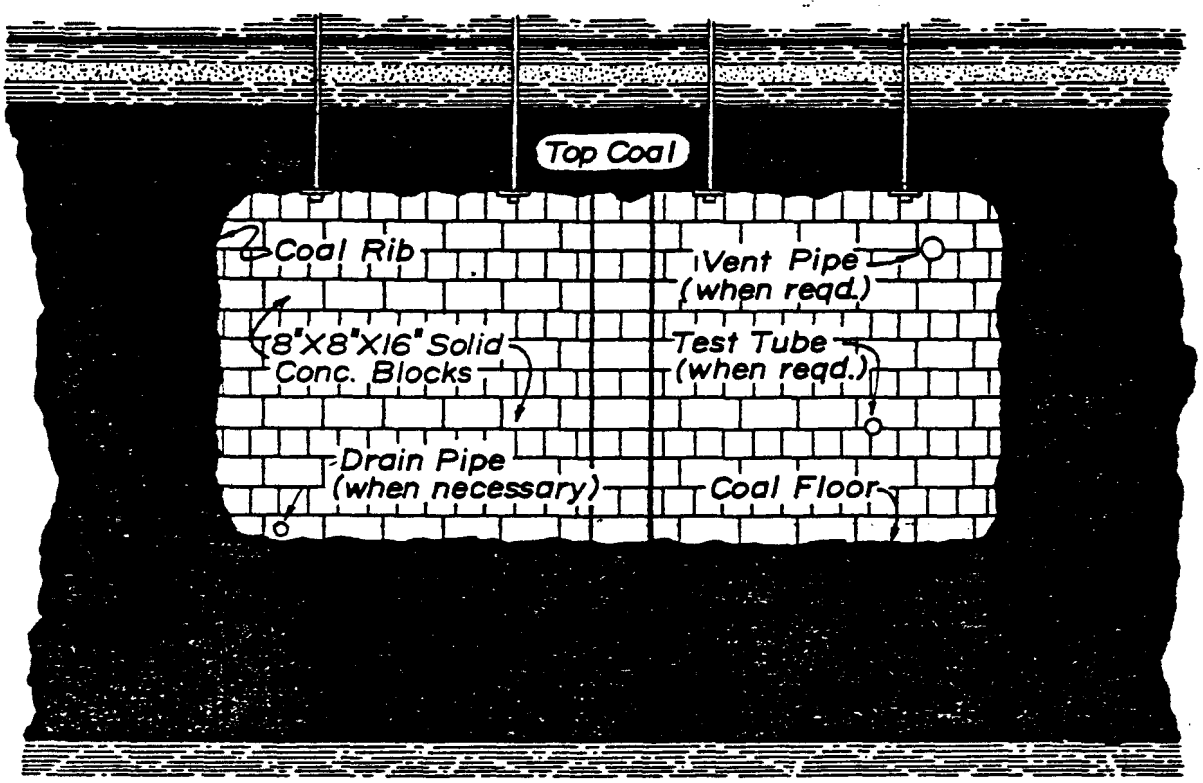
Notes:

1. *All irregular holes to be filled with approved materials.*
2. *Intake side of stopping to be coated with an approved sealant.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 15, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L. WRIGHT	
SCALE: 1" = 5'	TITLE TEMPORARY STOPPING, Block — DRAWING NO. A5-0029



TOP VIEW

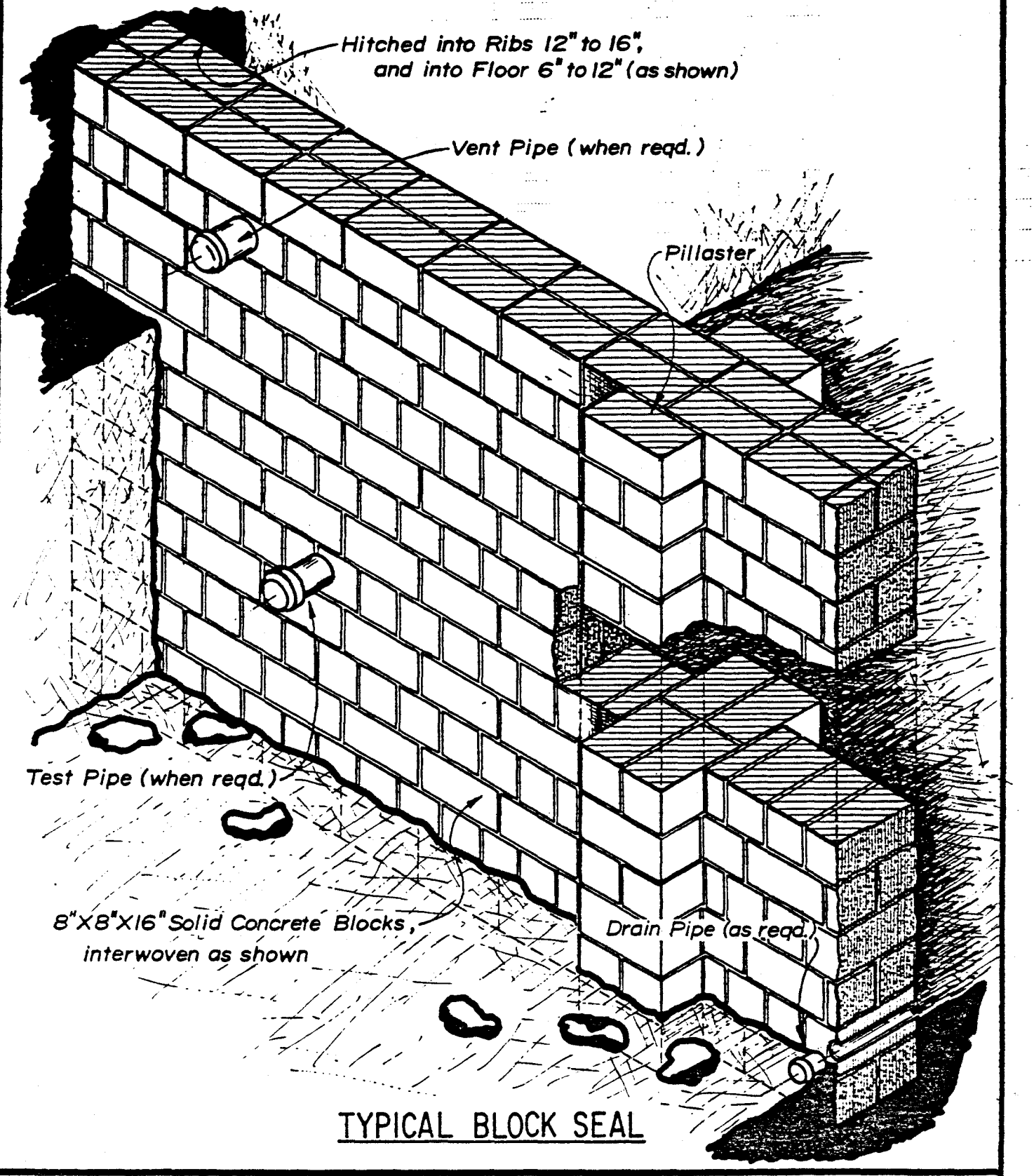


FRONT VIEW

Notes:

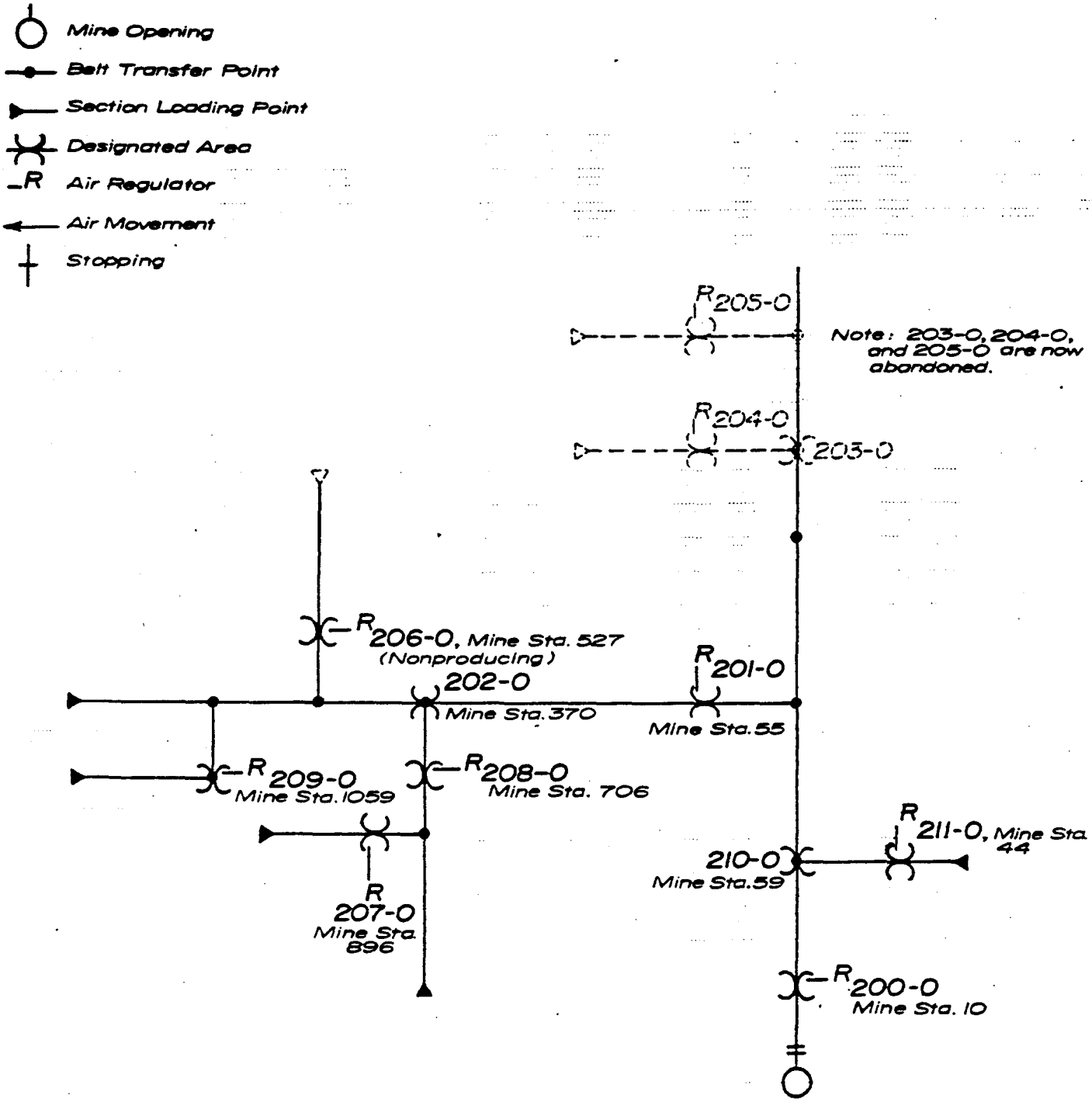
1. *Blocks to be 8"X8"X16" solid concrete (min. compressive strength 1800 PSIG), hitched 12" to 16" into the ribs and 6" to 12" into the floor.*
2. *Vent pipe and test tubes shall be placed in one seal in each set.*
3. *Drain pipes shall be provided when necessary.*
4. *Interwoven Pillaster shall be built in the approximate center of the seal.*
5. *Seals shall be 16" thick and sealed with an approved sealant material.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**	
DATE: April 8, 1981	**SCOFIELD ROUTE**	
CHECKED:	**HELPER, UTAH 84526**	
APPROVAL:		
APPROVAL: W. L. Wright		
SCALE: 1" = 5'	TITLE SEAL, TYPICAL (CONC. BLOCK)	DRAWING NO. A5-0018



TYPICAL BLOCK SEAL

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 13, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: N.L. WRIGHT	
SCALE: 1/2" = 1'-0"	TITLE: CONC. BLOCK SEAL CONSTRUCTION — DRAWING NO. A5-0025



"SUPERCEDES DWG. NO. A5-0032"

DRAWN BY: Ed Sanderson	DATE: Mar. 22, 82	VALLEY CAMP of UTAH SCOFIELD ROUTE HELPER, UTAH 84526
CHECKED BY:	DATE:	
REVISED BY:	SCALE: None	
APPROVAL ENG.:		
APPROVAL SAFETY:	TITLE: DESIGNATED AREA LINE DIAG.	DRAWING NO. A5-0044 / REV. NO. 0
APPROVAL MINE:		

Mine BELINA NO. 1 **Mine I.D. No.** 42- 01279

LOCATION OF DESIGNATED AREA: Main West belt line return air course regulator, at mine station 10. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Approximately 50 feet upwind (opposite direction of airflow) from the center of the intersection where air is directed into the return airway. Placed at normal breathing level but not less than 1 foot from the roof or rib on the walkway side.	***DESIGNATED AREA ID. NO.*** 200-0
LOCATION OF DESIGNATED AREA: Main South belt line return air course regulator, at mine station 55. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Approximately 50 feet upwind (opposite direction of airflow) from the center of the intersection where air is directed into the return airway. Placed at normal breathing level but not less than 1 foot from the roof or rib on the walkway side.	***DESIGNATED AREA ID. NO.*** 201-0
LOCATION OF DESIGNATED AREA: Main East head drive transfer point to Main South belt line, at mine station 370. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Within 10 to 40 feet downwind (with direction of airflow) of the dust generating source. On the walkway side of the Main South belt line, but not less than 1 foot from the roof or rib.	***DESIGNATED AREA ID. NO.*** 202-0
LOCATION OF DESIGNATED AREA: Second West main belt line return air course regulator, at mine station 527. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Approximately 50 feet upwind (opposite direction of airflow) from the center of the intersection where air is directed into the return airway. Placed at normal breathing level but not less than 1 foot from the roof or rib on the walkway side.	***DESIGNATED AREA ID. NO.*** 206-0

VALLEY CAMP OF UTAH, INC -- DESIGNATED AREA SAMPLING

Mine BELINA NO. 1 **Mine I.D. No.** 42-01279

LOCATION OF DESIGNATED AREA: First Right belt line return air course regulator, at mine station 896. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Approximately 50 feet upwind (opposite direction of airflow) from the center of the intersection where air is directed into the return airway. Placed at normal breathing level, but not less than 1 foot from the roof or rib on the walkway side.	***DESIGNATED AREA ID. NO.*** 207-0
LOCATION OF DESIGNATED AREA: Main East belt line return air course regulator, at mine station 706. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Approximately 50 feet upwind (opposite direction of airflow) from the center of the intersection where air is directed into the return airway. Placed at normal breathing level, but not less than 1 foot from the roof or rib on the walkway side.	***DESIGNATED AREA ID. NO.*** 208-0
LOCATION OF DESIGNATED AREA: East Return belt drive transfer point onto Second East Main belt, at mine station 1059. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Within 10 to 40 feet downwind (with direction of airflow) of the dust generating source. On the walkway side of the Second East belt line, but not less than 1 foot from the roof or rib.	***DESIGNATED AREA ID. NO.*** 209-0
LOCATION OF DESIGNATED AREA: North Mains belt drive transfer point onto Main West belt line, at mine station 59. ***POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:*** Within 10 to 40 feet downwind (with direction of airflow) of the dust generating source. On the walkway side of the Main West belt line, but not less than 1 foot from the roof or rib.	***DESIGNATED AREA ID. NO.*** 210-0

VALLEY CAMP OF UTAH, INC -- DESIGNATED AREA SAMPLING

Mine BELINA NO. 1 **Mine I.D. No.** 42-01279

LOCATION OF DESIGNATED AREA: North Mains belt line return air course regulator, at mine station 44.	***DESIGNATED AREA ID. NO.*** 211-0
POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA: Approximately 50 feet upwind (opposite direction of airflow) from the center of the intersection where air is directed into the return airway. Placed at normal breathing level but not less than 1 foot from the roof or rib on the walkway side.	
LOCATION OF DESIGNATED AREA:	***DESIGNATED AREA ID. NO.***
POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:	
LOCATION OF DESIGNATED AREA:	***DESIGNATED AREA ID. NO.***
POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:	
LOCATION OF DESIGNATED AREA:	***DESIGNATED AREA ID. NO.***
POSITION OF SAMPLING INSTRUMENT WITHIN DESIGNATED AREA:	

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 3/25/82

Mine Name: BELINA NO. 1 MINE
Mine I.D. No.: 42-01279
MMU I.D. No.: 001-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: Continuous

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be Sixty (60) feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be Fifteen (15) feet. (Longwalls not applicable).

3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
JOY 12CM3	35	#1	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations
Note: See page no. 37.

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 3/25/82

Mine Name: BELINA NO. 1 MINE
Mine I.D. No.: 42-01279
MMU I.D. No.: 003-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: Continuous

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be Sixty (60) feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be Fifteen (15) feet. (Longwalls not applicable).

3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
JOY 12CM3	35	#1	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations
Note: See page no. 37.

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 3/25/82

Mine Name: BELINA NO. 1 MINE
Mine I.D. No.: 42-01279
MMU I.D. No.: 004-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: Continuous

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be Sixty (60) feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be Fifteen (15) feet. (Longwalls not applicable).

3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
JOY 12CM3	35	#1	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations

Note: See page no. 37.

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 3/25/82

Mine Name: BELINA NO. 1 MINE
Mine I.D. No.: 42-01279
MMU I.D. No.: 007-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: Continuous

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be Sixty (60) feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be Fifteen (15) feet. (Longwalls not applicable).

3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
JOY 12CM3	35	#1	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations

Note: See page no. 37.

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 3/25/82

Mine Name: BELINA NO. 1 MINE
Mine I.D. No.: 42-01279
MMU I.D. No.: 008-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: CONTINUOUS

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be Sixty (60) feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be Fifteen (15) feet. (Longwalls not applicable).

3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
JOY 12CM3	35	#1	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations

Note: See page no. 37.

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 3/25/82

Mine Name: BELINA NO. 1 MINE
Mine I.D. No.: 42-01279
MMU I.D. No.: 009-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: Continuous

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be Sixty (60) feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be Fifteen (15) feet. (Longwalls not applicable).

3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

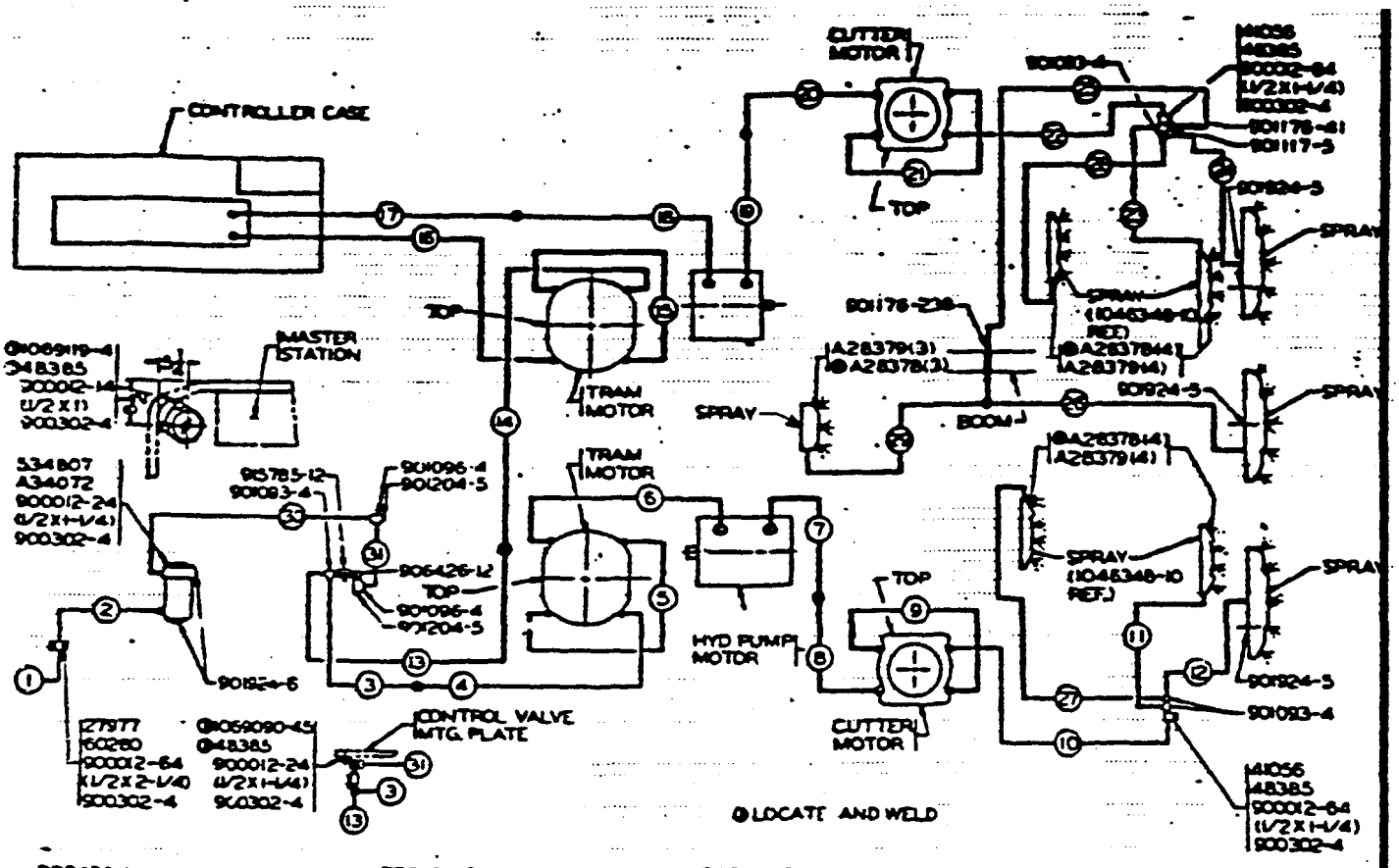
4. The following water suppression system shall be maintained and operated as follows:

Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
JOY 12CM3	35	#1	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations

Note: See page no. 37.

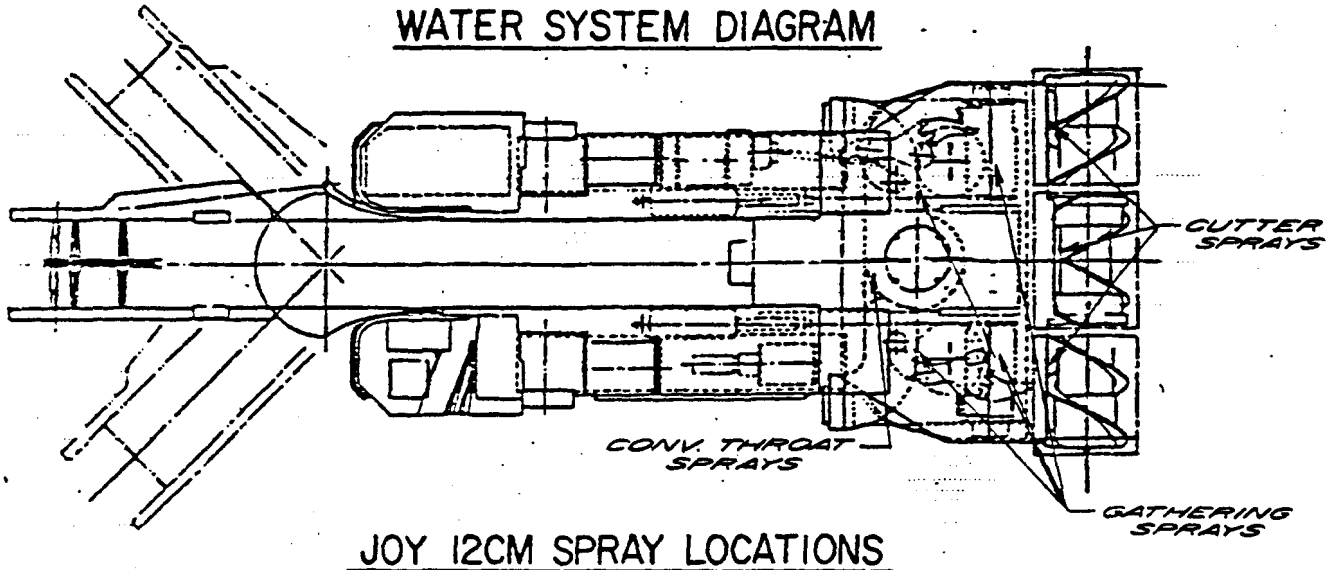


PD2439-1
700080-158 MPT REUSABLE
712080-158 MPT CRIMP
712080-155 MPT CRIMP

PD2439-2
700080-154 JIC REUSABLE
712080-154 JIC CRIMP
PD2439-4
712080-156 JIC CRIMP

PD2439-5
712080-157 STECKO CRIMP

WATER SYSTEM DIAGRAM



JOY 12CM SPRAY LOCATIONS

DRAWN BY: Ed Sanderson	DATE: Mar. 24, 82	VALLEY CAMP of UTAH SCOFIELD ROUTE HELPER, UTAH 84526
CHECKED BY:	DATE:	
REVISED BY:	SCALE: None	
APPROVAL ENG.:		
APPROVAL SAFETY:	TITLE: JOY 12CM WATER SYSTEM	DRAWING NO. A5-0045 / REV. NO. 0
APPROVAL MINE:		

U. S. Department of Labor

Mine Safety and Health Administration
P O Box 25367
Denver, Colorado 80225

Coal Mine Safety and Health
District 9

July 1, 1981

Trevor G. Whiteside
Senior Mining Engineer
Valley Camp of Utah, Inc.
Scofield Route
Helper, Utah 84526

Re: Belina No. 2 Mine
I. D. No. 42-01280
Roof Control Plan

Dear Mr. Whiteside:

The roof control plan for the subject mine, dated June 17, 1981, has been reviewed and is approved. However, this approval is granted with the following conditions being complied with:

1. Steel crossbars on five foot centers shall be installed in the intake escapeway inby the end of the arch supports up to and including the first open crosscut.

2. The remaining entries shall be crossbarred also from the end of the arch supports inby up to and including the first open crosscut.

Sincerely,

for Harold E. Dalton

John W. Barton
District Manager

VALLEY CAMP OF UTAH, INC.

Scofield Route

Helper, Utah 84526

17 June 1981

Mr. John W. Barton
District Manager
M.S.H.A.
P. O. Box 25367
Denver, Colorado 80225

RE: Belina No. 2 Mine
I.D. No. 42-01280
Roof Control Plan

Dear Mr. Barton:

As required by Subparts 75.1721 and 75.200-5, 30 CFR 75, please find attached, one (1) copy of the proposed Roof Control Plan for the subject mine.

If I can be of assistance in the approval process of this plan, please contact me.

Sincerely,

T. G. Whiteside
Senior Mining Engineer

Copy to: Mine Safety Committee
W. Wright
R. Tallerico

Attachment

BELINA NO. 2 MINE

ROOF CONTROL PLAN

June 16, 1981

General Information

Date June 16, 1981 Mine I.D. No. 42-01280

A. Company: Valley Camp of Utah, Inc.

Address: Scofield Route, Helper (City) Utah (State)

B. Mine: Belina No. 2

Mine Location:

Scofield	Carbon	Utah
City	County	State

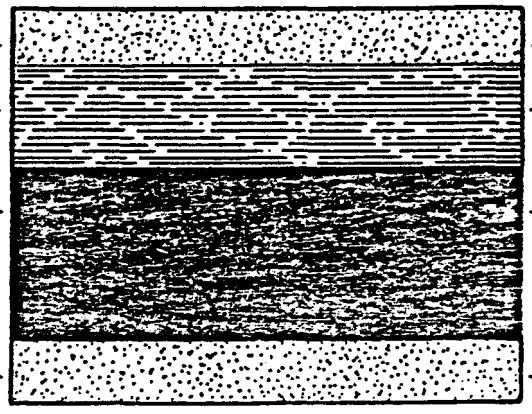
C. Location (Reference to nearest highway route, direction and distance)

3.2 Miles Southwest Off Route No. Utah 96

D. Type(s) of plan Full

E. Area(s) of mine covered by the plan Entries, rooms, crosscuts and pillars

F. Maximum cover 1200 feet



G. W. H. Haynes, Jr. President - Western Division
Company or mine official validating plan — Title

Roof Control Investigator _____

This Roof Control Plan approved this date hereby supersedes all previously approved plans.

Approved by _____ _____ Date

Title _____

H. ROOF-SUPPORT MATERIALS - Roof Bolts

Manufacturer CF&I Steel Corp. Manufacturer's Designation 5772-1238-141.2

Mikco Industries None

OR Equivalent

Minimum length 48" Diameter 3/4 ~~High Strength~~ 5/8 Extra High Strength

Type steel Hot Rolled Type thread Rolled

Length of thread 6" to 8" Type head Standard (Standard, Self Centering, Cone N

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

I. BEARING PLATES

Manufacture Mikco Industries Manufacturer's Designation None

Pattin-West None

OR Equivalent

Dimensions ¼" x 6" x 6"

3/16" x 6" x 6" High Tensil

Shape Square and Embossed Center Hole Size 13/16"

J. WASHERS

Manufacturer N/A Manufacturer's Designation N/A

Type steel N/A Size N/A

Shape N/A Hole Size N/A
(Donut embossed, Bell embossed, Flat)

K. ANCHORAGE UNIT

Manufacturer Ohio Brass Manufacturer's Designation OB22378

Pattin-West 5792-0125-9

OR Equivalent

Type Standard Expansion Shell Size of Finished Hole 1-3/8"

Method of Drilling Rotary, Percussion or Combination Dust Control Vacuum and/or water

Installed torque 150 to 200 Foot-Pounds, Conventional

L. MATERIALS USED IN CONJUCTION WITH ROOF BOLTS

Cottonwood Blocks 2" x 8" x 12" (Min.) with one hole

Roof Bolt Mats as required --- See Drawing

M. FACE EQUIPMENT AND SECTION HAULAGE EQUIPMENT ASSOCIATED WITH EACH

1. Joy Continous Miner 12CM1-10BX; 950 AC Volt
2. 2 -- 10SC-22 Joy Shuttle Cars; 250 DC Volt
3. 1 -- Lee Norse Model TD-2-43-5-4E Roof Bolter
4. 1 -- Galis Model 320A Roof Bolter; 440 AC Volt
5. Kersey Scoop Tractor; Model PAST-24-S
6. MSA Trickle Duster
7. Galis Auxillary Fans; Model 1520 480 Volts
8. Wagner Scooptram
9. Jeffery Diesel Ramcar Model 37688
10. Joy RCS 220 Air Compressor

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 Feet

Entry Centers 70' - 100' Main Entries

Crosscut Width 20 Feet

Crosscut Centers 75 Feet - 120 Feet

Room Width 20 Feet

Room Centers 40 Feet - 80 Feet

Room Crosscut Width 19 Feet

Room Crosscut Centers 60 Feet Minimum

Slope Width (Anthracite) N/A

Gangway Width (Anthracite) N/A

O. ROOF SUPPORT MATERIAL-Conventional or Temporary and Supplemental

Length of Post As Required

Diameter of Post One (1) inch for each 15 inches in length up to 8 feet, but in no case will the diameter be less than 4 inches. For heights over 8 feet, the minimum allowable diameter will be 8 inches. Split posts shall have a cross-section area equal to that required for round posts of equivalent lengths. Smaller posts may be used provided they are set in clusters to provide equivalent support.

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"x4") x 6" x 30" Minimum

Wedges, size and shape (0"x1") x 6" x 10" Minimum

Crossbars, type Straight grain solid wood or metal - When required

Crossbars, size A minimum of 3 inches by 8 inches of varying lengtl when required

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

Cribbing blocks, size A mimimum of 30 inches in length of varying cross section - when required

Mats 1/16 Ga. metal steel 2"-11" wide, 3'-9' long; 4-15 holes (2" dia.) per 9 sheet; corrugation spacing 5-7 1/2"; corrugation depth 6 13/16"; corrugation width 7' 2 3/4".

Wire mesh American Fence or equivalent

P. ARCH SUPPORT MATERIAL

Manufacturer Commercial Shearing OR Equivalent

Manufacturer's Designation

Maximum width 20' 0"

Minimum width 14' 0"

Maximum height 14' 0"

Minimum height 9' 0"

Size W8 x 24#/Ft.

Minimum load

Material A572 Grade 50

Lagging 3" x 12" x 3' 11 1/2" Minimum

Rods 3/4" x 51" with 3" thread at each end. (Min.)

Nuts 3/4" (2 per rod)

Pipe spacers Schedule 40 Minimum

Minimum length 3' 11 1/2"

ROOF SUPPORT MATERIALS FOR RESIN GROUTED RODS

A. RODS

Manufacturer Pattin-West — Manufacturer's Designation

Safeloc Systems

CF&I

OR Equivalent

Minimum length 48 inches — Diameter 3/4 inch Min.

Type Steel Grade 40 ASTM A-615 — Type Head Square

Minimum Yield

Dimensions of bolt head : Nut 1-1/8 inch — Flange 2 inch

B. BEARING PLATES

Manufacturer Mikco Ind. — Manufacturer's Designation

OR Equivalent

Dimensions 6" x 6" x 3/16" Pressed with bent corner and 1" or 1-1/8" Center Hole

Shape Square — Center Hole Size 1" and 1-1/8"

C. RESIN

Manufacturer Dupont — Manufacturer's Designation

Carboloy

OR Equivalent

Type Tube — Method of Drilling Rotary, percussion or combination

Size of Finished Hole 1" - 1 1/32" — Dust Control Water and/or Vacuum

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. (a) 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.

   (b) 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 it 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.

   (b) Where required, the installation of temporary supports shall begin prior to moving the roof bolting machine into the place, unless roof bolting machines are equipped with acceptable automated temporary supports.

4. 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 sound and vibration method and installing supports shall do so with caution and shall be within 5 feet (less if indicated on sketches) 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.

5. When wooden material such as planks, header blocks, or crossbars are used between the 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.

6. When installing permanent supports, temporary supports may be re-positioned in the sequence indicated on the attached sketches (pgs. 18 & 26). 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.

7. Where it is necessary to perform any work such as extend line curtains or other ventilation devices inby the roof bolts, or to make methane tests inby the roof bolts, a minimum of two temporary supports 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. Other methods of providing temporary supports for this work will be used if equivalent protection is provided.

8. 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. Does not apply when roof bolting machine is equipped with an ATRS system.

   (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 feet centers across the place so that the work in progress is done between the installed temporary supports and adequate permanent supports in sound roof.

9. (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 length 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 the bar shall be suitable for the area involved in its use; i.e. construction area, roof-fall areas, and other mining areas require a bar of suitable length).

10. 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).

11. Roof bolts shall be installed in the sequence shown in the drawings.

12. 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 22 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.

13. *An approved, calibrated torque wrench that will indicate the actual torque on the roof bolts by a direct reading shall be provided in each working section.

14. *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.

15. *On a daily basis, a spot check of torques will be performed on at least one out of each ten on the roof bolts from the outby corner of the last open crosscut to the face and a record kept of the results. The torque range is 150-200 ft. lb. This record is to show the number of roof bolts tested, number of roof bolts below the recommended range, and the number of the roof bolts above the recommended range. If the results show that a majority of the roof bolts are not maintaining at least seventy percent of the minimum torque required (fifty percent if plates bear against wood), or have exceeded the maximum required torque by fifty percent, supplementary support such as additional roof bolts, longer roof bolts with adequate anchorage, posts, cribs, or crossbars to be installed until a review of the adequacy of the roof control plan is made by an authorized representative of the Secretary of the Interior.

16. (a) Sidecuts will 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 set on 5 foot centers. 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 intersections until either:

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

        (ii) The newly created opening is timbered off with at least one row of posts installed on not more than 5 foot centers across the opening.

17. 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 roof. Where crossbars or planks are installed, they shall be blocked to equally distribute the load across their length.

18. Posts shall be installed tight and on solid footing. Not more than two wooden wedges shall be used to install a post.

19. 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.

20. An additional supply of supplementary roof support material consisting of roof bolts, at least 12 inches longer than the bolt length being used, and posts of proper length with sufficient cap pieces and wedges, shall be provided at the mine site or a dumping point inside which would allow for delivery to any section of the mine within 60 minutes. (The roof bolts, 12 inches longer, do not apply to resin installations).

21. 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 250 feet of their working area.

22. (a) Where roof falls have occurred and at all overcast, boom holes, and other construction sites that require removal of mine roof material, (e.g., by blasting, by ripping with a continuous mining machine, but 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 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 describing the procedures to be followed for Working Roof Falls.

(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 one row of post (or the equivalent) installed on not more than 5-foot centers across the opening.

23. On all active 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 accidentally dislodged.

24. 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 angles greater than 5° from the perpendicular to the roof line.

25. All roof bolt materials shall be stored and handled in such a manner that will minimize danger.

26. 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 be shown on a map of the mine.

27. In areas where steel arch supports (Dwg. No A5-0016) or crossbars (Dwg. No. A5-0014) are being installed, roof bolting, as normally done, will not be required. Roof bolting may however, be used to supplement the installation of either crossbars or steel arches.

* NOTE: Does not apply to Resin Bolting Procedures

SAFETY PRECAUTIONS

AUTOMATED TEMPORARY ROOF SUPPORT

1.

Roof Bolter Manufacturer	Model Number	Serial Number	Minimum Load Carrying Capacity
1. Lee-Norse	TD2-43	21271	17,318 lbs.
2. Lee-Norse	TD2-43	21343	17,318 lbs.
3. Lee-Norse	TD2-43	21374	17,318 lbs.
4. Lee-Norse	TD2-43	21447	17,318 lbs.
5. Lee-Norse	TD2-43	21449	17,318 lbs.

2. Automated temporary roof support systems shall be used in lieu of conventional temporary supports in all faces where they will reach the roof. (See also Item No. 14).

3. Upon completion of the loading cycle, a reflectorized warning sign, such as "STOP" or "CAUTION - UNSUPPORTED ROOF", etc., shall be provided to warn persons approaching the area that it is not permanently supported, and such signs, etc., shall remain in place until installation of permanent supports is started.

4. 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.

5. This automated support system may be used in all working sections and falls, or construction areas where it can be used safety and correctly.

6. 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 oil due to a broken hose.

7. No one shall proceed inby the automated support system unless a minimum of two temporary supports are installed not more than five feet apart and within five feet of permanent support, face or ribs, and the work is done between such supports and/or the nearest face or rib.

8. The roof bolter operator shall not proceed inby the last complete row of bolts until the safety arm support is placed firmly against the roof at the point where the work is to be performed.

9. While drilling, the center of the safety arm support shall be against the roof, and shall be no more than 5 feet from the last complete row of bolts and either the coal rib or an installed bolt. (See also Item No. 14).

10. At least two safety jacks shall be available in the section to be used when unusual or adverse roof conditions are encountered, and the automated temporary support does not provide adequate protection for the operator. Timber may be used in place of safety jacks, if height requires.

11. Where crossbars are being installed, they may be moved into place and secured against the roof with the automated support system before persons proceed inby permanent supports to install legs under the bars.

13. The temporary roof support requirements stated elsewhere in the plan do not apply where the roof bolting machine is equipped with an acceptable A.T.S. system. This does not preclude the use of temporary supports for additional safety precautions during periods of inactivity such as strikes and mine shutdowns. Temporary supports may also be used to make necessary face tests and to assist in ventilation.

14. In areas that have been mined, or have fallen above the height limit of the automated temporary support system, a maximum of one (1) crib block may be used to allow the support to be pressured against the mine roof.

15. The manner in which the A.T.S. system is otherwise employed shall be consistent with the approved roof control plan.

SAFETY PRECAUTIONS FOR RESIN GROUTED RODS

1. All safety precautions required in the regular roof control plan will be followed, except the torque test required for conventional-type roof bolts will not apply. If failure occurs, the bolting operation will discontinue until the reason for failure has been determined. If the reason for failure cannot be determined, changes in the roof bolting procedure will be made to adequately support the roof, or supplemental supports will be used.

2. Persons responsible for the installation of resin rods will be taught the installation procedures recommended by the manufacturer, including the safe handling precautions of the resin material.

3. Drill steels will be equivalent in length to the rods used or adequately marked to assure proper hole depth. Each drill hole will be filled the entire length with resin.

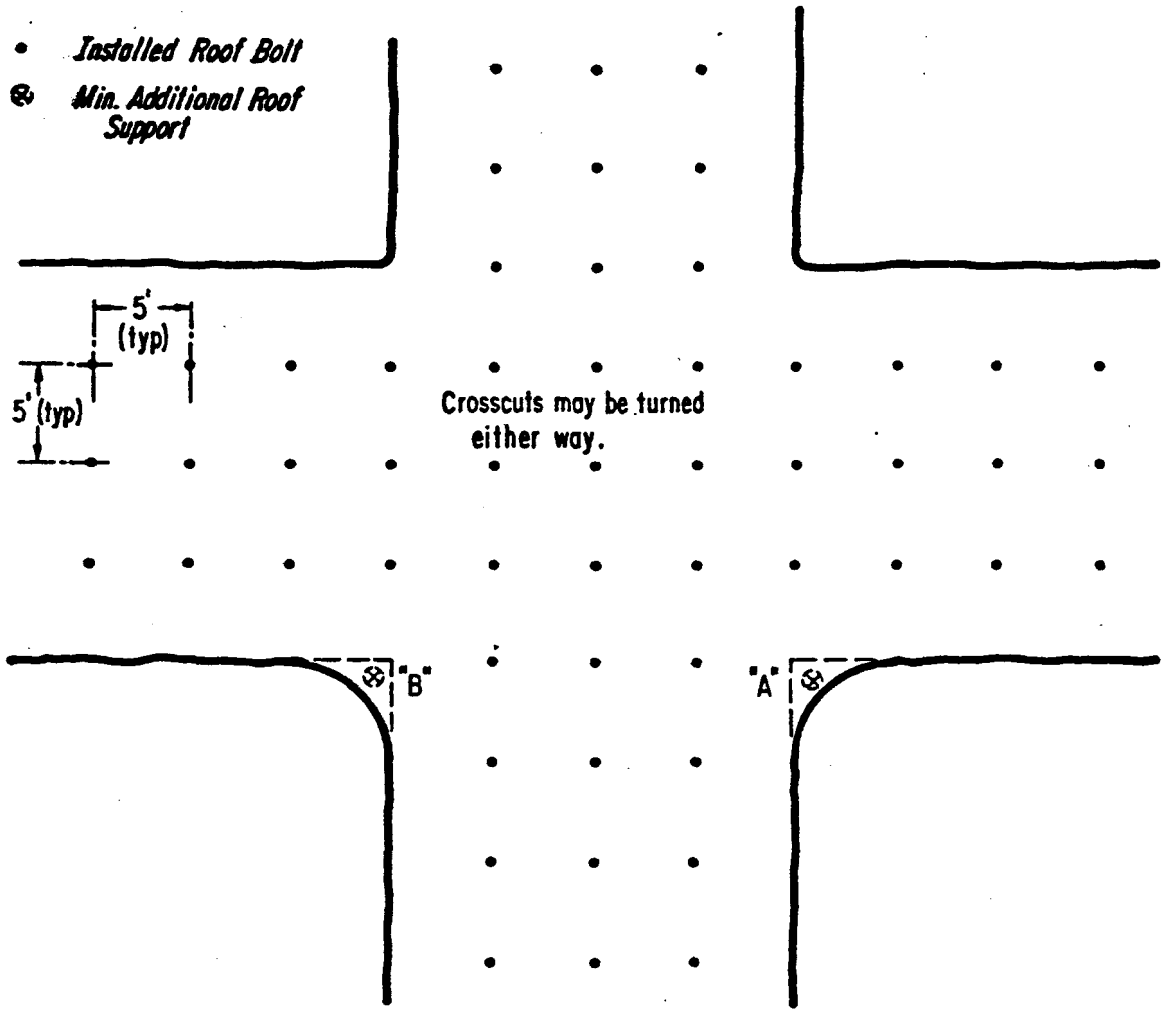
4. All resin grouted rods will be used with bearing plates approved for use. The bearing plate or the wood material between the bearing plate and the roof will be tight against the mine roof.

5. Resin packages will be stored in an area where the temperature is within the range recommended by the manufacturer.

6. Broken cartridges or cartridges which show signs of deterioration will not be used, and will be removed from the underground portion of the mine.

7. Resin grouted rods and conventional roof bolts will not be intermixed during systematic bolting cycles, except that intermixing may occur in areas where supplementary supports are required.

8. Resin cartridges will not be used if the recommended shelf-life has been exceeded, unless written authorization for use is permitted by the manufacturer or an authorized representative of the manufacturer.

