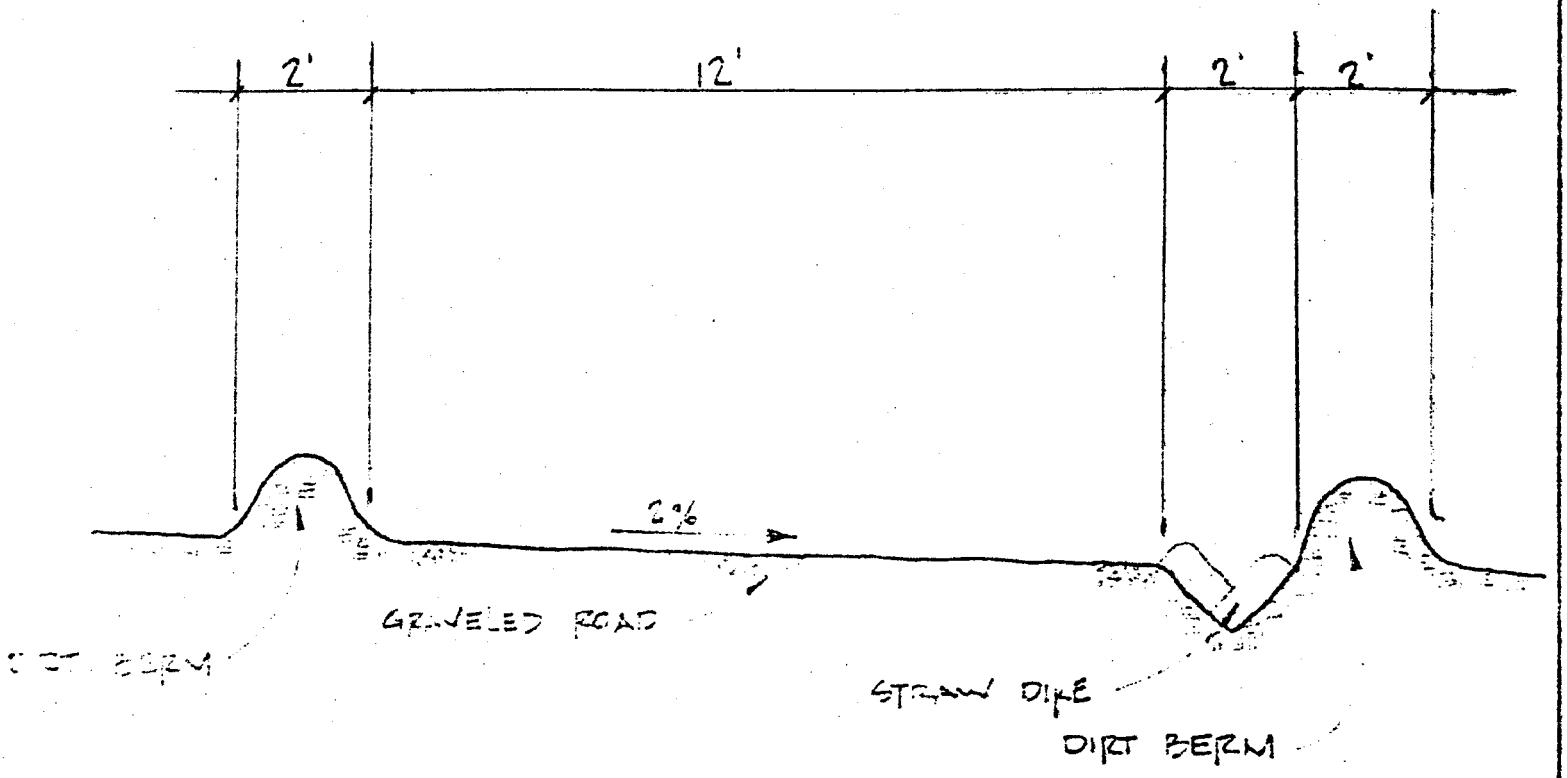


TYPICAL ROAD CROSSECTION

EMERY MINING CORP.