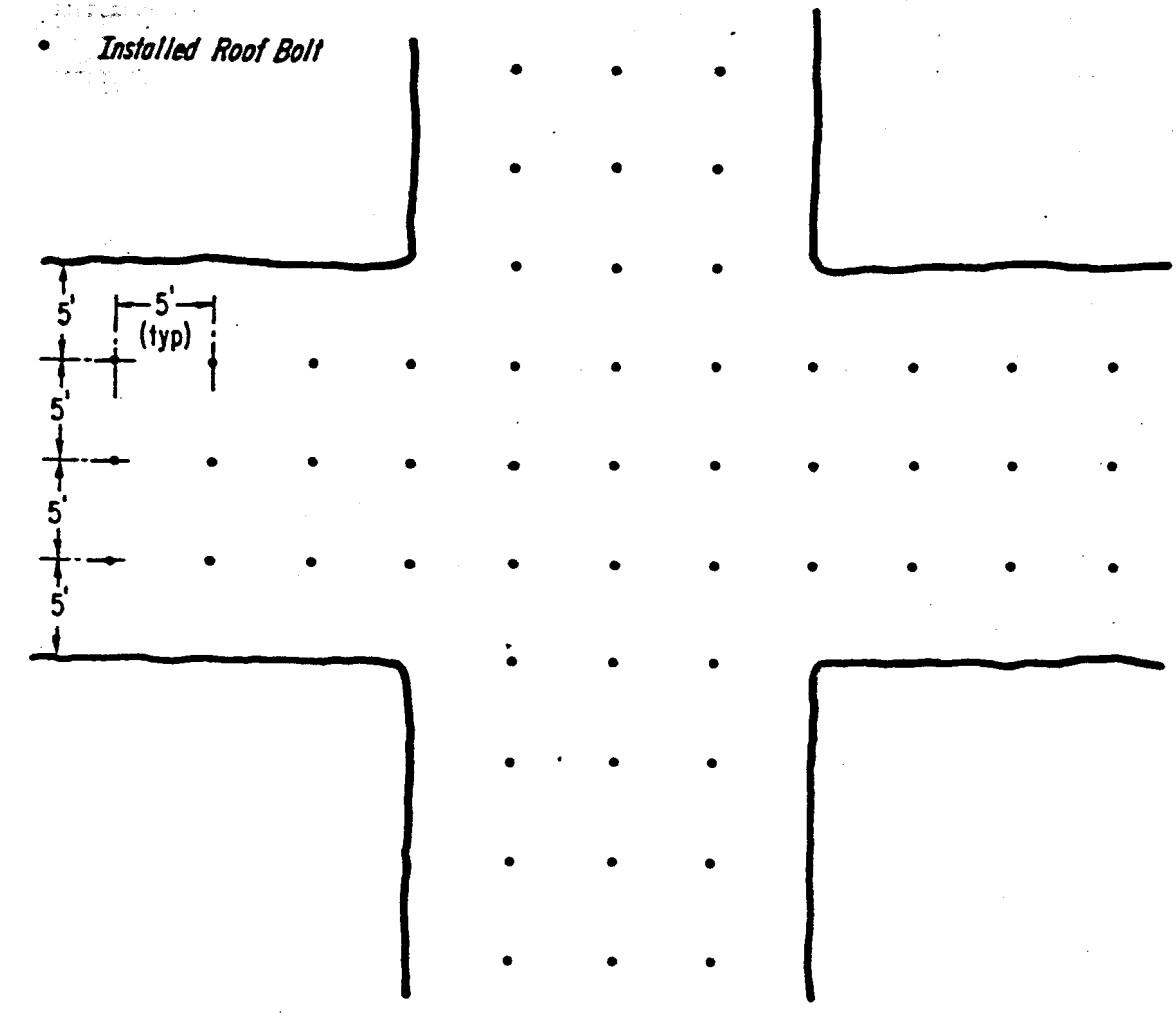


TYPICAL INTERSECTION

Notes:

1. *All entries and crosscuts shown are supported according to the roof control plan.*
2. *Due to the length of the continuous miners, it is necessary to cut a slight curve when turning a crosscut (see "A" & "B"). Additional roof support (roof bolts and/or timbers) will be placed in these areas.*
3. *Curves can be cut either to the right or left, and when necessary in both directions.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: Mar. 25, 1981	**SCOFIELD ROUTE**
CHECKED: T.G.W	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L.W	
SCALE: 1" = 10'	TITLE TYPICAL INTERSECTION — DRAWING NO. A5-0020



TYPICAL BOLT PATTERN
for
REGULAR INTERSECTION
Full Roof Bolt Plan

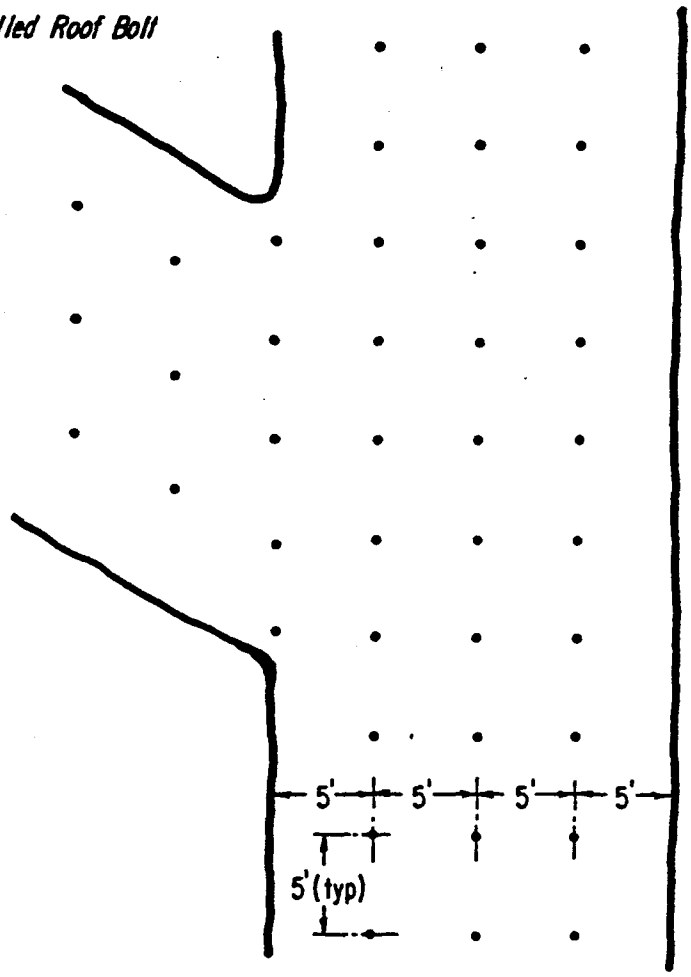
Notes:

1. *Each row consists of 3 roof bolts installed on 5ft. centers, 5ft. from each rib and will be bolted to within 5ft. of the face.*

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 25, 1981	SCOFIELD ROUTE
CHECKED: T G W	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W. L. W.	
SCALE: 1" = 10'	TITLE TYPICAL BOLT PATTERN — DRAWING NO. A5-0021

LEGEND

• *Installed Roof Bolt*



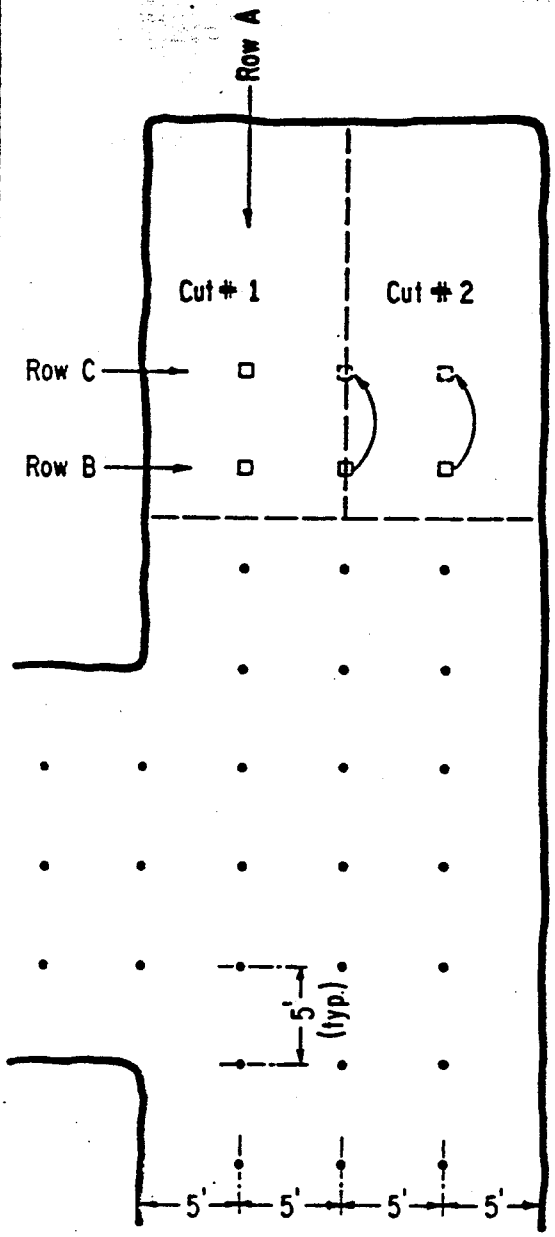
TYPICAL BOLT PATTERN
for
SLANT INTERSECTION

Full Roof Bolt Plan

Notes:

1. *Each row consists of 3 roof bolts installed on 5ft. centers, 5ft. from each rib and will be bolted to within 5ft. of the face.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: Mar. 25, 1981	**SCOFIELD ROUTE**
CHECKED: T G W	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W L W	
SCALE: 1" = 10'	TITLE: TYPICAL BOLT PATTERN, SLANT — DRAWING NO. A5-0022



Notes:

1. *Depth of sump cuts controlled by ventilation requirement, but the Continuous Mining Machine operator shall not be advanced beyond the last permanent roof support.*
2. *Temporary supports in row A installed promptly upon withdrawal of machine from cut #1. Row B to be set promptly upon withdrawal of machine from cut #2. Temporary supports in row B shall be advanced to row C after the first row of bolts are installed. This cycle shall continue until the entire cut is bolted.*
3. *Without A.T.R.S. system, temporary support installation shall begin prior to moving the roof bolting machine into place.*

LEGEND

- □ *Temporary Supports*
- □ *Future Temporary Supports*
- • *Installed Roof Bolts (5ft. centers)*

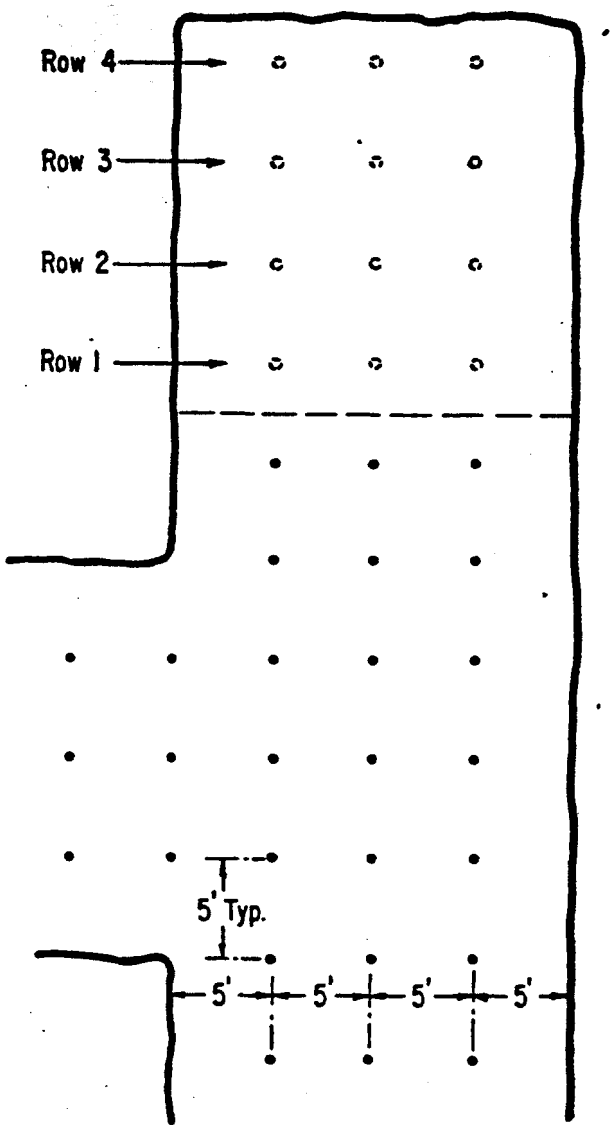
TEMPORARY SUPPORT PATTERN

for use

WITHOUT A.T.R.S. SYSTEM

(Full Roof Bolt Plan)

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 24, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: WLW	
SCALE: 1" = 10'	TITLE: TEMPORARY SUPPORT PATTERN — DRAWING NO. A5-0023



Notes:

1. *Bolting sequence is by row number.*
2. *Standard procedure will be to install 3 roof bolts from each position. (Numbered)*
3. *Row 1 will be completed before bolting in row 2 will commence.*
4. *Bolting cycle may begin on right side depending upon conditions.*
5. *Temporary posts or jacks will be installed only where needed to make necessary tests or for ventilation purposes.*
6. *The Continuous Mining Machine Operator shall not be advanced beyond the last row of permanent roof support.*

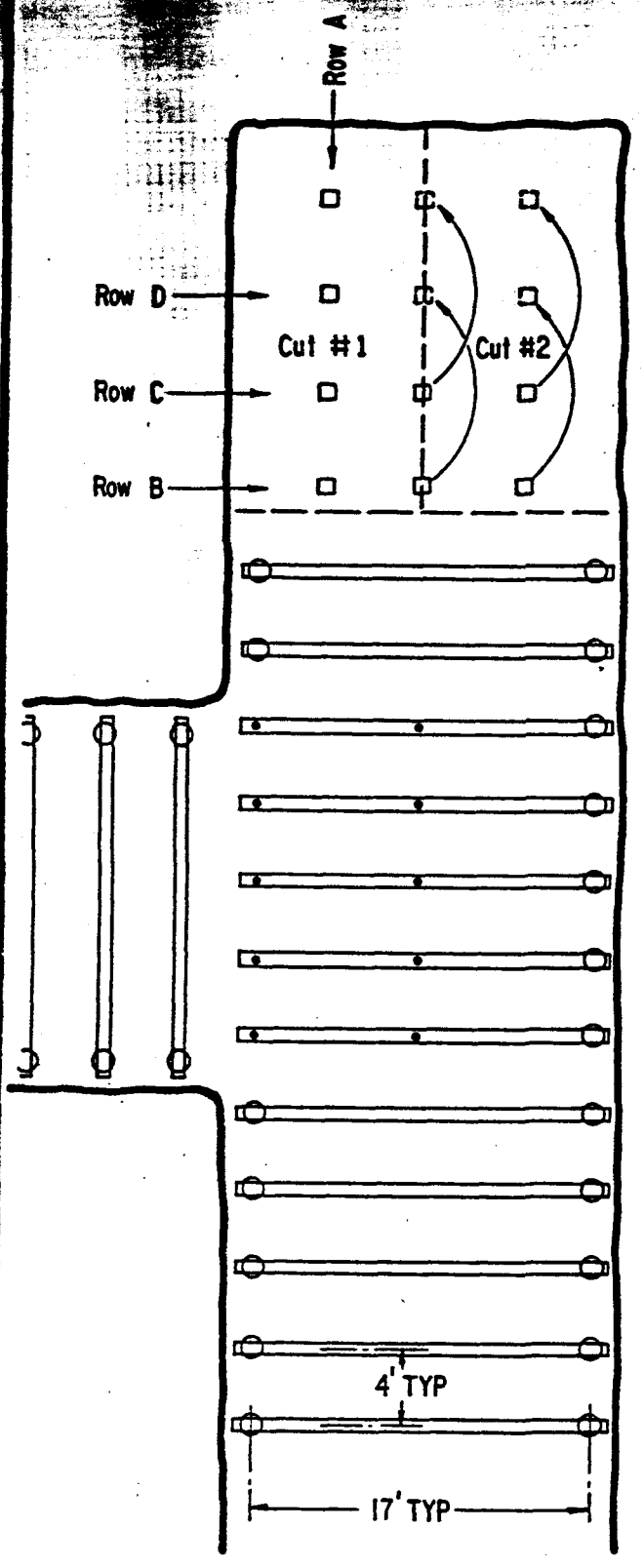
LEGEND

- • *Installed Roof Bolts*
- ○ *Future Roof Bolt Locations*

ROOF BOLT INSTALLATION SEQUENCE

for
Lee Norse Twin Boom Roof Bolters
with Temporary Roof Support System
Model No. TD-243-5-4E

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 24, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W.	
SCALE: 1" = 10'	TITLE ROOF BOLT INSTALLATION SEQU. / DRAWING NO. A5-0024



Notes:

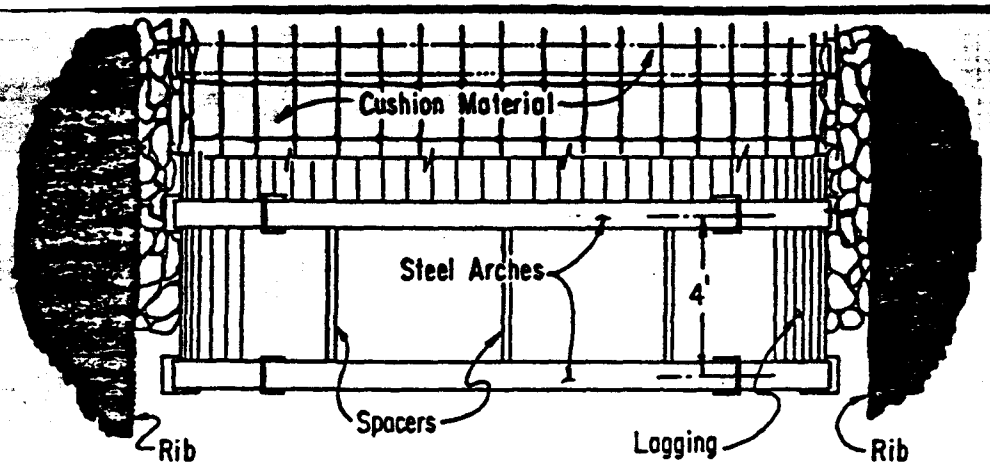
1. *Depth of sump cut controlled by ventilation requirements, but machine operator shall not advance beyond last crossbar.*
2. *Temporary supports in row "A" shall be installed promptly upon withdrawal of machine from cut #1; Rows "B" & "C" to be set promptly upon withdrawal of machine from cut #2; Temporary supports in row "B" shall be advanced to row "D" after the first crossbar is installed. This cycle shall continue until the entire cut is cross-barred.*

LEGEND

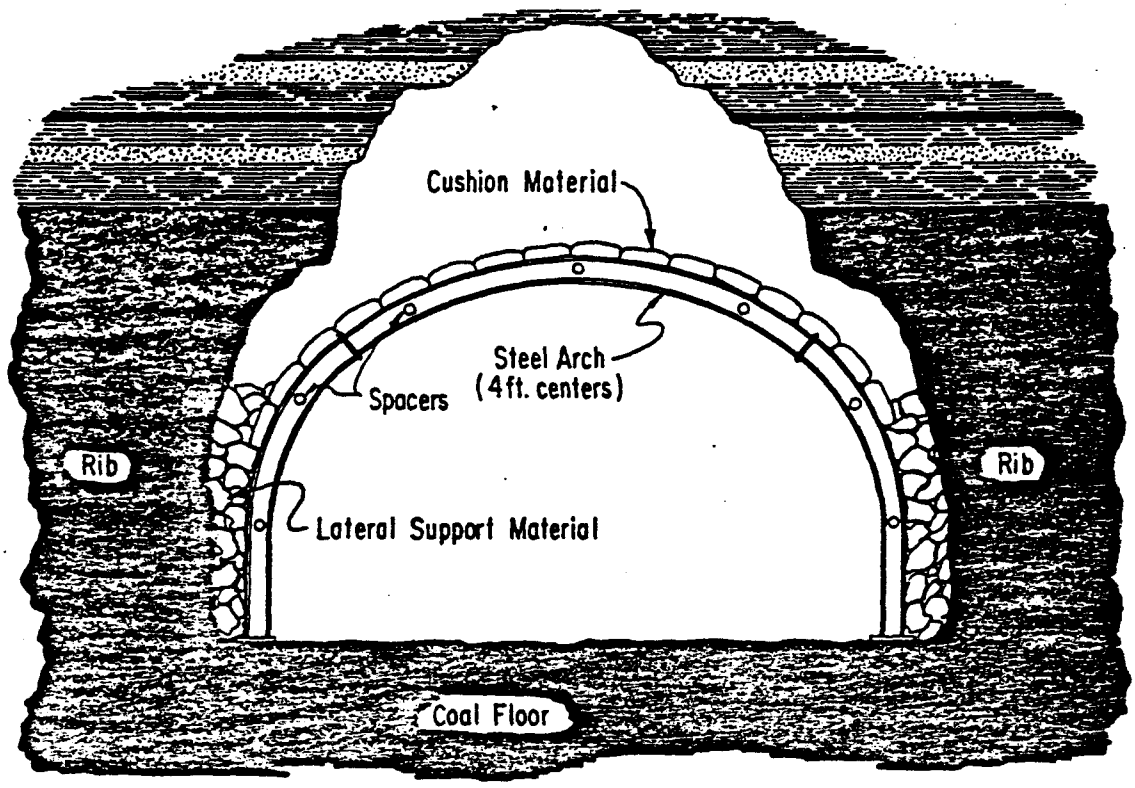
- *Crossbar on Support Posts*
- *Crossbar bolted to Roof*
- *Temporary Support*
- *Future Temporary Support*

TYP. CROSSBAR PLAN for FRACTURED or HEAVY ROOF AREAS

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: Mar. 19, 1981	SCOFIELD ROUTE
CHECKED: TGW	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W.L.W.	
SCALE: 1" = 10'	TITLE: TYP. CROSSBAR PLAN — DRAWING NO. A5-0014



TOP VIEW



FRONT VIEW

Notes:

1. *Steel Arches will be used as mining conditions and roof strata dictate.*
2. *Lateral support and cushioning materials will be installed as necessary.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: Mar. 23, 1981	**SCOFIELD ROUTE**
CHECKED: TGW	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L.W	
SCALE: 1"=5'	TITLE TYP. STL. ARCH INSTALLATION — DRAWING NO. A5-0016

VALLEY CAMP OF UTAH, INC.

Scofield Route

Helper, Utah 84526

VENTILATION, METHANE AND DUST CONTROL PLAN

FOR

BELINA NO. 2 MINE

I.D. #42-01280

JUNE 15, 1981

REVISED MARCH 26, 1982

VALLEY CAMP OF UTAH, INC.

Scofield Route
Helper, Utah 84526

March 26, 1982

VENTILATION PLAN

I. GENERAL INFORMATION

A. Mine and Company Data:

Mine Name:	Belina No. 2 Mine, U.S.B.M. I.D. #42-01280
Company:	Valley Camp of Utah, Inc.
Address:	Scofield Route, Helper, Utah 84526
Mine Location:	Approximately 2.0 miles South of Scofield Town Site, Thence 3.2 miles Southwest of Route 96.
Telephone:	(801) 448-9413
Operator:	W. H. Haynes, Jr.
Title:	Vice President
Address:	640 Terrace Hill Drive Salt Lake City, Utah 84103
Telephone:	(801) 363-9061

B. Life of Mine is anticipated to be more than one year.

C. Number of Employees: Surface 2

Underground 22

Total 24

D. Main Fan Installation:

One Jeffery Aerodyne 8HU-84 exhaust-type fan with eight blades, full load ratings: 310,000 CFM; 9.2 inch water gauge; 575 HP General Electric Induction Motor: 1200 RPM.

Note: The Jeffery Fan is installed and is operating at 0.0 water gauge, with 8 blades, at 150,000 CFM; 150 HP General Electric Induction Motor.

II. MAIN FANS

A. The main fans will be installed according to the requirements of Section 75.300 - 2. Should it be necessary to deviate from these requirements, the substitution will provide no less than the same measure of protection to the miners and the District Manager will be contacted for approval.

B. The main fans will operate according to the following criteria:

1. Kept in continuous operation except for the following:

   (a) Idle days and/or idle shifts.

   (b) Fan adjustments on days when all men other than those performing evaluations or adjustments are withdrawn from the mine.

   (c) Power failure.

   (d) Uncontrolled failure or fan failure.

2. Upon restoration of the ventilation after a scheduled stoppage, and after the fan has been in operation for at least 15 minutes with a normal water gauge, a pre-shift examination will be made of the entire mine. Such examination will be within 3 hours prior to the time the men are permitted to enter the mine, and before any power lines leading underground are energized.

3. If an unusual variance in the mine ventilation pressure is observed, or if an electrical or mechanical deficiency of the fan is detected, the mine foreman will be notified immediately, and appropriate action or repairs will be instituted promptly.

C. Inspection, examinations and records of fan operation will be conducted and kept by a qualified person in accordance with Section 75.300 - 4.

III. AUXILIARY FANS

A. Galis Permissible Fan Model 1520 Self-Propelled with trickle duster 16,000 CFM at 5.0 w.g., 440 Volt A.C. certified Galis starter.

Joy Permissible Fan Model H-72-42V, with MSA Trickle Duster, 400 Volt A.C.

The auxiliary fans will be used in production work when required. The fans will be located and operated to avoid any re-circulation of air. When operating, the auxiliary fans will be inspected by a certified person once every four hours, and the examiner will place his initials, date and time, near the auxiliary fans when his examination is complete.

B. The auxiliary fans will be operated according to the requirements of 75.302 - 4, and as follows:

1. Operated primarily for the purpose of dust control and in conjunction with the approved method of face ventilation; i.e., line brattice, check curtains, etc.

2. The auxiliary fans will operate exhausting, with a free discharge capacity of at least 6,000 cubic feet per minute. When using auxiliary fans, they will be re-located when necessary, and used in the faces from which coal is being cut, mined, or loaded. They may also be used for the abatement of respirable dust (when required) in faces in which roof bolting operations are in progress.

3. Various sized vent tubing will be used from the face area to the intake side of the fan. Thirty inch vent tubing will be used on the exhaust side, only when people are working on the exhaust side of the fan.

4. Exhausting fans will be installed in the return air current from the place to be ventilated by the fans, and volume of positive intake air current available at the entrance to the place to be ventilated with exhaust fans will be greater than the free discharge capacity of the fan.

IV. METHANE AND DUST CONTROL PROCEDURES AT FACE AREAS

A. An auxiliary exhaust fan with Trickle Duster mounted on fan exhausting from area where coal is being mined, or an auxiliary fan located in area where coal is being mined with a conventional type (MSA) Trickle Duster located in a return air course exhausting simultaneously with the auxiliary fan.

B. All continuous miners in all working areas will have at least 26 water sprays, uniformly spaced across the head of the miner with 90% of the sprays working at all times, with a minimum pressure of 85 P.S.I.

C. Water sprays are installed at loading points (breaker-feeders) with 6 sprays at approximately 10 GPM at line pressure. The line pressure is approximately 50 P.S.I. Water sprays will not be required when the coal contains a significant amount of moisture to prevent the raising of excessive amounts of dust.

D. "Line brattice or any other approved device used to provide ventilation to the working face from which coal is being cut, mined or loaded, will be installed at a distance no greater than 15 feet from the area of deepest penetration, to which any portion of the face has been advanced." (As per Drawing No. A5-0030).

E. "A minimum quantity of 6,000 cubic feet a minute of air will reach each working face from which coal is being cut, mined or loaded."

F. "The minimum mean entry face velocity as specified in Section 75.301-4, 30 CFR 75, will be 60 feet a minute in all working places where coal is being cut, mined or loaded."

G. "The minimum quantity of air reaching the last open crosscut in any pair or set of developing entries or rooms will be at least 12,000 cubic feet a minute, and the minimum quantity of air reaching the intake end of the pillar line will be at least 12,000 cubic feet a minute."

H. When the miner is withdrawn from the working face, the face will then be classified as a working place, and will require only a perceptible movement of air for ventilation until electrical equipment is taken inby the last open crosscut. Prior to taking any electrical equipment inby the last open crosscut, a check for methane will be made, and a line brattice will be installed in accordance with 75.302.1.

I. In areas where roof bolting is being done, a minimum quantity of 3,000 cubic feet per minute of air will be maintained over the machine and workers. In addition, an approved dust collection system or a wet drilling system (water) will be used to control dust from drilling. During roof bolting, the line curtain or vent tubing shall be maintained to within 15 feet of the face.

V. GENERAL METHANE AND DUST CONTROL PRACTICES

A. Methane examinations.

1. Pre-shift examinations will be made on a daily basis by a certified person in accordance with the requirements of Section 75.303.

2. At least once during each coal producing shift, and more often, if necessary, for safety, each working face will be examined by a certified person in accordance with the requirements of Section 75.304.

3. At least once during the week, or more often if necessary, the mine will be examined by a certified person according to the requirements of Section 75.305.

4. Methane tests will be made at each working face at the start of each shift, prior to energizing electrical equipment. Also, examinations for methane shall be made at intervals not to exceed twenty (20) minutes while electrical equipment is being operated in a working place.

5. Methane accumulations in face areas will be dealt with according to the requirements of Section 75.308.

6. Persons making methane examinations in working places, will make such examinations from the protection of the last row of either temporary or permanent roof supports.

B. Methane content in any return air course other than air courses returning the split of air from a working section (as provided in Section 75.309 and 75.310) shall not exceed 2.0 volume per centum. The methane content in the air in active workings shall be less than 1.0 volume per centum. If at any time, the air in any active working contains 1.0 volume per centum or more of methane, changes or adjustments shall be made at once in the ventilation in the mine so that the air shall contain less than 1.0 volume per centum of methane.

C. Each working section will be placed on a separate split of air by the use of overcasts/ undercasts, stoppings and regulators.

D. The air that travels the neutral split of the conveyor entry shall be bled directly to the return via small pipe or equivalent means.

E. All ventilating devices such as stoppings, overcasts, undercasts, and shaft partitions shall be of substantial and incombustible construction, installed in a workmanlike manner and maintained in a condition to serve the purpose for which they were intended, and any stopping leaking air excessively shall be repaired immediately.

F. The ventilation of each entry, room or crosscut, shall be in accordance with the drawings enclosed. In the event a connection cannot be made between entries or rooms, and a dead end is left, line brattice shall be installed within 15 feet of the face before the area is abandoned.

G. Sealants to be used on one side of all ventilation controls, stoppings, regulators, overcasts, undercasts, etc., shall be any of those approved by MSHA.

H. Self-closing, fire-proof, man doors shall be located at intervals not to exceed 500 feet, alternating sides between the intake air and belt line and intake air and return air.

I. Water sprays installed for dust suppression will be maintained and operated at the indicated volume and water pressure in the plan during mining operations.

J. Belt transfers will be cleaned and rock dusted, as needed.

K. Shuttle car haulageways will be kept well sprinkled.

L. Rock dust will be applied as required as faces are advanced, and along haulageways and belt lines, as required.

M. Conveyorways will be approximately 5 feet to 23 feet in height, and no more than 20 feet wide.

N. No underground crushers or dumps are anticipated.

O. Coal shall not be permitted to accumulate at the outby end of the face equipment to the extent that ventilation of the working face is restricted.

VI. PERMANENT STOPPINGS

Materials and methods for required construction:

A. Permanent stoppings shall be constructed of mortar and 8" x 8" x 16" cinder or concrete blocks form-fitted to the riblines. One side of the stoppings shall be sealed to minimize leakage. (See Drawing No. A5-0017 for typical).

B. Material used for overcasts and undercasts will be either cinder or concrete blocks and mortar, or steel or tin or treated wood.

C. Permanent stoppings, where required, shall be erected between the intake and return air courses, and shall be erected to and including the third connecting crosscut outby the faces of the entries. Construction to begin when the third crosscut is completed, and continued in a reasonable and diligent manner until completed.

D. Regulators shall be constructed of masonry, wood or metal similar to stoppings (see Subpart No. 1). To control air flow, sliding doors or removable wooden or metal slats over a framed opening will be used. Small air flow requirements may be controlled by removing a few blocks, rather than installing the regulator components.

VII. TEMPORARY STOPPINGS

Materials and methods for construction:

A. Temporary stoppings shall be used for belt line and return air isolation in short-lived panels, such as entries developed for room and pillar activities. Such areas shall not have over 40 stoppings and length of service per stopping shall not exceed 18 months. (See Drawing No. A5-0031).

B. Temporary stoppings shall also be used to separate the intake and the temporary returns during development of entries, which after development, become common entries. Such installations shall be limited to a maximum service time of 12 months per stopping, and no more than 30 stoppings will be used in any one phase of development. Permanent belt line isolation in these areas will be obtained by the use of permanent type stoppings.

C. Temporary stoppings will be constructed of Kennedy type stopping material with the joints coated or cinder blocks dry stacked and coated with at least ¼" of sealant on the intake side.

D. Any wooden materials used to assist in the installation of these stoppings shall be treated with an approved retardant.

VIII. SEALS AND BULKHEADS

Materials and methods for construction:

A. Seals will be installed in all side panels as soon as possible after the panel is mined out. Permanent seals shall be constructed of solid concrete blocks, which will withstand a minimum static load of 20 PSIG.

B. The permanent seal location shall not be less than 10 feet from the nearest corner of a pillar and in an area as stable as possible. Prior to installation, all loose materials shall be removed from ribs, roof and floor for at least 3 feet from either end of the proposed location of the seal, and questionable roof shall be properly supported.

C. A vent pipe shall be installed through at least one seal of each set in each panel and extend into a return air course. This pipe shall be less than 8" in diameter and will have a strength equal to Schedule 40 steel pipe. It shall be packed with coarse gravel or minus 1" crushed stone with fines removed for at least 10 feet or provided with an equivalent flame arrestor. The pipe will be located near the roof, at least 4 feet from a rib and not on center line of the seal, and shall be closed at each end with perforated caps or equivalents. This pipe will be installed only if required by the District Manager.

D. At least one seal of each set of seals will be fitted with a surveillance tube to permit sampling of gases. This tube shall be ¼" copper tubing, ½" Schedule 40 pipe, or equivalent, and shall be sealed at the accessible outlet end with a valve. The tube and valve shall be capable of withstanding a minimum of 75 PSIG pressure.

E. Where necessary, a pipe for water drainage shall be installed in at least one seal of each set of seals. The pipe shall be located at the floor level in the

lowest seal of each set and shall be of corrosion resistant material, not less than 4 inches in diameter, equal in strength to Schedule 40 steel pipe. This pipe shall terminate on the accessible side at a pump or check valve at the bottom of a sump not less than 500 gallon capacity, and not less than 2 feet deep. It shall be sealed with a cap if water is not present.

F. In sealed adjoining intake airways (none anticipated), a pre-shift exam for methane shall be made in the passageway adjoining the seals.

G. Before bulkheads are constructed, the return air from the area to be sealed shall be examined for carbon monoxide. If detectable concentrations of carbon monoxide are present in the atmosphere, bulkheads shall be constructed in accordance with procedures approved by the Secretary or his authorized representative.

H. Bulkheads and adjoining entries shall be examined in accordance with Section 75.322 following any change in ventilation which materially affects the main current or any split thereof.

I. The bulkheads shall not be used to impound water in the sealed areas unless approved by the Secretary or his authorized representative.

J. Seals shall be of solid concrete blocks (average minimum compressive strength of 1800 PSI tested in accordance with A.S.T.M. C-140-70) and mortar (1 part cement, 3 parts sand, and not more than 7 gallons of water per sack of cement). Seals shall be installed in the following manner: the bulkhead shall be recessed at least 12 inches deep in the rib, and at least 6 inches deep in the floor (no recess shall be made in the roof). The blocks shall be at least 6 inches high, except in the top course, and 8 inches wide. The blocks shall be laid in mortar, in a transverse pattern. In the bottom course, the blocks shall be laid with a long axis parallel to the rib. The long axis in succeeding courses shall be perpendicular to the long axis of the block in the preceding course. An interlaced pilaster shall be constructed in the approximate center of the bulkhead.

K. Sequence of seal construction will be as follows:

(1) Belt entry;

(2) Intake entries

(3) Return entries.

Return entries will be done simultaneously, when possible.

IX. DIESEL EQUIPMENT

A. The manufacturer's operating instructions and maintenance manuals will serve as guidelines for compliance.

B. The exhaust from operating diesel equipment shall be sampled daily with the engine running; if the analysis of the samples exceed 5 parts per million nitrogen dioxide, or 50 parts per million of carbon monoxide, or both, corrective measures will be taken immediately. Sampling device will be a DRAGER MULTI-GAS DETECTOR unit or equivalent.

C. The atmosphere returning from any working place where diesel powered equipment is being used, shall be tested at least once each shift while the equipment is in operation, and if the analysis of the samples exceeds 5 parts per million nitrogen dioxide or 50 parts per million carbon monoxide, or both, corrective measures shall be taken immediately.

D. The date, time, machine identification, and results of analysis of samples, will be recorded in a book maintained for this purpose.

X. BLEEDER SYSTEM

Forasmuch as this mine, as well as this area, has a history of being "gas free", the use of bleeder systems is not anticipated. In lieu of a bleeder system, panels will be sealed immediately upon completion of mining. See Drawing No. A5-0035 for typical.

XI. DESIGNATED AREA SAMPLING

A. Pursuant to 30 CFR 75.316 (amended), respirable dust levels in the mine atmosphere, in active areas where miners normally work or travel, will be maintained so as to prevent the average concentration from exceeding 2.0 milligrams per cubic feet of air.

B. Designated area sampling will be done in the following areas, and in other areas where miners may be exposed to respirable dust concentrations greater than 1.0 mg/m^3 as indicated by prior MSHA or operator samples.

1. Belt Haulage:

   (a) Places where the air in the belt entry is regulated into the return airway. This applies only to areas where the major volume of air is being regulated into the return airway.

   (b) Along belt lines at locations which represent no more than four (4) dust generation sources (transfer points).

   (c) At locations upwind of the points where different splits of air join into a common return airway.

C. Dust sampling instruments shall be positioned within designated areas so that the measurements are indicative of the highest level of dust exposure to personnel who are required to work or travel in that area. General positioning of dust sampling instruments shall be as follows.

1. Within 10 to 40 feet downwind of the dust generating source.

2. In belt entries, approximately 50 feet upwind (opposite direction of airflow) from the center of each intersection where air is directed into a return airway.

3. At normal breathing levels, but not less than one (1) foot from the roof or rib.

4. More than two (2) feet from any obstruction and placed in a manner where it will not be directly behind an obstrucion which would affect the airflow around the sampling device.

5. Within 36 inches of the operator's control station or normal work position, such as trackless haulage equipment operators.

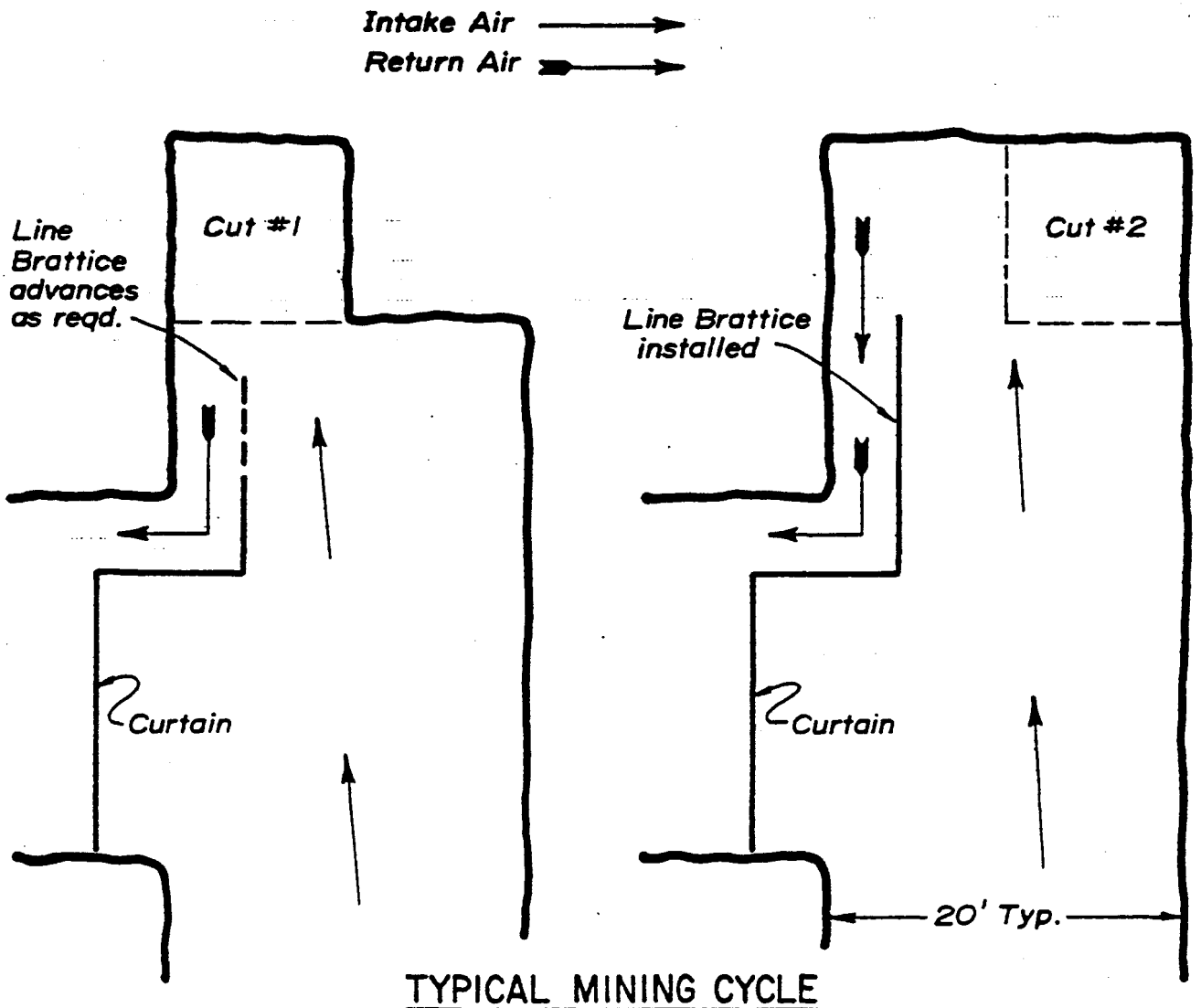
D. Additional designated area sampling will be conducted as the mining progresses, and additional dust generation sources are developed.

E. Designated area sampling requirements may be eliminated at locations where results of valid respirable dust samples taken during a one (1) year period show a concentration at or below 1.0 mg/m^3. The District Manager may also remove the sampling requirements if valid respirable dust samples taken by MSHA during or after one (1) year also reveal that such area is at or below the 1.0 mg/m^3 concentration level. Also, a minimum of five (5) valid (combination of MSHA and operator) dust samples shall have been taken in that area. These provisions apply only to individual designated areas.

F. In the event of a citation or order, any corrective action will be in accordance with Section 70.201(d).

G. Each designated area will be sequentially numbered in it's respective category and code, as per MSHA guidelines.

Note: At the present time, and due to the fact that Belina No. 2 Mine does not have a belt system, there are no designated areas to sample. As soon as it becomes necessary we will begin sampling.



TYPICAL MINING CYCLE

Notes:

1. *Maximum sump cut of Continuous Miner shall be 10 feet.*
2. *Brattice shall be maintained to within 15 ft. of the face.*
3. *The minimum mean air velocity shall be 60 ft. per minute.*
4. *Brattice line will be extended as cut progresses.*

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 16, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1" = 10'	TITLE TYPICAL MINING CYCLE — DRAWING NO. A5-0030

LEGEND

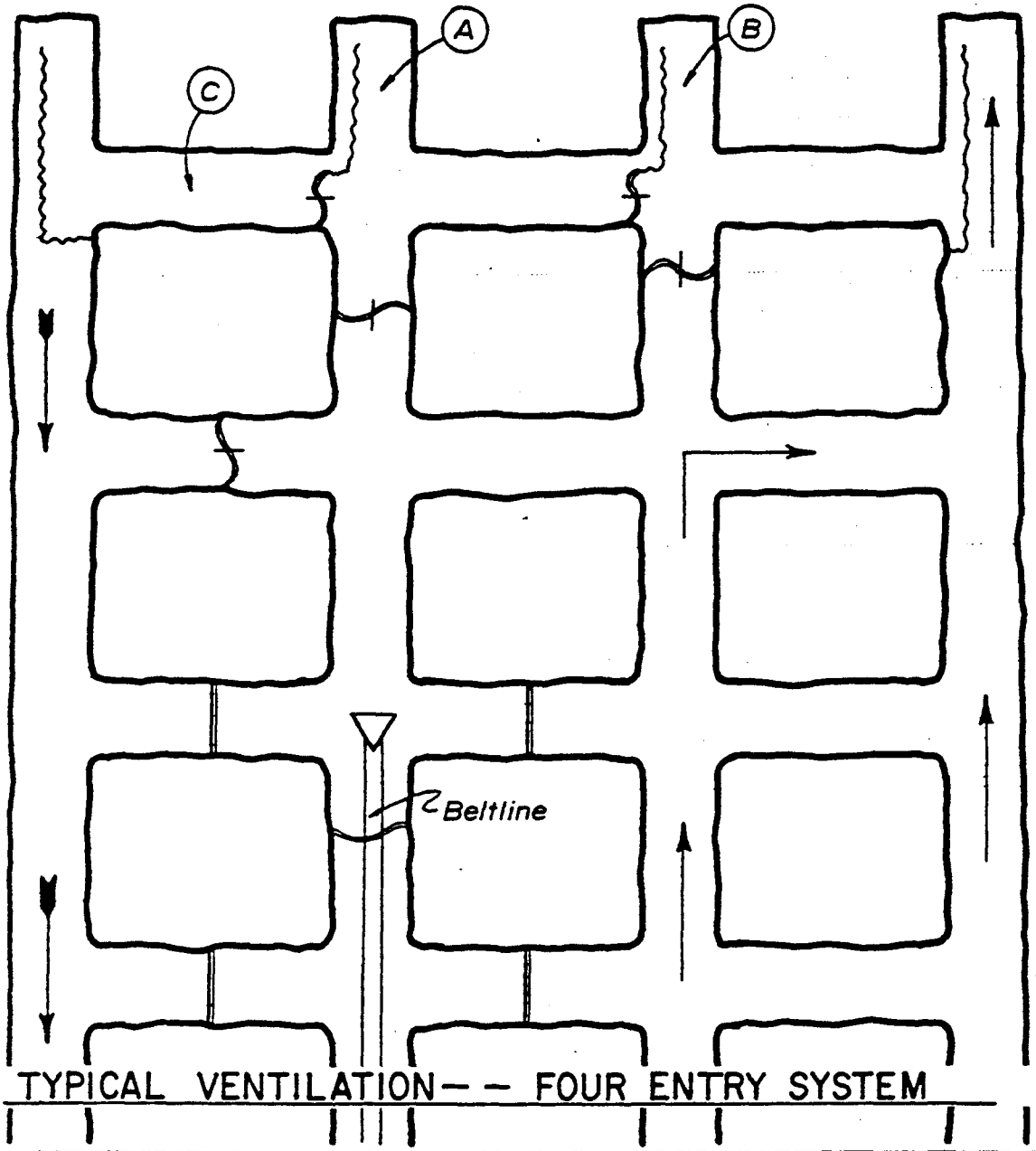
- Line Brattice
- Curtains
- Temporary Stoppings
- Intake Air
- Return Air

EXPLANATION

(A) 6,000 cfm – Mining
Perceptible Movement – Idle

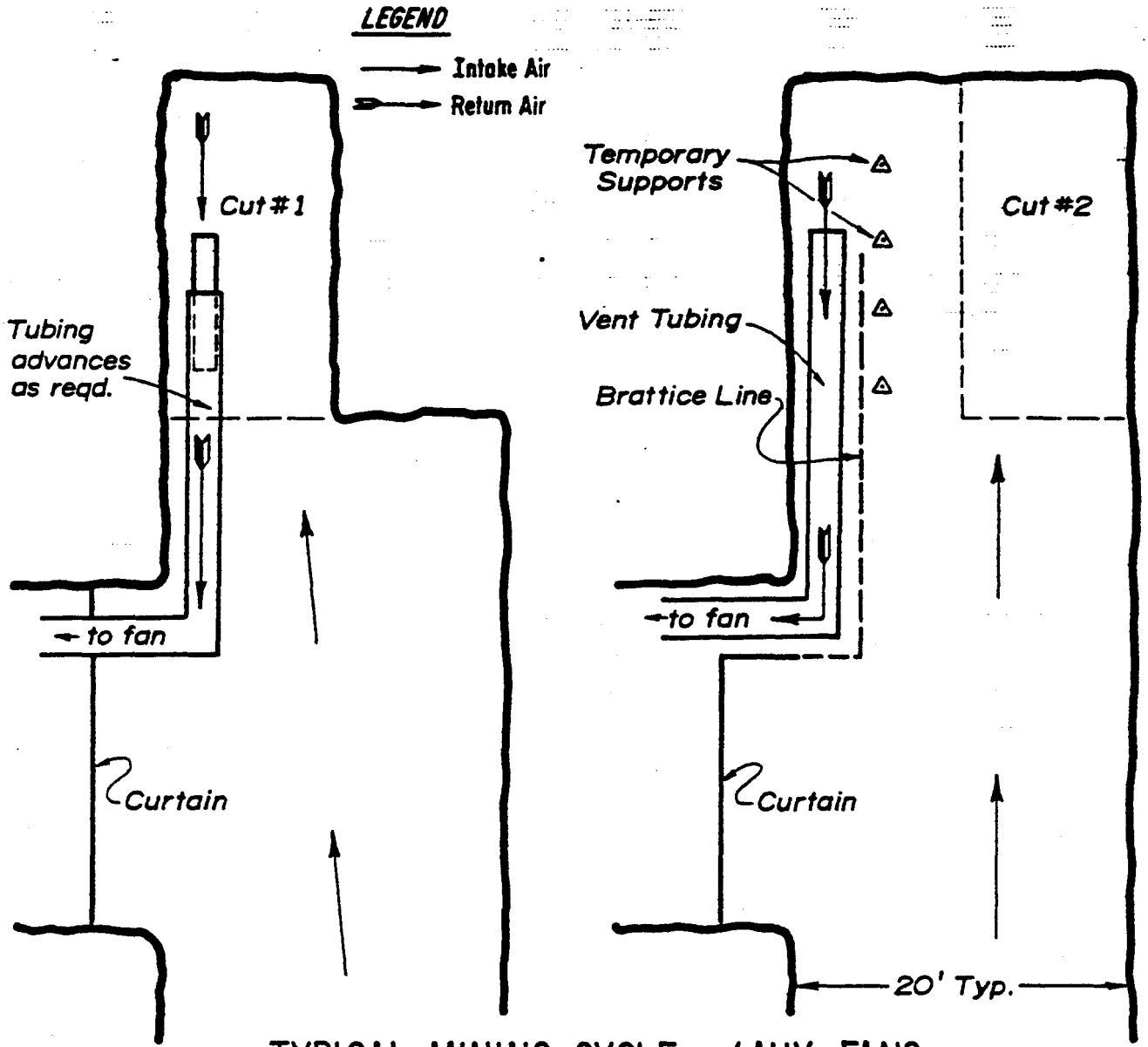
(B) 3,000 cfm – Bolting
Perceptible Movement – Idle

(C) 12,000 cfm – Mining
3,000 cfm – Bolting



TYPICAL VENTILATION – – FOUR ENTRY SYSTEM

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 16, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL: W. L. Wright	
SCALE: None	TITLE 4 ENTRY VENTILATION SYS. — DRAWING NO. A5-0031



TYPICAL MINING CYCLE w/ AUX. FANS

Notes:

1. *Vent Tubing will be maintained to within 10 feet of the face during mining. This will be accomplished by extending a slip tube out of the primary vent tube as mining progresses. Slip tube shall be 2" smaller (O.D.) than vent tube.*
2. *Line Brattice will be installed; after the mining cycle is completed, or during unscheduled fan stoppages; or idle shifts; to within 15 feet of the face.*
3. *The minimum mean air velocity shall be 60 ft. per minute.*
4. *The minimum quanity of air reaching each working face from which coal is being cut, mined or loaded will be 6,000 CFM.*
5. *Maximum depth of sump cut by Continuous Miner shall be 20 ft.*

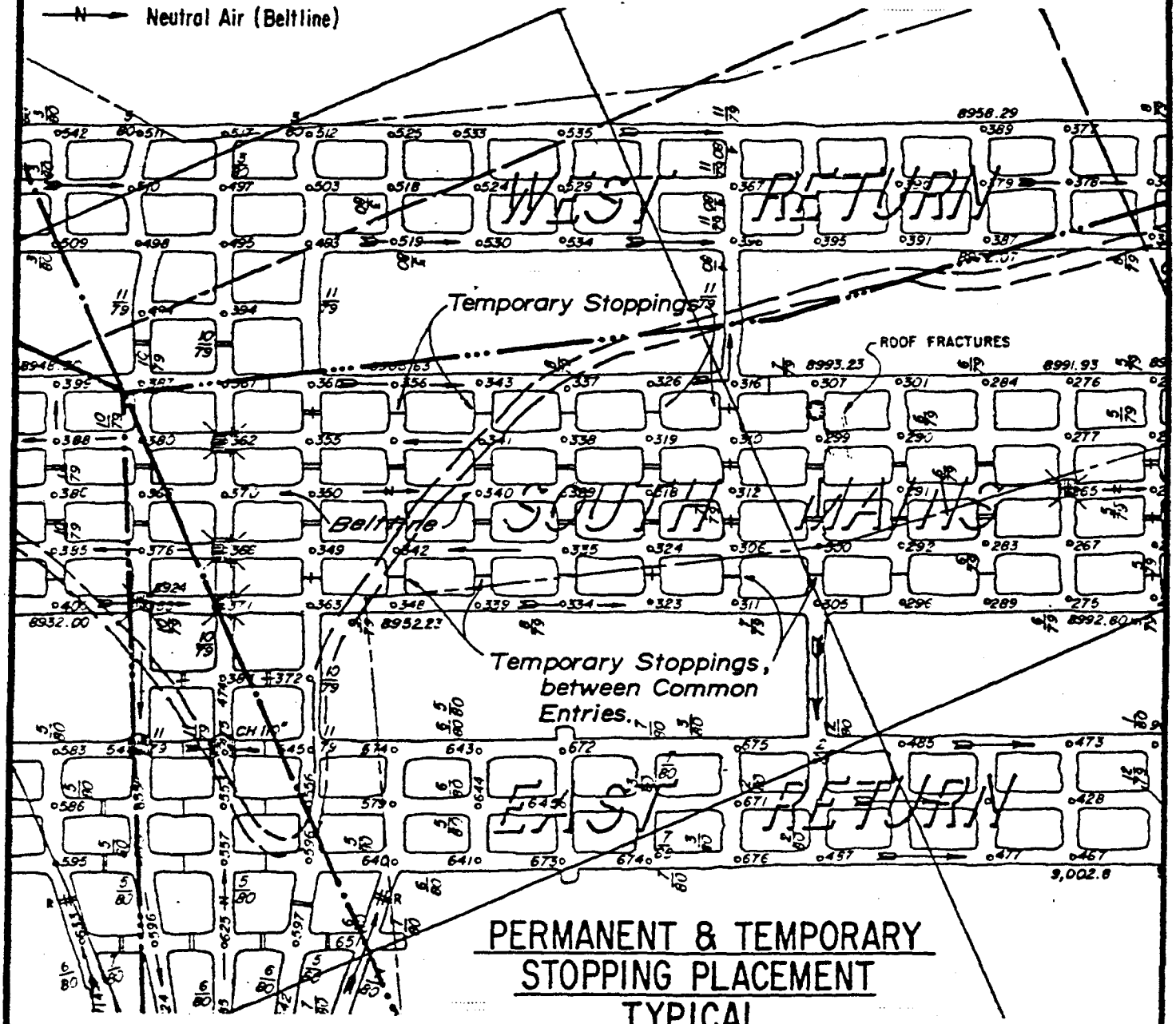
DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 22, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL:	
SCALE: NONE	TITLE MINING CYCLE, w/ AUX. FAN — DRAWING NO. A5-0036

LEGEND

- Permanent Stopping
- Temporary Stopping
- Stopping w/door
- Overcast
- Intake Air
- Return Air
- Neutral Air (Beltline)

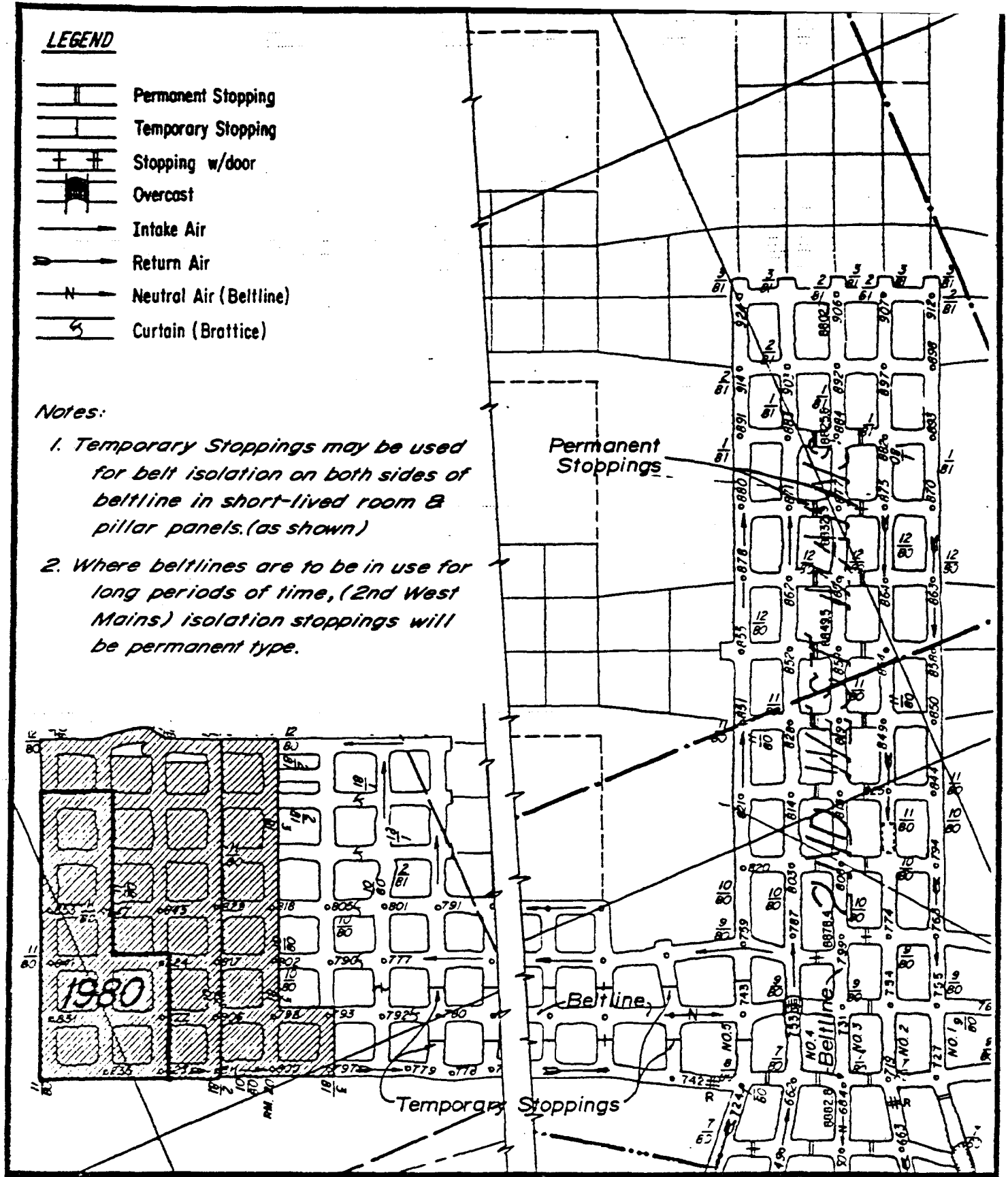
Notes:

1. *Temporary Stoppings may be used in areas where entries are, or will be, common.*
2. *Where beltlines are to be in use for long periods of time, (South Mains) isolation stoppings will be permanent type.*

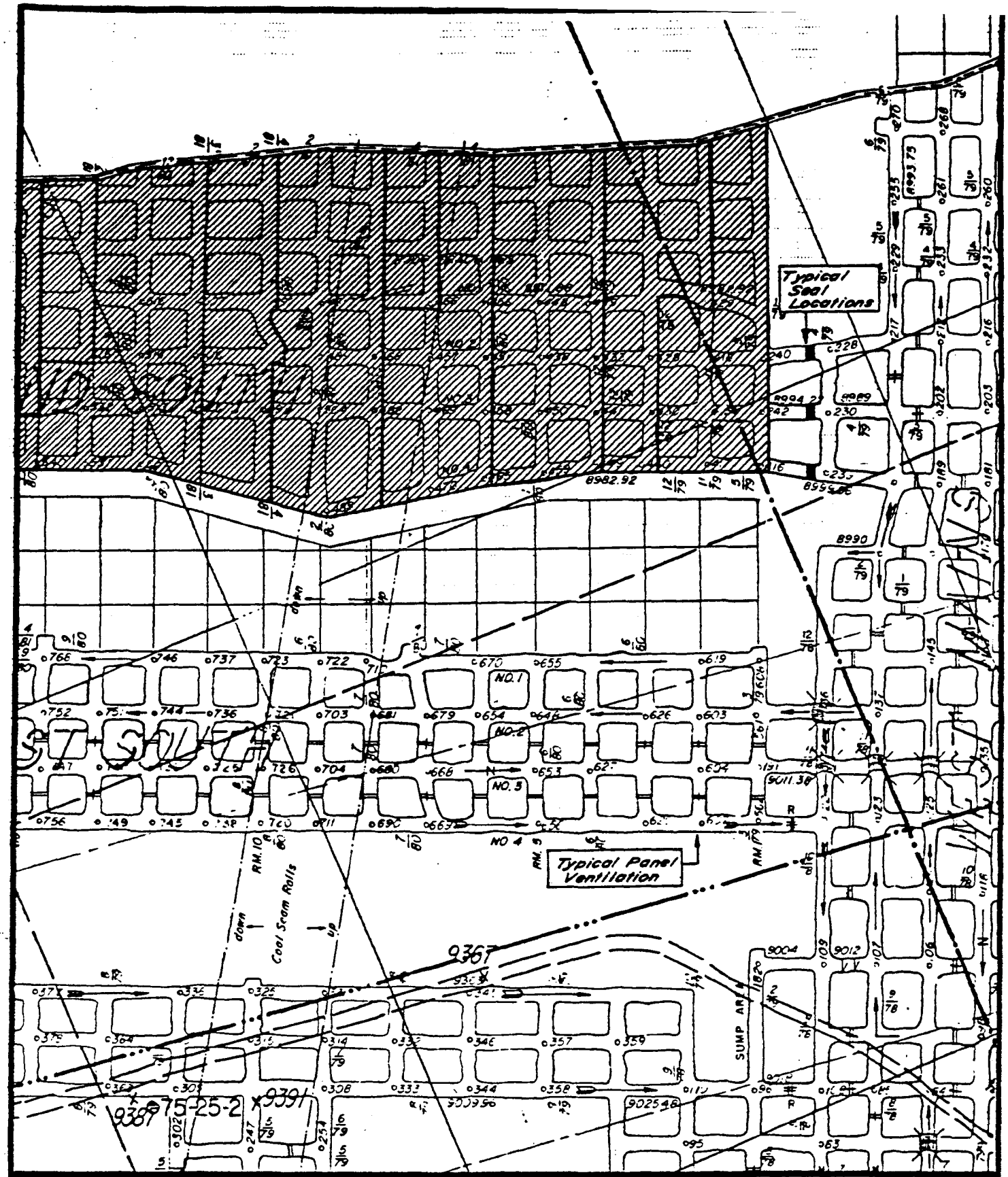


PERMANENT & TEMPORARY STOPPING PLACEMENT TYPICAL

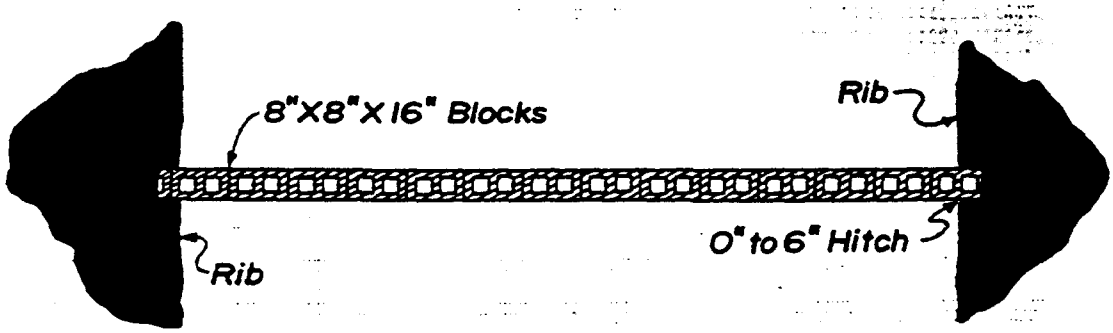
DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.	
DATE: April 21, 1981	SCOFIELD ROUTE	
CHECKED:	HELPER, UTAH 84526	
APPROVAL:		
APPROVAL:		
SCALE: NONE	TITLE STOPPING PLACEMENT, TYPICAL	DRAWING NO. A5-0033



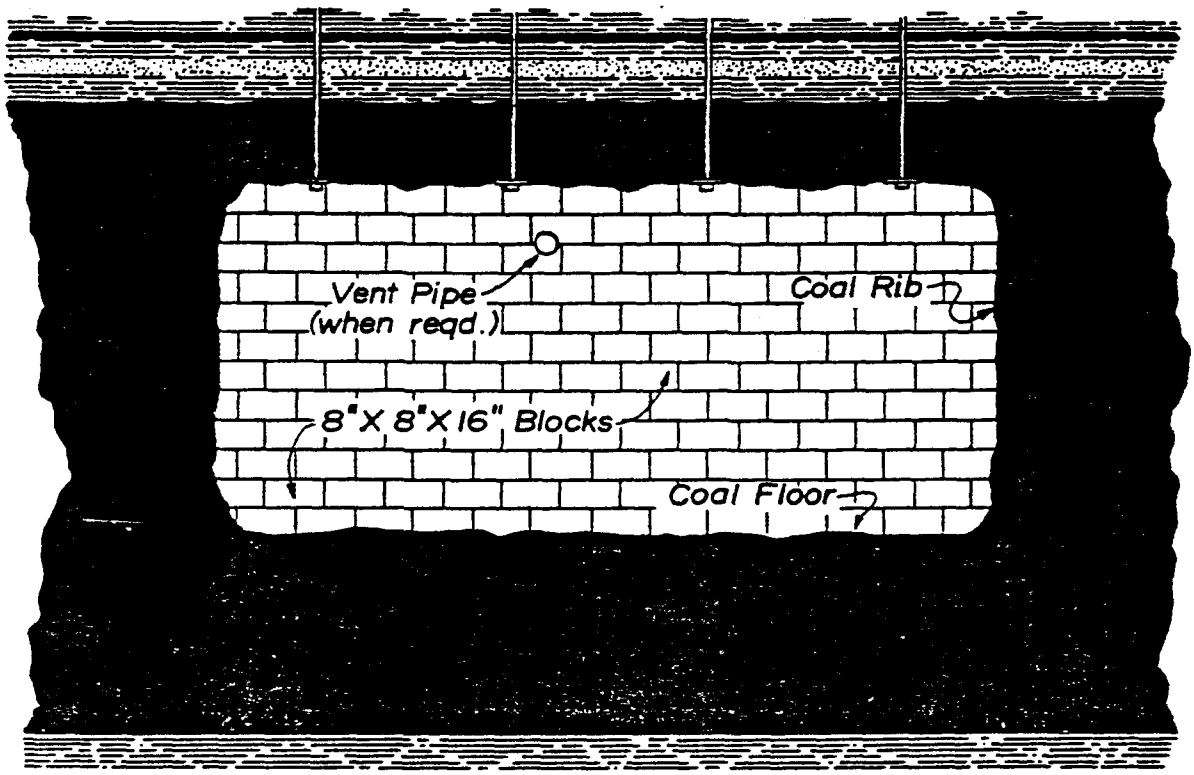
DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 21, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. L. Wright	
SCALE: NONE	TITLE PANEL VENTILATION, TYPICAL — DRAWING NO. A5-0034



DRAWN BY: ED SANDERSON	**VALLEY CAMP OF UTAH, INC.**
DATE: JUNE 18, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL:	
SCALE: NONE	TITLE PANEL VENT. & SEALING, TYP. — DRAWING NO. A5-0035



TOP VIEW

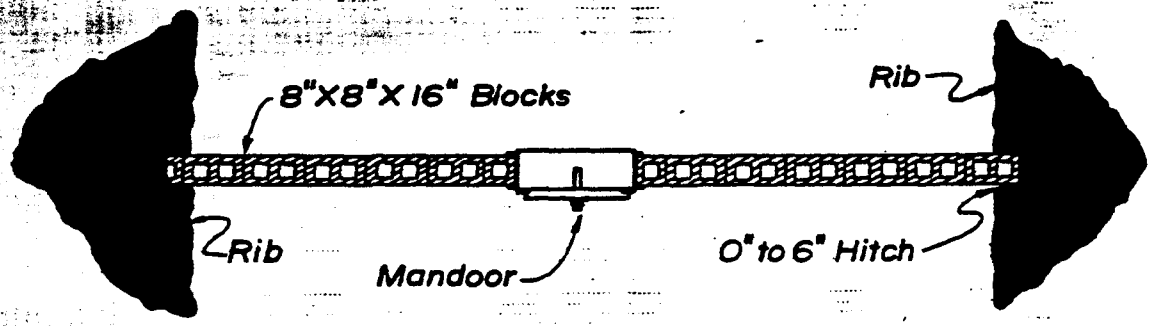


FRONT VIEW

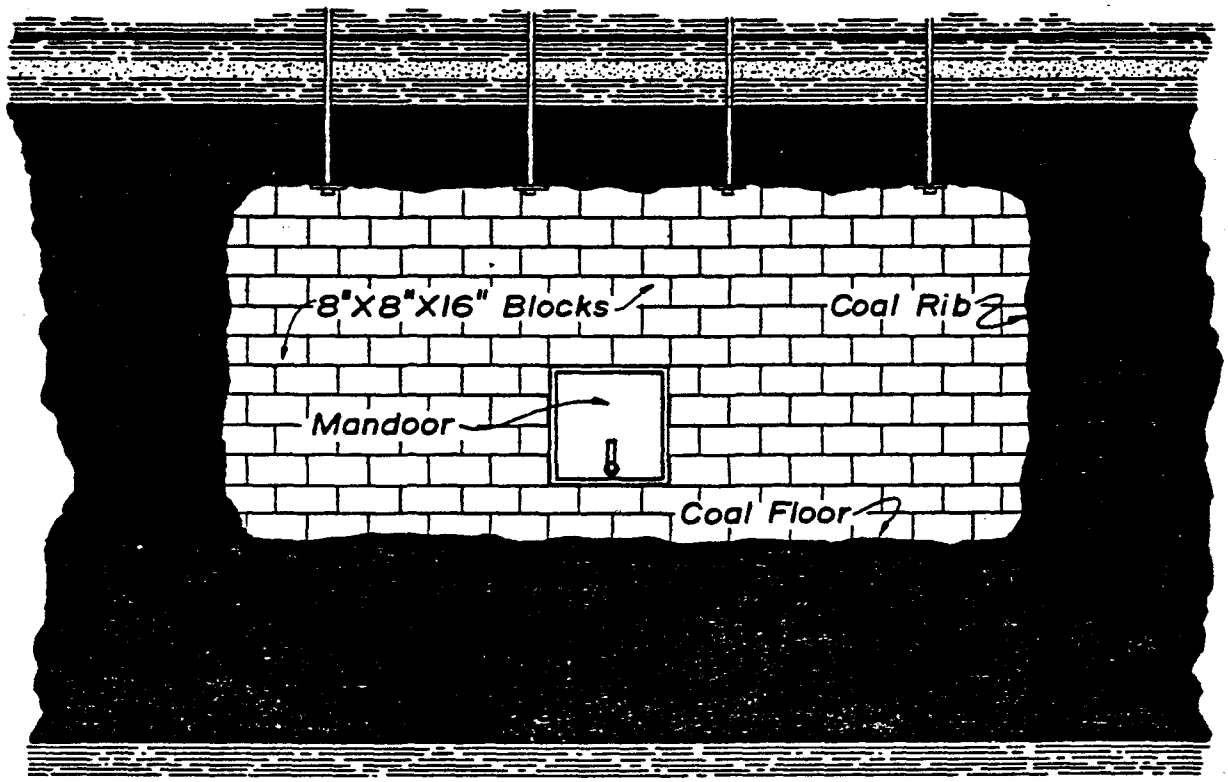
Notes:

1. *All stoppings (permanent) shall be made with 8"X 8"X 16" Blocks and sealed on one side with an approved sealant.*
2. *Ventilation pipe for belt lines when necessary.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 8, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL:	
SCALE: 1" = 5'	TITLE: PERMANENT STOPPING, TYP. — DRAWING NO. A5-0017

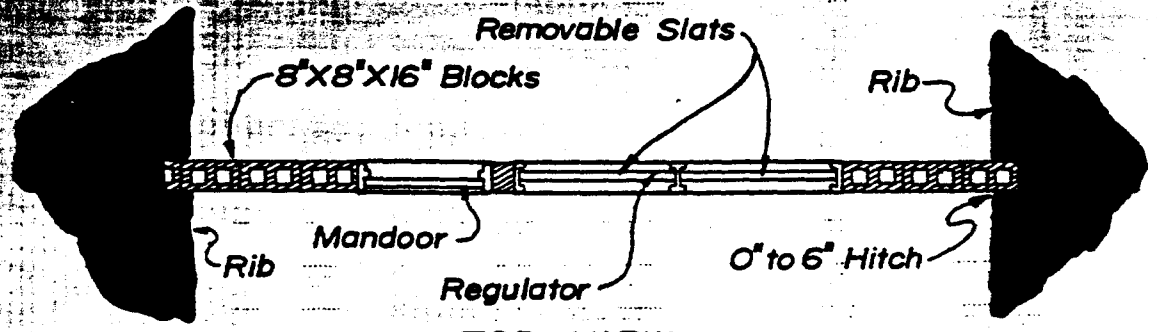


TOP VIEW

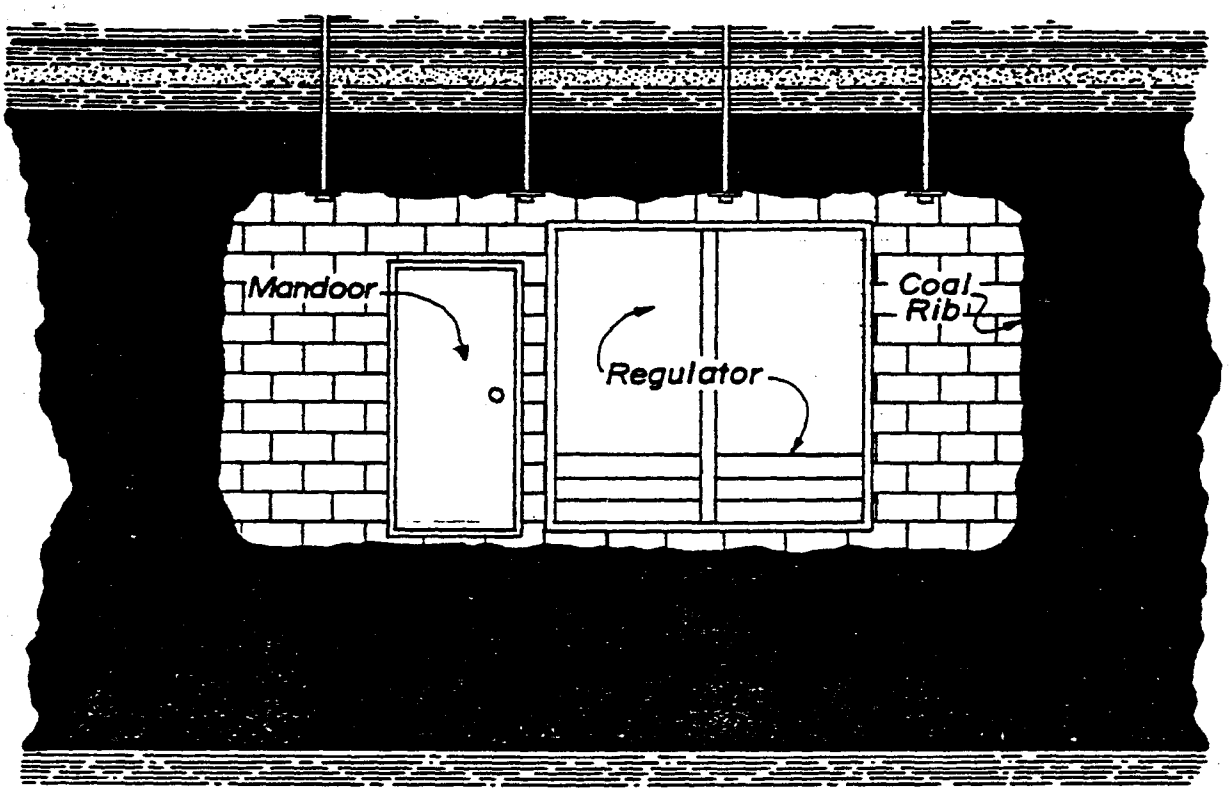


FRONT VIEW

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 13, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1" = 5'	TITLE STOPPING W/ MANDOOR, TYP. — DRAWING NO. A5-0026

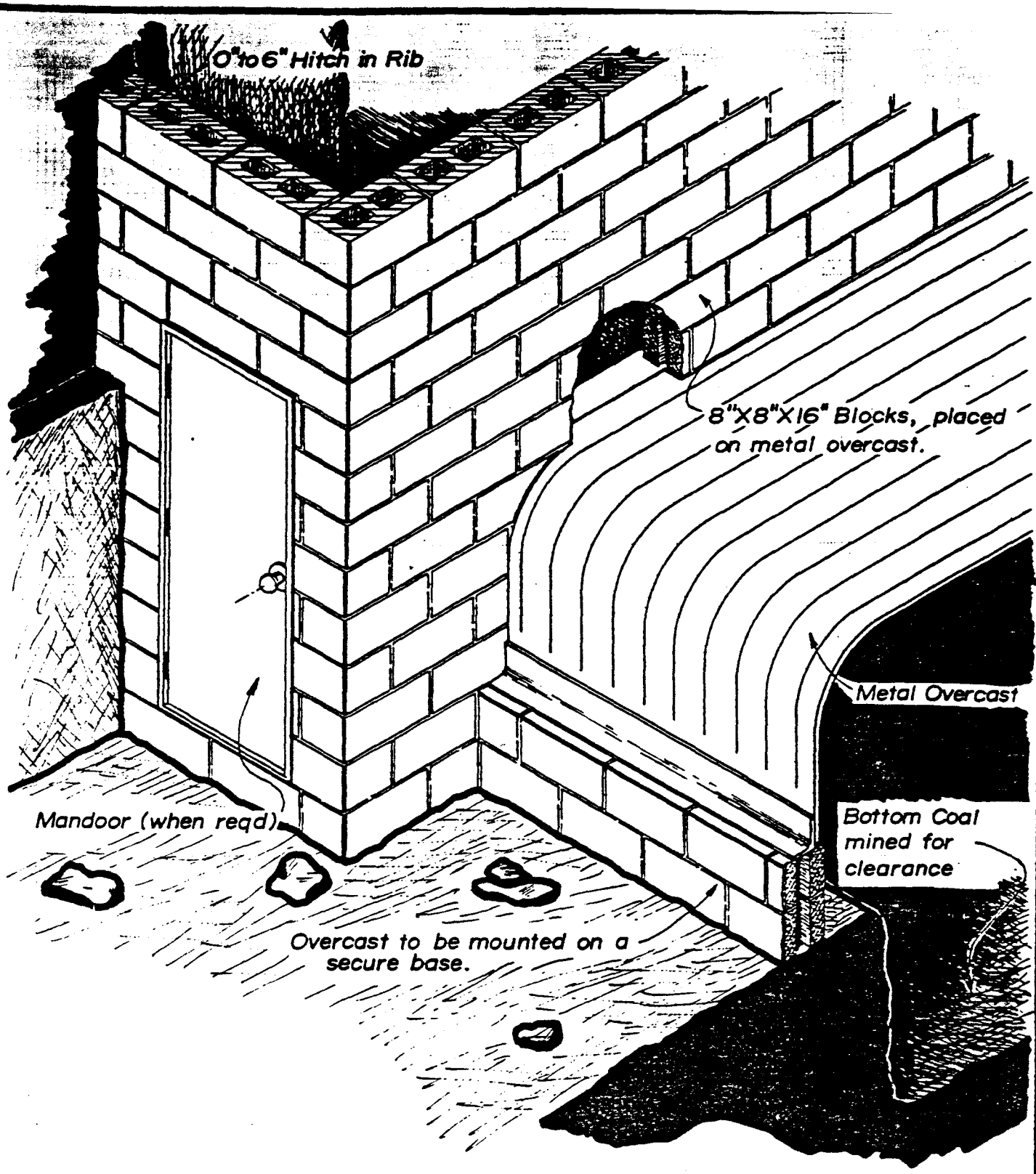


TOP VIEW



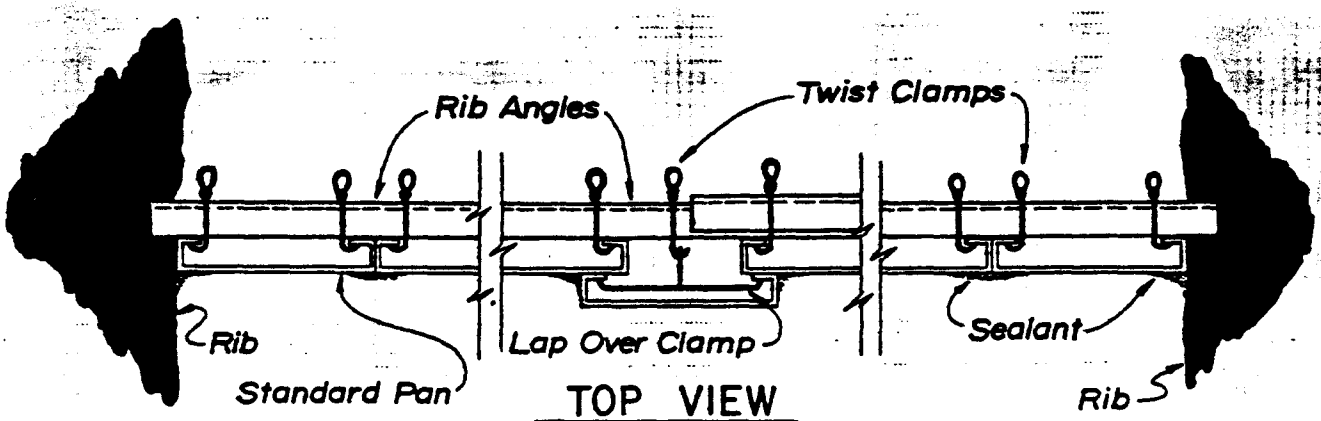
FRONT VIEW

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 13, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1" = 5'	TITLE REGULATOR, TYPICAL — DRAWING NO. A5-0019

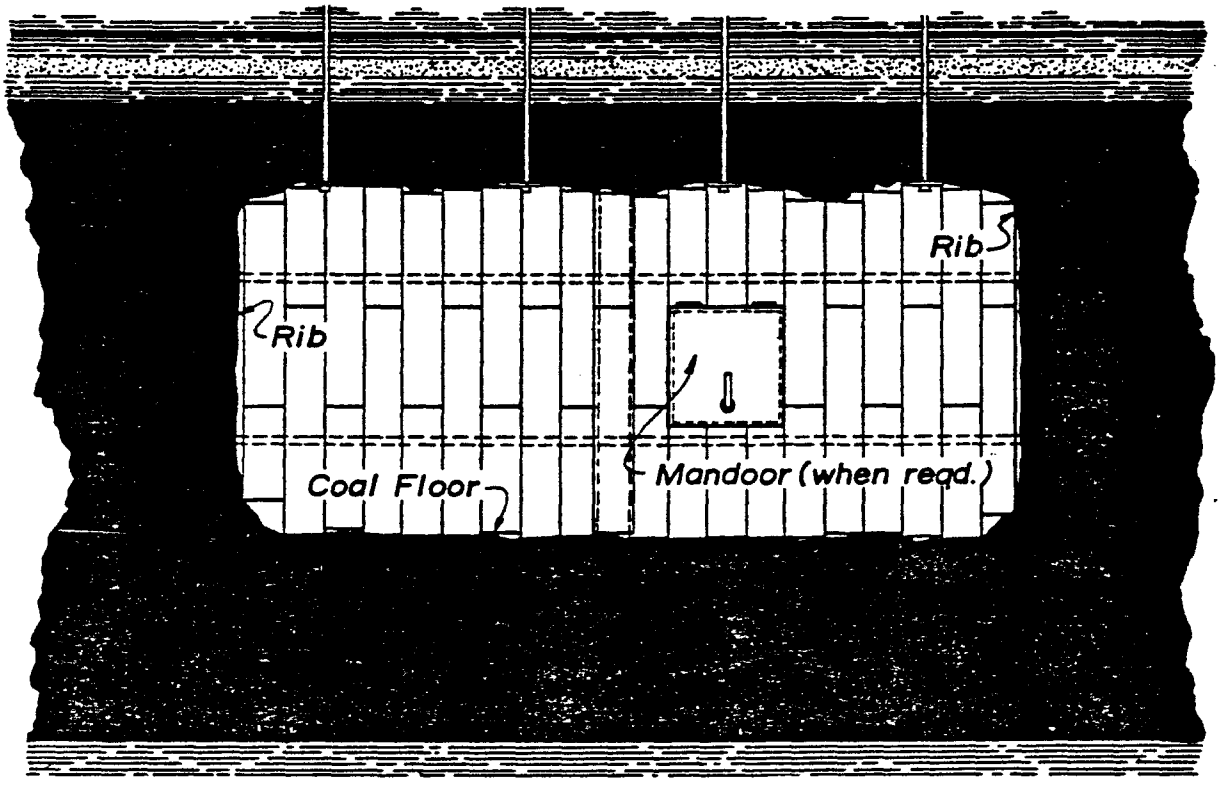


TYPICAL OVERCAST

DRAWN BY: Ed Sanderson	VALLEY CAMP OF UTAH, INC.
DATE: April 14, 1981	SCOFIELD ROUTE
CHECKED:	HELPER, UTAH 84526
APPROVAL:	
APPROVAL:	
SCALE: 1/2" = 1'-0"	TITLE TYP. OVERCAST CONSTRUCTION — DRAWING NO. A5-0027



TOP VIEW
SCALE: 1"=1'-0"

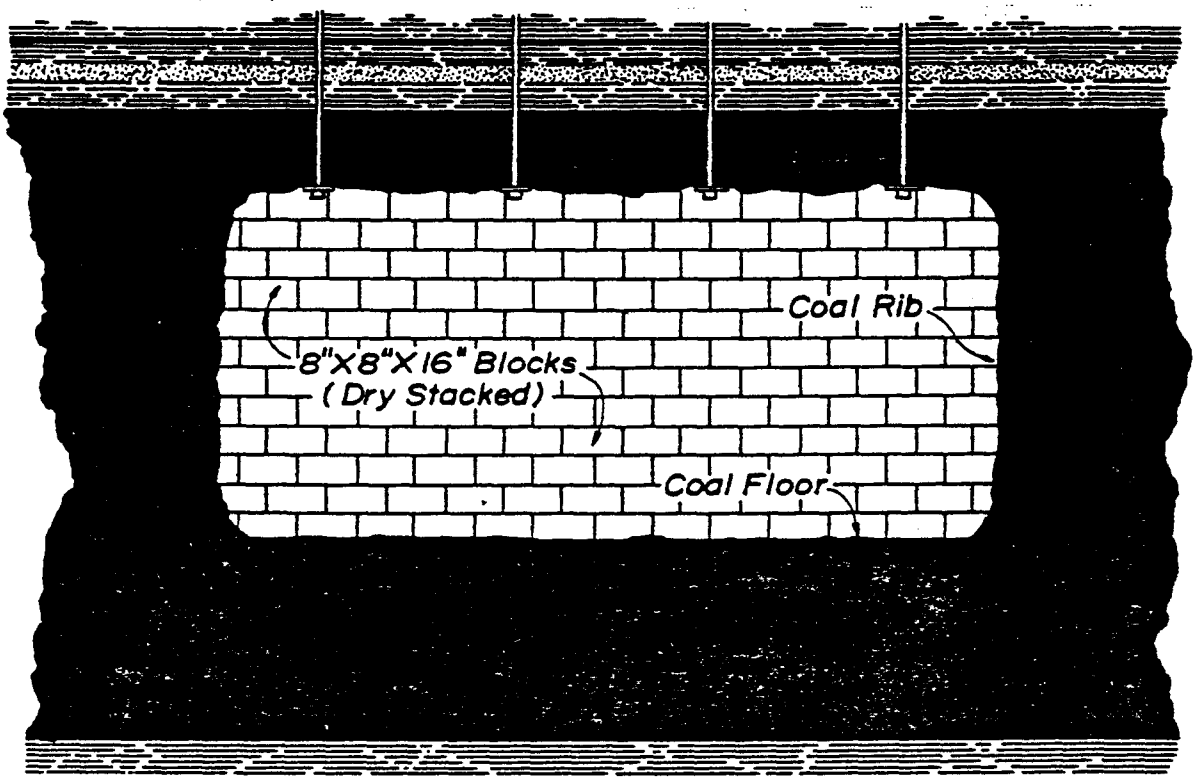


FRONT VIEW
SCALE: 1"=5'

Notes:

1. *Temporary stoppings to be constructed of standard packaged Kennedy Panels and accessories.*
2. *All irregular holes to be filled with approved materials.*
3. *Joints to be coated with an approved sealant.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 14, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. L. WEIGHT	
SCALE: "as noted"	TITLE: TEMPORARY STOPPING, Kennedy — DRAWING NO. A5-0028

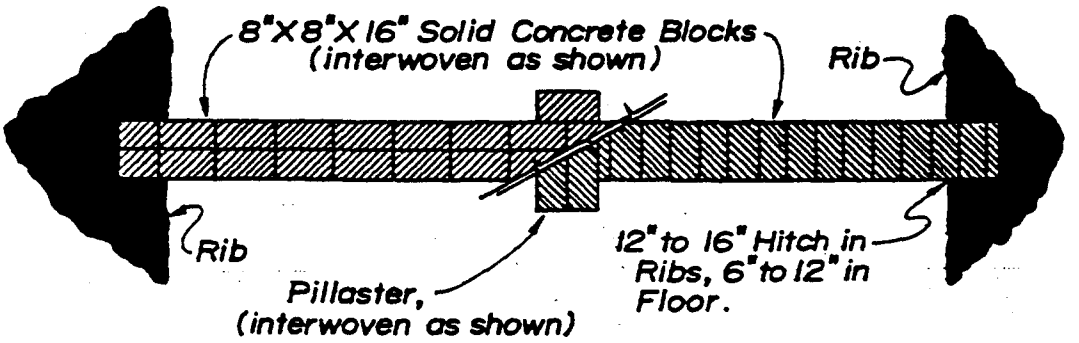


FRONT VIEW

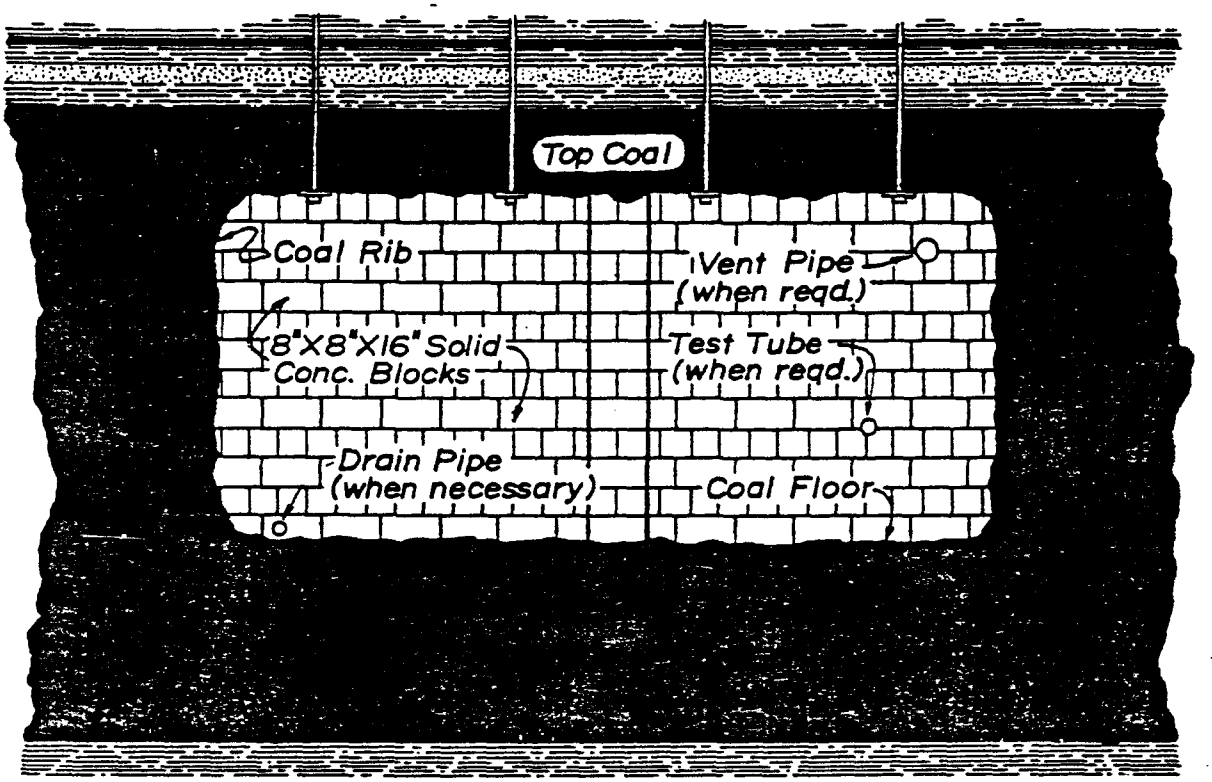
Notes:

1. *All irregular holes to be filled with approved materials.*
2. *Intake side of stopping to be coated with an approved sealant.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 15, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L. Wright	
SCALE: 1" = 5'	TITLE TEMPORARY STOPPING, Block — DRAWING NO. A5-0029



TOP VIEW

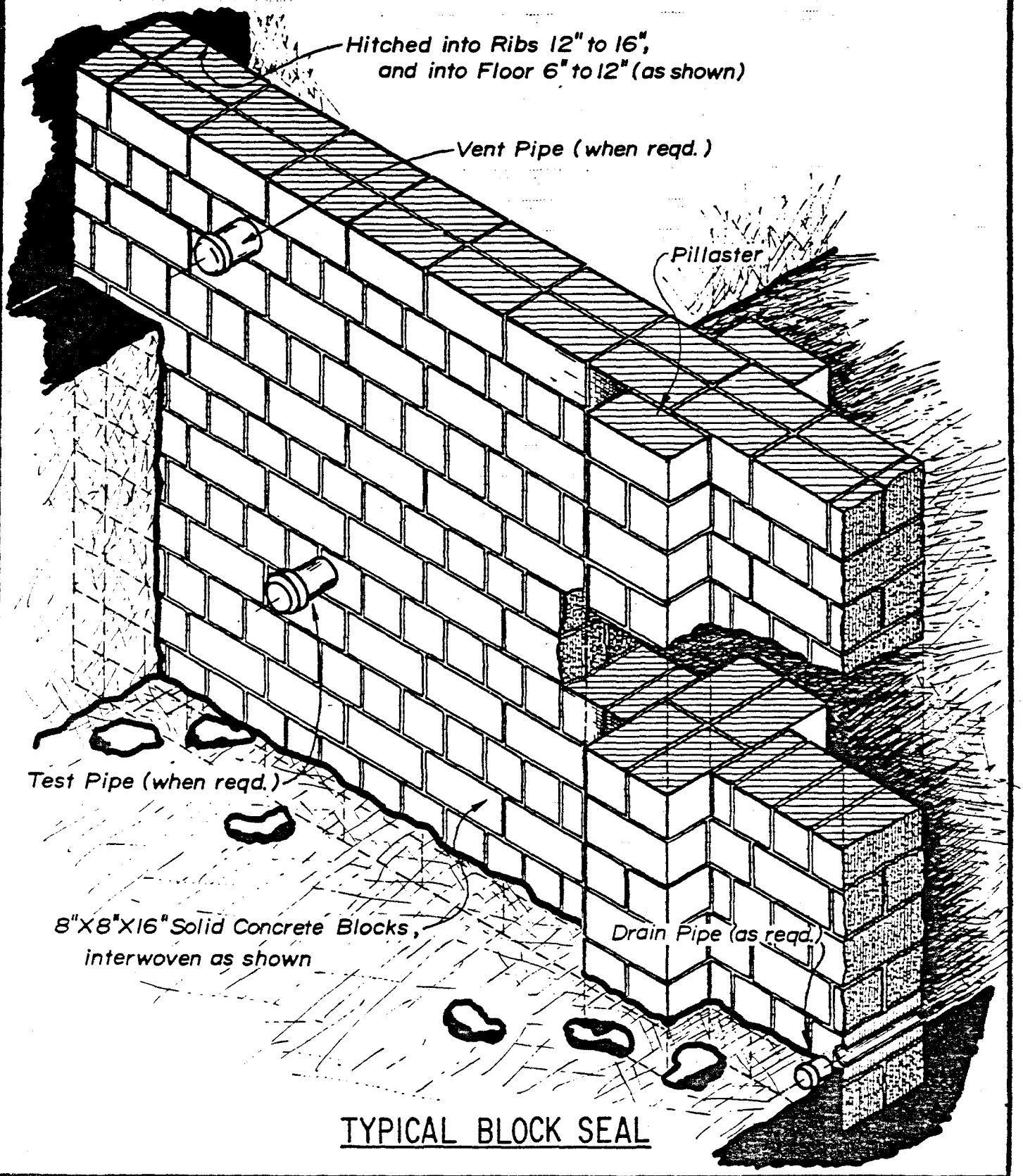


FRONT VIEW

Notes:

1. *Blocks to be 8"X8"X16" solid concrete (min. compressive strength 1800 PSIG), hitched 12" to 16" into the ribs and 6" to 12" into the floor.*
2. *Vent pipe and test tubes shall be placed in one seal in each set.*
3. *Drain pipes shall be provided when necessary.*
4. *Interwoven Pillaster shall be built in the approximate center of the seal.*
5. *Seals shall be 16" thick and sealed with an approved sealant material.*

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 8, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W. L. Wright	
SCALE: 1" = 5'	TITLE SEAL, TYPICAL (CONC. BLOCK) — DRAWING NO. A5-0018



TYPICAL BLOCK SEAL

DRAWN BY: Ed Sanderson	**VALLEY CAMP OF UTAH, INC.**
DATE: April 13, 1981	**SCOFIELD ROUTE**
CHECKED:	**HELPER, UTAH 84526**
APPROVAL:	
APPROVAL: W.L. Wi[illegible]	
SCALE: 1/2" = 1'-0"	TITLE: CONC. BLOCK SEAL CONSTRUCTION — DRAWING NO. A5-0025

DUST CONTROL PRACTICES IN THE FACE AREA

Date: 6/16/81

Mine Name: BELINA NO. 2
Mine I.D. No.: 42-01280
MMU I.D. No.: 001-0
Designated Occupation (D.O.): 036

Type of Mining and Section Equipment: Continuous

The following parameters are hereby adopted as part of the ventilation system and methane and dust control plan as per Section 75.316, 30 CFR.

(Signature - Company Official)

1. The minimum mean entry air velocity maintained in the working place or the minimum face velocity maintained across the longwall face shall be 60 feet per minute.

2. The maximum distance the ventilating device is maintained from the area of deepest penetration of the working face shall be 15 feet. (Longwalls not applicable).

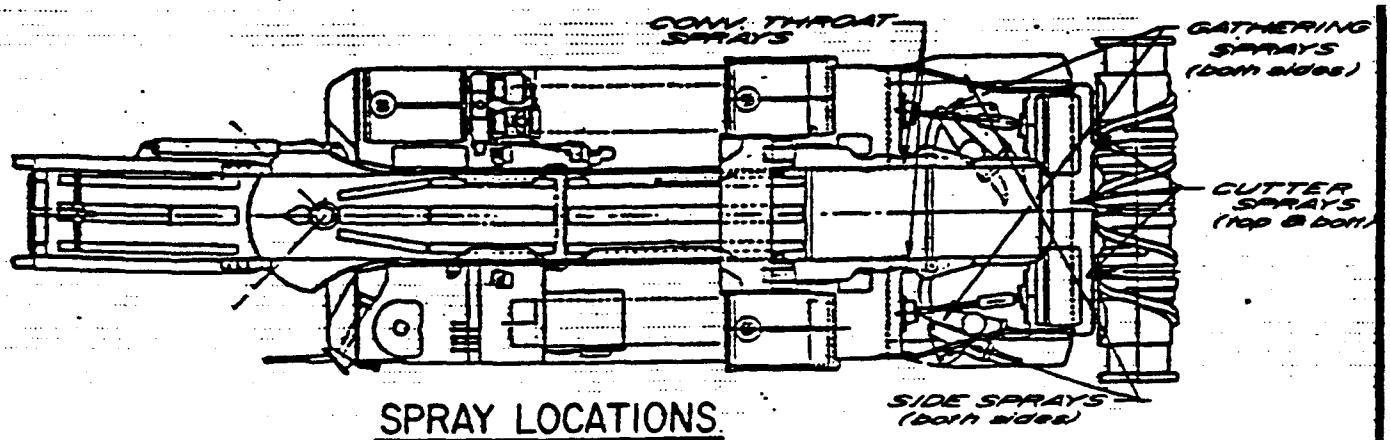
3. The minimum quantity of air reaching the working face or longwall face shall be 6,000 cubic feet a minute.

4. The following water suppression system shall be maintained and operated as follows:

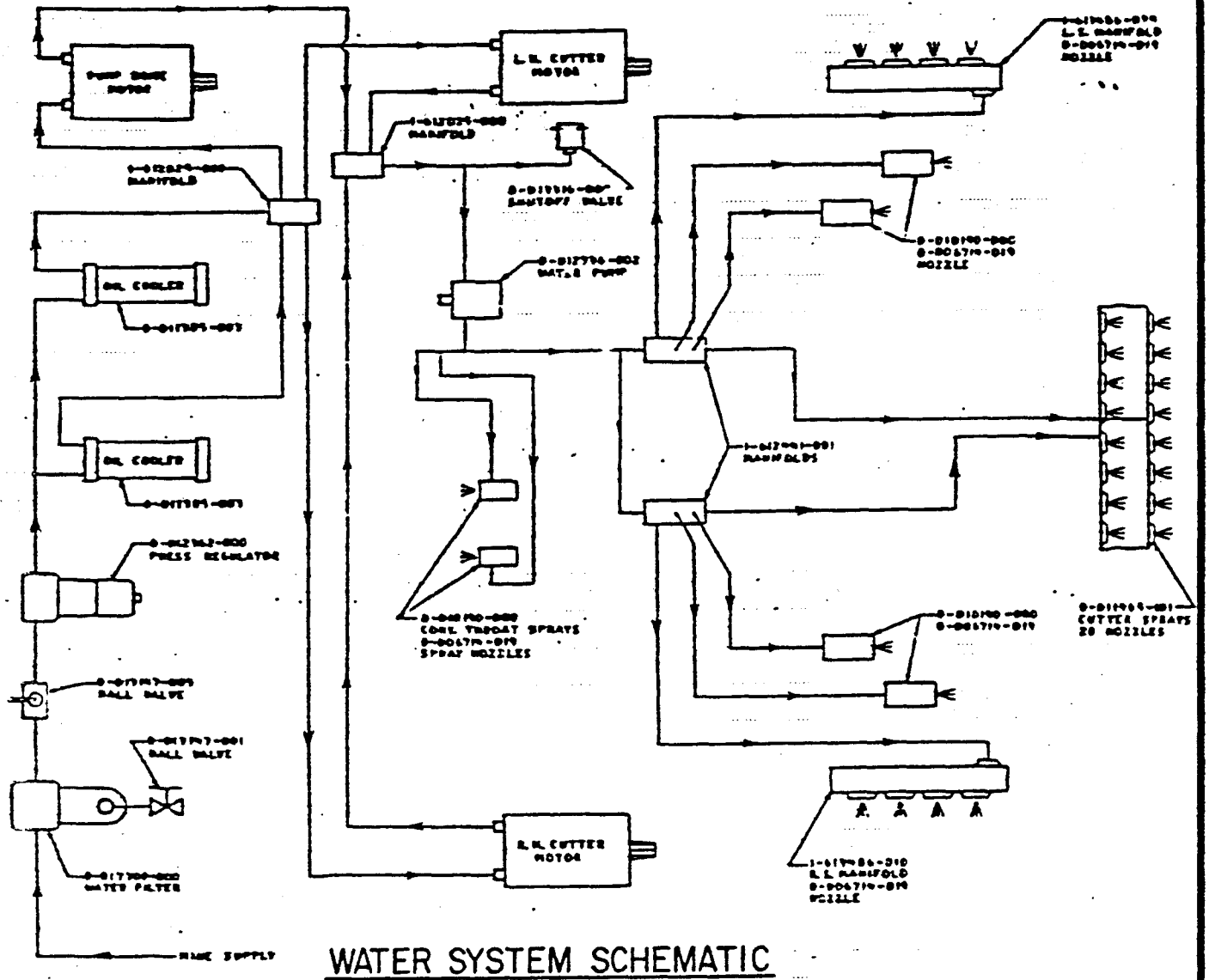
Equipment Description	*Number of Sprays	Type of Sprays	Minimum Operating Pressure
Lee Norse	26	#3	85 PSI

5. Other controls or practices: (identify additional sheets by MMU I.D. number)

*Include sketch or schematic showing locations



SPRAY LOCATIONS



WATER SYSTEM SCHEMATIC

DRAWN BY: Ed Sanderson	DATE: Mar. 24, 82	VALLEY CAMP of UTAH SCOFIELD ROUTE HELPER, UTAH 84526
CHECKED BY:	DATE:	
REVISED BY:	SCALE: None	
APPROVAL ENG.:		
APPROVAL SAFETY:	TITLE: LEE NORSE CM 455 WATER SYS.	DRAWING NO. A5-0046 / REV. NO. 0
APPROVAL MINE:		

APPENDIX C

ACR MAP E1-0005

BELINA NO. 1 5 YEAR FORECAST

FOR LIFE OF MINES

ACR MAP E2-0006

BELINA NO. 2 5 YEAR FORECAST

FOR LIFE OF MINES

Reference: UMC 783.12
UMC 784.12
UMC 784.20

APPENDIX D

ACR MAP D5-0063

ARCHEOLOGIC-CULTURAL RESOURCES

REFERENCE UMC 783.12

12 May 1982

APPENDIX E

ALPINE WELL LOG

****

WATER MONITORING DATA

****

WHISKEY CANYON WELL LOGS

Reference: UMC 783.15
UMC 784.14
UMC 817.52
UMC 785.19

APPENDIX E

Alpine Well :

Copied 2-25-54
Exam. & Recorded 10-9-53
Exam. for filing 10-9-53
Final Copy checked
Indexed 2-25-54
Well No. (D-13-7)8dcc-1

PAGE
(Leave Blank)

Report No. D 265
Filed Sept. 14, 1953
Rec. By
Ret'd

Report of Well and Tunnel Driller

STATE OF UTAH

(Separate report shall be filed for each well or tunnel)

GENERAL INFORMATION:

Report of well or tunnel driller is hereby made and filed with the State Engineer, in compliance with Sec. 100-3-22, Utah Code Annotated, 1943. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of well or tunnel. Failure to file such report constitutes a misdemeanor.)

1. Name and address of ~~person~~, company ~~or corporation drilling or~~ drilling well ~~or tunnel~~. (Strike words not needed)

   J.S. Lee & Sons 4091 So. State St. S.L.C., Utah

2. Name and address of owner of well or ~~tunnel~~ Utah Natural Gas Co. (Strike Words not needed)

   Provo, Utah

3. Source of supply is in ~~Utah~~, County Carbon County; ..... (Leave blank) drainage area; ..... (Leave blank) artesian basin

4. The number of approved application to appropriate water is 25082

5. Location of well ~~or mouth of tunnel~~ is situated at a point

   N 450 ft. and E 500 ft. from S¼ Cor. Sec. 8, T13S, R7E SLB&M.

   (Describe by rectangular coordinates or by one course and distance with reference to U. S. Government Survey Corner — Copy description from well owner's approved application)

6. Date on which work on well or ~~tunnel~~ was begun Aug. 8, 1953 (Strike words not needed)

7. Date on which work on well or ~~tunnel~~ was completed or ~~abandoned~~ Aug. 20, 1953 (Strike words not needed)

8. Maximum quantity of water measured as ~~flowing~~, pumped or ~~.....~~ on completion of (Strike words not needed) well ~~or tunnel in sec. ft.~~ ; or in gals. per minute 50 Date

DETAIL OF COLLECTING WORKS:

9. WELL: It is drilled, ~~dug, flowing or~~ pump well. Temperature of water °F. (Strike words not needed)

   (a) Total depth of well is 280 ft. below ground surface.

   (b) If flowing well, give water pressure (hydrostatic head) above ground surface ft.

   (c) If pump well, give depth from ground surface to water surface before pumping 100 ft.; during pumping 147 ft.

   (d) Size and kind of casing 10 " (If only partially cased, give details)

   (e) Depth to water-bearing stratum 100 ft. (If more than one stratum, give depth to each)

   (f) If casing is perforated, give depth from ground surface to perforations

   (g) Log of well 0 to 7' top soil, 7 to 189 sand clay, 189 to 192 sand stone water, 192 to 201 sandy clay, 201 to 213 shale, 213 to 228 sand stone water, 228 to 233 sandy clay, 233 to 249 shale, 249 to 251 Lime stone, 251 to 280 shale

   (h) Well was equipped with cap, ~~valve~~, or ..... to control flow. (Strike words not needed)

(Over)

SEP 14 1953
STATE ENGINEER
COUNTER

10. **TUNNEL:** It is timbered, tiled, piped, open, bulkheaded, covered or.....
(Strike words not needed)

(a) Dimensions.....; total length..... : temperature of water.....°F.

(b) Position of water bearing stratum or strata with reference to mouth of tunnel.....

.....

.....

(c) Log of tunnel.....

.....

.....

.....

11. **GENERAL REMARKS:** (Note any general or detailed information not covered above).

STATE OF UTAH,
COUNTY OF Salt Lake } ss.

I, J. G. Lee, being first duly sworn, do hereby certify that I am the driller of the aforesaid well or tunnel who furnished the foregoing statement of facts; that I have read said statement and each and all of the items therein contained are true to the best of my knowledge and belief.

Driller

Subscribed and sworn to before me this 14 day of Sept., 19 59.

(SEAL)

Notary Public

My Commission Expires:
July 18, 1956

Form 33-84-20

Township _____ _____
Township: S. C. _____ _____ T. S. _____
Inspection Sheet _____ _____ _____
Filed _____ _____ _____

REPORT OF WELL DRILLER
STATE OF UTAH

Application No. Test Well 1-thru 1-36
Claim No. _____
Coordinate No. _____

Well No. W-19-1

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:
Name Valley Camp Coal Co
Address Clear Creek Utah

(2) LOCATION OF WELL:
County Carbon Ground Water Basin _____ (Sevier Basin)
North 50 feet, East 1940 feet from SW Corner
of Section 19 T 13 S, R 7 E SLBM (or the nearest whole section)

(3) NATURE OF WORK (check): New Well ☒
Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐
If abandonment, describe material and procedure: _____

(4) NATURE OF USE (check):
Domestic ☐ Industrial ☒ Municipal ☐ Irrigation ☐ Stockwater ☐
Mining ☒ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):
Rotary ☒ Bor ☐ Jetted ☐
Cable ☐ Driven ☐ Dug ☐

(6) CASING SCHEDULE: Threaded ☒ Welded ☐
6 5/8" Diam. from +2 feet to 730 feet Gage 0.5
_____" Diam. from _____ feet to _____ feet Gage _____
_____" Diam. from _____ feet to _____ feet Gage _____
New ☒ Reject ☐ Used ☐

(7) PERFORATIONS: Perforated? Yes ☐ No ☐
Type of perforator used Slots
Size of perforations 1/8 x _____ inches by 12" inches
perforations from 580 feet to 730' feet
perforations from _____ feet to _____ feet
perforations from _____ feet to _____ feet
perforations from _____ feet to _____ feet
perforations from _____ feet to _____ feet

(8) SCREENS: Well screen installed? Yes ☐ No ☒
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ Set from _____ ft. to _____
Diam. _____ Slot size _____ Set from _____ ft. to _____

(9) CONSTRUCTION:
Was well gravel packed? Yes ☒ No ☐ Size of gravel 3/8"
Gravel placed from 500 feet to 730 feet
Was a surface seal provided? Yes ☒ No ☐
To what depth? 500' feet
Material used to seal: Cement
Did any strata contain unusable water? Yes ☐ No ☒
Type of water: _____ Depth of strata _____
Method of sealing strata off: _____

Was surface casing used? Yes ☐ No ☒
Was it cemented in place? Yes ☐ No ☐

(10) WATER LEVELS:
Static level 500 feet below land surface Date July 7
Artesian pressure _____ feet above land surface Date _____

LOG RECEIVED:

(11) FLOWING WELL:
Controlled by (check) Valve ☐
Cap ☐ Plug ☐ No Control ☐
Does well leak around casing? Yes ☐ No ☐

(12) WELL TESTS: Drawdown is the distance in feet the water level is lowered below static level.
Was a pump test made? Yes ☒ No ☐ If so, by whom? Layne Bidlingmaier
Yield: 1.5 gal./min. with _____ feet drawdown after _____ hours
" " " " " " " " " " " "
Bailer test _____ gal./min. with _____ feet drawdown after _____ hours
Artesian flow _____ g.p.m. Date _____
Temperature of water 46° Was a chemical analysis made? No ☒ Yes ☐

(13) WELL LOG: Diameter of well 12¼" inches
Depth drilled 730 feet. Depth of completed well 730 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc. of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	7	X										Gage Slide
0	38			X								11" Gage 55.
38	43	X										Slide
44	440	X		X								Interbedded Silt & SS
												Last Casing: Drill
												Black Fine sand 730
												Air pressure released
												Water in 541 ft.
												Valley Camp Was Electr
												Log in file

Work started July 1 19 61 Completed July 11 19 61

(14) PUMP:
Manufacturer's Name Reda
Type: Sub H.P. 30 25 HP
Depth to pump or bailer 700 feet

Well Driller's Statement:
This well was drilled under my supervision, and this report is true to the best of my knowledge and belief.
Name W. E. Hazard Jr. (Person, Firm, or Corporation) (Type or print)
Address Box 576 Clearfield Utah
(Signed) W. E. Hazard Jr. (Well Driller)
License No. 515 Date July 28 1961

USE OTHER SIDE FOR ADDITIONAL REMARKS

DIGILOG, INC.

7001 West 117th Avenue Suite One
Broomfield, Colorado 80020
(303) 466-7388

Date 11/17/79

HOLE: WW-79 (W-79-1)

Location
Sec: Twp: Rng:
State/County: UTAH CARBON
Project: BELINA
Depth Drilled: 630'
Measured from: GROUND LEVEL
Elevation:

CLIENT: SANDERS EXPLOR.
Drilling Co.: EMERALD DRILLING
Geologist: MIKE WELLER
Unit Operator: R. BOUFFARD
Unit Number: D-6
Job Number:

RADIATION LOG

	Gamma	Density	Neutron	
Logged Depth (ft.)	616	620		
Rerun Interval (ft.)				
Range (cps./in.)	10	100		
Counts Increasing to:				
Depth Scale (ft./in.)	10			
Logging Speed (ft./min.)	15			
Time Constant (sec.)	2	2		
Dead Time (μsec.)				
K-factor (x10⁻⁵)				
Water Factor ( ) in. hole				
Casing Factor ( ) in. steel				
Probe Number	1387			
Probe Dia. (in.)	1¼			
Crystal Size (in.)	2½x½			
Print Out (ft.)				
Reference Source (cps.)				

ELECTRIC LOG

Logged Depth (ft.)	615
Resistance Scale (Ω/in.)	10
S.P. Scale (mv/in.)	
16" Normal Resistivity (Ωm/in.)	
64" Normal Resistivity (Ωm/in.)	
Logging Speed (ft./min.)	15
Viscosity-Density	
Rm. @ T°F	
Rmf. @ T°F	
Rmc. @ T°F	

LOG

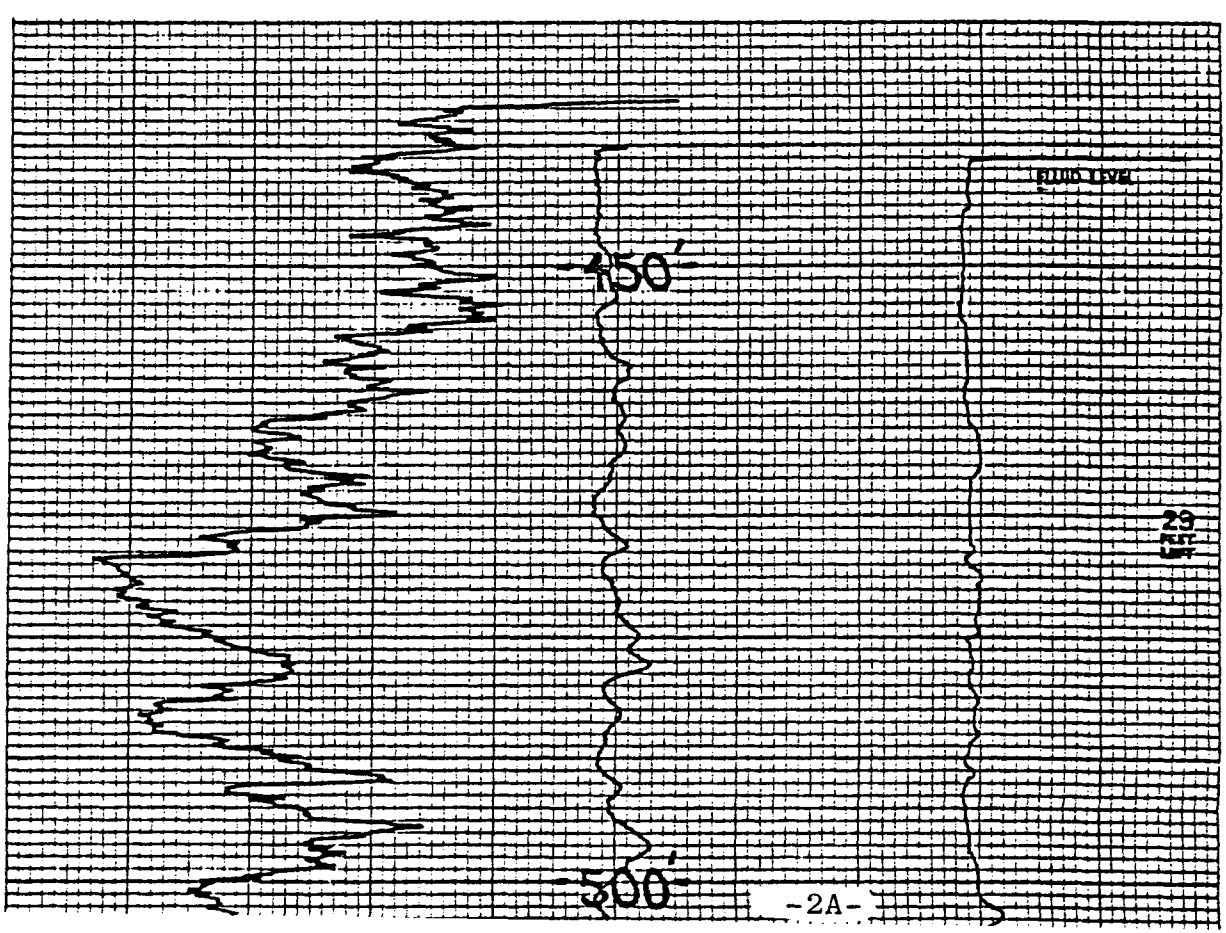
Logged Depth (ft.)	
Scale:	
Depth Scale (ft./in.)	
Logging Speed (ft./min.)	

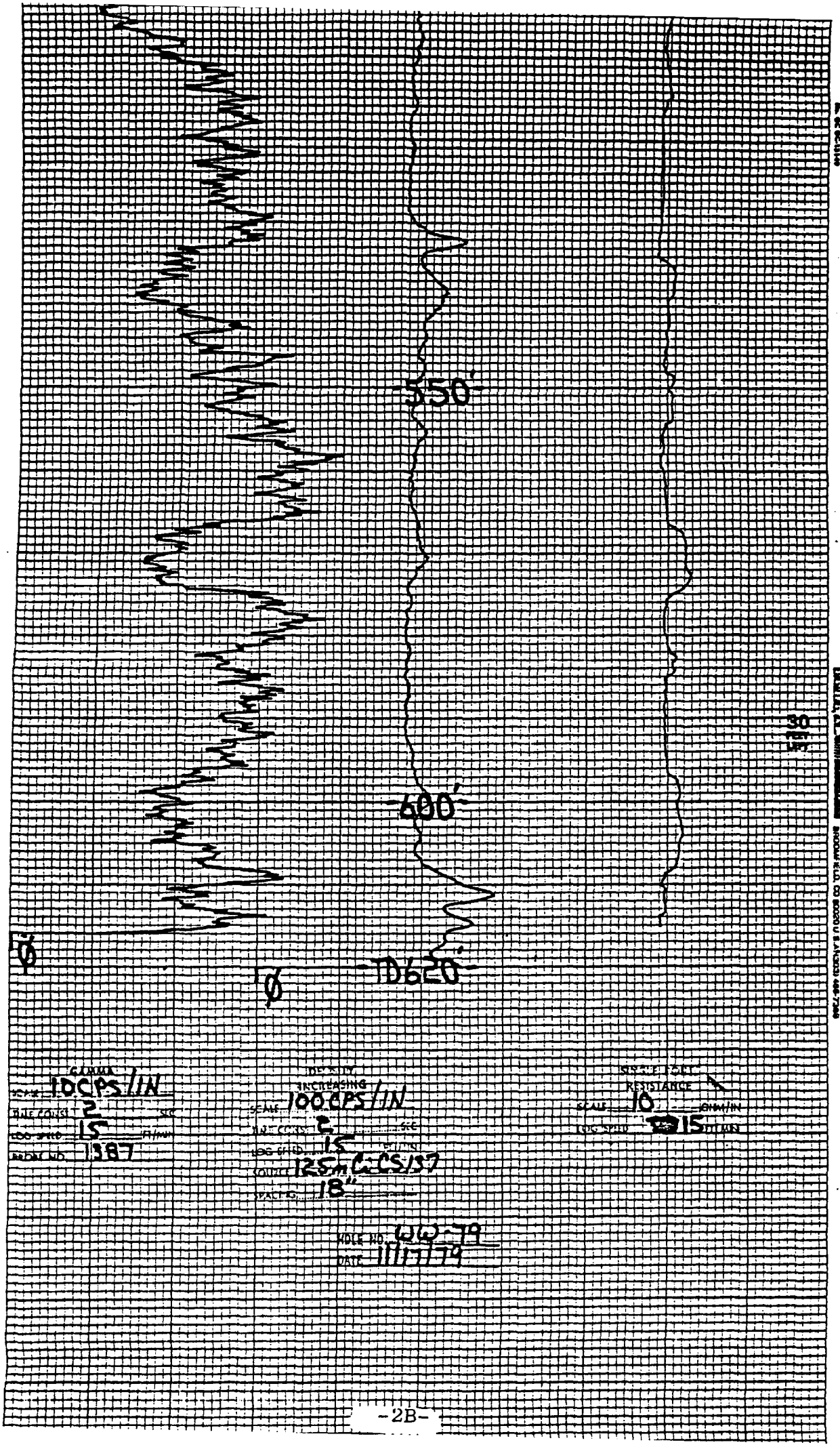
REMARKS:

Other Services Provided:

CASING-HOLE DATA

Bit Size: 5¾ in.,	0	to TD	ft.
Bit Size: in.,		to	ft.
Cased From:		to	ft.
Dia. (inside):		in., wall size	in.
Cased From:		to	ft.
Dia. (inside):		in., wall size	in.




550'
600'
620'
GAMMA
SCALE 10CPS/IN
TIME CONST 2 SEC
LOG SPEED 15 FT/MIN
RECORD NO. 1387
DENSITY
INCREASING
SCALE 100CPS/IN
TIME CONST 2 SEC
LOG SPEED 15 FT/MIN
COUNTS 125mCCS/37
SPACING 18"
SINGLE POINT
RESISTANCE
SCALE 10 OHM/IN
LOG SPEED 15 FT/MIN
HOLE NO. WW-79
DATE 11/17/79

WATER MONITORING DATA

PREPARED BY

VAUGHN HANSEN ASSOCIATES

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station CS-1
Location Upper South Fork Eccles Creek

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Other (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen: Ammonia as NH_4-N (mg/L)	Nitrogen: Nitrate as NO_3-N (mg/L)	Nitrogen: Nitrite as NO_2-N (mg/L)	Nitrogen: Total Sulfur (mg/L)	Nitrogen: Organic (mg/L)	Phosphate: Total as PO_4-P (mg/L)	Phosphate: Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Fluoride as F (mg/L)	Surfactant as MBAS (mg/L)	Solids: TSS (mg/L)	Solids: Total Settleable Solids (mg/L)	Solids: TDS (mg/L)	Solids: Total Sol. Sol. (mg/L)	Solids: Total Volatile Solids (mg/L)	Specific Cond. (µmhos)	Turbidity (FTU)	Carbonate Alk. as $CaCO_3$ (mg/L)	Bi-carbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radio-activity (pc/L)	Beta Radio-activity (pc/L)
11-8-78	11:25	0.4	5	1	7.4						4.0	11.5				0.15	<0.01	0.10			0.024	14.0			11.0		252			440			287.96					
12-27-78	14:30																																				
5-11-79	15:40	0.6	1	1	8.4						8.00		<1.0	0.010	<0.10	1.28				0.05		10.0			4.0		270			410	0.85		285.48	234		14.0		
6-20-79	12:03	3.6	16	7	8.4	49.0	2.0			<1.0	3.00	8.7	<1.0	<0.001	<0.01	0.18				0.015	0.010	6.0			13.0		190			325	10.00		217.16	178		12.0	2.9	9.5
7-18-79	10:30	0.4	21	7.5	7.62						10.50	8.4	<1.0	0.024	<0.01	0.08				0.020		10.0			5.0		223			420	3.90	<0.01	252.20	210		24.0		
8-23-79	10:47	0.3	18	5	7.8	700	4.0			2.3	9.00	8.7	<1.0	<0.001	<0.05	0.09				0.120		6.0			6.0		254			420	2.00		297.92	240		16.0	<2.0	4.0
9-27-79	17:45	0.3	15	8.0	7.12						3.00	7.2		<0.001	<0.01	0.06				0.020		11.0			11.0		268			410	2.50		297.68	244		18.0		
6-26-80	09:33	3.4																																			
7-23-80																																					
8-26-80		0.9	7	6	8.3																									375							
9-16-80	09:38	0.28	9	6	7.8																									410							
10-7-80	15:28	0.215	20	9	8.7																									420							
11-19-80	11:18		-2	0	7.6																																
12-29-80	In-Accessible																																				
1-27-81	In-Accessible																																				
2-25-81	In-Accessible																																				
3-11-81	In-Accessible																																				
4-8-81	In-Accessible																																				

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Diss. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Diss. (mg/L)	Potassium Total (mg/L)	Iron Diss. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Manganese Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
11-8-78			<0.001	0.012			<0.001	62.4	<1.0	<0.001		0.005	<0.01	0.13			0.045		15.34	0.003				1.022	<0.001	4.75	<0.001	13.68	0.004					
12-27-78																																		In-accessable
5-11-79			<0.001	0.010		0.110	<0.001	72.0	6.0	0.003		0.003	0.004	0.12		0.022	0.081	0.003	17.28	0.002	<0.0002			0.962	0.001		0.005	2.10	0.009					
6-20-79			<0.001	0.090		0.059	<0.001	55.2	2.0	0.003		0.003	0.005	0.12		0.200	0.330	0.009	11.52	0.005	<0.0002			0.677	<0.001		0.003	1.67	0.017					
7-18-79			<0.001	0.030		0.077	<0.001	61.6	4.0	0.003		0.008	<0.001	0.16		0.030	0.100	0.001	14.64	0.005	<0.0002			0.909	<0.001		0.001	3.11	0.020					
8-23-79			<0.001	0.020		0.015	<0.001	83.2	<0.1	0.005		0.005	<0.001	0.20		0.045	0.149	<0.001	3.84	0.002	<0.0002			1.140	<0.001		<0.001	9.00	0.031					
9-27-79			<0.001	0.025		0.070	<0.001	84.1	<0.1	<0.001		0.009	<0.001	0.21		0.010	0.240	<0.001	3.70	0.005	<0.0002			1.120	<0.001		<0.001	12.50	0.035					
6-26-80																																		
7-23-80																																		
8-26-80																																		
9-16-80																																		
10-7-80																																		
11-19-80																																		
12-29-80																																		
1-27-81																																		
2-25-81																																		
3-11-81																																		
4-8-81																																		

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station CS-1
Location Upper South Fork Eagle Creek

DATE	TIME	FLOW (CFS)	TEMPERATURE AIR (°C)	TEMPERATURE WATER (°C)	pH	COLIFORM TOTAL (MPN)	COLIFORM FECAL (MPN)	FECAL STREP. (MPN)	C.O.D. (MG/L)	B.O.D. (MG/L)	T.O.C. (MG/L)	DISSOLVED OXYGEN (MG/L)	OIL & GREASE (MG/L)	PHENOL (MG/L)	NITROGEN AMMONIA as NH_3-N (MG/L)	NITROGEN NITRATE as NO_3-N (MG/L)	NITROGEN NITRITE as NO_2-N (MG/L)	NITROGEN TOTAL KJELDAHL (MG/L)	NITROGEN ORGANIC (MG/L)	PHOSPHATE TOTAL as PO_4-P (MG/L)	PHOSPHATE ORTHO as PO_4-P (MG/L)	SULFIDE as SO_4 (MG/L)	MERCAPTAN as CH (MG/L)	SULFATE as SO_4 (MG/L)	SOLIDS TDS (MG/L)	SOLIDS TOTAL DISSOLVED SOLIDS (MG/L)	SOLIDS T.S.S. (MG/L)	SOLIDS TOTAL SOLIDS (MG/L)	SOLIDS TOTAL VOLATILE SOLIDS (MG/L)	SPECIFIC COND. (µMHOS)	TURBIDITY (FTU)	CARBONATE ALK. as CO_3 (MG/L)	BI-CARBONATE ALK. as HCO_3 (MG/L)	TOTAL ALK. as $CaCO_3$ (MG/L)	TOTAL HARDNESS as $CaCO_3$ (MG/L)	ALPHA RADIO-ACTIVITY (pCi/L)	BETA RADIO-ACTIVITY (pCi/L)	

DATE	ALUMINUM DISS. (MG/L)	ANTIMONY DISS. (MG/L)	ARSENIC DISS. (MG/L)	BARIUM DISS. (MG/L)	BERYLLIUM DISS. (MG/L)	BORON DISS. (MG/L)	CADMIUM DISS. (MG/L)	CALCIUM DISS. (MG/L)	CHLORIDE DISS. (MG/L)	CHROMIUM HEXAVALENT (MG/L)	COBALT DISS. (MG/L)	COPPER DISS. (MG/L)	CYANIDE as CN (MG/L)	FLUORIDE DISS. (MG/L)	GERMANIUM DISS. (MG/L)	IRON DISS. (MG/L)	IRON TOTAL (MG/L)	LEAD DISS. (MG/L)	MANGANESE DISS. (MG/L)	MANGANESE DISS. (MG/L)	MERCURY DISS. (MG/L)	MOLYBDENUM DISS. (MG/L)	NICKEL DISS. (MG/L)	POTASSIUM DISS. (MG/L)	SELENIUM DISS. (MG/L)	SILICA as SiO_2 (MG/L)	SILVER DISS. (MG/L)	SODIUM DISS. (MG/L)	ZINC DISS. (MG/L)	VANADIUM DISS. (MG/L)				COMMENTS
1-9-78																																			
12-27-7																																			
5-11-79			<0.001	0.01		0.105	<0.001			<0.001		0.003				0.022	0.081	<0.001							<0.001		<0.001		0.006						
6-20-79			<0.001	0.050		0.040	<0.001			<0.001		0.003				0.200	0.330	<0.001							<0.001		<0.001		0.010						
7-18-79			<0.001	0.020		0.050	<0.001			<0.001		0.005				0.030	0.100	<0.001							<0.001		<0.001		0.018						
8-23-79			<0.001	0.013		0.010	<0.001			<0.001		0.001				0.045	0.149	<0.001							<0.001		<0.001		<0.001						
9-26-79			<0.001	0.010		0.050	<0.001			<0.001		0.002				0.010	0.240	<0.001							<0.001		<0.001		0.007						
6-2-80																																			
7-29-80																																			
8-26-80																																			
9-16-80																																			
10-7-80																																			
11-19-80																																			
12-29-80																																			
1-23-81																																			
2-25-81																																			
3-11-81																																			
4-9-81																																			

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-001
Location Belina Mine Discharge

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep. (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen: Ammonia as NH_3-N (mg/L)	Nitrogen: Nitrate as NO_3-N (mg/L)	Nitrogen: Nitrite as NO_2-N (mg/L)	Nitrogen: Total Kjeldahl (mg/L)	Nitrogen: Organic (mg/L)	Phosphate: Total as PO_4-P (mg/L)	Phosphate: Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Fluoride as F (mg/L)	Sulfide as H_2S (mg/L)	Solids: TDS (mg/L)	Solids: Total Settleable Solids (ml/L)	Solids: T.S.S. (mg/L)	Solids: Total Susp. Org. (mg/L)	Solids: Total Volatile Solids (mg/L)	Cond. (micromhos)	Turbidity (FTU)	Carbonate Alk. as CO_3 (mg/L)	Bicarbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radio-activity (pCi/L)	Beta Radio-activity (pCi/L)
9-23-81	14:21	0.02	18	12	8.0																				1.0		376			382				194		<0.01		
10-14-81	14:25	0.03	1	4	8.0	700	5			2.4			78.60												16.0		330			500				199.15		<0.01		
11-28-81	14:30	0.02	13	5	8.1																				4.0		325			236				166.35		<0.001		
11-11-81	13:23	0.003	4	4	7.5								1.40												5.0		370			320				180.41		<0.01		
11-25-81	13:00	0.004	-3	2	7.2																				1.0		335			340				194.30		<0.01		
12-9-81	16:50	0.002	4	1									0.20												23.0		385			260				188.80		2.00		
12-23-81	13:28	0.004	-10	1	7.7																				3.0		375			305				183.16		2.00		

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride (mg/L)	Germanium Total (mg/L)	Iron (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Manganese Total (mg/L)	Molybdenum Total (mg/L)	Mercury Total (mg/L)	Nickel Total (mg/L)	Nickel Total (mg/L)	Palladium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
9-23-81																	0.188																	
10-14-81																	0.210								<0.001									
11-11-81																	0.166																	
11-25-81																	0.195								<0.001									
12-9-81																	0.155																	Grab Sample
12-23-81																	0.120								0.002									
																	0.130																	Grab Sample

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-001
Location Belina Mine Discharge

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen: Ammonia as NH_3-N (mg/L)	Nitrogen: Nitrate as NO_3-N (mg/L)	Nitrogen: Nitrite as NO_2-N (mg/L)	Nitrogen: Nitrogen Total Kjeldahl (mg/L)	Nitrogen: Nitrogen Organic (mg/L)	Phosphate: Total as PO_4-P (mg/L)	Phosphate: Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Hydroxide as OH (mg/L)	Bicarbonate as HCO3 (mg/L)	Solids: TDS (mg/L)	Solids: Total Volatile Solids (mg/L)	Solids: TSS (mg/L)	Solids: Total Solids (mg/L)	Solids: Total Volatile Solids (mg/L)	Cond (µmhos)	Turbidity (JTU)	Carbonate Alk. as CO_3 (mg/L)	Bicarbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radioactivity (pCi/L)	Beta Radioactivity (pCi/L)
1-14-81	16:21	0.4	-2	5	7.4	79.0	<2.0			16.0			1.20												14.0		365			450				250		4.0		
1-28-81		-0-																																				
2-11-81		-0-																																				
2-25-81	15:25	0.07	-2	4		27.0	<2.0			8.5			1.00												30.0		315							240		<0.1		
3-11-81	14:00	0.001	-2	3	7.7																				5.0		280			276				230		8.0		
3-25-81	14:40	0.01	5	3	7.8	17.0	<2.0			23.0			0.10												54.0		330			560				118		6.0		
4-8-81	14:48	0.07	6	5	8.0																				3.0		280			480				220		12.0		
4-22-81	15:30	0.06			8.0	79.0	<2			40.0			<1.0												154		295			450				212		10.0		
4-27-81		Pond			7.4	230	<2			76.0			10.1														370							120		3.74		
4-28-81		Pond			7.7	330	<2			64.0			9.3														350							108		1.87		
4-30-81		Pond			7.8	170	<2			61.0			3.2														405							126		1.87		
5-13-81	16:30	Pond	15	19																					27.0		293							190		<0.01		
5-27-81	15:30	0.06				23.0	<2			160			0.20												10.0		330							208		32.00		
6-10-81	15:40	Pond	26	21	8.4																				33.0		425			580				126		<0.01		
6-24-81	16:00	0.05	22	11	8.1								1.60												12.0		430			490				176		3.80		
7-8-81	16:30	0.04			8.1	4.0	2.0			5.3			<0.01												10.0		480			750				184		<0.01		
7-22-81	17:50	0.02	17	12	8.0																				1.0		380			540				198		<0.01		
8-12-81	15:20					Pond under remediation no discharge																																
8-26-81	14:50	0.04	20	20	8.4																				2.0		350			445				192		1.90		
9-9-81	14:45	0.12	14	12	7.0								1.80												35.0		345			355				164		<0.01		

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Diss. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Diss. (mg/L)	Hexavalent Total (mg/L)	Iron Diss. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Manganese Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
1-14-81																	0.180			0.022				<0.001								Grab Sample
1-28-81																																	
2-11-81																																	
2-25-81																	0.120			0.020				0.001									
3-11-81																	0.050																
3-25-81																	3.240							0.002									
4-9-81																	0.147																Grab Sample
4-22-81																	4.640			0.090				0.002									
4-27-81																1.060																	
4-28-81																0.630																	
4-30-81																1.100																	
5-13-81																	3.450																Grab
5-27-81																	0.170							<0.001									
6-10-81																	0.290																
6-24-81																	0.040							0.002									
7-8-81																	0.250							0.001									
7-22-81																	0.144																
8-12-81																	[illegible]							[illegible]									

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station YC-1
Location Mud Creek below Utah mine #2

DATE	TIME	FLOW	TEMPERATURE AIR	TEMPERATURE WATER	pH	COLIFORM TOTAL	COLIFORM FECAL	FECAL STREP	C.O.D.	B.O.D.	T.O.C.	DISSOLVED OXYGEN	OIL & GREASE	PHENOL	NITROGEN AMMONIA as NH_3-N	NITROGEN NITRATE as NO_3-N	NITROGEN NITRITE as NO_2-N	NITROGEN TOTAL KJELDAHL	NITROGEN ORGANIC	PHOSPHATE TOTAL as PO_4-P	PHOSPHATE ORTHO as PO_4-P	SULFATE as SO_4	PHENOLIC as OH	ALKALINITY as $CaCO_3$	SOLIDS TDS	SOLIDS TOTAL DISSOLVED SOLIDS	SOLIDS T.S.S.	SOLIDS TOTAL SUSPENDED SOLIDS	SOLIDS TOTAL VOLATILE SOLIDS	COND.	TURBIDITY	CARBONATE ALK. as CO_3	BICARBONATE ALK. as HCO_3	TOTAL ALK. as $CaCO_3$	TOTAL HARDNESS as $CaCO_3$	ACIDITY as $CaCO_3$	ALPHA RADIOACTIVITY	BETA RADIOACTIVITY
		GPM	°C	°C		MPN	MPN	MPN	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	FTU	MG/L	MG/L	MG/L	MG/L	MG/L	PC/L	PC/L
3-26-81	08:41	5	16	11	7.6								4.00	<0.001	<0.01	<0.01				0.250	0.100	33.0			6.0		292			498			280K	230		6.0		
10-14-81	09:43	5.2	3	1	6.7									<0.001	0.25					0.220		36.0			35.0		328			500			33369					
12-23-81	11:32		-10	1	7.2									<0.001	2.35					0.520		69.0			22.0		415			345			266.5K	300.37				

DATE	ALUMINUM TOTAL	ANTIMONY TOTAL	ARSENIC TOTAL	BARIUM TOTAL	BERYLLIUM TOTAL	BORON TOTAL	CADMIUM TOTAL	CALCIUM TOTAL	CHLORIDE DISS.	CHROMIUM HEXAVALENT	COBALT TOTAL	COPPER TOTAL	CYANIDE as CN	FLUORIDE DISS.	MANGANESE TOTAL	IRON DISS.	IRON TOTAL	LEAD TOTAL	MAGNESIUM TOTAL	MERCURY TOTAL	MERCURY TOTAL	MOLYBDENUM TOTAL	NICKEL TOTAL	PHOSPHORUS TOTAL	SELENIUM TOTAL	SILICA as SiO_2	SILVER TOTAL	SODIUM TOTAL	ZINC TOTAL	VANADIUM TOTAL				COMMENTS
	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L				
3-26-81			0.002	0.050		0.040	<0.001	64.80	13.60	<0.001		0.020		0.19		0.020	0.380	<0.001	21.60	0.050	<0.002			2.65	0.005		<0.001	12.50	0.020					
10-14-81								75.20	9.10								0.395		23.50	0.044				2.50				13.00						
12-23-81								93.50	12.80								0.382		31.50	0.036				2.30				12.60						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-1
Location Mud creek below mine #2

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenols (mg/L)	Nitrogen Ammonia as NH_3-N (mg/L)	Nitrogen Nitrate as NO_3-N (mg/L)	Nitrogen Nitrite as NO_2-N (mg/L)	Nitrogen Total Kjeldahl (mg/L)	Nitrogen Organic (mg/L)	Phosphate Total as PO_4-P (mg/L)	Phosphate Ortho as PO_4-P (mg/L)	Sulfate as SO4 (mg/L)	Fluoride as F (mg/L)	Surfactant as MBAS (mg/L)	Solids TDS (mg/L)	Solids Total Settleable Solids (mg/L)	Solids TSS (mg/L)	Solids Total Volatile Solids (mg/L)	Solids Total Volatile Suspended Solids (mg/L)	Conductivity (µmhos)	Turbidity (FTU)	Chlorides as Cl (mg/L)	Bicarbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity to $NaCO_3$ (mg/L)	Alpha Radio-Activity (pCi/L)	Beta Radio-Activity (pCi/L)
3-17-77	13:15	6	3	5	7.5				4.8		3.0	10.15	<1.0		0.15	0.02	<0.01	0.25		0.042	0.015	43.0	<0.01		13.0	<0.1	440			670	1.50	<0.01	297.6	244	232			
6-16-77	10:20	2.4	21	12	7.6				10.0		8.0	8.8	<2.0	0.009	0.75	0.01		0.90		0.035	0.010	27.0	<0.01		22.0	0.4	320			450	7.50	<0.01	319.6	262	288		2	6
6-28-77	14:10	19	20	16	7.1	110	<20				13.0		<1.0	0.005		0.20	<0.01	0.10				28.0			12.8		210			325			195.2					
9-23-77	12:40	3	27	15	8.3							8.5	1.3	0.008								31.5			2.0		255			390			253.7					
10-25-77	10:50	4.7	5	3	7.5							11.0	1.6	0.028								38.0			4.0		295			540			295.2					
12-27-77	09:45	2.9	-17	0	7.86							10.4	1.1	0.006								46.0			16.0		346						334.7					
2-28-78	11:00	5.7	-7	0.2	7.8							10.0	1.2	<0.001		0.10					0.155	45.0			51.0		290			440			277.92	236				
4-18-78	10:35	12.6	13	6.5	7.72							10.0	1.4	0.008		0.11					0.19	38.0			111		315			480			292.8	238				
6-20-78	11:55	17.3	10	4	7.95							10.0	3.2	<0.001		0.24					0.015	18.0			19.0		219			375			237.8	190		10.0		
8-29-78	11:55	4.8	11	8.0	8.0							9.0	<1.0	0.108		0.04					0.120	52.0			27.0		300			510			278.11	228		6.0		
10-31-78	14:23	2.7	-1	1	7.9							9.0	<1.0	<0.001		<0.01					0.080	54.0			27.0		310			550			278.4	220		14.0		
2-27-80	12:30	16.6	3	0.5	8.7							10.0	13.80	0.024		0.15				0.320	0.080	370			102		790			560			305	250		8.0		
4-29-80	10:15	25.6	10	8	8.9							9.2		0.070	<0.01					0.400		31.0			500		238			425			224.48					
6-25-80	19:25	30.9	11	5	8.8							9.6		<0.002	<0.01					0.130		45.0			77.0		204			320			163.48					
8-25-80	13:45	9.7	15	13	8.7							8.4	<0.01	<0.001	<0.01	<0.01				0.080	<0.010	30.0			29.0		319			460			272.22	260		20.0		
10-7-80	11:23	4.7	5	4	8.1									<0.001	0.25					0.060		30.0			4.0		305			470			277.20					
12-8-80	15:40	7.1	-3	1	7.6									0.007	<0.01					0.040		33.0			20.0		320			490			304.28					
2-5-81	13:30	4.2	8	4	8.1								1.20	0.012	<0.01	0.07				0.020		9.0			17.0		250			300			255.74	242		<0.1		
4-8-81	11:27	6.4	5	5	8.1									<0.001	0.12					0.028		32.0			57.0		300			332			300.12					
6-24-81	09:06	6.4	17	11	8.4									<0.001	<0.01					0.200		55.5			13.0		291			350			265.36	226		<0.01		

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Diss. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Diss. (mg/L)	Molybdenum Total (mg/L)	Iron Diss. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Manganese Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
3-17-77	0.021		<0.001	0.006		<0.001	<0.001	65.6	4.0	<0.001		0.013		0.17			0.201	<0.001	29.32	0.014	<0.0002		0.002	2.53	<0.001	6.0	<0.001	5.93	0.015					
6-16-77	0.009	<0.001	<0.001	0.056	<0.001	0.017	<0.001	68.0	10.0	<0.001	<0.001	0.005	<0.01	0.27	<0.001		0.146	<0.001	28.32	0.047	<0.0002	<0.001	<0.001	2.30	<0.001	5.6	<0.001	5.66	0.013	<0.001				
6-28-77			<0.001				<0.001	48.8	10.0	<0.001		0.005		0.14			0.099	<0.001	11.52	0.049	<0.0002			1.155	<0.001	3.6	<0.001	18.0	0.007					
9-23-77			0.004				<0.001	59.6	10.0	<0.001		0.004		0.15			0.235	<0.001	24.5	0.025	<0.0002			2.09	<0.001		<0.001	4.14	0.010					
10-25-77			<0.001				<0.001	74.4	9.0	<0.001		0.015		0.16			0.170	<0.001	24.0	0.030	<0.0002			2.450	<0.001			4.00	0.007					
12-27-77			<0.001				<0.001	84.0	12.0	<0.001		0.010		0.16			0.139	<0.001	26.4	0.053	<0.0002			2.215	<0.001			8.5	0.004					
2-28-78			<0.001				<0.001	61.6	<0.1	<0.001		0.003		0.18			0.406	<0.001	24.48	0.088	<0.0002			2.001	<0.001		<0.001	10.2	0.008					
4-18-78			<0.001				<0.001	77.6	14.0	<0.001		0.004		0.16			3.428	0.003	20.16	0.142	<0.0002			2.318	<0.001		<0.001	8.83	0.012					
6-20-78			<0.001				<0.001	56.0	4.0	<0.001		0.002		0.24			1.080	0.004	14.4	0.051	0.0013			1.105	<0.001		<0.001	4.10	0.014					
8-29-78			<0.001				<0.001	76.0	1.0			0.007		0.25			0.890	<0.001	4.32	0.051	<0.0002			2.203	<0.001		<0.001	7.80	0.005					
10-31-78			<0.001	0.210		0.050	<0.001	63.20	8.0	<0.001		0.010		0.17			0.320	<0.001	26.88	0.049	<0.0002			2.250	<0.001		<0.001	7.60	0.006					
2-27-80			<0.001	0.090		0.115	<0.001	60.80	20.0	<0.001		0.010		0.16			3.590	0.002	120	0.130	<0.0002			2.26	<0.001		<0.001	9.20	0.010					
4-29-80								60.00	8.0								3.216		14.40	0.150				2.50				8.30						Raining
6-25-80								47.20	2.0								0.594		11.88	0.060				0.97				2.70						
8-25-80			<0.001	<0.001		<0.001	<0.001	64.80	12.0	<0.001		<0.001		0.16		<0.001	1.310	<0.002	19.68	<0.001	<0.0002			1.90	<0.001		<0.001	27.00	0.010					
10-7-80								62.40	3.9								0.613		21.60	0.012				2.31				20.00						
12-8-80								92.00	5.85								0.250		18.24	0.060				2.27				5.65						
2-5-81			0.001	0.058		0.030	0.002	74.40	12.0	<0.001		<0.001		0.19			0.460	0.060	36.80	0.070	<0.0002			2.37	0.001		<0.001	1.30	0.015					
4-8-81								76.00	17.00								0.510		23.22	0.075				2.50				7.80						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station YC-2
Location Mud Creek above Utah # 2 mine

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	DISSOLVED OXYGEN mg/L	OIL & GREASE mg/L	PHENOL mg/L	NITROGEN AMMONIA as N mg/L	NITROGEN NITRATE as NO_3-N mg/L	NITROGEN NITRITE as NO_2-N mg/L	NITROGEN TOTAL ALBUMIN mg/L	NITROGEN ORGANIC mg/L	PHOSPHATE TOTAL as PO_4-P mg/L	PHOSPHATE ORTHO as PO_4-P mg/L	SULFITE as SO_3 mg/L	HYDROGEN as H mg/L	SULFIDE as H_2S mg/L	SOLIDS TDS mg/L	SOLIDS TOTAL SUSPENDED SOLIDS mg/L	SOLIDS T.D.S. mg/L	SOLIDS TOTAL DISSOLVED SOLIDS mg/L	SOLIDS TOTAL VOLATILE SOLIDS mg/L	COND. µmhos	TURBIDITY FTU	CARBONATE ALK. as CO_3 mg/L	BI-CARBONATE ALK. as HCO_3 mg/L	TOTAL ALK. as $CaCO_3$ mg/L	TOTAL HARDNESS as $CaCO_3$ mg/L	ACIDITY as $CaCO_3$ mg/L	ALPHA RADIO-ACTIVITY pc/L	BETA RADIO-ACTIVITY pc/L
3-26-81	08:59		15	12	8.3								0.40	<0.001	<0.01	<0.01				0.220	<0.001	40.0			12.0		304			395			280.6	230		14.00		
11-19-81	11:23	5.2	2	2	7.8									<0.001	0.20					0.230		36.0			21.0		340			530			347.2					
12-22-81	11:45		-10	1	7.4									<0.001	2.61					0.500		135			15.0		499			320			342.80	397.51				

DATE	ALUMINUM TOTAL mg/L	ANTIMONY TOTAL mg/L	ARSENIC TOTAL mg/L	BARIUM TOTAL mg/L	BERYLLIUM TOTAL mg/L	BORON TOTAL mg/L	CADMIUM TOTAL mg/L	CALCIUM TOTAL mg/L	CHLORIDE DISS. mg/L	CHROMIUM HEX as Cr mg/L	COBALT TOTAL mg/L	COPPER TOTAL mg/L	CYANIDE as CN mg/L	FLUORIDE DISS. mg/L	GERMANIUM TOTAL mg/L	IRON DISS. mg/L	IRON TOTAL mg/L	LEAD TOTAL mg/L	MANGANESE TOTAL mg/L	MERCURY TOTAL mg/L	MOLYBDENUM TOTAL mg/L	NICKEL TOTAL mg/L	POTASSIUM TOTAL mg/L	SELENIUM TOTAL mg/L	SILICA as SiO_2 mg/L	SILVER TOTAL mg/L	SODIUM TOTAL mg/L	ZINC TOTAL mg/L	MAGNESIUM TOTAL mg/L				COMMENTS
3-26-81			0.002	0.055		0.40	<0.001	72.00	12.70	<0.001		0.010		0.18		<0.001	0.610	<0.001	24.00	0.070	<0.0002			2.97	0.005		<0.001	5.60	0.015					
11-19-81								72.00	6.80								1.750		24.48	0.060				2.20				20.00						
12-22-81								79.50	10.35								0.790		29.50	0.050				2.65				17.50						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-4
Location Whiskey Canyon Creek above Belina Mine

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP. MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	DISSOLVED OXYGEN mg/L	OIL & GREASE mg/L	PHENOL mg/L	NITROGEN AMMONIA as NH_3-N mg/L	NITROGEN NITRATE as NO_3-N mg/L	NITROGEN NITRITE as NO_2-N mg/L	NITROGEN TOTAL KJELDAHL mg/L	NITROGEN ORGANIC mg/L	PHOSPHATE TOTAL as PO_4-P mg/L	PHOSPHATE ORTHO as PO_4-P mg/L	SULFATE as SO_4 mg/L	FLUORIDE as F mg/L	SURFACTANT as MBAS mg/L	SOLIDS TDS mg/L	SOLIDS TOTAL SUSPENDED mg/L	SOLIDS TDS mg/L	SOLIDS TOTAL SOLIDS mg/L	SOLIDS TOTAL VOLATILE SOLIDS mg/L	COND. µmhos	TURBIDITY FTU	CARBONATE ALK. as CO_3 mg/L	BICARBONATE ALK. as HCO_3 mg/L	TOTAL ALK. as $CaCO_3$ mg/L	TOTAL HARDNESS as $CaCO_3$ mg/L	ACIDITY as $CaCO_3$ mg/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L
4-8-81	15:10	-0-																																				
6-24-81	16:18	0.009	15	12	8.4									<0.001	<0.05					0.160		13.2			20.0		166			235			175.18	148		<20.1		
8-26-81	14:46	-0-																																				
9-14-81	14:13	0.004	-1	2	8.4									<0.001	0.19					0.200		27.0			64.0		221			340			218.40					
12-13-81	12:40	-0-																																				

DATE	ALUMINUM TOTAL mg/L	ANTIMONY TOTAL mg/L	ARSENIC TOTAL mg/L	BARIUM TOTAL mg/L	BERYLLIUM TOTAL mg/L	BORON TOTAL mg/L	CADMIUM TOTAL mg/L	CALCIUM TOTAL mg/L	CHLORIDE DISS. mg/L	CHROMIUM HEX as CR mg/L	COBALT TOTAL mg/L	COPPER TOTAL mg/L	CYANIDE as CN mg/L	FLUORIDE DISS. mg/L	GERMANIUM TOTAL mg/L	IODIDE DISS. mg/L	IRON TOTAL mg/L	LEAD TOTAL mg/L	MAGNESIUM TOTAL mg/L	MANGANESE TOTAL mg/L	MERCURY TOTAL mg/L	MOLYBDENUM TOTAL mg/L	NICKEL TOTAL mg/L	POTASSIUM TOTAL mg/L	SELENIUM TOTAL mg/L	SILICA as SiO_2 mg/L	SILVER TOTAL mg/L	SODIUM TOTAL mg/L	ZINC TOTAL mg/L	VANADIUM TOTAL mg/L				COMMENTS
4-8-81																																			
6-24-81								48.00	7.50								0.830		9.60	0.090				0.86				120						
8-26-81																																			
10-14-81								52.00	3.20								0.335		11.52	0.018				2.60				1400						
12-23-81																																			Freeze

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-2
Location Mud Creek above Utah mine #2

Date	Time	Flow	Temperature Air	Temperature Water	pH	Coliform Total	Coliform Fecal	Fecal Strep	B.O.D.	C.O.D.	T.O.C.	Dissolved Oxygen	Oil & Grease	Phenol	Nitrogen Ammonia as NH_4^+	Nitrogen Nitrate as NO_3^-	Nitrogen Nitrite as NO_2^-	Nitrogen Total Kjeldahl	Nitrogen Organic	Phosphate Total as PO_4^{-3}	Phosphate Ortho as PO_4^{-3}	Sulfate as SO_4	Hardness as CaCO	Alkalinity as $CaCO_3$	Solids TDS	Solids Total Volatile Solids	Solids T.S.S.	Solids Total Solids Volatile Solids	Conductivity	Turbidity	Chemical Alk. as CO_3	Bi-carbonate Alk. as HCO_3	Total Alk. as $CaCO_3$	Total Hardness as $CaCO_3$	Activity as $CaCO_3$	Alpha Radio-activity	Beta Radio-activity
		cfs	°C	°C		MPN	MPN	MPN	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µmhos	FTU	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L
3-17-77	14:00	3.5	-1	2	7.6				9.5		4.0	9.75	<1.0		0.13	0.03	<0.01	0.20		0.062	0.050	52.0	<0.01		8.0	<0.1	450		690	1.50	<0.01	297.7	248	280			
6-16-77	11:30	2.3	21	13	7.6				4.0		3.5	7.1	<1.0	<0.001	0.13	0.01		0.40		0.025	0.011	28.3	<0.01		3.0	0.2	280		425	3.50	<0.01	292.8	240	276		0	0
6-28-78	15:55	16	24	16	7.2	220	<20			<1.0	19.0		<1.0	0.008		0.20	<0.01	0.10				260			2.2		216		335			207.4					
8-23-78	12:50	1.5	26	12	8.0							8.6	1.5	0.002								31.0			6.0		260		395			270.8					
10-25-78	11:00	3.2	3	3	7.2							10.0	2.0	0.004								39.0			5.0		298					297.6					
12-27-78	10:10	5.7	-11	0	7.92							11.1	1.2	0.003								45.0			22.0		328		500			329.4					
2-28-79	11:30	5.1	-6	0.2	7.7							9.6	<1.0	<0.001		0.12					0.060	40.0			55.0		316		490			324.57	266				
4-18-79	11:20	12	9	6.5	7.73							9.1	<1.0	0.010		0.20					0.08	41.0			54.0		318		490			292.8	238				
6-20-79	09:25	13.6	14	4.7	7.9							7.5	5.2	<0.001		0.28					0.010	14.8			14.0		209		358			224.49	184		10.0		
8-23-79	09:21	8.4	12	6	8.1							8.3	<1.0	0.008		<0.01					0.140	44.1			84.0		310		510			297.89	244		10.0		
10-27-79	14:09	5.0	2	1	7.8							10.0	<1.0	<0.001		<0.01					0.040	60.0			40.0		312		550			272.11	228		16.0		
2-27-80	14:05	10.7	6	0.5	9.2							10.1	12.8	0.006		0.14				0.316	0.120	380			139		728		515			280.60	230		12.0		
4-29-80	10:55	25.5	9.0	3.0	8.85							9.0		0.018	<0.01					0.300		19.5			500		229		410			229.34					
6-25-80	11:38	31	11	5	8.6							9.8		0.014	<0.01					0.110		<3.0			76.0		172		270			278.72					
8-25-80	13:30	6.8	15	12	8.7							8.6	3.00	0.150	<0.01	<0.01				0.380	<0.010	27.0			28.0		290		450			309.88	254		10.0		
10-2-80	10:42	4.7	16	5	8.9									<0.001	<0.01					0.090		30.0			1.0		310		480			331.84					
12-10-80	15:25	11	0	1	7.10									0.019	<0.01					0.040		34.5			18.0		332		500			399.92					
2-25-81	14:10	4.4	11	4	8.0								1.60	<0.002	<0.01	0.04				0.021		48.0			12.0		280		430			258.44	212		<0.1		
4-8-81	11:40	6.4	6	4	8.1									<0.001	0.15					0.020		50.0			27.0		350		319			336.72					
6-24-81	09:28	6.4	18	12	8.4									<0.001	0.10					0.200		48.5			11.0		298		355			265.16	222		<0.01		

Date	Aluminum Total	Antimony Total	Arsenic Total	Barium Total	Beryllium Total	Boron Total	Cadmium Total	Calcium Total	Chloride Diss.	Chromium Hex. or Cr	Cobalt Total	Copper Total	Cyanide as CN	Fluoride Diss.	Manganese Total	Iron Diss.	Iron Total	Lead Total	Magnesium Total	Manganese Total	Mercury Total	Molybdenum Total	Nickel Total	Potassium Total	Selenium Total	Silica as SiO_2	Silver Total	Sodium Total	Zinc Total	Vanadium Total				Comments
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
3-17-77	0.008		<0.001	0.005		<0.001	<0.001	68.0	4.0	<0.001		0.002		0.16			0.223	<0.001	26.40	0.017	<0.0002		<0.001	2.18	<0.001	5.4	<0.001	8.63	0.017				
6-16-77	0.008	<0.001	<0.001	0.018	<0.001	0.005	<0.001	67.2	12.0	<0.001	<0.001	0.007	<0.01	0.20	<0.001		0.137	<0.001	25.92	0.003	<0.0002	<0.001	<0.001	2.28	<0.001	5.0	<0.001	4.78	0.011	<0.01				Snowing
6-28-78			<0.001				<0.001	51.2	10.0	<0.001		0.005		0.14			0.183	<0.001	11.50	0.050	<0.0002			1.289	<0.001	2.9	<0.00	4.0	0.005					
8-23-78			<0.001				<0.001	57.6	4.0	<0.001		0.006		0.14			0.164	<0.001	26.9	0.026	<0.0002			1.82	<0.001		<0.001	3.96	0.012					
10-25-78			<0.001				<0.001	72.0	9.0	<0.001		0.009		0.16			0.188	<0.001	25.9	0.030	<0.0002			1.80	<0.001			3.90	0.009					
12-27-78			<0.001				<0.001	80.8	6.0	<0.001		0.001		0.17			0.200	<0.001	26.4	0.047	<0.0002			2.116	<0.001			4.46	0.006					
2-28-79			<0.001				<0.001	77.0	<0.1	<0.001		0.006		0.17			0.519	<0.001	24.96	0.079	<0.0002			2.213	<0.001		<0.001	4.0	0.005					Overcast
4-18-79			<0.001				<0.001	80.8	14.0	<0.001		0.002		0.17			2.784	0.002	19.20	0.118	<0.0002			2.294	<0.001		<0.001	3.85	0.009					
6-20-79			<0.001				<0.001	57.6	4.0	<0.001		0.003		0.16			1.150	<0.001	12.96	0.059	<0.0002			1.098	<0.001		<0.001	2.63	0.006					
8-23-79			<0.001				<0.001	76.0	2.0			0.011		0.24			1.210	<0.001	8.60	0.016	<0.0002			2.194	<0.001		<0.001	1.92	0.004					
10-31-79			<0.001	0.217		0.060	<0.001	65.60	8.0	<0.001		0.012		0.18			0.860	<0.001	29.76	0.052	<0.0002			2.740	<0.001		<0.001	5.85	0.007					
2-27-80			<0.001	0.090		0.115	<0.001	60.80	20.0	<0.001		<0.001		0.15			43.10	0.002	120	0.150	<0.0002			2.15	<0.001		<0.001	1.10	0.010					
4-29-80								58.90	10.0								2.150		13.44	0.128				2.10				8.00						Light Rain
6-25-80								94.00	<0.1								1.230		16.76	0.050				0.91				4.00						Scattered Showers
8-25-80			<0.001	<0.001		0.030	<0.001	62.40	6.0	<0.001		<0.001		0.15		<0.001	0.350	<0.002	23.52	<0.001	<0.0002			1.87	<0.001		<0.001	15.00	<0.001					
10-2-80								57.60	8.5								0.815		25.92	0.010				2.22				23.00						
12-10-80								76.40	5.75								0.260		23.04	0.060				2.25				5.25						
2-25-81			0.001	0.050		0.030	<0.001	67.10	11.00	<0.001		<0.001		0.19			0.365	0.020	25.20	0.070	<0.0002			2.33	0.001		<0.001	3.20	0.010					

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-4
Location Above Belina mine

Date	Time	Flow	Temperature Air	Temperature Water	pH	Coliform Total	Coliform Fecal	Fecal Strep.	C.O.D.	B.O.D.	T.O.C.	Dissolved Oxygen	Oil & Grease	Phenol	Nitrogen Ammonia as NH_3-N	Nitrogen Nitrate as NO_3-N	Nitrogen Nitrite as NO_2-N	Nitrogen Total Kjeldahl	Nitrogen Organic	Phosphate Total as PO_4-P	Phosphate Ortho as PO_4-P	Sulfate as SO_4	Fluoride as F	Surfactant as MBAS	Solids TDS	Solids Total Settleable Solids	Solids TSS	Solids Total Susp. Solids	Solids Total Volatile Solids	Odor	Turbidity	Carbonate Alk. as $CaCO_3$	Bi-carbonate Alk. as HCO_3	Total Alk. as $CaCO_3$	Total Hardness as $CaCO_3$	Acidity as $CaCO_3$	Alpha Radio-activity	Beta Radio-activity
		cfs	°C	°C		MPN	MPN	MPN	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Threshold	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L	pCi/L
3-17-77	14:30	-0-																																				
6-16-77	13:00	-0-																																				
5-10-78	14:55	-0-																																				
6-14-78	15:55	1	20	4	7.0						10.0	9.4	<1.0	<0.001	0.10	0.10	<0.01	0.18			0.025	8.0			85.0		84.0					78.2						
7-12-78	15:05	0.07	21	14	7.7							7.3	<1.0									24.0			10.0		110			130		92.72						
8-23-78	14:35	-0-																																				
10-25-78	14:00	-0-																																				
12-27-78	15:10	-0-																																				
2-28-79	12:30	-0-																																				
4-18-79	12:05	-0-																																				
6-20-79	12:30	0.1	16	7	8.0							8.1	1.4	<0.001		0.12					0.012	28.6			64.0		98.0			112		73.20	100.0		60.0		
8-23-79	10:18	0.01	17	7.5	8.3							7.4	<1.0	0.004		<0.01					0.020	10.0			35.0		222			360		24.44	202		10.0		
10-3-79	13:94	-0-																																				
2-27-80	14:10	-0-																																				
4-29-80			In Accessible																																			
6-25-80	15:05	0.8	27	10	8.7							8.0		<0.002	<0.01					0.070		50.0			37.0		112			170		48.80					
8-25-80	15:40	0.01	13	14	8.4							7.0	7.80	0.002	<0.01	<0.01				0.100	<0.010	7.5			17.0		220			340		54.80	190		28.0		
10-7-80	09:20	0.002	12	6	8.7									<0.001	<0.01					0.100		304			26.0		600			920		98.28					
12-8-80	14:30	-0-																																				
2-25-81	13:30	-0-																																				

Date	Aluminum Total	Antimony Total	Arsenic Total	Barium Total	Beryllium Total	Boron Total	Chromium Total	Calcium Total	Calcium Diss.	Chromium Hexavalent	Cobalt Total	Copper Total	Cyanide as CN	Fluoride Diss.	Potassium Total	Iron Diss.	Iron Total	Lead Total	Magnesium Total	Manganese Total	Mercury Total	Molybdenum Total	Nickel Total	Phosphorus Total	Selenium Total	Silica as SiO_2	Silver Total	Sodium Total	Zinc Total	Vanadium Total				Comments
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
3-17-77																																		
6-16-77																																		
5-10-78																																		
6-14-78			<0.001				<0.001	23.2	8.0	<0.001		0.007		0.08			0.128	<0.001	1.92	0.013	<0.002			0.439	<0.001	2.50	<0.001	5.5	0.006					
7-12-78			<0.001					11.2	<1.0								0.215	<0.001	1.92	0.011	<0.002			0.618	<0.001		<0.001	28.0	0.018					
8-23-78																																		
10-25-78																																		
12-27-78																																		
2-28-79																																		
4-18-79																																		
6-20-79			<0.001				<0.001	21.40	<1.0	<0.001		0.007		0.10			0.880	<0.001	8.16	<0.001	<0.002			0.575	<0.001		<0.001	0.65	0.008					
8-23-79			<0.001				<0.001	72.0	<0.1			0.011		0.20			1.150	<0.001	4.80	0.168	<0.002			1.733	<0.001		<0.001	3.50	0.055					
10-3-79																																		
2-27-80																																		
4-29-80																																		
6-25-80								17.80	<0.1								0.860		6.72	0.030				0.38				16.00						
8-25-80			<0.001	<0.001		0.070	<0.001	57.40	14.0	<0.001		<0.001		0.12		<0.001	0.480	<0.002	11.52	<0.001	<0.000			0.83	<0.001		<0.001	10.00	<0.001					
10-7-80								41.60	0.2								0.510		96.00	<0.001				0.89				1.20						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-5
Location Below Belina Mine
Whiskey Canyon Creek

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	DISSOLVED OXYGEN mg/L	OIL & GREASE mg/L	PHENOL mg/L	NITROGEN AMMONIA as NH_3-N mg/L	NITROGEN NITRATE as NO_3-N mg/L	NITROGEN NITRITE as NO_2-N mg/L	NITROGEN TOTAL KJELDAHL mg/L	NITROGEN ORGANIC mg/L	PHOSPHATE TOTAL as PO_4-P mg/L	PHOSPHATE ORTHO as PO_4-P mg/L	SULFATE as SO_4 mg/L	CHLORIDE as Cl mg/L	SULFIDE as H_2S mg/L	SOLIDS TDS mg/L	SOLIDS TOTAL DISSOLVED SOLIDS mg/L	SOLIDS T.S.S. mg/L	SOLIDS TOTAL SOLIDS mg/L	SOLIDS TOTAL VOLATILE SOLIDS mg/L	COND. µmhos/cm	TURBIDITY FTU	CARBONATE ALK. as CO_3 mg/L	BICARBONATE ALK. as HCO_3 mg/L	TOTAL ALK. as $CaCO_3$ mg/L	TOTAL HARDNESS as $CaCO_3$ mg/L	ACIDITY as $CaCO_3$ mg/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L
4-8-81	11:23	-0-																																				
6-24-81	16:45	0.1	20	20	8.6									<0.001	0.10					0.210		110			15.0		288			410			131.76	116		<0.01		
8-26-81	16:33	0.08	20	17	8.7								1.80	<0.001	<0.01	<0.01				0.230	0.050	54.0			3.0		275			370			100.54	156		<0.01		
10-14-81	13:23	0.3	1	0	8.3									0.002	0.23					0.235		51.0			224		400			610			349					
12-23-81	15:08	-0-																																				

DATE	ALUMINUM TOTAL mg/L	ANTIMONY TOTAL mg/L	ARSENIC TOTAL mg/L	BARIUM TOTAL mg/L	BERYLLIUM TOTAL mg/L	BORON TOTAL mg/L	CADMIUM TOTAL mg/L	CALCIUM TOTAL mg/L	CHLORIDE DISS. mg/L	CHROMIUM HEXavalent CR mg/L	COBALT TOTAL mg/L	COPPER TOTAL mg/L	CYANIDE as CN mg/L	FLUORIDE DISS. mg/L	IRON TOTAL mg/L	IRON DISS. mg/L	IRON TOTAL mg/L	LEAD TOTAL mg/L	MAGNESIUM TOTAL mg/L	MANGANESE TOTAL mg/L	MERCURY TOTAL mg/L	MOLYBDENUM TOTAL mg/L	NICKEL TOTAL mg/L	POTASSIUM TOTAL mg/L	SELENIUM TOTAL mg/L	SILICA as SiO_2 mg/L	SILVER TOTAL mg/L	SODIUM TOTAL mg/L	ZINC TOTAL mg/L	VANADIUM TOTAL mg/L				COMMENTS
4-8-81																																			
6-24-81								49.20	21.50								0.190		27.84	0.020				3.95				6.60						
8-26-81			0.003	0.040		0.080	<0.001	49.80	33.90	<0.001		0.010		0.20		<0.001	0.50	<0.001	27.84	0.020	<0.002			3.78	0.003		<0.001	6.50	0.015					
10-14-81								40.00	33.90								0.550		33.64	0.020				3.50				6.00						
12-23-81																																			FROZEN

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-5
Location Below Belina mine

Date	Time	Flow gpm	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	TOC mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen Ammonia as NH_3-N mg/L	Nitrogen Nitrate as NO_3-N mg/L	Nitrogen Nitrite as NO_2-N mg/L	Nitrogen Total Kjeldahl mg/L	Nitrogen Organic mg/L	Phosphate Total as PO_4-P mg/L	Phosphate Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Phenols as OH mg/L	Surfactant as LAS mg/L	Solids TSS mg/L	Solids Total Settleable Solids mg/L	Solids TDS mg/L	Solids Total SO_4 mg/L	Solids Total Volatile SO_4 mg/L	Conductivity µmhos	Turbidity FTU	Bicarbonate Alk. as CO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radio-activity pCi/L	Beta Radio-activity pCi/L
3-17-77	14:25	-0-																																			
6-16-77	13:10	-0-																																			
5-10-78	15:55	1.4	17	2.5	7.5						9.0	9.9	15.2			1.12	0.02	0.55			0.120	102			2640		200			310			560				
6-14-78	16:55	1.6	25	10	7.1						23.0	9.0	<1.0	0.005	0.12	0.46	<0.01	0.25			0.028	10.0			869		138			250			134.2				
9-12-78	15:45	0.3	27	20.5	8.3							8.1	16.0									78.0			750		283			355			282.52				
10-23-78	13:10	0.01	22	8	8.4						20.1	8.2	12.0	0.250								26.0			8.0		210			320			219.6				
10-25-78	11:32	-0-																																			
12-27-78	10:40	-0-																																			
2-28-79	12:10	-0-																																			
4-18-79	11:47	0.3	10	1	7.48						6.0	10.0	1.8	0.008		1.09					2.00	191			3910		510			770			231.8	190			
6-20-79	17:48	0.6	20	10	8.9							8.0	2.7	<0.001		0.20					0.015	32.5			19.0		210			360			192.2	174		<1.0	
8-25-79	09:55	0.09	16	5.5	8.1							8.8	<1.0	0.086		<0.01					0.100	44.9			1.0		275			450			219.54	198		10.0	
10-30-79	13:44	-0-																																			
2-27-80	14:26	-0-																																			
4-29-80	11:32	2.6	4	2	9.2							9.2		0.015	0.20					3.100		32.0			3402		215			380			185.44				
6-25-80	14:25	2.2	25	12	9.1							7.5		0.050	<0.01					0.070		45.0			46.0		188			290			146.40				
8-25-80	15:08	0.6	14	14	8.7							8.0	<0.01	<0.001	<0.01	<0.01				0.200	<0.010	52.0			149		270			420			231.80	190		14.0	
10-7-80	10:00	0.4	7	4	9.0									<0.001	<0.01					0.070		255			340		255			390			278.54				
12-10-80	14:54	-0-																																			
2-2-81		-0-																																			

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride mg/L	Chromium Hex. as Cr mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride mg/L	Germanium Total mg/L	Iron mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Manganese Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
3-17-77																																		
6-16-77																																		
5-10-78			<0.001				<0.001	47.5	10.0	<0.001		0.002		0.19			0.059	<0.001	8.64	0.015	<0.0002			1.364	<0.001	3.90	<0.001	3.79	0.008					
6-14-78			<0.001				<0.001	38.4	8.0	<0.001		0.009		0.14			1.492	<0.001	5.76	0.013	<0.0002			1.032	<0.001	4.50	<0.001	7.5	0.008					
9-12-78			<0.001					32.5	2.0								0.098	<0.001	6.80	0.070	<0.0002			1.496	<0.001		<0.001	62.0	0.014					
10-23-78			<0.001					49.6	<1.0			0.006		0.12			0.011	<0.001	19.2	0.011	<0.0002			1.481	<0.001		<0.001	2.97	0.017					
10-25-78																																		
12-27-78																																		
2-28-79																																		
4-18-79			0.044					77.6	12.0			0.007		0.20			88.5	0.086	11.04	1.532	<0.0002			2.552	<0.001		<0.001	5.58	0.108					
6-20-79			<0.001				<0.001	56.0	4.0	<0.001		<0.001		0.116			0.750	<0.001	12.48	0.243	<0.0002			1.521	<0.001		<0.001	2.85	0.015					
8-25-79			<0.001				<0.001	95.6	4.0			0.013		0.22			0.110	<0.001	6.24	0.060	<0.0002			1.800	<0.001		<0.001	4.79	<0.001					
10-30-79																																		
2-27-80																																		
4-29-80								54.40	14.0								0.950		12.96	0.113				6.10				4.30						Rain
6-25-80								49.60	2.0								0.960		10.08	0.030				1.21				2.90						
8-25-80			<0.001	<0.001		0.080	<0.001	60.00	10.0	<0.001		<0.001		0.19		<0.001	2.850	<0.002	24.00	<0.001	<0.0002			2.24	<0.001		<0.001	4.60	<0.001					
10-7-80								56.00	9.0								2.650		20.16	0.005				2.53				0.00						
12-10-80																																		

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-10
Location South Fork Eccles Creek above Eccles Creek

Date	Time	Flow	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	T.A.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen Ammonia as NH_3-N mg/L	Nitrogen Nitrate as NO_3-N mg/L	Nitrogen Nitrite as NO_2-N mg/L	Nitrogen Total Kjeldahl mg/L	Nitrogen Organic mg/L	Phosphate Total as PO_4-P mg/L	Phosphate Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Hardness as CaCO mg/L	Surfactant as MBAS mg/L	Solids TDS mg/L	Solids Total Settleable Solids mg/L	Solids T.S.S. mg/L	Solids Total Solids mg/L	Solids Total Volatile Solids mg/L	Cond. µmhos	Turbidity FTU	Carbonate Alk. as CO_3 mg/L	Bi-Carbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radio-Activity pCi/L	Beta Radio-Activity pCi/L
8-25-80	16:00	0.9	14	13	8.2	1100	2.0				7.00	8.1	0.60	<0.001	<0.01	<0.01				0.120		25.0			16.0		235			360	7.20		25.63	210			<0.1	1.0	2.1
9-16-80	09:04	0.5	12	7	8.5									0.048	<0.01					0.080		20.0			17.0		225			350			24.56						
10-7-80	12:50	0.157	21	8	8.6									0.023	<0.01					0.060		6.0			6.0		212			320			25.64						
11-19-80	10:36		-6	0	7.5									<0.001	<0.01					0.170		12.0			14.0		278			260			34.28						
12-29-80	10:00		In Accessible																																			
1-27-81	11:31		In Accessible																																			
2-25-81	In Accessible																																					
3-11-81	13:40	-0-																																				
4-8-81	13:27	-0-																																				
6-24-81		0.16	21	11	8.4									<0.001	<0.05					0.240		20.0			11.0		212			300			22.48	190			<0.01		
8-26-81	16:16	0.2	17	14	8.4								2.20	<0.001	<0.01	<0.01				0.290	0.110	15.0			4.0		230			290			29.88	204			14.00		
10-19-81	13:36	0.1	3	3	8.3									<0.001	0.18					0.260		27.0			40.0		320						27.30						
12-23-81	13:11	-0-																																				

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride Diss. mg/L	Chromium Hexavalent mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride Diss. mg/L	Manganese Total mg/L	Iron Diss. mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Molybdenum mg/L	Mercury Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
8-25-80			<0.001	0.030		0.025	<0.001	57.60	<0.1	<0.001		<0.001	<0.001	0.014		0.100	0.530	<0.001	20.64	0.040	<0.002		0.89	0.002		<0.001	2.10	0.020					
9-16-80								62.40	1.7	<0.001							0.245		15.36	0.026		<0.001	0.60				1.80						
10-7-80								59.20	8.4								0.420		17.96	0.033			1.01				6.00						
11-19-80								72.80	1.30								0.490		16.80	0.035			1.07				15.00						
12-29-80																																	
1-27-81																																	
2-25-81																																	
3-11-81																																	
4-8-81																																	
6-24-81								55.20	2.98								0.120		15.84	0.030			0.87				210						
8-26-81			0.003	0.030		0.020	<0.001	56.80	4.69	<0.001		<0.001		0.17		0.030	0.430	<0.001	18.72	1.070	<0.002		1.22	0.004		<0.001	2.30	0.010					
10-19-81								60.00	4.80								0.480		16.32	0.031			1.20				17.00						
12-23-81																																	Freeze

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station Station VC-10
Location South Fork Eccles Creek above Eccles Creek

DATE	TIME	FLOW	TEMPERATURE		pH	COLIFORM		FECAL STREP.	C.O.D.	B.O.D.	T.O.C.	DISSOLVED OXYGEN	OIL & GREASE	PHENOL	NITROGEN					PHOSPHATE		SULFATE	HYDROGEN	SULFIDE	SOLIDS					ODOR	TURBIDITY	CARBONATE ALK.	BI-CARBONATE ALK.	TOTAL ALK.	TOTAL HARDNESS	ALPHA RADIO-ACTIVITY	BETA RADIO-ACTIVITY	
			AIR	WATER		TOTAL	FECAL								AMMONIA	NITRATE	NITRITE	NITROGEN TOTAL ALBUMIN	NITROGEN ORGANIC	TOTAL	ORTHO				TDS	TOTAL RETURNABLE SOLIDS	T.S.S.	TOTAL SOLIDS	TOTAL VOLATILE SOLIDS									
		CFS	°C	°C		MPN	MPN	MPN	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	ODOR NUMBER	FTU	MG/L	MG/L	MG/L	MG/L	PCI/L	PCI/L	

DATE	ALUMINUM DISS.	ANTIMONY DISS.	ARSENIC DISS.	BARIUM DISS.	BERYLLIUM DISS.	BORON DISS.	CADMIUM DISS.	CALCIUM DISS.	CHLORIDE DISS.	CHROMIUM HEXAVALENT CR.	COBALT DISS.	COPPER DISS.	CYANIDE AS CN	FLUORIDE DISS.	GERMANIUM DISS.	IRON DISS.	IRON TOTAL	LEAD DISS.	MANGANESE DISS.	MANGANESE DISS.	MERCURY DISS.	MOLYBDENUM DISS.	NICKEL DISS.	POTASSIUM DISS.	SELENIUM DISS.	SILICA AS SiO_2	SILVER DISS.	SODIUM DISS.	ZINC DISS.	VANADIUM DISS.				COMMENTS
	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L				
8-25-80			<0.001	0.030		0.010	<0.001			<0.001		<0.001				0.100	0.530	<0.001							<0.001		<0.001		0.010					
9-16-80																	0.245																	
10-7-80																	0.420																	
11-19-80																	0.490																	
12-29-80																																		
1-22-81																																		
2-25-81																																		
3-11-81																																		
4-8-81																																		

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-11
Location Beardinghouse Creek

DATE	TIME	FLOW (CFS)	TEMPERATURE AIR (°C)	TEMPERATURE WATER (°C)	pH	COLIFORM TOTAL (MPN)	COLIFORM FECAL (MPN)	FECAL STREP (MPN)	C.O.D. (MG/L)	B.O.D. (MG/L)	T.O.C. (MG/L)	DISSOLVED OXYGEN (MG/L)	OIL & GREASE (MG/L)	PHENOL (MG/L)	NITROGEN AMMONIA as NH_3-N (MG/L)	NITROGEN NITRATE as NO_3-N (MG/L)	NITROGEN NITRITE as NO_2-N (MG/L)	NITROGEN TOTAL KJELDAHL (MG/L)	NITROGEN ORGANIC (MG/L)	PHOSPHATE TOTAL as PO_4-P (MG/L)	PHOSPHATE ORTHO as PO_4-P (MG/L)	SULFATE as SO_4 (MG/L)	CHLORIDE as Cl (MG/L)	SURFACTANT as MBAS (MG/L)	SOLIDS TDS (MG/L)	SOLIDS TOTAL NITROGEN SOLIDS (MG/L)	SOLIDS TSS (MG/L)	SOLIDS TOTAL COLIFORM SOLIDS (MG/L)	SOLIDS TOTAL VOLATILE SOLIDS (MG/L)	COND (µmhos)	TURBIDITY (FTU)	CARBONATE ALK. as CO_3 (MG/L)	BICARBONATE ALK. as HCO_3 (MG/L)	TOTAL ALK. as $CaCO_3$ (MG/L)	TOTAL HARDNESS as $CaCO_3$ (MG/L)	ANIONITY as $CaCO_3$ (MG/L)	ALPHA RADIO-ACTIVITY (pCi/L)	BETA RADIO-ACTIVITY (pCi/L)
7-27-80	In Accessible																																					
4-29-80	In Accessible																																					
6-25-80	10:36	6.5	27	9	8.8							8.5		0.016	<0.01					0.170		27.0			33.0		145			230			71.76					
8-25-80	13:10	1.7	17	10	8.4							8.3	<0.01	<0.001	<0.01	0.04				0.060	0.006	16.5			19.0		268			410			168.40	224		<0.1		
10-7-80	12:28	0.9	21	8	8.5									0.014	<0.01					0.170		3.0			8.0		252			390			38.88					
12-10-80	15:13		In Accessible																																			
2-25-81	In Accessible																																					
4-8-81	12:49		In Accessible																																			
6-24-81	10:28	0.6	25	15										<0.001	0.10					0.080		39.0			11.0		258			310			74.34	210		<0.01		
8-26-81	09:48	0.5	23	14									1.60	<0.001	<0.01	<0.01				0.280	0.060	34.0			4.0		285			360			295.48	234		16.00		
10-14-81	13:06	0.5	3	4	7.8									<0.001	0.22					0.280		21.0			51.0		310			470			326.15					
12-23-81	12:45		-11	2	7.9									<0.001	2.70					0.490		32.0			26.0		295			260			304.80	279.84				

DATE	ALUMINUM TOTAL (MG/L)	ANTIMONY TOTAL (MG/L)	ARSENIC TOTAL (MG/L)	BARIUM TOTAL (MG/L)	BERYLLIUM TOTAL (MG/L)	BORON TOTAL (MG/L)	CADMIUM TOTAL (MG/L)	CALCIUM TOTAL (MG/L)	CHLORIDE DISS. (MG/L)	CHROMIUM HEX as CR (MG/L)	COBALT TOTAL (MG/L)	COPPER TOTAL (MG/L)	CYANIDE as CN (MG/L)	FLUORIDE DISS. (MG/L)	MERCURY TOTAL (MG/L)	IRON DISS. (MG/L)	IRON TOTAL (MG/L)	LEAD TOTAL (MG/L)	MANGANESE TOTAL (MG/L)	MOLYBDENUM TOTAL (MG/L)	MERCURY TOTAL (MG/L)	NICKEL TOTAL (MG/L)	NICKEL TOTAL (MG/L)	PHOSPHORUS TOTAL (MG/L)	SELENIUM TOTAL (MG/L)	SILICA as SiO_2 (MG/L)	SILVER TOTAL (MG/L)	SODIUM TOTAL (MG/L)	ZINC TOTAL (MG/L)	VANADIUM TOTAL (MG/L)				COMMENTS
7-27-80																																		
4-29-80																																		
6-25-80								37.60	<0.1								0.660		9.60	0.040				0.87				2.20						
8-25-80			<0.001	0.030		0.010	<0.001	78.40	18.0	<0.001		<0.001		0.14		0.050	0.400	<0.001	15.84	0.020	<0.0002			1.19	<0.001		<0.001	7.00	0.002					
10-7-80								65.60	2.2								0.390		18.24	0.026				1.47				8.00						
12-10-80																																		
2-25-81																																		
4-8-81																																		
6-24-81								56.00	9.42								0.790		27.56	0.040				1.27				7.80						
8-26-81			0.003	0.050		0.020	<0.001	71.20	6.67	<0.001		0.010		0.16		<0.001	0.880	<0.001	23.04	0.050	<0.0002			1.67	0.005		<0.001	3.60	0.010					
10-14-81								42.20	5.90								0.820		16.32	0.046				1.65				5.40						
12-23-81								77.50	4.78								0.825		23.00	0.089				0.86				3.10						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-12
Location Finn Canyon Creek

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen Ammonia as NH_3-N mg/L	Nitrogen Nitrate as NO_3-N mg/L	Nitrogen Nitrite as NO_2-N mg/L	Nitrogen Total Kjeldahl mg/L	Nitrogen Organic mg/L	Phosphate Total as PO_4-P mg/L	Phosphate Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Fluoride as F mg/L	Surfactant as MBAS mg/L	Solids TDS mg/L	Solids Total Suspended mg/L	Solids T.S.S. mg/L	Solids Total Dissolved mg/L	Solids Total Volatile mg/L	Cond. µmhos	Turbidity FTU	Carbonate Alk. as $CaCO_3$ mg/L	Bicarbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radio-activity pCi/L	Beta Radio-activity pCi/L
2-27-80	In-Accessible																																				
4-29-80	In-Accessible																																				
1-25-80	10:20	4.2	20	6.5	8.7							8.8		<0.002	<0.01					0.080		16.0			30.0		125			210			117.12					
5-25-80	12:53	0.3	13	9	7.9							6.7	<0.01	<0.001	0.11	<0.01				0.550	0.040	13.5			87.0		238			370			235.32	206		6.0		
8-7-80	17:13	0.004	20	10	8.4									<0.001	<0.01					1.060		15.0			1.0		318			490			216.44					
12-10-80	15:08	-0-																																			
2-25-81		-0-																																			
4-8-81	17:46	-0-																																			
1-29-81	10:10	0.4	24	13	8.6									<0.001	<0.05					0.130		14.9			3.0		159			209			175.66	148		13.81		
7-26-81	09:36	-0-																																			
8-19-81	10:35	-0-																																			
12-23-81	11:50	In-Accessible																																			

Date	Aluminum Total µg/L	Antimony Total µg/L	Arsenic Total µg/L	Barium Total µg/L	Beryllium Total µg/L	Boron Total µg/L	Cadmium Total µg/L	Calcium Total µg/L	Chloride Diss. µg/L	Chromium Hex. as Cr µg/L	Cobalt Total µg/L	Copper Total µg/L	Cyanide as CN µg/L	Fluoride Diss. µg/L	Germanium Total µg/L	Iron Diss. µg/L	Iron Total µg/L	Lead Total µg/L	Magnesium Total µg/L	Manganese Total µg/L	Mercury Total µg/L	Molybdenum Total µg/L	Nickel Total µg/L	Potassium Total µg/L	Selenium Total µg/L	Silica as SiO_2 µg/L	Silver Total µg/L	Sodium Total µg/L	Zinc Total µg/L	Vanadium Total µg/L				Comments
2-27-80																																		
4-29-80																																		
1-25-80								30.40	<0.1								0.770		8.16	0.020				0.68				2.10						
5-25-80			<0.001	0.030		0.020	<0.001	62.40	12.0	<0.001		0.010		0.15		0.040	7.700	<0.001	16.80	0.020	<0.0002			1.88	<0.01		<0.01	3.50	0.004					
8-7-80								79.20	4.2								8.200		22.08	0.031				1.86				13.00						
12-10-80																																		
2-25-81																																		
4-8-81																																		
1-29-81								114.80	2.63								0.020		11.52	0.010				0.58				1.90						
7-26-81																																		
8-19-81																																		
12-23-81																																		Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-13
Location Long Canyon Creek

Date	Time	Flow (CFS)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen Ammonia as NH_3-N (mg/L)	Nitrogen Nitrate as NO_3-N (mg/L)	Nitrogen Nitrite as NO_2-N (mg/L)	Nitrogen Total Kjeldahl (mg/L)	Nitrogen Organic (mg/L)	Phosphate Total as PO_4-P (mg/L)	Phosphate Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Fluoride as F (mg/L)	Surfactant as MBAS (mg/L)	Solids TDS (mg/L)	Solids Total Volatile Solids (mg/L)	Solids T.S.S. (mg/L)	Solids Total Suspended Solids (mg/L)	Solids Total Volatile Solids (mg/L)	Cond. (µmhos)	Turbidity (FTU)	Chromium Alk. as $CaCO_3$ (mg/L)	Bi-Chromate Alk. as $NaCO_3$ (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radio-Activity (pc/L)	Beta Radio-Activity (pc/L)
2-27-80	In Accessible																																				
4-27-80	In Accessible																																				
6-25-80	10:00	7.0	21	4	8.45							9.1		0.013	<0.01					0.060		12.0			23.0		110			180			114.54					
8-25-80	12:24	0.2	10	10	8.5							6.8	0.80	<0.001	0.111	<0.01				0.100	0.050	9.0			34.0		221			340			234.80	190		6.0		
12-10-80	15:05	-0-																																			
2-25-81		-0-																																			
4-8-81	12:00		In Accessible																																		
6-24-81	09:50	0.04	26	12	8.5									<0.001	0.15					0.160		17.0			2.0		157			220			175.68	150		<0.01		
8-26-81	09:26	-0-																																			
10-14-81	10:49	-0-																																			
12-23-81	11:45		In Accessible																																		

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Diss. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Diss. (mg/L)	Molybdenum Total (mg/L)	Iron Diss. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Manganese Total (mg/L)	Magnesium Total (mg/L)	Mercury Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
2-27-80																																	
4-27-80																																	
6-25-80								26.40	<0.1								0.170		10.08	0.030			0.53				1.70						
8-25-80			<0.001	0.020		<0.001	<0.001	59.40	14.0	<0.001		0.010		0.13		0.030	0.690	<0.001	11.04	0.010	<0.0002		1.11	<0.001		<0.001	10.50	0.002					
12-10-80																																	
2-25-81																																	
4-8-81																																	
6-24-81								49.80	3.14								0.030		10.08	<0.001			0.82				2.00						
8-26-81																																	
10-14-81																																	
12-23-81																																	Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-14
Location Whiskey Canyon Creek below sediment pond

Date	Time	Flow (cfs)	Temperature Air (°F)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen Ammonia as NH_3-N (mg/L)	Nitrogen Nitrate as NO_3-N (mg/L)	Nitrogen Nitrite as NO_2-N (mg/L)	Nitrogen Total Kjeldahl (mg/L)	Nitrogen Organic (mg/L)	Phosphate Total as PO_4-P (mg/L)	Phosphate Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Chloride as Cl (mg/L)	Sulfide as H_2S (mg/L)	Solids TDS (mg/L)	Solids Total Settleable Solids (ml/L)	Solids TSS (mg/L)	Solids Total Fixed Solids (mg/L)	Solids Total Volatile Solids (mg/L)	Cond. (µmhos)	Turbidity (FTU)	Carbonate Alk. as CO_3 (mg/L)	Bi-carbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radio-activity (pCi/L)	Beta Radio-activity (pCi/L)
4-29-80	11:48		In Accessible																																		
6-25-80	14:40	1.7	25	10.5	8.8							7.7		0.002	0.10					0.060		37.0			34.0		180			300			156.16					
8-25-80	15:25	0.6	15	12	8.7							7.9	0.60	0.010	<0.01	0.68				0.040	0.020	39.0			18.0		299			460			273.27	328		49.1		
10-7-80	09:40	0.5	9	6	8.9									<0.001	<0.01					0.080		12.0			21.0		251			390			295.24					
12-10-80	14:37	-0-																																			
2-25-81		-0-																																			
4-8-81	15:20	-0-																																			
6-24-81	15:45		28	12	8.3									<0.001	0.10					0.210		125			147		366			482			236.14	200		<0.01		
8-26-81	14:30	0.07	20	11	8.4								0.40	<0.001	<0.01	0.16				0.190	0.040	55.5			3.0		320			390			263.55	220		<0.01		
10-14-81	13:58	0.04	0	4	8.4									<0.001	0.21					0.250		60.0			22.0		320			500			257.90					
12-23-81	15:40	-0-	In Accessible																																		

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Diss. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Diss. (mg/L)	Manganese Total (mg/L)	Iron Diss. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
4-29-80																																	Rain & Snow
6-25-80								47.20	2.0								0.750		11.52	0.040			1.18				2.70						
8-25-80			<0.001	0.050		0.050	<0.001	73.60	18.0	<0.001		0.020		0.19		0.030	0.390	<0.001	23.04	0.020	<0.0002		2.36	<0.001		<0.001	3.90	0.050					
10-7-80								59.20	9.5								0.288		19.68	0.050			2.75				12.00						
12-10-80																																	
2-25-81																																	
4-8-81																																	
6-24-81								30.40	19.90								0.240		63.36	0.080			3.86				6.30						
8-26-81			0.002	0.085		0.090	0.002	53.80	28.00	<0.001		<0.001		0.21		10.00	0.530	<0.001	37.92	0.060	<0.0002		3.90	0.005		<0.001	7.60	0.130					
10-14-81								60.00	11.10								0.980		21.16	0.065			4.10				31.00						
12-23-81																																	Frozen-Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station W 19-1
Location Whiskey Canyon Well

Date	Time	Flow (gpm)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep. (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen: Ammonia as NH_4^+N (mg/L)	Nitrogen: Nitrate as NO_3^-N (mg/L)	Nitrogen: Nitrite as NO_2^-N (mg/L)	Nitrogen: Total Kjeldahl (mg/L)	Nitrogen: Organic (mg/L)	Phosphate: Total as PO_4^{-P} (mg/L)	Phosphate: Ortho as PO_4^{-P} (mg/L)	Sulfate as SO_4 (mg/L)	Fluoride as F (mg/L)	Surfactant as MBAS (mg/L)	Solids: TDS (mg/L)	Solids: Total Volatile Solids (mg/L)	Solids: T.S.S. (mg/L)	Solids: Total Susp. Solids (mg/L)	Solids: Total Volatile Solids (mg/L)	Cond. (µmhos)	Turbidity (FTU)	Carbonate Alk. as CO_3 (mg/L)	Bicarbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radio-Activity (pCi/L)	Beta Radio-Activity (pCi/L)
12-5-79	15:55	0.03		6.0	7.60	<2.2	<2.2		5.0	<1.0				0.001	<0.01	0.30				0.171		24.0			16.0		306			500	2.00		305	250				
12-5-79	17:00	0.03		6.0	7.60	<2.2	<2.2		5.6	<1.0				0.001	<0.01	0.24				0.170		26.0			19.0		300			500	2.00		309.88	254				
7-18-80	15:09	0.13		7.0	7.50	<2.2	<2.2			<1.0	<1.0		4.00	<0.001	<0.01	0.42				0.002		110			70.0		370			570	5.40		259.32	210				
7-19-80	15:15	0.13		7.0	7.60	<2.2	<2.2			<1.0	<1.0		1.20	0.014	<0.01	0.32				0.005		940			14.0		360			550	1.20		268.40	220				
10-7-80	09:00			9.0	8.5									<0.001	0.20					0.040		15.0			3.0		290			450			339.60					
12-10-80	14:05			5	7.2									0.001	<0.01					0.030		16.5			6.0		294			450			339.80					
2-25-81	15:00				8.0								1.20	0.009	<0.01	0.20				0.006		40.0					302			460			280.60	230		<0.1		
4-8-81	14:59			3	8.0									0.035	0.14					0.025		22.0			2.0		277			270			307.94					
8-24-81	15:01			13	8.1								<0.01	<0.001	<0.01	0.26				0.160	0.090	36.0					290			370			272.80	240		42.00		
11-14-81	14:46				8.0									<0.001	0.19					0.200		18.0					293			440			339.40					
12-23-81	13:39			4	7.6									0.006	2.48					0.420		20.0			6.0		293			285			322.90	262.75				

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Dissol. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Dissol. (mg/L)	Germanium Total (mg/L)	Iron Dissol. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Manganese Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
12-5-79							<0.001	76.00	4.0	<0.001		0.005	<0.001			0.010	0.470	<0.001	20.16	0.010	<0.0002			1.418	<0.001		<0.001	2.50	0.105					Total Depth 720'
12-5-79							<0.001	75.20	4.0	<0.001		0.005	<0.001			0.010	0.465	<0.001	21.12	0.011	<0.0002			1.419	<0.001		<0.001	2.51	0.104					Total Depth 720'
7-18-80			<0.001				<0.001	67.40	4.0	<0.001		0.007	<0.001				0.310	<0.001	19.68	0.022	<0.0002			12.50	<0.001		<0.001	35.80	0.015					
7-19-80			<0.001				<0.001	66.40	4.0	<0.001		0.005	<0.001				0.228	<0.001	19.60	0.014	<0.0002			10.70	<0.001		<0.001	31.75	0.021					
10-7-80								68.00	0.4								0.200		23.04	0.020				1.33				12.10						
12-10-80								75.20	7.35								0.120		19.68	0.005				1.35				2.70						
2-25-81			0.001	0.070		0.015	<0.001	89.30	6.00	<0.001		0.010		0.19			0.810	0.020	10.20	0.010	<0.0002			1.36	0.001		<0.001	7.60	1.270					
4-8-81								72.80	7.00								0.850		23.50	0.014				1.29				3.80						
8-24-81			<0.001	0.070		0.020	<0.001	76.00	3.74	<0.001		0.010		0.17		0.001	0.040	0.194	21.60	<0.001	<0.0002			1.33	0.003		<0.001	2.50	0.380					
11-14-81								73.60	3.70								0.140		19.68	0.010				8.55				9.30						
12-23-81								78.00	4.20								0.046		23.00	0.002				1.55				2.65						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S7-11
Location

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen: Ammonia as NH_3-N mg/L	Nitrogen: Nitrate as NO_3-N mg/L	Nitrogen: Nitrite as NO_2-N mg/L	Nitrogen: Total Kjeldahl mg/L	Nitrogen: Organic mg/L	Phosphate: Total as PO_4-P mg/L	Phosphate: Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Hardness as CaCO mg/L	Alkalinity as $CaCO_3$ mg/L	Solids: TDS mg/L	Solids: Total Suspended mg/L	Solids: TSS mg/L	Solids: Total Dissolved mg/L	Solids: Total Volatile mg/L	Color Units	Turbidity FTU	Bicarbonate Alk. as CO_3 mg/L	Carbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Density as $CaCO_3$ mg/L	Alpha Radio-activity pCi/L	Beta Radio-activity pCi/L
6-26-80			In Accessible																																		
8-27-80	11:25	0.01	9.0	3.0	8.6								<0.01	0.209	<0.01	0.30				0.095	0.090	12.10			1.0		169			260			183	150		8.0		
10-8-80	11:23	0.002	15	7	8.6									<0.001	<0.01					0.360		4.5			9.0		219			340			246.68					
12-24-80	In Accessible	Snow																																			
2-25-81	In Accessible	Snow																																			
4-9-81	In Accessible	-Snow																																			
6-24-81	11:40	0.001	19	18	8.7									<0.001	<0.01					0.210		37.5					172			230			1.3332	114		10.01		
8-26-81	11:01	-0-																																			
10-28-81	11:55	-0-																																			
12-23-81			In Accessible																																		

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride mg/L	Chromium Hexavalent mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride mg/L	Manganese Total mg/L	Iron mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Manganese Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
6-26-80																																		Covered by Snow
8-27-80			<0.001	0.010		0.010	<0.001	48.00	2.0	<0.001		0.010		0.06		0.010	0.140	<0.002	8.64	<0.001	<0.0002			0.53	<0.001		<0.001	3.00	0.010					
10-8-80								65.60	0.6								0.950		7.68	0.020				0.64				9.00						
12-24-80																																		
2-25-81																																		
4-9-81																																		
6-24-81								45.60	13.30								0.100		9.12	0.010				0.46				4.00						
8-26-81																																		
10-28-81																																		Covered with Snow
12-23-81																																		Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S24-12
Location

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep. MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen: Ammonia as NH_3-N mg/L	Nitrogen: Nitrate as NO_3-N mg/L	Nitrogen: Nitrite as NO_2-N mg/L	Nitrogen: Total Kjeldahl mg/L	Nitrogen: Organic mg/L	Phosphate: Total as PO_4-P mg/L	Phosphate: Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Fluoride as F mg/L	Sulfide as H_2S mg/L	Solids: TDS mg/L	Solids: Total Suspended Solids mg/L	Solids: T.S.S. mg/L	Solids: Total Dissolved Solids mg/L	Solids: Total Volatile Solids mg/L	Chloride mg/L	Turbidity FTU	Carbonate Alk. as CO_3 mg/L	Bicarbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radioactivity pCi/L	Beta Radioactivity pCi/L
6-26-80	14:27	0.002	17	4	7.4									0.022	<0.01					0.030		15.5			1.0		216.8			410			302.16					
7-23-80		0.004		6																										560								
8-26-80	15:52	0.003	15	7	7.1	33.0	<2.0				15.00		<0.01	0.005	<0.01	0.58				0.030		18.0			15.0		320			490	0.58		352.46	294		240	1.1	2.5
9-16-80	09:24	0.003	12	6	7.3										<0.01															490								
10-7-80	13:40	0.002	21	9	8.6									0.003	<0.01					0.050		12.0			39.0		350			540			422.12					
11-19-80	11:07	0.002	-2	5	7.4																									440								
12-24-80	In Accessible			Snow																																		
2-25-81	In Accessible			Snow																																		
4-8-81	In Accessible			Snow																																		
6-24-81	15:04	0.003	23	10	7.7									<0.001	0.10					1.50		48.0					360			205			336.72	276		11.40		
8-26-81	15:45	0.001	15	11	8.1								4.80	<0.001	<0.01	<0.01				0.180	<0.001	26.0					325			375			343.54	302		<0.01		
10-29-81	10:15	0.001	6	5	6.5									<0.001	0.10					0.200		13.0					315			344			372.30					
12-23-81			In Accessible																																			

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride Ions mg/L	Chromium Hexavalent mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride Ions mg/L	Manganese Total mg/L	Iron Ions mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
6-26-80								71.20	6.0								0.020		21.12	<0.010			1.16				2.40						
7-23-80																																	
8-26-80			<0.001	0.050		0.005	<0.001	75.20	4.0	<0.001		<0.001	0.002	0.016			0.260	<0.001	27.36	0.004	<0.0002		12.50	0.001		<0.001	3.60	0.010					
9-16-80																																	
10-7-80								74.40	0.40								0.53		32.16	0.030			1.72				16.00						
11-19-80																																	
12-24-80																																	
2-25-81																																	
4-8-81																																	
6-24-81								56.80	2.47								0.120		40.32	0.010			1.65				8.00						
8-26-81			<0.001	0.060		0.040	<0.001	83.20	3.00	<0.001		0.011		0.18		0.010	0.120	<0.001	28.32	0.010	<0.0002		1.89	0.002		0.003	2.20	0.015					
9-29-81								72.80	3.30								0.15		33.12	0.014			1.90				2.20						
12-23-81																																	Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S24-12
Location

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP. MPN	C.O.D. MG/L	B.O.D. MG/L	T.O.C. MG/L	DISSOLVED OXYGEN MG/L	OIL & GREASE MG/L	PHENOL MG/L	NITROGEN AMMONIA as NH_4-N MG/L	NITROGEN NITRATE as NO_3-N MG/L	NITROGEN NITRITE as NO_2-N MG/L	NITROGEN TOTAL KJELDAHL MG/L	NITROGEN ORGANIC MG/L	PHOSPHATE TOTAL as PO_4-P MG/L	PHOSPHATE ORTHO as PO_4-P MG/L	SULFATE as SO_4 MG/L	CHLORIDE as Cl MG/L	FLUORIDE as F MG/L	SOLIDS TDS MG/L	SOLIDS TOTAL SETTLEABLE SOLIDS ML/L	SOLIDS TSS MG/L	SOLIDS TOTAL SOLIDS MG/L	SOLIDS TOTAL VOLATILE SOLIDS MG/L	COND. µMHOS/CM	TURBIDITY FTU	CARBONATE ALK. as $CaCO_3$ MG/L	BI-CARBONATE ALK. as $NaCO_3$ MG/L	TOTAL ALK. as $CaCO_3$ MG/L	TOTAL HARDNESS as $CaCO_3$ MG/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L	

DATE	ALUMINUM DISS. MG/L	ANTIMONY DISS. MG/L	ARSENIC DISS. MG/L	BARIUM DISS. MG/L	BERYLLIUM DISS. MG/L	BORON DISS. MG/L	CADMIUM DISS. MG/L	CALCIUM DISS. MG/L	CHLORIDE DISS. MG/L	CHROMIUM HEXavalent MG/L	COBALT DISS. MG/L	COPPER DISS. MG/L	CYANIDE as Cn MG/L	FLUORIDE DISS. MG/L	MANGANESE DISS. MG/L	IRON DISS. MG/L	IRON TOTAL MG/L	LEAD DISS. MG/L	MAGNESIUM DISS. MG/L	MERCURY DISS. MG/L	MERCURY DISS. MG/L	MOLYBDENUM DISS. MG/L	NICKEL DISS. MG/L	POTASSIUM DISS. MG/L	SELENIUM DISS. MG/L	SILICA as SiO_2 MG/L	SILVER DISS. MG/L	SODIUM DISS. MG/L	ZINC DISS. MG/L	VANADIUM DISS. MG/L				COMMENTS
1-7-80																	0.020																		
1-24-80																																			
1-6-80			<0.001	0.020		0.005	<0.001			<0.001		<0.001					0.360	<1.00							<0.001				<1.00						
1-6-80																																			
1-7-80																	0.530																		
1-8-80																																			
1-7-80																																			
2-25-81																																			

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S25-13
Location

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen: Ammonia as NH3-N (mg/L)	Nitrogen: Nitrate as NO3-N (mg/L)	Nitrogen: Nitrite as NO2-N (mg/L)	Nitrogen: Total Kjeldahl (mg/L)	Nitrogen: Organic (mg/L)	Phosphate: Total as PO4-P (mg/L)	Phosphate: Ortho as PO4-P (mg/L)	Sulfate as SO4 (mg/L)	Fluoride as F (mg/L)	Surfactant as MBAS (mg/L)	Solids: TSS (mg/L)	Solids: Total Settleable Solids (ml/L)	Solids: TDS (mg/L)	Solids: Total Dissolved Solids (mg/L)	Solids: Total Volatile Solids (mg/L)	Odor (Threshold)	Turbidity (FTU)	Carbonate Alk. as CO_3 (mg/L)	Bi-Carbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radio-Activity (pCi/L)	Beta Radio-Activity (pCi/L)
6-26-80	12:34	0.04	21	5	7.4									<0.002	<0.01					0.100		13.0			12.0		51.0			78			31.72					
9-26-80	18:05	0.002	12	7	7.4								<0.01	0.010	<0.01	0.33				0.070	0.070	13.0			42.0		159			250			159.28	124		42.0		
10-9-80	09:33	0.003	14	8	8.8									0.003	<0.01					0.060		6.0			17.0		218			330			76.52					
12-29-80	In-Accessible			Snow																																		
2-25-81	In-Accessible			Snow																																		
4-8-81	In-Accessible			Snow																																		
6-29-81	13:53	0.003	24	6	7.5									<0.001	0.15					0.370		33.0					210			225			200.08	164		7.6		
9-26-81	14:00	0.001	19	11	8.1								3.80	<0.001	<0.01	0.52				0.230	0.050	7.0					220			290			241.54	198		12.00		
12-28-81	13:19	-0-																																				
12-29-81			In-Accessible																																			

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride (mg/L)	Chromium Hex. as CR (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride (mg/L)	Mercury Total (mg/L)	Iron (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Manganese Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
6-26-80								11.20	4.0								0.490		4.32	<0.010			0.36				0.60						
9-26-80			<0.001	0.010		<0.001	<0.001	47.20	6.0	<0.001		0.010		0.09		0.020	0.085	<0.001	6.72	<0.001	<0.0002		0.25	<0.001		<0.001	1.20	0.010					
10-9-80								54.40	0.6								0.530		15.36	0.020			0.77				9.30						
12-29-80																																	
2-25-81																																	
4-8-81																																	
6-29-81								49.60	2.80								0.300		13.34	0.010			0.50				7.00						
9-26-81			<0.001	0.015		0.010	<0.001	62.40	3.98	<0.001		0.014		0.14		0.010	0.210	<0.001	18.96	0.020	<0.0002		0.70	0.003		<0.001	2.80	0.010					
10-29-81																																	Covered with Snow
12-28-81																																	Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S31-13
Location

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Streptococci (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen Ammonia as NH_3-N (mg/L)	Nitrogen Nitrate as NO_3-N (mg/L)	Nitrogen Nitrite as NO_2-N (mg/L)	Nitrogen Total Kjeldahl (mg/L)	Nitrogen Organic (mg/L)	Phosphate Total as PO_4-P (mg/L)	Phosphate Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Sulfide as S (mg/L)	Sulfate as H_2S (mg/L)	Solids TSS (mg/L)	Solids Total Settleable Solids (mg/L)	Solids TDS (mg/L)	Solids Total Solids (mg/L)	Solids Total Volatile Solids (mg/L)	Conductivity (micromhos)	Turbidity (FTU)	Carbonate Alk. as CO_3 (mg/L)	Bicarbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radioactivity (pc/L)	Beta Radioactivity (pc/L)
6-25-80	11:28	0.02	17	5	7.8									0.002	<0.01					0.040		13.5			1.0		152			240			152.44					
8-27-80	10:35	0.004	14	7	7.8								<0.01	0.256	<0.01	0.68				0.030	0.010	30.0			8.0		250			380			241.56	198		14.0		
10-8-80	10:40	0.003	19	10	8.5									<0.001	<0.01					0.070		18.0			2.0		258			400			287.68					
12-29-80	Inaccessible			Snow																																		
2-25-81	Inaccessible			Snow																																		
4-8-81	Inaccessible			Snow																																		
6-24-81	12:28	0.01	16	5	7.8									<0.001	<0.01					0.220		42.0					272			190			263.52	216		19.0		
8-26-81	11:40	0.001	24	13	7.8								<0.01	0.002	<0.01	0.82				0.170	0.050	36.0					290			328			328.64	230		10.00		
10-29-81	12:26	0.001	9	5	7.6									<0.001	0.20					0.100		20.0					280			282			310.90					
12-29-81			Inaccessible																																			

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Cl (mg/L)	Chromium Hexavalent Cr (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Cl (mg/L)	Germanium Total (mg/L)	Iron Cl (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Manganese Total (mg/L)	Magnesium Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
6-25-80								55.20	<0.1								0.110		1.44	<0.040				0.64				1.20						
8-27-80			<0.001	0.020		0.010	<0.001	73.40	6.0	<0.001		<0.001		0.09		0.010	0.140	<0.002	12.96	<0.001	<0.0002			0.94	<0.001		<0.001	1.60	0.005					
10-8-80								71.20	<0.1								0.040		13.92	<0.001				0.95				1.80						
12-29-80																																		
2-25-81																																		
4-8-81																																		
6-24-81								66.40	1.73								0.060		16.80	<0.001				0.94				1.70						
8-26-81			<0.001	0.025		0.010	<0.001	78.40	2.38	<0.001		0.006		0.11		<0.001	0.070	<0.001	17.76	0.010	<0.0002			0.86	0.004		<0.001	2.20	0.015					
10-29-81								76.00	3.30								0.065		22.08	0.012				0.95				1.80						
12-29-81																																		Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S36-17
Location

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP. MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	DISSOLVED OXYGEN mg/L	OIL & GREASE mg/L	PHENOL mg/L	NITROGEN AMMONIA as NH_3-N mg/L	NITROGEN NITRATE as NO_3-N mg/L	NITROGEN NITRITE as NO_2-N mg/L	NITROGEN TOTAL KJELDAHL mg/L	NITROGEN ORGANIC mg/L	PHOSPHATE TOTAL as PO_4-P mg/L	PHOSPHATE ORTHO as PO_4-P mg/L	SULFATE as SO_4 mg/L	MANGANESE as Mn mg/L	SURFACTANT as MBAS mg/L	SOLIDS TSS mg/L	SOLIDS TOTAL NONVOLATILE SOLIDS mg/L	SOLIDS T.D.S. mg/L	SOLIDS TOTAL SOLIDS mg/L	SOLIDS TOTAL VOLATILE SOLIDS mg/L	COND. µmhos/cm	TURBIDITY FTU	CARBONATE ALK. as CO_3 mg/L	BICARBONATE ALK. as HCO_3 mg/L	TOTAL ALK. as $CaCO_3$ mg/L	TOTAL HARDNESS as $CaCO_3$ mg/L	ACIDITY as $CaCO_3$ mg/L	GAMMA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L
8-26-80			In Accessible																																			
9-27-80	09:33	0.01	14	6	8.16								<0.01	0.196	<0.01	2.20				0.050	0.005	10.0			3.0		238			360			356	210		12.0		
10-8-80	08:55	0.004	11	8	7.7									<0.001	<0.01					0.060		6.0			5.0		231			350			352					
12-29-80	In Accessible			Snow																																		
2-25-81	In Accessible			Snow																																		
4-8-81	In Accessible			Snow																																		
6-24-81	10:55	0.01	27	11	8.0									<0.001	<0.01					0.280		36.0					398			385			365	218		9.50		
8-26-81	10:18	0.002	22	13	8.3								<0.01	<0.001	<0.01	1.24				0.180	0.080	20.5					241			290			253	210		<0.01		
10-28-81	13:48	0.02	7	6	7.8									<0.001	0.10					0.100		3.0					245			232			232					
12-29-81			In Accessible																																			

DATE	ALUMINUM TOTAL mg/L	ANTIMONY TOTAL mg/L	ARSENIC TOTAL mg/L	BARIUM TOTAL mg/L	BERYLLIUM TOTAL mg/L	BORON TOTAL mg/L	CADMIUM TOTAL mg/L	CALCIUM TOTAL mg/L	CHLORIDE mg/L	CHROMIUM HEXAVALENT mg/L	COBALT TOTAL mg/L	COPPER TOTAL mg/L	CYANIDE as CN mg/L	FLUORIDE mg/L	MOLYBDENUM TOTAL mg/L	IRON mg/L	IRON TOTAL mg/L	LEAD TOTAL mg/L	MAGNESIUM TOTAL mg/L	MANGANESE TOTAL mg/L	MERCURY TOTAL mg/L	VOLFRAMIUM TOTAL mg/L	NICKEL TOTAL mg/L	POTASSIUM TOTAL mg/L	SELENIUM TOTAL mg/L	SILICA as SiO_2 mg/L	SILVER TOTAL mg/L	SODIUM TOTAL mg/L	ZINC TOTAL mg/L	VANADIUM TOTAL mg/L				COMMENTS
8-26-80																																			Covered by Snow
9-27-80			<0.001	0.010		0.010	<0.001	72.00	6.0	<0.001		<0.001		0.11		0.010	0.250	<0.002	12.00	<0.001	<0.0002			0.57	<0.001		<0.001	1.70	0.007					
10-8-80								64.00	<0.1								0.100		12.96	0.010				0.65				7.20						
12-29-80																																			
2-25-81																																			
4-8-81																																			
6-24-81								51.00	1.65								0.370		22.52	0.010				0.47				14.00						
8-26-81			0.002	0.020		0.020	<0.001	68.00	1.87	<0.001		0.009		0.15		<0.001	0.050	<0.001	14.40	<0.001	<0.0002			0.70	0.003		<0.001	2.00	0.007					
10-28-81								64.00	3.20								0.065		19.72	0.003				0.80				4.00						
12-29-81																																			Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station 536-19
Location

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen Ammonia as NH_3-N mg/L	Nitrogen Nitrate as NO_3-N mg/L	Nitrogen Nitrite as NO_2-N mg/L	Nitrogen Total Kjeldahl mg/L	Nitrogen Organic mg/L	Phosphate Total as PO_4-P mg/L	Phosphate Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Hardness as CaCO mg/L	Alkalinity as $CaCO_3$ mg/L	Solids TDS mg/L	Solids Total Suspended mg/L	Solids T.S.S. mg/L	Solids Total Dissolved mg/L	Solids Total Volatile mg/L	Conductivity µmhos	Turbidity FTU	Chlorides Alk. as CO_3 mg/L	Bicarbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radioactivity pCi/L	Beta Radioactivity pCi/L
6-25-80	11:30	0.01	17	5	7.80									<0.002	<0.01					0.070		8.5			1.0		95.0		150			72.72					
8-27-80	09:45	0.003	11	6	7.5								0.80	0.002	<0.01	0.54				0.060	0.040	7.5			5.0		135			200			149.89	122		18.0		
12-24-80	In-Accessible			Snow																																		
2-25-81	In-Accessible			Snow																																		
4-8-81	In-Accessible			Snow																																		
6-24-81	13:04	0.01	20	4	7.2									0.096	<0.01					0.250		25.5					130		89			112.24	22.00		22.80		
8-26-81	12:40	0.001	24	18	8.0								3.40	<0.001	<0.01	0.56				0.340	0.340	7.5					191		285			208.77	172		18.00		
10-28-81	11:33	-0-																																				
12-27-81			In-Accessible																																			

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride Diss. mg/L	Chromium Hexavalent mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride Diss. mg/L	Molybdenum Total mg/L	Iron Diss. mg/L	Iron Total mg/L	Lead Total mg/L	Manganese Total mg/L	Magnesium Total mg/L	Mercury Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
6-25-80								27.40	<0.1								0.070		0.48	<0.010			0.32				12.00						
8-27-80			<0.001	0.010		<0.001	<0.001	44.00	<0.1	<0.001		<0.001		0.08		0.010	1.350	<0.002	4.32	<0.001			0.43	<0.001		<0.001	1.20	0.002				
12-24-80																																	
2-25-81																																	
4-8-81																																	
6-24-81								34.40	1.08								0.160		5.76	0.010			0.33				3.40						
8-26-81			0.003	0.017		0.010	<0.001	62.40	2.08	<0.010		0.011		0.15		<0.001	0.270	<0.001	6.24	0.020	<0.002		0.40	0.004		<0.001	1.90	0.010					
10-28-81																																	
12-27-81																																	Sample

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S36-23
Location

Date	Time	Flow CFS	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen Ammonia as NH_3-N mg/L	Nitrogen Nitrate as NO_3-N mg/L	Nitrogen Nitrite as NO_2-N mg/L	Nitrogen Total Kjeldahl mg/L	Nitrogen Organic mg/L	Phosphate Total as PO_4-P mg/L	Phosphate Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Hardness as CaCO mg/L	Alkalinity as HCO_3 mg/L	Solids TDS mg/L	Solids Total Settleable Solids mg/L	Solids T.D.S. mg/L	Solids Total Solids mg/L	Solids Total Volatile Solids mg/L	Conductivity µmhos	Turbidity FTU	Hardness Alk. as $CaCO_3$ mg/L	Bi-carbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radio-activity pCi/L	Beta Radio-activity pCi/L
6-25-80	11:54	0.01	15	3	7.70									0.061	<0.01					0.040		20.0			1.0		178			280			175.68				
7-22-80	12:15	0.17		4																										300							
8-26-80	17:40	0.008	12	5	6.9	<2.0	<2.0				<0.01		<0.01	0.105	<0.01	0.39				0.010		12.5			1.0		318			490	0.58		246.44	202		18.0	1.5	2.9
9-16-80	15:30	0.009	19	4	7.0																									350							
10-8-80	12:24	0.008	18	6	7.8									<0.001	<0.01					0.050		4.5			1.0		229			350							
11-19-80	15:06	0.007	4	2	6.8																									470							
12-29-80	Inaccessible			Snow																																	
2-25-81	Inaccessible			Snow																																	
3-3-81	Inaccessible			Snow																																	
6-29-81	13:33	0.01	17	3	7.2									<0.001	0.010					0.240		39.0					249			233			239.12	196		2470		
8-26-81	13:18	0.007	15	5	7.6								0.40	<0.001	<0.01	0.42				0.240	0.050	9.0					244			255			243.52	216		16.00		
10-28-81	11:09	0.01	6	5	7.7									<0.001	0.30					0.200		3.0					250			235			290.34					
12-15-81			Inaccessible																																		

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride Diss. mg/L	Chromium Hex. as Cr mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride Diss. mg/L	Germanium Total mg/L	Iron Diss. mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Manganese Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
6-25-80								67.40	<0.1								0.100		1.92	<0.010				0.46				1.20						Some Snow melt
7-22-80																																		
8-26-80			<0.001	0.035		0.003	<0.001	76.80	2.0	<0.001		0.002	0.002	0.11		0.100	0.150	0.005	2.40	0.005	<0.0002			0.41	0.001		<0.001	4.90	0.030					
9-16-80																																		
10-8-80								71.20	<0.1								0.050		2.40	0.010				0.42				18.00						
11-19-80																																		
12-29-80																																		
2-25-81																																		
3-3-81																																		
6-29-81								67.20	1.60								0.010		9.60	<0.001				0.46				13.00						
8-26-81			<0.001	0.015		0.010	<0.001	76.00	1.67	<0.001		0.020		0.19		<0.001	0.100	<0.001	7.68	0.020	<0.0002			0.38	0.004		<0.001	2.00	0.015					
10-28-81								75.20	4.00								0.114		10.08	0.022				0.40				6.00						
12-15-81																																		Snow

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station S36-23
Location

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	DISSOLVED OXYGEN mg/L	OIL & GREASE mg/L	PHENOL mg/L	NITROGEN AMMONIA as NH_3-N mg/L	NITROGEN NITRATE as NO_3-N mg/L	NITROGEN NITRITE as NO_2-N mg/L	NITROGEN NITROGEN TOTAL KJELDAHL mg/L	NITROGEN NITROGEN ORGANIC mg/L	PHOSPHATE TOTAL as PO_4-P mg/L	PHOSPHATE ORTHO as PO_4-P mg/L	SULFATE as SO_4 mg/L	HARDNESS as CaCO mg/L	SURFACTANT as MBAS mg/L	SOLIDS TDS mg/L	SOLIDS TOTAL SETTLEABLE SOLIDS ml/L	SOLIDS T.S.S. mg/L	SOLIDS TOTAL DISSOLVED SOLIDS mg/L	SOLIDS TOTAL VOLATILE SOLIDS mg/L	ODOR Z-BRANCH	TURBIDITY FTU	CARBONATE ALK. as CO_3 mg/L	BI-CARBONATE ALK. as HCO_3 mg/L	TOTAL ALK. as $CaCO_3$ mg/L	TOTAL HARDNESS as $CaCO_3$ mg/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L	

DATE	ALUMINUM DISS. mg/L	ANTIMONY DISS. mg/L	ARSENIC DISS. mg/L	BARIUM DISS. mg/L	BERYLLIUM DISS. mg/L	BORON DISS. mg/L	CADMIUM DISS. mg/L	CALCIUM DISS. mg/L	CHLORIDE DISS. mg/L	CHROMIUM HEXAVALENT CR mg/L	COBALT DISS. mg/L	COPPER DISS. mg/L	CYANIDE as Cn mg/L	FLUORIDE DISS. mg/L	HERBICIDES DISS. mg/L	IRON DISS. mg/L	IRON TOTAL mg/L	LEAD DISS. mg/L	MANGANESE DISS. mg/L	MANGANESE DISS. mg/L	MERCURY DISS. mg/L	MOLYBDENUM DISS. mg/L	NICKEL DISS. mg/L	POTASSIUM DISS. mg/L	SELENIUM DISS. mg/L	SILICA as SiO_2 mg/L	SILVER DISS. mg/L	SODIUM DISS. mg/L	ZINC DISS. mg/L	VANADIUM DISS. mg/L				COMMENTS
6-25-80																0.100																			
7-29-80																																			
8-26-80			<0.001	0.002		0.001	<0.001			<0.001		<0.001				0.100	0.150	<0.001							<0.001		<0.001		0.025					
9-26-80																																			
10-8-80																	0.050																		
11-19-80																																			
12-28-80																																			
7-25-81																																			

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station 4 N 1E #750
Location Mine Center

DATE	TIME	FLOW GPM	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP MPN	C.O.D. MG/L	B.O.D. MG/L	TOC MG/L	DISSOLVED OXYGEN MG/L	OIL & GREASE MG/L	PHENOL MG/L	NITROGEN AMMONIA as NH_3-N MG/L	NITROGEN NITRATE as NO_3-N MG/L	NITROGEN NITRITE as NO_2-N MG/L	NITROGEN TOTAL KJELDAHL MG/L	NITROGEN ORGANIC MG/L	PHOSPHORUS TOTAL as PO_4-P MG/L	PHOSPHORUS ORTHO as PO_4-P MG/L	SULFATE as SO_4 MG/L	FLUORIDE as F MG/L	SURFACTANT as MBAS MG/L	SOLIDS TSS MG/L	SOLIDS TOTAL SETTLEABLE SOLIDS ml/l	SOLIDS T.D.S. MG/L	SOLIDS TOTAL SOLIDS MG/L	SOLIDS TOTAL VOLATILE SOLIDS MG/L	COND. µmhos/cm	TURBIDITY FTU	CARBONATE ALK. as CO_3 MG/L	BICARBONATE ALK. as HCO_3 MG/L	TOTAL ALK. as $CaCO_3$ MG/L	TOTAL HARDNESS as $CaCO_3$ MG/L	ACIDITY as $CaCO_3$ MG/L	ALPHA RADIO-ACTIVITY PC/L	BETA RADIO-ACTIVITY PC/L
11-3-80	11:47				7.40																						283			435			366					
11-27-81					7.70										0.30					0.100		15.0					375			570			425.8					

DATE	ALUMINUM TOTAL MG/L	ANTIMONY TOTAL MG/L	ARSENIC TOTAL MG/L	BARIUM TOTAL MG/L	BERYLLIUM TOTAL MG/L	BORON TOTAL MG/L	CADMIUM TOTAL MG/L	CALCIUM TOTAL MG/L	CHLORIDE CHL MG/L	CHROMIUM HEXAVALENT MG/L	COBALT TOTAL MG/L	COPPER TOTAL MG/L	CYANIDE as CN MG/L	FLUORIDE CHL MG/L	MANGANESE TOTAL MG/L	IRON CHL MG/L	IRON TOTAL MG/L	LEAD TOTAL MG/L	MAGNESIUM TOTAL MG/L	MERCURY TOTAL MG/L	MERCURY TOTAL MG/L	MOLYBDENUM TOTAL MG/L	NICKEL TOTAL MG/L	POTASSIUM TOTAL MG/L	SELENIUM TOTAL MG/L	SILICA as SiO_2 MG/L	SILVER TOTAL MG/L	SODIUM TOTAL MG/L	ZINC TOTAL MG/L	VANADIUM TOTAL MG/L				COMMENTS
9-3-80								78.40	1.5										19.41					1.36				2.20						
11-27-81								64.00	1.3								0.120		26.88	0.012				4.50				4.00						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station: North Main
Location: Station 91

DATE	TIME	FLOW	TEMPERATURE AIR	TEMPERATURE WATER	pH	COLIFORM TOTAL	COLIFORM FECAL	FECAL STREP.	C.O.D.	B.O.D.	T.O.C.	DISSOLVED OXYGEN	OIL & GREASE	PHENOL	NITROGEN AMMONIA as NH_3-N	NITROGEN NITRATE as NO_3-N	NITROGEN NITRITE as NO_2-N	NITROGEN TOTAL KJELDAHL	NITROGEN ORGANIC	PHOSPHORUS TOTAL as PO_4-P	PHOSPHORUS ORTHO as PO_4-P	SULFATE as SO_4	FLUORIDE as F	SULFIDE as H2S	SOLIDS TDS	SOLIDS TOTAL SETTLEABLE SOLIDS	SOLIDS T.S.S.	SOLIDS TOTAL SOLIDS	SOLIDS TOTAL VOLATILE SOLIDS	CONDUCTIVITY	TURBIDITY	CARBONATE ALK. as CO_3	BI-CARBONATE ALK. as HCO_3	TOTAL ALK. as $CaCO_3$	TOTAL HARDNESS as $CaCO_3$	ACIDITY as $CaCO_3$	ALPHA RADIO-ACTIVITY	BETA RADIO-ACTIVITY
		CFS	°C	°C		MPN	MPN	MPN	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	µmhos	FTU	MG/L	MG/L	MG/L	MG/L	MG/L	PC/L	PC/L
10-77					7.70										0.10					<0.001		177					273			430			43.30					

DATE	ALUMINUM TOTAL	ANTIMONY TOTAL	ARSENIC TOTAL	BARIUM TOTAL	BERYLLIUM TOTAL	BORON TOTAL	CADMIUM TOTAL	CALCIUM TOTAL	CHLORIDE	CHROMIUM HEX. as CR	COBALT TOTAL	COPPER TOTAL	CYANIDE as CN	FLUORIDE	GERMANIUM TOTAL	IRON	IRON TOTAL	LEAD TOTAL	MAGNESIUM TOTAL	MANGANESE TOTAL	MERCURY TOTAL	MOLYBDENUM TOTAL	NICKEL TOTAL	POTASSIUM TOTAL	SELENIUM TOTAL	SILICA as SiO_2	SILVER TOTAL	SODIUM TOTAL	ZINC TOTAL	VANADIUM TOTAL				COMMENTS
	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L				
10-77								50.40	3.40								0.125		20.16	0.010				3.50				5.40						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station: YC-001
Location: Belina Mine Discharge

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep. (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenol (mg/L)	Nitrogen: Ammonia as NH_3-N (mg/L)	Nitrogen: Nitrate as NO_3-N (mg/L)	Nitrogen: Nitrite as NO_2-N (mg/L)	Nitrogen: Total Kjeldahl (mg/L)	Nitrogen: Organic (mg/L)	Phosphate: Total as PO_4-P (mg/L)	Phosphate: Ortho as PO_4-P (mg/L)	Sulfate as SO_4 (mg/L)	Fluoride as F (mg/L)	Surfactant as MBAS (mg/L)	Solids: TSS (mg/L)	Solids: Total Settleable Solids (ml/L)	Solids: TDS (mg/L)	Solids: Total Solids (mg/L)	Solids: Total Volatile Solids (mg/L)	Conductivity (µmhos)	Turbidity (FTU)	Carbonate Alk. as CO_3 (mg/L)	Bicarbonate Alk. as HCO_3 (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radioactivity (pCi/L)	Beta Radioactivity (pCi/L)
3-12-80	15:30	-0-																																				
3-26-80	16:00	-0-																																				
4-9-80		-0-																																				
4-23-80		-0-																																				
5-14-80		-0-																																				
5-28-80		-0-																																				
6-11-80		-0-																																				
6-25-80		-0-																																				
7-1-80	10:00				8.0	49.0	23.0			96.0			654												74.0		315			450				130		<0.1		
7-24-80	15:15	0.045	18	15	7.2					8.3			3.00												10.0		308			480				202		4.0		
7-13-80	12:32	0.04	23	12	8.0	7.0	2.0			<1.0			0.20												4.0		380			500				216		10.0		
7-27-80	16:00	0.116	19.5	14	8.2																				41.0		345			525				214		14.0		
8-10-80	13:55	0.13			7.6	1700	49.0			5.0			<0.10												84.0		254			390				186		4.0		
8-24-80	15:30	0.27	13	10	7.4																				32.0		328			490				216		<1.0		
10-9-80	16:05	0.21	19	13	7.6	79.0	2.0			14.5			0.20												6.0		311			445				216		6.0		
10-22-80	15:40	0.29	2	9	7.6																				6.0		310			440				1200		8.0		
11-12-80	15:10	0.33	3	6	7.3	170	<2.0			3.6			5.0												2.0		860			1320				200		6.0		
11-26-80	15:30	0.27	-5	4	7.2																				32.0		390			590				256		20.0		
12-10-80	14:20	0.002	2	3	7.7	5.0	<2.0			4.6			3.0												6.0		380			550				262		22.0		
12-24-80	12:40	0.6	3	3	7.6																				23.0		490			700				254		<0.1		

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride Diss. (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Diss. (mg/L)	Manganese Total (mg/L)	Iron Diss. (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Molybdenum Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Vanadium Total (mg/L)				Comments
3-12-80																																		
3-26-80																																		
4-9-80																																		
4-23-80																																		
5-14-80																																		
5-28-80																																		
6-11-80																																		
6-25-80																																		
7-1-80																	7.370	0.004		0.010														Filtered by Hydrologic Consultants
7-24-80																	0.180			0.002					<0.001									
8-13-80																	0.110			<0.010					<0.001									Sample by sampler at site
8-27-80																	0.150																	
9-10-80																	0.160			0.010					<0.001									
9-24-80																	0.158																	
11-9-80																	0.250			0.010					<0.001									
11-22-80																	0.166																	
12-10-80																	0.230			0.010					<0.001									
12-24-80																	0.228																	

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-001
Location Belina mine discharge

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep. MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen: Ammonia as NH_4-N mg/L	Nitrogen: Nitrate as NO_3-N mg/L	Nitrogen: Nitrite as NO_2-N mg/L	Nitrogen: Total Kjeldahl mg/L	Nitrogen: Organic mg/L	Phosphorus: Total as PO_4-P mg/L	Phosphorus: Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Sulfide as S mg/L	Surfactant as MBAS mg/L	Solids: TDS mg/L	Solids: Total Settleable Solids ml/L	Solids: T.S.S. mg/L	Solids: Total Solids mg/L	Solids: Total Volatile Solids mg/L	Odor threshold	Turbidity FTU	Chlorides as Cl mg/L	Bi-carbonate ALK as HCO_3 mg/L	Total ALK as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radio-activity pCi/L	Beta Radio-activity pCi/L
5-9-79	14:15	0.005	0	1	7.65	<2.0	<2.0			3.7		9.4	1.0												2.0		200						144		6.0		
5-29-79	16:10	0.008	14	10	8.2																				52.0		314						200		12.0		
6-13-79	16:00	0.27	20	13	8.4	11.0	<2.0			2.8		7.3	<1.0												5.0		320			490			248		20.0		
6-27-79	15:30	0.37	22	12	7.75																				5.0		330			520			220		24.0		
7-11-79	9:25	0.09	20	16	7.7	2.0	<2.0			<1.0			<1.0												2.0		300			4900			210		18.0		
7-25-79	15:00	0.36	23	15	7.3																				7.0		240			400			180		8.0		
8-9-79	16:20	0.12	23	16.5	7.6	17.0	<2.0			<1.0		6.0	<1.0												3.0		310			430			272		14.0		
8-27-79	15:45	0.03	15	9	7.8																				7.0		300			500			242		13.0		
9-12-79	14:45	0.21			7.6	33.0	5.0			1.5			1.4												64.0		310			480			210		22.0		
9-26-79	16:15	0.18	14	11.5	7.6																				67.0		440			450			214		12.0		
10-10-79	14:30	0.22		6	7.7	490	20.0			<1.0			1.6												4.0		370			450			196		8.0		
10-24-79	16:05	0.18			7.3																				12.0		285			390			204		12.0		
11-14-79	14:52	0.01	1	1	7.58	110	<2.0			<1.0			0.8												<1.0		308			460			210		20.0		
11-29-79	16:00	-0-																																				
12-12-79	09:10	-0-																																				
12-26-79	16:00	-0-																																				
1-9-80	16:00	-0-																																				
1-23-80	15:25	0.002	-6	4	8.2	2.0	<2.0			<1.0			2.4												8.0		310			480			206		18.0		
2-13-80	15:00	-0-																																				
2-27-80	15:00	-0-																																				

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride mg/L	Chromium Hex. or Cr mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride mg/L	Strontium Total mg/L	Iron mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Manganese Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
5-9-79																	0.04			0.012					<0.001									
5-29-79																	1.934																	
6-13-79																	0.015			0.004					<0.001									
6-27-79																	0.046																	
7-11-79																	0.045			0.010					<0.001									
7-25-79																	0.210																	
8-9-79																	0.09			0.002					<0.001									
8-27-79																	0.540																	
9-12-79																	0.57			0.004					0.001									
9-26-79																	1.290																	
10-10-79																	0.155			0.021					<0.001									
10-24-79																	0.580			0.445														
11-14-79																	0.490			0.008					<0.001									
11-29-79																																		
12-12-79																																		
12-26-79																																		
1-9-80																																		
1-23-80																	0.450			0.010					<0.001									

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-6
Location Upper Eccles Creek

Coastal States Station

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep. MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen: Ammonia as NH_3-N mg/L	Nitrogen: Nitrate as NO_3-N mg/L	Nitrogen: Nitrite as NO_2-N mg/L	Nitrogen: Total Kjeldahl mg/L	Nitrogen: Organic mg/L	Phosphate: Total as PO_4-P mg/L	Phosphate: Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Hardness as CaCO mg/L	Alkalinity as CaCO mg/L	Solids: TDS mg/L	Solids: Total Suspended Solids mg/L	Solids: T.D.S. mg/L	Solids: Total Volatile Solids mg/L	Total Volatile Solids mg/L	Odor Threshold	Turbidity FTU	Chlorides mg/L	Bicarbonate Alk. as HCO_3 mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Alpha Radio-activity pc/L	Beta Radio-activity pc/L
3-17-77	14:40	0.6	0	1	7.8				10.0		6.0	9.0	<1.0		0.21	0.15	<0.01	0.39		0.055	0.024	28.0	<0.01		10.0	<0.1	412			630	3.50	<0.01	297.7	248	262			
6-16-77	12:30	0.3	18	14	7.7				8.0		5.0	7.0	<1.0	<0.001	0.18	0.05		0.50		0.310	0.120	10.8	<0.01		3.0	<0.1	230			350	2.00	<0.01	251.3	206	202		0	0
5-10-78	14:10	4.5	15	4	8.0						6.0	9.0	10.4			1.05	<0.01	0.18			0.035	14.0			98.0		248			385			238					
6-14-78	16:40	8.5	22	9	7.4						28.0	9.3		3.009	0.10	0.49	<0.01	0.15			0.022	14.0			42.0		160			260			153.1					
7-12-78	14:15	2.1	21	14.5	8.3							8.0	5.8									27.0			8.0		228			386			222.4					
8-23-78	14:15	0.4	20	12.5	8.1						26.0	8.6	1.0	0.010								20.0			6.0		220			335			236.7					
10-25-78	11:40	0.3	3	0.5	7.1							11.1	1.5	0.003								19.0			4.0		255			440			265.5					
11-8-78	10:35	0.5	2.0	0.3	7.4						8.0	11.8				0.59	<0.01	0.10			0.090	23.0			11.0		260			462			283.04					
12-29-78	11:10	0.1	-2	2	7.22						19.0	11.0	1.6	<0.001		0.74	<0.01	0.11			0.020	22.0			16.0		286						302.54					
2-28-79	12:13		Inaccessible																																			
4-19-79	11:55		In-accessible																																			
5-11-79	15:10	1.5	0	0.3	8.4						10.0	9.3	<1.0	0.042	<0.10	2.40				0.06		9.0			22.0		260				4.0		264.4	202		12.0		
6-20-79	11:10	2.4	16	9	8.4	70.0	<2.0				3.0	8.8	3.0	<0.001	<0.01	0.66				0.018	0.010	24.0			9.0		210			370	5.0		212.2	174		2.0	2.1	12.5
7-18-79	10:57	1.1	24	12	7.52						8.5	7.4	<1.0	0.014	<0.01	0.05				0.020		23.0			4.0		229			410	3.50	<0.01	236.46	194		10.0		
9-26-79	13:10	0.4	16	7.5	7.50						3.0	7.2		<0.001	<0.01	0.20				<0.001		15.0			1.0		212			405	3.10		233.12	196		10.0		
10-31-79	12:15	0.3	-1	0.75	7.80						10.0		2.3	<0.001		2.59					0.060	18.0			24.0		288			505			268.5	216		18.0		
1-30-79	12:10	0.6	-5	0.3	7.3							9.2		0.062	<0.01					0.080		22.0			24.0		277			475			292.6					
2-27-80			In-Accessible																																			
4-29-80			In-Accessible																																			
5-14-80	13:52	4.5	10	3	8.6							9.8		0.008	<0.01					<0.001		18.0			22.5		235			390			234.24					

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium Total mg/L	Chloride Diss. mg/L	Chromium Hexavalent mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride Diss. mg/L	Mercury Total mg/L	Iron Diss. mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Manganese Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
3-17-77	0.014		<0.001	0.020		0.003	<0.001	73.6	4.0	<0.001		0.010		0.16			0.609	<0.001	19.72	0.018	<0.0002		<0.001	1.34	<0.001	4.3	<0.001	6.15	0.060					
6-16-77	0.008	<0.001	<0.001	0.045	<0.001	0.014	<0.001	64.0	6.0	<0.001	<0.001	0.009	<0.01	0.24	<0.001		0.625	<0.001	14.40	<0.001	<0.0002	<0.001	<0.001	1.31	<0.001	4.0	<0.001	2.19	0.012	<0.001				
5-10-78			<0.001				<0.001	63.2	8.0	<0.001		0.006		0.14			0.029	<0.001	13.92	0.016	<0.0002			1.176	<0.001	5.2	<0.001	3.88	0.009					
6-14-78			<0.001				<0.001	45.6	10.0	<0.001		<0.001		0.13			0.161	<0.001	6.24	0.032	<0.0002			0.658	<0.001	4.85	<0.001	7.0	0.004					
7-12-78			<0.001					78.0	2.0								0.062	<0.001	5.28	0.010	<0.0002			1.005	<0.001		<0.001	54.0	0.010					
8-23-78			<0.001					60.0	2.0			0.006		0.14			<0.001	<0.001	14.4	0.002	<0.0002			1.178	<0.001		<0.001	3.00	0.007					
10-25-78			<0.001				<0.001	65.6	1.5	<0.001		0.005		0.15			0.056	<0.001	20.10	0.005	<0.0002			1.220	<0.001			3.21	0.008					
11-8-78			<0.001	<0.001			<0.001	72.8	2.0	<0.001		0.004	<0.01	0.13			0.091		17.28	0.014				1.587	<0.001	7.25	<0.001	3.93	0.003					
12-29-78			<0.001	0.002			<0.001	73.6	10.0	<0.001		0.127		0.16			0.100	<0.001	19.64	0.012	<0.0002			1.272	<0.001	5.80	<0.001	7.50	0.004					
2-28-79																																		In-Accessible
4-19-79																																		In-Accessible
5-11-79			<0.001	0.050		0.075	<0.001	65.60	6.0	0.005		0.005	0.002	0.11		0.024	0.627	0.001	13.40	0.007	<0.0002			1.151	<0.001		0.004	7.74	0.015					
[illegible]			<0.001	0.060		0.050	<0.001	57.40	<1.0	0.003		0.070	<0.001	0.17		0.020	0.390	0.002	7.60	0.007	<0.0002			0.722			0.004	7.41	0.011					
7-18-79			<0.001	0.026		0.075	<0.001	61.60	4.0	0.003		0.009	<0.001	0.06		0.010	0.140	0.003	15.84	0.007	<0.0002			1.004	<0.001		0.002	3.02	0.016					
9-26-79			<0.001	0.036		0.070	<0.001	60.50	3.0	<0.001		0.025	<0.001	0.14		0.028	0.140	<0.001	13.40	0.020	<0.0002			0.42	<0.001		<0.001	5.00	0.03					
10-31-79			<0.001	0.075		0.060	<0.001	63.80	6.0	<0.001		0.010		0.15			0.350	<0.001	18.72	0.009	<0.0002			3.00	<0.001		<0.001	8.10	0.005					
1-30-79								80.00	4.0								0.180		14.84	0.012				1.291				3.32						
[illegible]																																		

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station: YC-6
Location: Eccles Creek above South Fork Eccles Creek
Coastal States Station

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	DISSOLVED OXYGEN mg/L	OIL & GREASE mg/L	PHENOL mg/L	NITROGEN AMMONIA as NH_4-N mg/L	NITROGEN NITRATE as NO_3-N mg/L	NITROGEN NITRITE as NO_2-N mg/L	NITROGEN TOTAL KJELDAHL mg/L	NITROGEN ORGANIC mg/L	PHOSPHATE TOTAL as PO_4-P mg/L	PHOSPHATE ORTHO as PO_4-P mg/L	SULFATE as SO_4 mg/L	MANGANESE as Mn mg/L	SURFACTANT as MBAS mg/L	SOLIDS TDS mg/L	SOLIDS TOTAL SUSPENDED SOLIDS mg/L	SOLIDS T.S.S. mg/L	SOLIDS TOTAL SETTLEABLE SOLIDS mg/L	SOLIDS TOTAL VOLATILE SOLIDS mg/L	COND. µmhos/cm	TURBIDITY FTU	CARBONATE ALK. as CO_3 mg/L	BI-CARBONATE ALK. as HCO_3 mg/L	TOTAL ALK. as $CaCO_3$ mg/L	TOTAL HARDNESS as $CaCO_3$ mg/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L	

DATE	ALUMINUM DISS. mg/L	ANTIMONY DISS. mg/L	ARSENIC DISS. mg/L	BARIUM DISS. mg/L	BERYLLIUM DISS. mg/L	BORON DISS. mg/L	CADMIUM DISS. mg/L	CALCIUM DISS. mg/L	CHLORIDE DISS. mg/L	CHROMIUM HEXAVALENT mg/L	COBALT DISS. mg/L	COPPER DISS. mg/L	CYANIDE as CN mg/L	FLUORIDE DISS. mg/L	GERMANIUM DISS. mg/L	IRON DISS. mg/L	IRON TOTAL mg/L	LEAD DISS. mg/L	MAGNESIUM DISS. mg/L	MANGANESE DISS. mg/L	MERCURY DISS. mg/L	MOLYBDENUM DISS. mg/L	NICKEL DISS. mg/L	PHOSPHORUS DISS. mg/L	SELENIUM DISS. mg/L	SILICA as SiO_2 mg/L	SILVER DISS. mg/L	SODIUM DISS. mg/L	ZINC DISS. mg/L	VANADIUM DISS. mg/L				COMMENTS
4-8-77																																			
5-27-77																																			
7-29-77																																			
4-18-77																																			
5-11-77			<0.001	0.02		0.090	<0.001			<0.001		0.009						<0.001							<0.001		<0.001		0.007						
5-20-77			<0.001	0.030		0.020	<0.001			<0.001		0.001						<0.001							<0.001		<0.001		0.008						
7-27-77			<0.001	0.020		0.080	<0.001			<0.001		0.005				0.010	0.140	<0.001							<0.001		<0.001		0.009						
8-25-77			<0.001	0.030		<0.001	<0.001			<0.001		0.003				0.015	0.160	<0.001							<0.001		<0.001		0.005						
1-16-77			<0.001	0.020		0.055	<0.001			<0.001		0.010				0.020	0.140	<0.001							<0.001		<0.001		0.005						
2-23-77																	0.350																		
4-20-77																	0.180																		
5-9-77																	0.195																		
																	0.100																		

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-6
Location Eccles Creek above South Fork
Coastal States Station

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep	C.O.D.	B.O.D.	T.O.C.	Dissolved Oxygen	Oil & Grease	Phenol	Nitrogen Ammonia as NH_3-N	Nitrogen Nitrate as NO_3-N	Nitrogen Nitrite as NO_2-N	Nitrogen Total Kjeldahl	Nitrogen Organic	Phosphate Total as PO_4-P	Phosphate Ortho as PO_4-P	Chloride as Cl	Fluoride as F	Sulfate as SO_4	Solids TDS	Solids Total Suspended	Solids T.S.S.	Solids Total Dissolved	Solids Total Volatile	Sodium	Turbidity	Alkalinity Alk. as $CaCO_3$	Alkalinity Alk. as $CaCO_3$	Total Alk. as $CaCO_3$	Total Hardness as $CaCO_3$	Acidity as $CaCO_3$	Alpha Radio-activity	Beta Radio-activity
								mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
6-26-80	09:38	3.7	12	6	9.0									<0.002	<0.01					0.030		42.0			3.0		215			320			202.6				
7-21-80	12:47	1.8	28	15	8.7									<0.001	<0.01					0.030		10.5			4.0		210			320			234.8				
8-25-80	16:05	1.2	14	11	8.3	13000	33.0				4.00	8.2	35.40	0.226	<0.01	0.45				0.090		14.0			90.0		265			400	3.80		275.72	230		<0.1	1.4	2.0
9-8-80	09:00	0.367	12	9	8.6									0.105	<0.01					0.080		15.0			7.0		258			395			298.36				
10-7-80	14:09	0.25	21	8	8.6									<0.001	0.10					0.040		12.0			9.0		285			440			327.59				
11-9-80	10:44		-6	0	7.4									<0.001	<0.01					0.270		14.5			90.0		310			250			336				
12-9-80	09:50		-4	0	7.7									0.230	<0.01					0.120		10.0			72.0		270			242			327.40				
1-27-81	11:25		-2	0	7.8									0.019	<0.01					0.050		6.0			7.0		295			265			356.74				
2-25-81	Inaccessible																																				
3-8-81	13:40		4	1	7.9									<0.001	<0.01					0.080		7.2			11.0		265			258			374.76				
4-9-81	15:53	0.9	7	2	8.1									0.266	0.15					1.280		49.0			534		290			248			295.96				

Date	Aluminum Total	Antimony Total	Arsenic Total	Barium Total	Beryllium Total	Boron Total	Cadmium Total	Calcium Total	Calcium Diss.	Chromium Hexavalent	Cobalt Total	Copper Total	Cyanide as CN	Fluoride Diss.	Manganese Total	Iron Diss.	Iron Total	Lead Total	Magnesium Total	Mercury Total	Molybdenum Total	Nickel Total	Potassium Total	Selenium Total	Silica as SiO_2	Silver Total	Sodium Total	Zinc Total	Vanadium Total				Comments
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
6-26-80								52.80	2.0								0.170		18.72	0.020			0.75				2.60						
7-21-80								58.40	4.0								0.100		12.48	0.003			0.99				2.80						
8-25-80			<0.001	0.080		0.086	<0.001	69.60	16.0	<0.001		0.010	0.001	0.16		0.760	3.720	<0.001	19.68	0.070	<0.0002		2.33	0.009		<0.001	3.70	0.060					Rain yesterday
9-8-80								71.20	3.1	<0.001							0.075		18.72	0.021		<0.001	0.85				2.60						
10-7-80								72.80	1.5								0.470		17.28	0.002			1.79				12.00						
11-9-80								86.40	2.14								0.830		20.64	0.100			2.18				7.00						
12-9-80								84.00	4.00								0.350		17.28	0.080			2.10				3.50						
1-27-81								87.20	4.67								0.330		16.80	0.031			1.90				7.50						
2-25-81																																	
3-11-81								79.40	6.38								0.120		17.28	0.020			1.39				3.30						
4-9-81								83.20	6.00								0.310		16.32	0.028			1.95				5.10						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station : VC-6
Location Eccles Creek above South Fork
Coastal States Station

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP MPN	C.O.D. MG/L	B.O.D. MG/L	T.O.C. MG/L	DISSOLVED OXYGEN MG/L	OIL & GREASE MG/L	PHENOL MG/L	NITROGEN AMMONIA as NH_3-N MG/L	NITROGEN NITRATE as NO_3-N MG/L	NITROGEN NITRITE as NO_2-N MG/L	NITROGEN TOTAL KJELDAHL MG/L	NITROGEN ORGANIC MG/L	PHOSPHATE TOTAL as PO_4-P MG/L	PHOSPHATE DISSOLVED as PO_4-P MG/L	SULFATE as SO_4 MG/L	MANGANESE as Mn MG/L	SULFIDE as $S^{=}$ MG/L	SOLIDS TDS MG/L	SOLIDS TOTAL DISSOLVED SOLIDS MG/L	SOLIDS T.S.S. MG/L	SOLIDS TOTAL SO_4 as SO_4 MG/L	SOLIDS TOTAL VOLATILE SOLIDS MG/L	COND. µmhos/cm	TURBIDITY FTU	CARBONATE ALK. as CO_3 MG/L	BI-CARBONATE ALK. as HCO_3 MG/L	TOTAL ALK. as $CaCO_3$ MG/L	TOTAL HARDNESS as $CaCO_3$ MG/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L	

DATE	ALUMINUM DISS. MG/L	ANTIMONY DISS. MG/L	ARSENIC DISS. MG/L	BARIUM DISS. MG/L	BERYLLIUM DISS. MG/L	BORON DISS. MG/L	CADMIUM DISS. MG/L	CALCIUM DISS. MG/L	CHLORIDE DISS. MG/L	CHROMIUM HEXAVALENT MG/L	COBALT DISS. MG/L	COPPER DISS. MG/L	CYANIDE as CN MG/L	FLUORIDE DISS. MG/L	MAGNESIUM DISS. MG/L	IRON DISS. MG/L	IRON TOTAL MG/L	LEAD DISS. MG/L	MANGANESE DISS. MG/L	MERCURY DISS. MG/L	MOLYBDENUM DISS. MG/L	NICKEL DISS. MG/L	POTASSIUM DISS. MG/L	SELENIUM DISS. MG/L	SILICA as SiO_2 DISS. MG/L	SILVER DISS. MG/L	SODIUM DISS. MG/L	ZINC DISS. MG/L	VANADIUM DISS. MG/L				COMMENTS
1-27-80																	0.170																	
2-21-80																	0.100																	
3-25-80			<0.001	0.090		0.020	<0.001			<0.001		0.006				0.760	3.720	<0.001						<0.001		<0.001		0.040						
4-16-80																	0.025																	
10-7-80																	0.420																	
11-19-80																	0.930																	
12-24-80																	0.350																	
1-22-81																	0.330																	
2-25-81																																		
3-11-81																	0.120																	
4-9-81																	0.310																	

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station
Location Eccles Creek above Mud Creek
Coastal States Station

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Oxygen Total (mg/L)	Oxygen Fecal (mg/L)	Fecal Coliform (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	T.O.C. (mg/L)	Dissolved Solids (mg/L)	Oil & Grease (mg/L)	Phenols (mg/L)	Nitrogen: Ammonia as NH3-N (mg/L)	Nitrogen: Nitrate as NO3-N (mg/L)	Nitrogen: Nitrite as NO2-N (mg/L)	Nitrogen: Total Kjeldahl (mg/L)	Nitrogen: Organic (mg/L)	Phosphate: Total as PO4 (mg/L)	Phosphate: Ortho as PO4 (mg/L)	Sulfate as SO4 (mg/L)	Chloride as Cl (mg/L)	Alkalinity as CaCO3 (mg/L)	Solids: TDS (mg/L)	Solids: Total Volatile Solids (mg/L)	Solids: T.S.S. (mg/L)	Solids: Total Solids (mg/L)	Solids: Total Volatile Solids (mg/L)	Odor (Number)	Turbidity (TU)	Hardness as CaCO3 (mg/L)	Calcium Hardness as CaCO3 (mg/L)	Total Alk. as CaCO3 (mg/L)	Total Phenol as C6H5OH (mg/L)	Acidity as CaCO3 (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)
3-17-77	15:00	2.5	0	2	7.8				12.0		11.0	9.5	<1.0		0.27	0.05	<0.01	0.35		0.038	0.026	50.0	<0.01		22.0	<0.1	420			640	3.50	<0.01	273.3	224	764			
4-16-77	11:50	1.7	22	15	7.6				6.0		4.0	7.8	<1.0	<0.001	0.14	0.03		0.65		0.130	0.080	28.0	<0.01		14.0	<0.1	280			410	2.20	<0.01	275.7	226	758		0	0
5-18-77	15:00	5.0	14	10	7.9						19.0	8.2	9.6			0.72	<0.01	0.10			0.020	33.0			309		250			380			242					
6-19-77	17:15	11.3	25	11.5	7.3						18.0	8.6		0.003	0.10	0.36	<0.01	0.12			0.020	10.0			247		162			290			162.48					
7-8-77	15:55	3.4	27	17	8.0							8.0	1.2									26.0			220		238			418			236.8					
8-23-77	13:05	1.5	21.5	13.5	8.0						14.0	6.8	7.0	0.080								28.0			11.0		240			370			251.3					
9-25-77	11:15	3.2	4	4	7.1							10.4	1.3	0.010								40.0			12.0		279			470			280.6					
12-29-77	10:25	1.3	-10	0.5	7.91						7.0	12.4	<1.0	0.004								43.0			10.0		302			460			297.7					
2-28-78	11:50	2.1	-1	2	8.0							9.7	1.0	<0.001		0.10					0.075	38.0			23.0		311			490			302.44	252				
4-18-78	11:25	2.6	9	6	7.72							9.4	3.8	0.004		0.40					0.30	40.0			217		305			470			285.04	292				
5-11-78	16:15	5.2	5	9	8.45						5.0	8.3	<1.0	0.002	0.80	1.48				0.24		30.0			258		300			490	6.5		293.32	236		22.0		
6-29-78	19:41	7.1	16	4.5	8.4	79.0	8.0			<1.0	2.0	8.45	1.8	<0.001	<0.01	0.33				0.020	0.010	14.0			24.0		240			450	10.0		243.32	216		18.0	3.5	10.0
8-23-78	09:35	8.4	13	5.5	8.0	330	13.0			1.6	4.0	9.1	<1.0	<0.001	<0.05	<0.01						32.0			18.0		290			490	2.00		285.4	234		14.0	<2.0	3.5
9-26-78	08:50	3	6	6	7.65						3.0	8.0		<0.001	<0.01	0.06				<0.001		32.0			5.0		286			510	2.6		288.6	230		15.0		
10-31-78	15:50	1.7	0	2	7.70							9.8	1.2	<0.001		<0.01					0.060	14.0			24.0		270			560			256.70	210		18.0		
11-30-78	10:49	1.8	-7	0.3	6.9							10.9		0.008	<0.01					0.070		40.0			23.5		298			525			292.80					
2-27-80	14:27	2.5	8	3	9.2							10.0	14.20	0.016		12.0				0.210	0.080	280			550		585			520			248.10	220		12.0		
3-27-80	11:40	2.4	1	3	8.95									0.008	<0.01					0.190		48.0			71.0		319			590			290					
4-29-80	11:08	17.4	7	3	8.9							9.2		<0.001	0.10					1.000		32.0			126.8		238			415			222.4					
5-14-80	10:18	14.4	10	4.5	8.65							9.8		<0.001	<0.01					0.150		38.0			107		269			435			296.54					

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chlorine Free (mg/L)	Chromium Hexavalent (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride Free (mg/L)	Molybdenum Total (mg/L)	Nickel Free (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Manganese Total (mg/L)	Mercury Total (mg/L)	Vanadium Total (mg/L)	Zinc Total (mg/L)	Potassium Total (mg/L)	Sodium Total (mg/L)	Silica as SiO2 (mg/L)	Selenium Total (mg/L)	Boron Total (mg/L)	Zinc Total (mg/L)	Chromium Total (mg/L)				Comments
3-17-77	0.021		<0.001	0.009		<0.001	<0.001	64.0	4.0	<0.001		0.015		0.16			0.092	<0.001	24.96	0.053	<0.0002		0.002	1.90	<0.001	5.0	<0.001	7.10	0.033				
4-16-77	0.046	<0.001	<0.001	0.063	<0.001	0.025	<0.001	58.4	6.0	<0.001	<0.001	0.005	<0.01	0.23	<0.001		0.346	<0.001	26.88	0.050	<0.0002	<0.001	<0.001	1.98	<0.001	5.5	<0.001	4.24	0.014	<0.001				
5-18-78			<0.001				<0.001	67.2	8.0	<0.001		0.007		0.16			0.040	<0.001	16.32	0.012	<0.0002			1.676	<0.001	5.25	<0.001	4.92	0.016				
6-19-78			<0.001				<0.001	51.2	10.0	<0.001		0.004		0.24			1.887	0.003	4.80	0.141	<0.0002			1.897	<0.001	5.10	<0.001	3.49	0.015				
7-12-78			<0.001					28.0	4.0								0.122	<0.001	7.68	0.043	<0.0002			1.488	<0.001		<0.001	53.0	0.018				
8-23-78			<0.001					56.8	4.0			0.003		0.15			0.216	<0.001	22.1	0.038	<0.0002			1.988	<0.001		<0.001	3.14	0.014				
10-25-78			<0.001				<0.001	57.6	5.0	<0.001		0.003		0.15			0.241	<0.001	28.3	0.011	<0.0002			1.520	<0.001			8.50	0.012				
12-27-78			<0.001				<0.001	73.6	6.0	<0.001		0.005		0.18			0.354	<0.001	24.0	0.066	<0.0002			1.895	<0.001			3.41	0.004				
2-28-79			<0.001				<0.001	68.8	<0.1	<0.001		0.004		0.17			0.380	<0.001	22.56	0.076	<0.0002			2.229	<0.001		<0.001	14.30	0.005				Overcast
4-18-79			<0.001				<0.001	72.0	8.0	<0.001		0.002		0.16			5.840	0.002	21.12	0.187	<0.0002			1.952	<0.001		<0.001	4.09	0.013				
5-11-79			0.002	0.550		0.11	<0.001	70.4	6.0	0.014		0.017	0.002	0.15		0.022	5.780	0.006	18.72	0.143	<0.0002			0.533	<0.001		0.002	7.01	0.502				
6-29-79			<0.001	0.060		0.045	<0.001	60.8	2.0	0.002		0.005	0.001	0.014		0.036	1.040	0.005	11.52	0.035	<0.0002			1.151	<0.001		0.003	12.5	0.016				
8-23-79			<0.001	0.020		0.025	<0.001	96.00	2.0	0.005		0.006	<0.001	0.23		0.040	0.190	<0.001	3.36	0.009	<0.0002			4.100	<0.001		<0.001	4.10	0.013				
9-26-79			<0.001	0.029		0.050	<0.001	64.20	4.0	<0.001		0.019	0.001	0.17		0.020	0.340	<0.001	6.20	0.005	<0.0002			1.350	<0.001		<0.001	34.6	0.018				
10-31-79			<0.001	0.220		0.050	<0.001	52.60	2.0	<0.001		0.015		0.17			0.296	<0.001	24.43	0.062	<0.0002			2.850	<0.001		<0.001	7.20	0.036				
11-30-79								74.40	4.0								0.670		22.56	0.085				2.112				3.41					
2-27-80			<0.001	0.150		0.110	<0.001	77.00	12.0	0.002		0.010		0.17			14.90	0.007	32.00	0.400	<0.0002			2.190	<0.001		<0.001	6.50	0.020				
3-27-80								71.20	10.0								1.940		24.96	0.130				2.112				7.00					
4-29-80								65.60	8.0								1.790		11.04	0.146				2.26				7.30					
5-14-80								72.50	6.0								1.820		12.48	0.152				2.10				7.50					

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-10
Location Left Fork Eccles Creek above Right Fork

Date	Time	Flow (cfs)	Temperature Air (°C)	Temperature Water (°C)	pH	Coliform Total (MPN)	Coliform Fecal (MPN)	Fecal Strep (MPN)	C.O.D. (mg/L)	B.O.D. (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	Oil & Grease (mg/L)	Phenols (mg/L)	Nitrogen Ammonia as NH_3-N (mg/L)	Nitrogen Nitrite as NO_2-N (mg/L)	Nitrogen Nitrate as NO_3-N (mg/L)	Nitrogen Total Kjeldahl (mg/L)	Nitrogen Organic (mg/L)	Phosphate Total as PO_4^{3-} (mg/L)	Phosphate Ortho as PO_4^{3-} (mg/L)	Sulfate as SO_4 (mg/L)	Hardness as CaCO (mg/L)	Alkalinity as $CaCO_3$ (mg/L)	Solids TDS (mg/L)	Solids Total Volatile (mg/L)	Solids TSS (mg/L)	Solids Total Volatile (mg/L)	Solids Total Volatile (mg/L)	Odor (Threshold)	Turbidity (FTU)	Alkalinity as $CaCO_3$ (mg/L)	Total Alk. as $CaCO_3$ (mg/L)	Total Hardness as $CaCO_3$ (mg/L)	Acidity as $CaCO_3$ (mg/L)	Alpha Radioactivity (pCi/L)	Beta Radioactivity (pCi/L)
6-14-78	14:30	8.5	22	9	7.3						27.0	9.0	<1.0	0.002	0.10	0.18	<0.01	0.14			0.021	4.0			89.0		139			210			251.28				
7-12-78	14:45	1	21	16	8.3							7.4	<1.0									15.0			60		205			346			219.6				
8-23-78	14:15	0.2	20	12	8.0						22.0	8.1	2.2	0.004								10.0			40		200			305			241.5				
10-25-78	11:50	0.3	3	0.5	7.4							11.3	<1.0	0.011								19.0			40		231			420			216.08				
11-8-78	10:45	0.3	2	0.2	7.5						11.0	11.4				0.12	<0.01	0.11			0.025	12.0			90		245			425			283.44				
12-27-78	11:05	0.2	-2	2	7.65						4.0	10.9	1.0	<0.001		0.26	<0.01	0.10			0.020	14.0			180		256			395			290.92				
2-28-79	12:13		In-accessible																																		
4-18-79	11:55		In-accessible																																		
5-11-79	15:28	0.9	0	2.5	8.4						8.0	9.3	1.6	0.076	<0.10	1.32				0.06		5.0			110		270			410	5.50		280.46	230		16.0		
6-20-79	11:20	3.8	16	5.5	8.18	70.0	<2.0				<1.00	8.7	<1.0	<0.001	<0.01	0.05				0.040	0.010	10.0			70		196			340	6.00		222.04	182		2.0	2.5	12.0
7-18-79	12:52	1.2	24	9.0	7.72						12.0	8.0	<1.0	0.010	<0.01	0.10				0.030		5.0			70		225			420	4.20	<0.01	248.40	220		28.0		
9-26-79	13:20	0.6	16	8.5	7.70						1.0	6.8		<0.001	[illegible]	0.03				0.020		10.0			90		227			380	4.40		255.96	218		19.0		
10-31-79	12:03	0.15	-1	0	7.9							9.4	1.0	<0.001		<0.01					0.060	31.0			240		275						278.84	222		24.0		
11-30-79	12:00	0.3	-5	0.3	7.3							10.2		0.010	<0.01					0.060		21.0			65		259			430			280.60					
2-27-80			In-Accessible																																		
3-27-80			In-Accessible																																		
4-29-80			In-Accessible																																		
5-18-80	11:23	2.6	10.0	2	8.2							9.9		0.046	<0.01					0.100		30.0			130		238			325			239.24					
6-25-80	09:58	7.0	12	4.5	9.2							9.9		0.002	<0.01					0.040		7.2			40		190			290			202.52					
7-21-80	12:50	2.2	28	13	8.7									0.021	<0.01					0.030		4.5			70		212			320			245.50					

Date	Aluminum Total (mg/L)	Antimony Total (mg/L)	Arsenic Total (mg/L)	Barium Total (mg/L)	Beryllium Total (mg/L)	Boron Total (mg/L)	Cadmium Total (mg/L)	Calcium Total (mg/L)	Chloride (mg/L)	Chromium Hex. (mg/L)	Cobalt Total (mg/L)	Copper Total (mg/L)	Cyanide as CN (mg/L)	Fluoride (mg/L)	Manganese Total (mg/L)	Iron (mg/L)	Iron Total (mg/L)	Lead Total (mg/L)	Magnesium Total (mg/L)	Mercury Total (mg/L)	Molybdenum Total (mg/L)	Nickel Total (mg/L)	Nickel Total (mg/L)	Potassium Total (mg/L)	Selenium Total (mg/L)	Silica as SiO_2 (mg/L)	Silver Total (mg/L)	Sodium Total (mg/L)	Zinc Total (mg/L)	Phosphate Total (mg/L)				Comments
6-14-78			<0.001				<0.001	41.6	8.0	0.001		<0.001		0.13			0.519	<0.001	7.68	0.022	<0.0002			0.577	<0.001	3.90	<0.001	2.00	0.003					
7-12-78			<0.001					26.4	<1.0								0.045	<0.001	5.76	0.005	<0.0002			0.914	<0.001		<0.001	4.20	0.018					
8-23-78			<0.001					52.8	<0.10			0.002		0.13			0.052	<0.001	18.2	0.016	<0.0002			0.937	<0.001		<0.001	2.05	0.015					
9-25-78			<0.001			<0.001	<0.001	59.2	<1.0	<0.001		0.003		0.14			0.086	<0.001	20.10	0.004	<0.0002			0.870	<0.001			3.2	0.019					
11-8-78			<0.001	0.030		<0.001	<0.001	66.4	7.0	<0.001		0.002	<0.01	0.12			0.119		19.2	0.019				1.027	<0.001	5.05	<0.001	2.24	0.002					
12-27-78			<0.001	0.020		<0.001		19.24	6.0	<0.001		0.003		0.15			0.079	<0.001	18.24	0.012				0.959	<0.001	5.60	<0.001	4.30	0.003					
2-28-79																																		
4-18-79																																		
5-11-79			<0.001	0.040		0.080	<0.001	68.0	6.0	0.003		0.003	<0.001	0.11		0.023	0.350	0.002	13.92	0.007	<0.0002			1.002	<0.001		<0.001	6.30	0.011					
6-20-79			<0.001	0.045		0.030	<0.001	54.4	<1.0	0.002		0.003	<0.001	0.15		0.020	0.260	0.002	17.48	0.009	<0.0002			0.691	<0.001		0.002	1.71	0.016					
7-18-79			<0.001	0.030		0.090	<0.001	64.80	7.0	0.002		0.006	<0.001	0.15		0.050	0.230	<0.001	13.92	0.022	<0.0002			0.902	<0.001		0.001	2.02	0.017					
9-26-79			<0.001	0.050		0.050	<0.001	63.85	2.0	<0.001		0.015	<0.001	0.19		0.030	0.540	<0.001	14.10	0.036	<0.0002			0.520	<0.001		<0.001	4.90	0.025					
10-31-79			<0.001	0.214		0.090	<0.001	58.80	4.0	<0.001		0.016		0.15			0.310	<0.001	16.10	0.020	<0.0002			2.300	<0.001		<0.001	8.50	0.022					
11-30-79								76.00	2.0								0.400		14.88	0.074				1.014				2.16						
2-27-80																																		
3-27-80																																		
4-29-80																																		
5-18-80								44.00	4.0								0.325		17.48	0.087				2.20				2.50						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station VC-9
Location Eccles Creek above Mud Creek
Coastal States Station

Date	Time	Flow cfs	Temperature Air °C	Temperature Water °C	pH	Coliform Total MPN	Coliform Fecal MPN	Fecal Strep MPN	C.O.D. mg/L	B.O.D. mg/L	T.O.C. mg/L	Dissolved Oxygen mg/L	Oil & Grease mg/L	Phenol mg/L	Nitrogen Ammonia as NH_3-N mg/L	Nitrogen Nitrate as NO_3-N mg/L	Nitrogen Nitrite as NO_2-N mg/L	Nitrogen Total Kjeldahl mg/L	Nitrogen Organic mg/L	Phosphate Total as PO_4-P mg/L	Phosphate Ortho as PO_4-P mg/L	Sulfate as SO_4 mg/L	Sulfide as S mg/L	Cyanide as CN mg/L	Solids TDS mg/L	Solids Total Suspended mg/L	Solids TSS mg/L	Solids Total Solids mg/L	Solids Total Volatile Solids mg/L	Odor Threshold	Turbidity JTU	Alkalinity Alk. as $CaCO_3$ mg/L	Hardness Ca-Carbonate Alk. as $CaCO_3$ mg/L	Total Alk. as $CaCO_3$ mg/L	Total Hardness as $CaCO_3$ mg/L	Acidity as $CaCO_3$ mg/L	Gross Alpha Radioactivity pCi/L	Gross Beta Radioactivity pCi/L
6-25-80	13:55	12.1	24	12	8.86							7.9		<0.002	<0.01					0.060		50.0			16.0		210		330			168.34					
7-21-80	13:15	3.4	27	16	8.6									0.002	<0.01					0.080		28.0			32.0		240		360			234.68					
8-25-80	14:30		14	12	9.0	35000	3300			3.1	4.00	8.0	<0.01	<0.001	0.16	0.64				0.900		46.0			2224		376		475	22.0		291.80	240		6.0	1.1	1.8
9-16-80	08:17	2.3	9	7	8.3									0.026	<0.01					0.060		25.5			22.0		268		440			255.24					
10-7-80	10:30	2.4	11	6	8.4									0.044	0.10					0.030		24.0			9.0		265		400			257.92					
11-19-80	10:04	3.6	-7	0.5	7.4									<0.001	<0.01					0.160		44.0			28.0		290		248			297.68					
12-8-80	12:00	3.2	6	2	7.7									0.002	<0.01					0.120		33.0			20.0		320		300			307.44					
1-27-81	10:50	2.7	0	1	7.8									<0.001	<0.01					0.030		16.0			20.0		285		265			331.84					
2-25-81	14:30	3.8	10	5	8.1									0.003	<0.01					<0.001		21.0			30.0		246		380			298.60					
3-11-81	12:48	2.4	2	3	7.9									<0.001	<0.01					0.070		20.0			17.0		265		276			298.60					
4-8-81	12:58	2.3	8	6	8.1									0.003	0.15					0.020		26.0			115		290		332			288.84					

Date	Aluminum Total mg/L	Antimony Total mg/L	Arsenic Total mg/L	Barium Total mg/L	Beryllium Total mg/L	Boron Total mg/L	Cadmium Total mg/L	Calcium mg/L	Chromium Hexavalent mg/L	Chromium Total mg/L	Cobalt Total mg/L	Copper Total mg/L	Cyanide as CN mg/L	Fluoride mg/L	Mercury Total mg/L	Iron mg/L	Iron Total mg/L	Lead Total mg/L	Magnesium Total mg/L	Manganese Total mg/L	Mercury Total mg/L	Molybdenum Total mg/L	Nickel Total mg/L	Potassium Total mg/L	Selenium Total mg/L	Silica as SiO_2 mg/L	Silver Total mg/L	Sodium Total mg/L	Zinc Total mg/L	Vanadium Total mg/L				Comments
6-25-80								56.0	2.0								0.440		11.52	0.040				1.05				2.60						
7-21-80								64.80	4.8								0.470		14.88	0.050				1.49				3.10						
8-25-80			0.014	0.550		0.120	<0.001	72.00	20.0	<0.001		0.020	0.015	0.24		0.070	58.50	0.040	25.92	0.046	K=0.002			1.58	0.007		0.002	13.40	0.380					
9-16-80								61.60	3.6	<0.001							0.410		27.84	0.055			<0.001	1.50				3.20						
10-7-80								57.20	2.7								0.580		24.48	0.085				2.18				4.80						
11-19-80								76.80	2.49								0.710		23.04	0.085				2.11				3.60						
12-8-80								72.80	26.00								1.120		27.36	0.080				1.95				14.70						
1-27-81								73.60	5.00								1.200		23.04	0.095				2.00				5.20						
2-25-81								29.20	10.00								0.740		48.90	0.080				2.34				4.60						
3-11-81								67.20	10.64								0.360		21.60	0.070				2.16				4.30						
4-8-81								79.20	16.00								0.750		15.84	0.090				2.40				6.80						

VAUGHN HANSEN ASSOCIATES
Consultants / Engineers

WATER QUALITY DATA

Station: VG-9
Location: Eccles Creek above Mud Creek Coastal States Station

DATE	TIME	FLOW CFS	TEMPERATURE AIR °C	TEMPERATURE WATER °C	pH	COLIFORM TOTAL MPN	COLIFORM FECAL MPN	FECAL STREP. MPN	C.O.D. MG/L	B.O.D. MG/L	T.O.C. MG/L	DISSOLVED OXYGEN MG/L	OIL & GREASE MG/L	PHENOL MG/L	NITROGEN AMMONIA as NH_3-N MG/L	NITROGEN NITRATE as NO_3-N MG/L	NITROGEN NITRITE as NO_2-N MG/L	NITROGEN TOTAL KJELDAHL MG/L	NITROGEN ORGANIC MG/L	PHOSPHATE TOTAL as PO_4-P MG/L	PHOSPHATE ORTHO as PO_4-P MG/L	SULFATE as SO_4 MG/L	CHLORIDE as Cl MG/L	FLUORIDE as SiO_2 MG/L	SOLIDS TSS MG/L	SOLIDS TOTAL VOLATILE SOLIDS MG/L	SOLIDS T.D.S. MG/L	SOLIDS TOTAL SOLIDS MG/L	SOLIDS TOTAL VOLATILE SOLIDS MG/L	COND. µmhos/cm	TURBIDITY FTU	CARBONATE ALK. as CO_3 MG/L	BI-CARBONATE ALK. as HCO_3 MG/L	TOTAL ALK. as $CaCO_3$ MG/L	TOTAL HARDNESS as $CaCO_3$ MG/L	ALPHA RADIO-ACTIVITY pCi/L	BETA RADIO-ACTIVITY pCi/L	

DATE	ALUMINUM DISS. MG/L	ANTIMONY DISS. MG/L	ARSENIC DISS. MG/L	BARIUM DISS. MG/L	BERYLLIUM DISS. MG/L	BORON DISS. MG/L	CADMIUM DISS. MG/L	CALCIUM DISS. MG/L	CHLORIDE DISS. MG/L	CHROMIUM HEX. as Cr MG/L	COBALT DISS. MG/L	COPPER DISS. MG/L	CYANIDE as CN MG/L	FLUORIDE DISS. MG/L	STRONTIUM DISS. MG/L	IRON DISS. MG/L	IRON TOTAL MG/L	LEAD DISS. MG/L	MANGANESE DISS. MG/L	MANGANESE DISS. MG/L	MERCURY DISS. MG/L	MOLYBDENUM DISS. MG/L	NICKEL DISS. MG/L	POTASSIUM DISS. MG/L	SELENIUM DISS. MG/L	SILICA as SiO_2 MG/L	SILVER DISS. MG/L	SODIUM DISS. MG/L	ZINC DISS. MG/L	VANADIUM DISS. MG/L				COMMENTS
6-25-80																	0.640																		
7-21-80																	0.470																		
8-25-80			<0.001	0.150		0.190	<0.001			<0.001		0.016				0.078	54.50	0.006							<0.001		<0.001		0.220						
9-16-80																	0.410																		
10-7-80																	0.580																		
11-19-80																	0.710																		
12-29-80																	1.120																		
1-27-81																	1.200																		
2-25-81																	0.740																		
3-11-81																	0.360																		
4-8-81																	0.750																		

APPENDIX F

ACR MAP D-1

RECLAMATION MAP - PORTAL AREA (Revised)

ACR MAP D-2

PORTAL AREA CROSS SECTIONS (Revised)

Reference: UMC 784.13
UMC 784.14
UMC 784.15
UMC 817.47
UMC 817.97

APPENDIX G

ACR MAP G VEGETATION (Revised)

Reference: UMC 783.19

APPENDIX H

SUBSIDENCE MONITORING

Reference: UMC 784.20

APPENDIX H

APPENDIX H
12 May 1982

VALLEY CAMP OF UTAH, INC.

SUBSIDENCE MONITORING PLAN

Belina Mine

Act/007/001

Prepared for

VALLEY CAMP OF UTAH, INC.

Clear Creek, Utah

By

VAUGHN HANSEN ASSOCIATES

Salt Lake City, Utah

October 1979

VALLEY CAMP OF UTAH, INC.

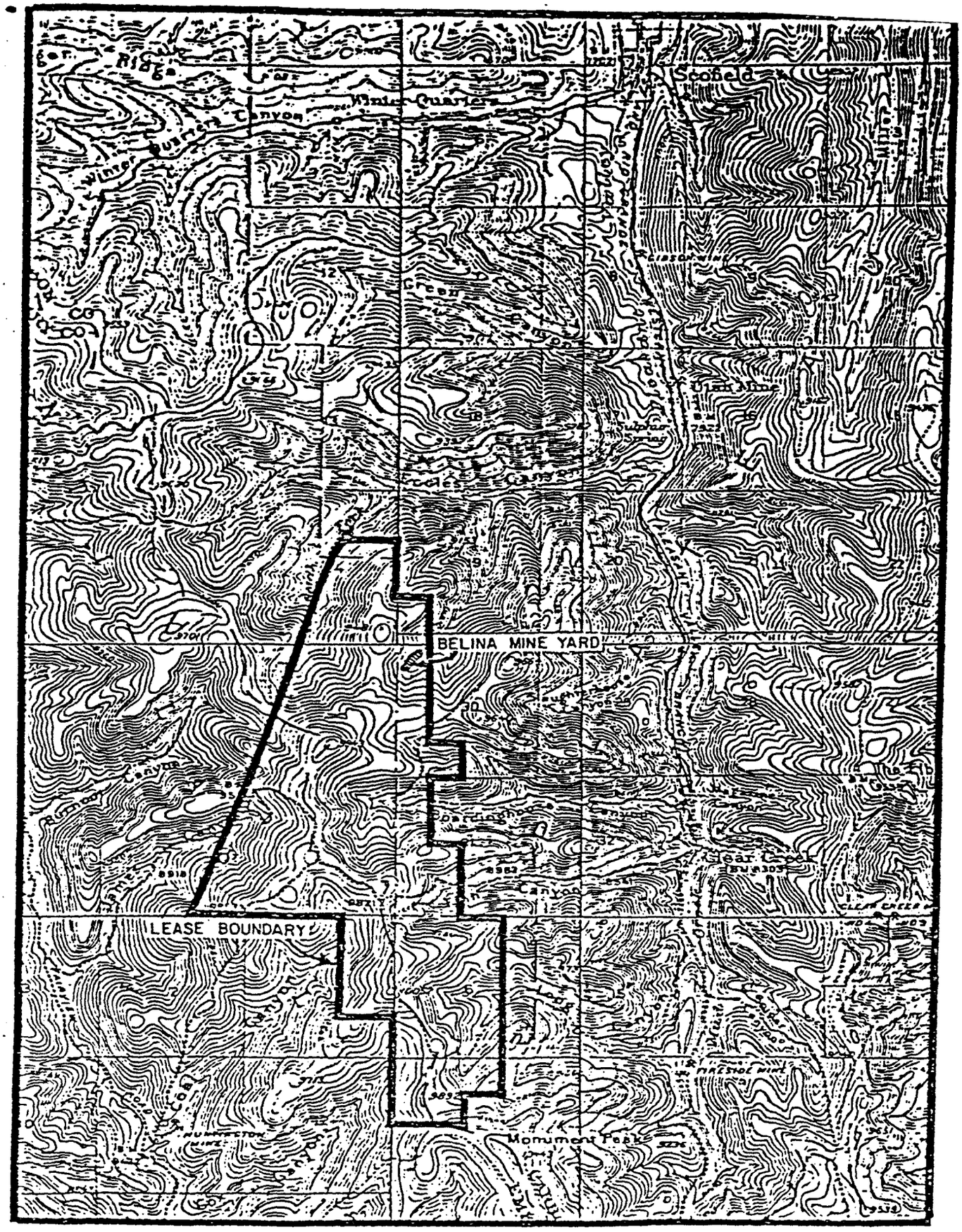
SUBSIDENCE MONITORING PLAN

INTRODUCTION

The purpose of this document is to set out the subsidence monitoring program implemented by Valley Camp of Utah, Inc. in the coal lease area currently being developed through the Belina No. 1 mine (see Figure 1). The C FR 211 Mine Plan for Belina No. 1 Mine was approved February 10, 1977, subject to a provision that Valley Camp should set up a subsidence monitoring system. The Office of Surface Mining Reclamation and Enforcement also now requires that a subsidence monitoring program be established where renewable resources exist. The program presented herein is based on the requirements of the Mining Supervisor inconsultation with U.S. Forest Service, Manti-LaSal National Forest. Prior to the development of this program, meetings were held with representatives of the Geological Survey and the Manti-LaSal National Forest and their draft guidelines were received and incorporated herein. Comments were also received from the Utah Division of Oil, Gas, and Mining and incorporated into this plan. Valley Camp of Utah, Inc., has entered into a Cooperative Agreement with the U.S. Forest Service to implement certain major aspects of this plan. This cooperative Agreement is attached hereto as Appendix I, and by this reference is made a part hereof.

BASELINE DATA COLLECTION

A field survey is being made by a consultant in order to locate surface and subsurface structures which might be materially damaged or altered by possible subsidence. The area surveyed includes the lease area plus the area covered by a 45 degree angle of draw from the lowest coal seam to be mined. Existing structures

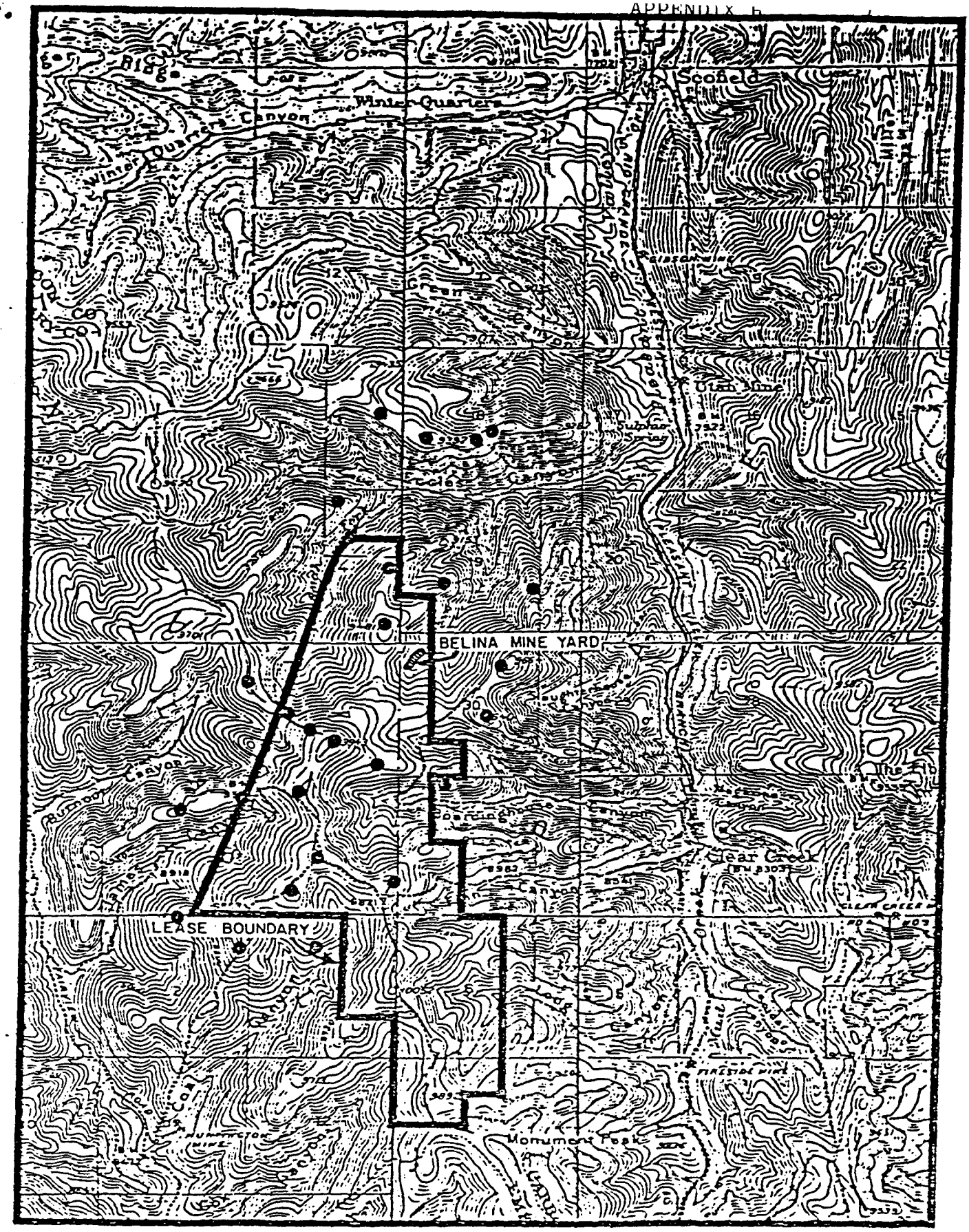


SCALE 1:62500

Figure 1. Location of Valley Camp of Utah, Inc. lease area near Clear Creek, Utah.

will be examined for their existing condition and photographs will be taken to provide a permanent record. Particular attention will be paid to gas pipelines, roads, fences, section corners, electronic equipment and instrumentation, etc. The condition of the ground surface in the study area will also be examined and noted.

In cooperation with the Manti-LaSal National Forest, monument locations have been selected in and adjacent to the lease area for the purpose of monitoring subsidence through the use of aerial photogrammetry (see Figure 2). These monoments have been placed and flagged. The monuments will be surveyed by representatives of Valley Camp to establish control. An initial photogrammetric flight has been made by the U.S. Forest Service to provide aerial photography of the entire lease area and angle of draw. Developmental mining and limited extraction causing no subsidence was commenced in 1977. The initial aerial photography conducted in September 1979, is representative of pre-mining conditions. Flights will be made in accordance with the draft guidelines; namely, a 30 percent overlap of flight lines and 65 percent overlap in photographs will result, producing photographs having a scale of 1:4800 and a quality that will produce elevations accurate to within one foot. The photographs will not be digitized unless future subsidence is discovered. At that point, that area over which subsidence has occurred will be studied to produce contour intervals, thus saving the expense of topographic reduction until necessary.



SCALE 1:62500

Figure 2. Location of existing and proposed subsidence monuments.

MONITORING PROGRAM

An ongoing subsidence monitoring program is being conducted consisting of annual field surveys and photogrammetric overflights, pursuant to the Cooperative Agreement between Valley Camp of Utah, Inc. and the U.S. Forest Service, attached hereto. An on-ground visual inspection will be made by Valley Camp or a consultant each year following the initial survey. This inspection, to be made normally in midsummer after the ground has dried, will deal with the condition of the ground surface and existing structures above all underground workings and their angle of draw. Attempts will be made to identify and document the presence of tension cracks, fissures, landslides, structural offsets, structural damage, etc. Photographs will be taken of the noted changes to assess impacts. Changes in the hydrologic condition of the area will be assessed through an on-going hydrologic monitoring program.

Annual overflights will be made of the area overlying underground workings plus the potential angle of draw. Monuments will be inspected each year prior to the flight to insure proper flagging. Flights will produce photographs at a scale of 1:4800 and follow the overlap guidelines outlined in the previous section. The photographs will not be topographically reduced unless subsidence is discovered. Only those areas where subsidence has occurred will be studied in further detail as an aid in establishing the magnitude of subsidence.

COOPERATIVE AGREEMENT

Between

VALLEY CAMP OF UTAH, INC.

and

Manti-LaSal National Forest
United States Department of Agriculture

THIS COOPERATIVE AGREEMENT, made and entered into by and between Valley Camp of Utah, Inc., hereinafter referred to as the COOPERATOR, and the Manti-Lasal National Forest, U.S. Department of Agriculture, hereinafter referred to as the FOREST SERVICE, under the provisions of the Granger--Thye Act of February 24, 1950 (16 U.S.C. 572).

WITNESSETH:

WHEREAS, the FOREST SERVICE has the responsibility as a surface management agency to insure mineral development with adequate protection of surface resources,

WHEREAS, the COOPERATOR is desirous to comply with the requirements for subsidence monitoring (30 CFR 211-700),

WHEREAS, it is to the mutual advantage of the parties hereto mentioned to cooperate in instigating and supporting a photogrammetric method of monitoring subsidence, more particularly prescribed in the attached plan, which is hereby made part of this agreement.

NOW THEREFORE, in consideration of the above premises, the parties hereto agree as follows:

A. THE COOPERATOR SHALL

1. Construct target monuments at designated locations over their lease area. One of these must be at or near the mine portal. These target monuments shall be in accordance with or superior to those shown on Attachment No. 1.

2. Determine the precise coordinates and elevation of each of these monuments--Utah Coordinate System should be used.

3. Flag all monuments, as shown on Attachment No. 1, each year prior to taking of the aerial photography.

4. Provide the FOREST SERVICE with copies of the survey data.

5. Upon presentation of a bill for collection, promptly deposit with the Forest Service, Five Thousand Dollars ($5,000.00) as an initial advance payment and before annual flights each year during the term hereof beginning in 1980, the estimated amount of Two Thousand Five Hundred Dollars ($2,500.00)

These amounts are estimated to cover the cost of conducting aerial photographic surveys of portions of the leasehold. These amounts include the cost of conducting the aerial survey, color and infrared photography, prints (digitizing photographs, producing contour maps, and/or ortho photographs, as needed), and related indirect costs.

6. Upon presentation of a Bill for Collection, reimburse the FOREST SERVICE within 30 days the actual cost of services in excess of advance deposits, each year during the term hereof.

B. THE FOREST SERVICE SHALL

1. Make aerial photographs of the lease area using methods that will produce usable and adequate photographic prints for measurement of subsidence.

2. Perform aerial triangulation (bridging).

3. Make point readings for subsidence monitoring (as necessary).

4. Provide to the COOPERATOR one set of black and white and one set of color prints (9" x 9"), with a 1:4800 scale following each flight.

5. Provide to the COOPERATOR copies of all subsidence monitoring point readings and other data determined (as may be required).

6. Deposit funds so collected in the cooperative work fund of the FOREST SERVICE.

7. Use the funds collected under A.5 and A.6 to cover the costs of conducting aerial surveys, color and (when required and agreed upon) infrared photography, prints, digitizing photographs, and producing contour maps and/or ortho photographs, as needed.

8. Assist, cooperate, and--in some areas-- conduct range analysis, timber surveys, and wildlife habitat studies on National Forest lands, as may be necessary, to determine the effects of undermining upon surface resources.

C. IT IS MUTUALLY AGREED AND UNDERSTOOD BY AND BETWEEN THE SAID PARTIES THAT

1. As data is collected, frequency and times of the surveys may be changed to accommodate identified needs.

2. The FOREST SERVICE will require continuance of programs until such time it is determined the program is no longer needed, but not to exceed five years following final closure of the mine. Special cases may exist which require this time period to extend beyond five years. Concurrence of all involved parties would then be required for extending this monitoring period.

3. This agreement will have no effect on provisions and clauses of any of the COOPERATOR'S Special Use Permit(s).

4. Upon request of the COOPERATOR, any unused or unobligated deposited funds for a given year will be refunded, and a statement of costs for the period provided. Otherwise, unused or unobligated funds will be applied to the following yearly billings(s).

5. Nothing herein shall be construed as obligating the FOREST SERVICE to expend, or as involving the United States in any contract or other obligation for the future payment of, money in excess of appropriations authorized by law and administratively allocated for this work.

6. No Member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall be construed to extend to this agreement if made with a corporation for its general benefit.

7. This agreement may be amended as necessary by mutual consent of both parties, by the issuance of a written amendment, signed and dated by both parties.

IN WITNESS THEREOF, the parties hereto have executed this agreement as of the last date written below.

VALLEY CAMP OF UTAH, INC.

[illegible]
Date

By [illegible]
W. H. Haynes, Jr.
Its Vice President

USDA - FOREST SERVICE

9/25/79
Date

By [illegible]
Forest Supervisor

APPENDIX H

U-020305

United States Department of the Interior

GEOLOGICAL SURVEY

Office of the Area Mining Supervisor
Conservation Division
2040 Administration Building
1745 West 1700 South
Salt Lake City, Utah 84104

May 23, 1980

Mr. William H. Haynes, Jr.
President Western Division
The Valley Camp Coal Company
Scofield Route
Helper, Utah 84526

Dear Mr. Haynes:

Your modified projection of Belina No. 1 mine development and extraction of coal to accommodate recent dike and fault encounters has been reviewed since our discussions with you on May 22, 1980, and is herewith approved.

The changes are minor modifications of an approved mine plan and will not result in a significant difference in the human environment as defined by NEPA, and covered in the environmental analysis of the approved mine plan.

The proposal to limit extraction of coal to first mining under the natural gas pipe lines on the surface to a draw angle of 35 degrees has also been reviewed and is approved. It is our opinion that 35 degrees is conservative and the true angle of draw is somewhat less. When data is available from your current subsidence monitoring program we may be able to reduce the angle and increase the coal recovery. Also if the requirements to protect the gas pipe lines on the surface change, or are not longer needed, then modifications to this approval will be made as appropriate.

If you have any questions or comments please contact Allen Vance or me.

Sincerely yours,

Jackson W. Moffitt

Jackson W. Moffitt
Area Mining Supervisor

Enclosure

RECEIVED
MAY 28 1980
By

APPENDIX I

PORTIONS OF

AVIFAUNA AND RAPTORS

BY

CLAYTON M. WHITE

PORTIONS OF

FISH AND WILDLIFE RESOURCE INFORMATION

BY

UTAH STATE DIVISION OF WILDLIFE RESOURCES

References: UMC 817.97
UMC 784.21

APPENDIX I
12 May 1982

DOUGLAS F. DAY
Director

1596 West North Temple/Salt Lake City, Utah 84116/801 533-9333

Reply To: SOUTHEASTERN REGIONAL OFFICE
455 West Railroad Avenue, Box 1220, Price, Utah 84501
(801) 637-5510

Mr. William H. Haynes
Valley Camp of Utah Inc.
Scofield Route
Helper, Utah 84526

Attention: Mr. Trevor G. Whiteside

Dear Bill:

I want to take this opportunity to extend thanks for the assistance Trev has provided Larry Dalton in becoming familiar with existing and planned surface facilities on the area encompassed by Valley Camp's Utah No. 2 and Belina No. 1 and 2 mining projects. I believe that you will find the enclosed information helpful at filing a mine and reclamation plan.

In response to your request for wildlife resource information (UMC 783.20) and the Division's recommendations concerning a wildlife plan (UMC 784.21) to accompany a permit application, the attached map, data and comments are provided. The wildlife resource information is consistant with the formal guidelines for acquisition of fish, wildlife and habitat information provided your Company by Utah's Division of Oil, Gas and Mining. In instances where your Company was required to provide for study beyond existing information, such findings need be merged with our report.

The Division Publication No. 78-16 "Species List of Vertebrate Wildlife that Inhabit Southeastern Utah" represents a low level of study. It adequately identifies potential occurrence; season of use (avifauna only); relative abundance as unknown, common, uncommon, rare, occasional, accidental, endangered, threatened, limited and extirpated; status as protected or non-protected; population trend and prefered habitat use area for each species of wildlife that can be found in the biogeographic area in which the project lies. This publication was earlier provided to Mr. Glenn Phillips who has represented Valley Camp of Utah Inc. through Golden Associates. It should be an appendix to the application so that all reviewers can be adequately appraised of the regional as well as site specific situation as it relates to wildlife.

Please note that the enclosed wildlife plan represents our recommendations; Utah's Division of Oil, Gas and Mining is the regulatory authority for approval of the mining and reclamation plan.

Thank you for an opportunity to assist your Company in complying with the State's permanent program for coal mining and reclamation and the resultant protection of Utah's wildlife resources. If the Division can be of any further service, please coordinate with Larry Dalton, Regional Resource Analyst (Phone 801-637-3310), as appropriate.

Sincerely,

Larry J. Wilson, Supervisor
Southeastern Region

LJW:LBD:gp

Attachment

cc: Darrell Nish, Chief Resource Analysis
Jack Topham, Carbon Conservation Officer
Clark Johnson, Coal Coordinator, U. S. Fish and Wildlife Service
Leon Berggren, Area Manager, Bureau of Land Management
Reed Christensen, Supervisor, Manti LaSal National Forest
Cleon B. Feight, Director, Division of Oil, Gas and Mining

Terrestrial Use Areas

Wildlife Habitat Types

Of the seven wildlife habitat types present on the mine plan area, wetlands and riparian habitats which are normally associated with drainage bottoms (ephemeral or intermittent), or perennial streams (SMC 700.5 and UMC 700.5), seeps and springs within the montane ecological association (Canadian life zone) are ranked as being of critical value to all wildlife. When compared to all other wildlife habitats, the aforementioned situation is considered to represent a unique habitat association (Table 1).

Riparian and wetland areas are highly productive in terms of herbage produced and use by wildlife, as compared to surrounding areas. Experience has shown that as much as 70 percent of a local wildlife population are dependent upon riparian zones. Any unique habitat type must be identified in the permit application and protected, due to their high value for all wildlife.

Quantitative (acreage) and qualitative (condition, successional stage and trend) data concerning the wildlife habitats in each geological association should be included as part of the mine permit application. It is important to note that each legal section of land encompassed or overlapped by the mine plan and adjacent areas has been ranked as to its value for the total wildlife resource. Sections 9, 16, 17, 19 and 31 of Township 13 South, Range 7 East and Section 6 of Township 14 South, Range 7 East, have each been ranked as being of critical value to wildlife. Sections 8, 18, 20, 21 and 30 of Township 13 South, Range 7 East; Sections 24, 25, 35 and 36 of Township 13 South, Range 6 East; Section 7 of Township 14 South, Range 7 East; and Section 1 of Township 14 South, Range 6 East, have all been ranked as being of high-priority value to wildlife. These rankings were developed through an analysis of cumulative values for use areas of individual wildlife species inhabiting each legal section of land (Table 2).

Amphibians--Species Occurrence and Use Areas (See pages 8-10 - Appendix I)

Six species of amphibians, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that all of these species inhabit the project area (Reference the Division Publication No. 78-16). Only the tiger salamander has been determined to be of high interest to the State of Utah (Appendix A).

The tiger salamander is a yearlong resident animal of the project area. The substantial value use area for the adult form is represented by any moist underground site, or any similar habitat such as inside rotten logs, cellars, or animal burrows. Such sites can be found within any wildlife habitat extending from the cold desert (upper Sonoran life zone) through the submontane (Transition life zone) and into the montane (Canadian life zone) ecological association. The larval form, often referred to as a mudpuppy, is a gilled animal that must remain in water within the above described ecological associations. It is interesting to note that the larva may fail to transform into an adult, even after their second season, and they can breed in the larva condition.

Once the larva is transformed into the adult form, the animal is primarily terrestrial. Salamanders do migrate to water in the spring for breeding and may remain there during much of the summer. Such an intensive use area would be ranked as being of high-priority value to the animal. In September, the newly transformed animals leave the water to find suitable places to spend the winter.

The tiger salamander breeds from March through June, and is sexually mature after one year. The male deposits a small, tent-shaped structure containing a myriad of sperm on the pool bottom. During courtship, the female picks up this structure in her cloaca; then the eggs are fertilized internally before or just at the time they are laid. The eggs, singly or in small clusters, adhere to submerged vegetation; after 10 to 12 days, they hatch. Obviously, a critical period for maintenance of the population is when breeding salamanders, eggs or their larva are inhabiting a water.

Post-embryonic development of a salamander's larval form progresses at a pace somewhat controlled by water temperature; in some cold waters, the larva may not transform into an adult, and drying up of a pool may hasten the process.

Migration to or from water usually occurs at night, during or just after a rain storm. When inhabiting terrestrial sites, the tiger salamander is most active at night, particularly on rainy nights, from March through September.

Larva, when small, feed on aquatic invertebrates and become predacious to the point of cannibalism when they are larger. Food items for adults include insects, earthworms and, occasionally, small vertebrates.

No amphibians have relative abundances that are so low to have caused the animal to be federally listed as a threatened or endangered species.

Reptiles--Species Occurrence and Use Areas - (See pages 8-13, Appendix I)

Eighteen species of reptiles, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that sixteen of these species inhabit the project area (Reference the Division Publication No. 78-16). Only two species of the reptiles inhabiting the project area have been determined to be of high interest to the State of Utah (Appendix A).

The Utah milk snake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the upper Sonoran (cold desert life zone) through the submontane (Transition life zone) and into the montane (Canadian and, possibly, Hudsonian life zone) ecological associations. Although its use area spans a multitude of habitats, the animal is extremely secretive, mostly nocturnal, and is often found inside or under rotten logs, stumps, boards, rocks or within other hiding places. At night, they can be found in the open where they hunt for small rodents, lizards and other small snakes. Occasionally, the milk snake may take small birds or bird eggs.

The milk snake may live beyond twenty years, and it becomes sexually mature during its third spring season. After mating, which occurs during spring or early summer when they are leaving the den, female milk snakes produce clutches which average seven eggs. The eggs are secreted in a moist, warn environ and then abandoned; incubation lasts 65 to 85 days. The site where an individual snake has deposited its clutch of eggs is of critical value to maintenance of the species.

The Utah mountain kingsnake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the submontane (Transition life zone) into the montane (Canadian and, possibly, Hudsonian life zones) ecological association. Little is known concerning this animal except that it frequents areas of dense vegetation and that it is often found near water. Its life history and food habits parallel that described for the Utah milk snake.

To date, snake dens, which are protected and of critical value to snake populations, have not been identified on or adjacent to the project area. It is important to note that inventory for such has not been attempted. If the Company, at some later time, discovers a den, it should be reported to the Utah Division of Wildlife Resources. If a den(s) is currently known, its location must be included with the permit application.

No reptiles have relative abundances that are so low to have caused the animal to be federally listed as a threatened or endangered species.

Birds--Species Occurrence and Use Areas

Two hundred forty-two species of birds, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that one hundred twenty-six of these species inhabit the project area (Reference the Division Publication No. 78-16). Thirty-three species of the birds inhabiting the project area have been determined to be of high interest to the State of Utah (Appendix A).

The Great Blue Heron is a yearlong resident of the environs associated with the project. The bird's substantial valued use area is always associated with open water where it feeds on aquatic wildlife. The Great Blue Heron normally nests in rookeries that are often co-inhabited by Snowy Egrets and Black Crowned Night Herons. The nest may be placed high in a tree along a lake or stream edge; however, they will nest on the ground. The rookery is ranked as being of critical value to herons; it is normally a traditional site and utilized year after year by a nesting colony. It is important to note that rookeries are abandoned if they become vulnerable to predation or experience continual disturbance. No rookery or nest site is known to exist on or adjacent to the mine plan area.

Both adult Great Blue Herons participate in the incubation and rearing process. Three to five eggs are laid, with a two or three day period between deposition of each egg. Incubation of each egg lasts about eighteen days; after which the nestlings remain in the nest for about sixty days. This period is crucial to survival of the heron population.

Ducks commonly known as waterfowl are represented by six species that may, on occasion, or during different seasons of the year inhabit the mine plan area. All of these species are of high interest to the State of Utah (Appendix A). Generally speaking, the riparian and wetland habitats

encompassed by the project and adjacent areas provide substantial value habitats for waterfowl. Each species has different life requirements and makes various uses of the riparian and wetland environs associated with the project.

For those waterfowl that nest locally (mallard, gadwall, green-winged teal and cinnamon teal), the period March 15 through July 15 is ranked as being of crucial value to maintenance of the population. Following incubation, which dependent upon the species, may vary between 20 and 28 days, and extend up until mid-August, the riparian and wetland habitats represent a high-priority brooding area. Additionally, the wetland habitat (large open water areas or dense marshland) is of high-priority for seclusion and protection of adult waterfowl during their flightless period when they moult. Males may begin the moult in early June, and both sexes and the young are capable of flight by mid-August.

All wetlands and open water areas can become locally important as high-priority use areas for waterfowl during peak migration periods in the spring (March 15 through May 15) and fall (August 15 through October 15).

The project and adjacent areas provide substantial valued habitat for a multitude of raptors--the turkey vulture, golden eagles, two species of falcons (prairie falcon and American kestrel), six species of hawks (goshawk, sharp-shinned, Cooper's, red-tailed, Swainson's and marsh hawks), and six species of owls (barn, screech, flammulated, great horned, pygmy and saw-whet owls). Many of these species are of high federal interest to the State of Utah (Appendix A).

Realistically, nesting habitat does not exist on the project or adjacent areas for many of these species. However, if a species were to nest on or adjacent to the project area, it would have a specific crucial period during which the aerie would need protection from disturbance; this period of time lies between February 1 and August 15. Generally speaking, aeries represent a critical valued site, and need protection from significant or continual disturbance within a one-half kilometer radius of the nest. This consideration need only be implemented during the period of time that the nest is occupied. Species specific protective stipulations for aeries are available from the Utah Division of Wildlife Resources and the U. S. Fish and Wildlife Service.

The current level of data relative to site specific use of the area by eagles, hawks and owls is unsatisfactory.

Likely there are aeries that have not been identified. Therefore, it is recommended that intensive surveys be initiated by the Company on the mine plan and adjacent areas for determination of locations for raptor aerie territories. Such data needs to be merged with information provided within this report.

Golden eagles are a common yearlong resident of the mine plan area. Currently, no active aerie territories are known. (Note: an aerie territory is utilized by one pair of eagles, but may contain several nest sites). It is possible that an eagle aerie may exist on the project area.

An active golden eagle nest site would be extremely sensitive to disturbance within a one-half kilometer radius. Such a buffer zone is ranked as being of critical value to maintenance of the eagle population when the bird is actually utilizing the aerie; that period of time is normally between April 15 and June 15. The radius for a buffer zone may need to be increased to one kilometer if a disturbance were to originate from above and within direct line of sight to the eagle aerie.

To date, there are no known high-priority concentration areas or critical roost trees for golden eagles on the project area. The mine plan and adjacent areas have been ranked as being of substantial value to golden eagles.

The northern bald eagle is an endangered winter resident (November 15 to March 15) of the local area. To date, there are no known high-priority concentration areas or critical roost trees for this species on or adjacent to the project. At best, the mine plan area could only be ranked as being of limited value to wintering bald eagles. Note that no bald eagles are known to nest in Utah; however, historic data documents nesting activity by these birds in the State. There is no known historic evidence of the northern bald eagle nesting on the mine plan or adjacent areas.

The American peregrine falcon (status is endangered) and the prairie falcon (status is common) are yearlong residents of the region. Each of these species utilized cliff nesting sites. To date, there are no known aerie sites for cliff nesting falcons on the project area. Suitable nesting habitat for the prairie falcon is widespread in the region and suitable nesting habitat for the American peregrine falcon can be found at specific, but limited sites within the region. However, no suitable

nesting habitat for either of these species is known on the project area. Since their occasional use of the area would not be unlikely, the project area has been ranked as being of limited value to these two cliff nesting falcons.

For each falcon, their aerie site, while being utilized, and a one-half kilometer radius, would be ranked as being of critical value to maintenance of their populations. The falcon's period of use at the aerie site spans the spring and early summer period--prairie falcon, April 15 to June 30; peregrine falcon, March 1 to June 30.

The level of file data relative to site specific use of the project area by nesting prairie falcons (not including the kestrel) is unsatisfactory.

The endangered arctic peregrine falcon is a winter resident (November 15 through March 15) of the local area. This species has not been observed to utilize the environs on or adjacent to the mine plan area; however, its occasional presence would not be unlikely. Therefore, the project area is ranked as being of limited value to this species.

The blue grouse is a yearlong resident of the project area. Adult birds prefer open stands of conifers. During winter, the blue grouse feeds exclusively upon needles and buds of Douglas-fir and spruce trees. Thus, this wildlife habitat (spruce-fir forest) is ranked as being of critical value to over-winter survival of the population during the crucial period of December through February.

Blue grouse annually exhibit what has been termed a reverse vertical migration. That is, during the spring months, they migrate from the high elevation spruce-fir habitat to lower elevation sagebrush, pinion-juniper or shrubland habitats. This movement is caused by a need of the birds to feed on early developing vegetation. Such movement also facilitates successful breeding, nesting and brooding of their young. Then, as the year progresses, they move to the higher elevations.

The males are polygamous and will set up and defend territories for booming and breeding activities against other breeding males. Such territories are critical to maintenance of the population during the crucial period of mid-March through mid-June.

After breeding, the female develops a nest site which is secreted on the ground; the nest is of critical value to maintenance of the blue grouse population. Upon hatching, which occurs in late May or early June, the young, accompanied by the hen, immediately leave the nest. The

young blue grouse, while being brooded, rely heavily on insects for their protein needs during the first several months of development. The adult bird also shifts its diet during this period to include a high proportion of insects. Brooding areas are ranked as being of high-priority value to blue grouse. The crucial period extends from hatching into mid-August.

As summer progresses into the fall season, the grouse consumes large quantities of berries.

The ruffed grouse is a yearlong resident of the project area. These grouse are usually found in the continuum of habitats extending from aspen to shrubland types. But, during winter, they often roost in dense stands of conifers. Generally speaking, ruffed grouse prefer habitats lying within 0.25 miles of a stream course; such areas are ranked as being of high priority value to their population. During winter, the ruffed grouse feeds exclusively upon staminate aspen buds. Thus, this wildlife habitat (aspen forest) is ranked as being of critical value to over-winter survival of the population during the crucial period of December through February. During the remainder of the year, their diet shifts to include a wide variety of plant and insect material.

Ruffed grouse do not exhibit any type of seasonal migration. The males are polygamous, and will set up and defend territories against other breeding males. The focal point for breeding activity is the drumming log; all such logs are ranked as being of critical value to grouse, since they represent sites of historical use. It is important to note that no such logs are known on the project area. If the Company is aware or becomes aware of such logs, they should be identified to the Division of Wildlife Resources. Such territories are critical to maintenance of the population during the crucial period of early March through May.

After breeding, the female develops a nest site which is secreted on the ground and deep within an aspen grove; the nest is of critical value to maintenance of the ruffed grouse population. Upon hatching, which occurs in late May or early June; the young, accompanied by the hen, immediately leave the nest. The young ruffed grouse rely heavily on insects for their protein needs during the first several months of development. The adult bird also shifts its diet during this period to include a high proportion of insects. Brooding areas are ranked as being of high-priority value to ruffed grouse. The crucial period for brooding extends from hatching into mid-August.

The band-tailed pigeon is a summer resident of the project area. This bird is seldom observed to utilize the Wasatch Plateau, but when observed, the species is only represented by a single bird, pairs, or even less frequently; a small flock. Since the band-tailed pigeon's use of the Wasatch Plateau is best described as "occasional", the environs associated with the project are only ranked as being of limited value to the bird. Nesting birds secret their nests in trees within the spruce-fir wildlife habitat. Peak on-nest activity occurs in late July and early August.

Mourning doves normally inhabit the project and adjacent areas, which represent a substantial valued use area for these birds, between May 1 and September 15 each year. They nest throughout most of this period and each pair produces two clutches. Riparian habitats are ranked as being of high-priority value for nesting. Locally, mourning doves show two peaks in on-nest activity--early July and early August. Successful nesting activities and any water sources are critical to maintenance of the mourning dove population.

The yellow-billed cuckoo is a summer resident of the project area. This bird only nests in the riparian wildlife habitat, therefore, such areas are of critical value to maintenance of this species. Little is known concerning the yellow-billed cuckoo. Its nest is represented by a frail, saucer-shaped structure of twigs, and is always placed in bush or tree.

The black swift is a summer resident of the Wasatch Plateau. The montane ecological association represents the swift's substantial valued use area. Normally, the bird is associated with a small flock that represents a colony. Black swifts are usually observed soaring as pairs, and they feed upon flying insects. A colony's nests are scattered along precipitous terrain, where the nest is often secreted behind a waterfall. Such a moist habitat is not known to exist on the project area. Cliff and tallus wildlife habitats are ranked as being of high-priority value to the black swift. There is evidence that pair bonds are long lasting and that a nest may be utilized in successive years.

The belted kingfisher is a yearlong resident of the project area. It is found only along riverine systems and its substantial value use area extends from the cold desert through the submontane, and into the montane ecological associations. Therefore, the riparian wildlife habitat of the project area represents a high-priority valued use area for this bird. It feeds exclusively upon fish. The kingfisher's nest is always secreted within a burrow along stream banks, thus, dirt bank habitats along riparian areas are of critical value to this bird.

The pileated woodpecker is a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). The spruce-fir and aspen wildlife habitats of the montane ecological association represent this bird's substantial valued use area. It is important to note that the pileated woodpecker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the bird is known to exist, it is a yearlong resident with a relative abundance considered to be rare.

The Williamson's sapsucker is another species having high federal interest pursuant to 43 CRF 3461.1 (n-1). Typically, the substantial value use area for this species is the spruce-fir habitat of the Hudsonian life zone in the montane ecological association. Therefore, the spruce-fir habitat of the Canadian life zone on the project site would only represent the substantial valued use area for the yellow-bellied sapsucker. The yellow-bellied sapsucker is a yearlong resident of the environs associated with the project area, and it has a relative abundance considered to be common; whereas the Williamson's sapsucker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the Williamson's sapsucker is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

The Lewis woodpecker is also another species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use area is represented by riparian habitats characterized by cottonwood stands and ponderosa forests. These habitats do not exist on the project site. It is important to note that the Lewis woodpecker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the bird is known to exist, it is a summer resident or only a transient. Its relative abundance is unknown.

The purple martin is a summer resident known to inhabit the environs of the biogeographic area that surrounds the project site. In Utah, its substantial valued use area is represented by open spruce-fir, aspen or ponderosa forest habitats of the montane ecological association. The purple martin feeds on flying insects and may secret its nest within any suitable above-ground cavity.

The western bluebird is a summer resident known to inhabit the environs of the biogeographic area that surrounds the

project site, whereas the mountain bluebird is a yearlong resident of the area. Both birds are cavity nesting species. The western bluebird nests from the pinion-juniper habitat of the submontane ecological association up into the lower forest habitats within the Canadian life zone of the montane ecological association. The mountain bluebird utilizes the same continuum of habitats for nesting, but also extends its nesting use across the Canadian and Hudsonian life zones, and into the Alpine life zone. During winter, both species show an elevational and longitudinal migration; they then utilize all habitats associated with the cold desert ecological association. Therefore, the substantial valued use area for each species spans a broad continuum of habitats. It is important to note that trees with cavities located on the project area can be of critical value to bluebirds.

Grace's warbler is a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use area is shrublands and associated ponderosa forest habitats of the submontane and montane ecological associations. This bird's nest is built twenty or more feet above ground in a ponderosa tree. It is important to note that the Grace's warbler has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where it is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

Scott's oriole is also a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use areas are riparian habitats characterized by cottonwood stands and the continuum of habitats extending from the pinion-juniper forest into shrublands of the submontane ecological association. The oriole's nest is characterized as a grassy pouch and is hung in a tree. It is important to note that the Scott's oriole has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where it is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

Mammals-- Species Occurrence and Use Areas

Mule deer are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats extending from the cold desert through the submontane and montane ecological associations. In some situations, deer show altitudinal migrations in response to winter conditions. There are, however, habitats where deer reside on a year-long basis.

Migration of mule deer from summer range to winter range is initiated during late October; probably the annual disturbance of the fall hunting season, coupled with changing weather conditions, is the initial stimulus. The onset of winter weather reinforces the deer's urge to migrate, and continued adverse weather conditions keep the deer on the winter range.

The project site only represents summer range for mule deer. Winter ranges for these mule deer are at least nine miles distant from the project site.

Deer begin their migration back to summer range during mid-May and remain there throughout October. Summer ranges on the project area represent deer herd Units 32 and 34. They are ranked as being of high-priority value to mule deer.

There are ranges that support mule deer on a yearlong basis. None of these types of range are associated with the project. It is important to note that such ranges are even more distal to the project site than winter ranges.

Mule deer fawn during the month of June. The continuum of wildlife habitats extending from pinion-juniper through the shrubland and into the aspen-type probably represent the fawning area. All riparian areas are of critical value for fawning and maintenance of the deer population. To date, no specific areas showing annual use for fawning are known. It is probable that such areas exist; they would be ranked as being of critical value to deer. It is important to note that June represents a crucial period for maintenance of deer populations.

Moose are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats in the montane ecological association, except those associated with the Alpine life zone. In some situations, moose show altitudinal migrations in response to winter conditions. All riparian habitats associated with the project have, at one time or another, supported moose on a yearlong basis.

Migration of moose from summer range to winter range is initiated during late November; probably, changing weather conditions is the initial stimulus. The onset of winter weather reinforces the moose's urge to migrate and continued adverse weather keeps the animal on the winter range.

Portions of the project site represent winter range for the Southeastern Utah moose herd---Scofield and Huntington drainages. To date, only riparian habitats on the project area

have been identified as winter range. Winter ranges for moose that are characterized as riparian habitats are ranked as being of critical value, whereas the remainder of the winter ranges are ranked as being of high priority value to the animal. Winter ranges are usually inhabited by moose between December 1 and May 15 each year. During winters with severe conditions, the higher elevation portion of the winter range becomes unavailable to moose due to snow depth. Critical valued sites must be protected from man's disturbance when the moose are physically present on the range.

Moose begin their migration back to summer range during mid-May, and remain there throughout November. The entire project area represents summer range. Summer ranges on the project area support animals from the Scofield and Huntington drainages of the Southeastern Utah moose herd. Those summer ranges are ranked as being of high-priority value.

Ranges that support moose on a yearlong basis are ranked as being of critical value.

Moose calf during late May and June. Calving takes place in the riparian or adjacent forest habitats. Without doubt, all riparian areas are of critical value for calving and maintenance of the moose population. To date, no specific areas showing annual use for calving are known. It is probable that such areas exist; they would be ranked as being of critical value to moose. It is important to note that June represents a crucial period for maintenance of moose populations.

Rocky Mountain elk are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats extending from the submontane through the montane ecological association. Elk do not show as strong of altitudinal migration as mule deer do in response to winter conditions, but they do migrate to wintering areas.

Migration of elk from summer range to winter range is initiated during late October; probably, the annual disturbance of the fall hunting seasons, coupled with changing weather conditions, is the initial stimulus. The onset of winter weather reinforces the elk's urge to migrate, and continued adverse weather keeps elk on the winter range.

The project site only represents summer range for the Manti elk herd--Unit 12. Winter ranges for these elk are at least eight miles distant from the project site.

Elk begin their migration back to summer range during mid-May and remain there throughout October. Summer ranges on the project area support the Manti elk herd--Unit 12; they are ranked as being of high-priority value.

Elk calf during the month of June. Their preferred calving areas are best described as aspen forests with lush understory vegetation. All riparian areas on the summer range are of critical value for calving and maintenance of the elk population. To date, no specific areas showing annual use for calving are known. It is probable that such areas exist; they would be ranked as being of critical value to elk. It is important to note that June represents a crucial period for maintenance of elk populations.

Currently, there are no other known high interest wildlife species or their habitat use areas on or adjacent to the project area. It is not unreasonable to suspect that in the future, some additional species of wildlife may become of high interest to the local area, Utah or the nation. If such is the case, the required periodic updates of project permits and reclamation plans can be adjusted, and appropriate recommendations made.

THE AVIFAUNA AND RAPTORS OF THE AREA OF VALLEY CAMP OF UTAH, INC.

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APPENDIX I

INTRODUCTION

Ornithological investigations have been accomplished over several time periods in the Scofield -- Skyline -- Valley Camp coal mining region. Specifically, these periods have been: December 1, April 7 - 8, April 25 - 26, May 17 - 18, June 13 - 14, and July 26 - 29. During these periods a record has been maintained on (1) threatened or endangered species, (2) raptors seen and nests located, (3) occurrences of species of high Federal interest and (4) migratory birds in general. The obvious time period where observations are missing are during the major autumn migration periods September--October. This may represent a critical block of time. For example, the peak of raptor migration, as seen along the Wasatch Front 60 miles north of Scofield, revealed a total of 308 migration raptors recorded between September 9 and October 4 with the peak seemingly around mid to late September (Mosher, et al 1978). Prior to the drawing of any final conclusions, that autumn time period should be examined.

The nature of the raptor fauna correlated with the findings of Jones (1979) on the Manti Division, Manti--LaSal National Forest to the south of the Scofield area.

MATERIALS AND METHODS

The survey method consisted entirely of visual observations. A one kilometer strip surrounding the conveyor belt, mine portals and other disturbance areas were walked. All birds were noted and old nests were marked where appropriate on USGS topographic maps.

Raptor Surveys

No particularly unique nor innovative methods are used to survey for raptors except when examining cliffs for nests. There one must look at each specific ledge or pothole for the presence of fecal "whitewash" matter. The one kilometer area was systematically walked and likely nesting areas (eg. particularly dense wood lots, cliffs) were thoroughly searched or otherwise examined with binoculars. Several hours were spent sitting quitely at selected locations listening for courtship or other calls of accipiter or buteo. Regions where several hours of careful observation and listening were spent were the confluences of Whiskey and Eccles Canyon and around the mine portals.

Species of High Federal Interest

Any habitat peculiar to the three woodpeckers and one bluebird of high Federal interest was given special attention. Habitat characteristic of these species is generally wanting in the Valley Camp area. The elevation is generally either too high in the case of one or of a different floral type in the case of two (see Results for a discussion of this).

RESULTS

Raptors

In addition to the Bald Eagle that occurs near Scofield during migration, but which we did not record, we found nine species of diurnal raptors and one

owl. Two active nests were found in Eccles Canyon, one of the Goshawk and one of the Cooper's Hawk. The Cooper's Hawk is also a species of high Federal interest. These two species can generally tolerate considerable human impact (Hennessy 1978). The Golden Eagle was seen on every survey period, but no active nest was found. It is also a species of high Federal interest.

Rare and Endangered Species

The Bald Eagle is seen in migration in the Scofield area, but none has been recorded within the one kilometer around disturbance area. The Peregrine Falcon has been seen once during the winter of 1976 (L. Dalton, pers. comm) but its occurrence there must be considered rare. It did not nest historically, as far as is known, within 25 miles of the mine area.

Species of High Federal Interest

The three woodpecker species that have been identified for special attention, Williamson's Sapsucker, Lewis' Woodpecker and Pileated Woodpecker, have not been observed to date. These three species present special problems with regard to Eccles Canyon. The habitat within the canyon along the mine route is more typical of Yellow-bellied Sapsucker habitat than the coniferous forest (spruce fir or yellow pine) type more typically used by Williamson's Sapsucker. Although Lewis' Woodpecker may occur in Eccles Canyon during migration, it normally breeds in riparian cottonwood or yellow pine stands or habitat not typical of Eccles Canyon. The Pileated Woodpecker usually occurs in mature hardwood or conifer stands and may occur anywhere in Utah although it is certainly of sporadic and rare occurence (see Behle and Perry, 1975).

The Western Bluebird is normally a species of yellow pine forests in Utah

and may be common where it does occur. It appears, however, to have limited distribution and none have been identified to date in the Eccles Canyon area although it occurs further south.

The Prairie Falcon has not been seen in the immediate vicinity of the mining property nor are there records for this location (L. Dalton, pers. comm).

Migratory Non-game Species

To date 49 species have been identified from our surveys. All are common species typical of the area. Twenty-five of the species were passerines and four were woodpeckers.

CONCLUSION

We have gathered no data to suggest that normal operation of the mine in an environmentally-conscious manner will have any negative impact on threatened or endangered species or species of high Federal interest.

LITERATURE CITED

Behle, W. H. and M. L. Perry. 1975. Utah Birds: guide, check-list and occurence charts. Utah Museum of Natural History, Univ. Utah, Salt Lake, 144 pp.

Hennessy, S. P. 1978. Ecological relationships of accipiters in northern Utah -- with special emphasis on the effects of human disturbance. MS thesis, unpbl. Utah State Univ., Logan, 66 pp.

Jones, S. G. 1979. Preliminary survey of raptor species in the Manti Division, Manti--La Sal National Forest. Great Basin Nat. 32:155-160.

Mosher, J. A., C. M. White, J. R. Murphy, and M. A. Jenkins. 1978. Raptors of the Uinta National Forest. Great Basin Nat. 38:438-446.

APPENDIX J

ACR VEGETATION MAP D3-0074

TEMPORARY RECLAMATION - LOAD-OUT AREA

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ACR VEGETATION MAP D3-0076

FINAL RECLAMATION - LOAD-OUT AREA

Reference: UMC 783.19
784.13

APPENDIX K

ACR VEGETATION MAP D5-0075

TEMPORARY RECLAMATION - BELINA PORTAL AREA

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ACR VEGETATION MAP D5-0077

FINAL RECLAMATION - BELINA PORTAL AREA

Reference: UMC 783.19
784.13