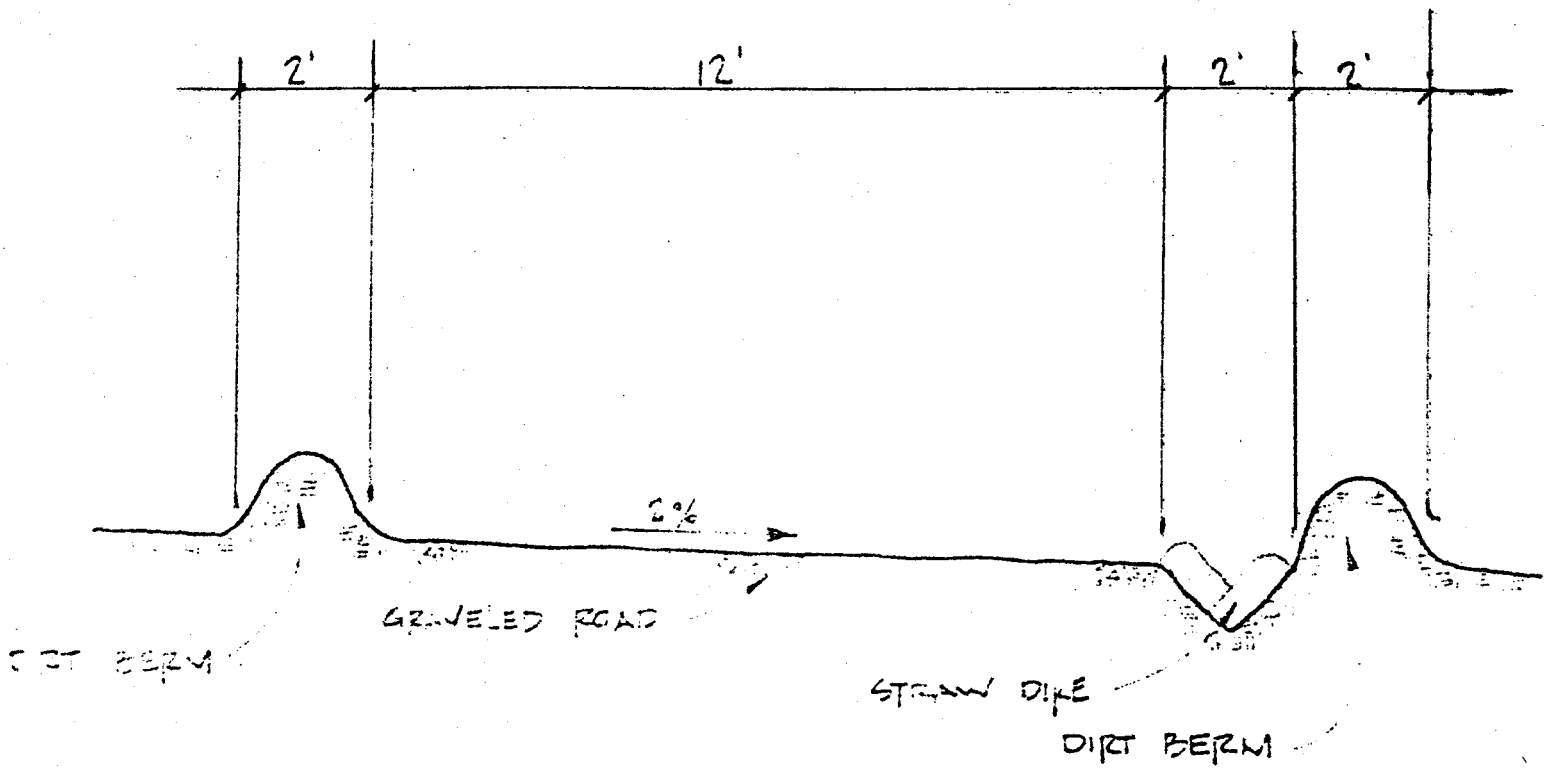
HUNTINGTON, UTAH 84528

TYPICAL ROAD CROSSECTION

PUMPHOUSE ROAD - DES-BEE-DOVE

MARK	REVISIONS	DATE

DRAWN BY BLP	APPROVED BY LJG	DRAWING NO CS-391A
SCALE 1" = 3'	DATE SEPT. 3, 1980	



TYPICAL ROAD CROSSECTION

EMERY MINING CORP.

HUNTINGTON, UTAH 84528

TYPICAL ROAD CROSSECTION

PUMPHOUSE ROAD · DES·BEE·DOVE

MARK	REVISIONS	DATE

DRAWN BY BLP	APPROVED BY LJG	DRAWING NO. CS-291 A
SCALE 1" = 3'	DATE SEPT. 3, 1980	

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS, AND MINING
1588 West North Temple
Salt Lake City, Utah 84116
(801) 533-5771

September 3, 1980

Mr. Merril Heward
Utah Power & Light Co.
P.O. Box 899
Salt Lake City, Utah 84110

RE: Waste Rock Disposal
DES/BEE/DOVE/Mines
ACT/015/017
Emery County, Utah

Dear Mr. Heward,

The waste rock disposal plans for the DES/BEE/DOVE Mines proposed by Utah Power & Light Company are incomplete and inadequate for technical review.

Utah Power & Light must submit a complete plan in accordance with UMC 784.19 and address how the pile will comply with UMC 817.17 and UMC 817.73 as amended.

From the information submitted, UP&L delineates the area of the pile, but does not specifically show the pile within the area. Any changes to the topography in the disposal area since 1978 should be delineated on the map.

Attached is a copy of OSM's comments regarding the waste rock disposal plans. The Division concurs with OSM's findings. Also attached is a tentative engineering guide which the Division may adopt for use. Please review the information contained in this guide prior to a resubmittal.

Sincerely,

Leland C. Spencer

LELAND C. SPENCER
RECLAMATION ENGINEER

LCS/lml
CC: Don Crane,OSM
Enclosures: (2)

UTAH POWER & LIGHT CO.
BEEHIVE MINE
LEASE MODIFICATION PLAN
SCALE: 1"=200'

RECEIVED
JUL 13 1979
STATE OF UTAH
Division of Oil, Gas & Mining

INTAKE
NEUTRAL
RETURN

OUTCROP

BURN LINE

MINED UPON RETREAT

PANEL #3

PANEL #4

MAIN NORTH

MINED UPON RETREAT

PANEL #2

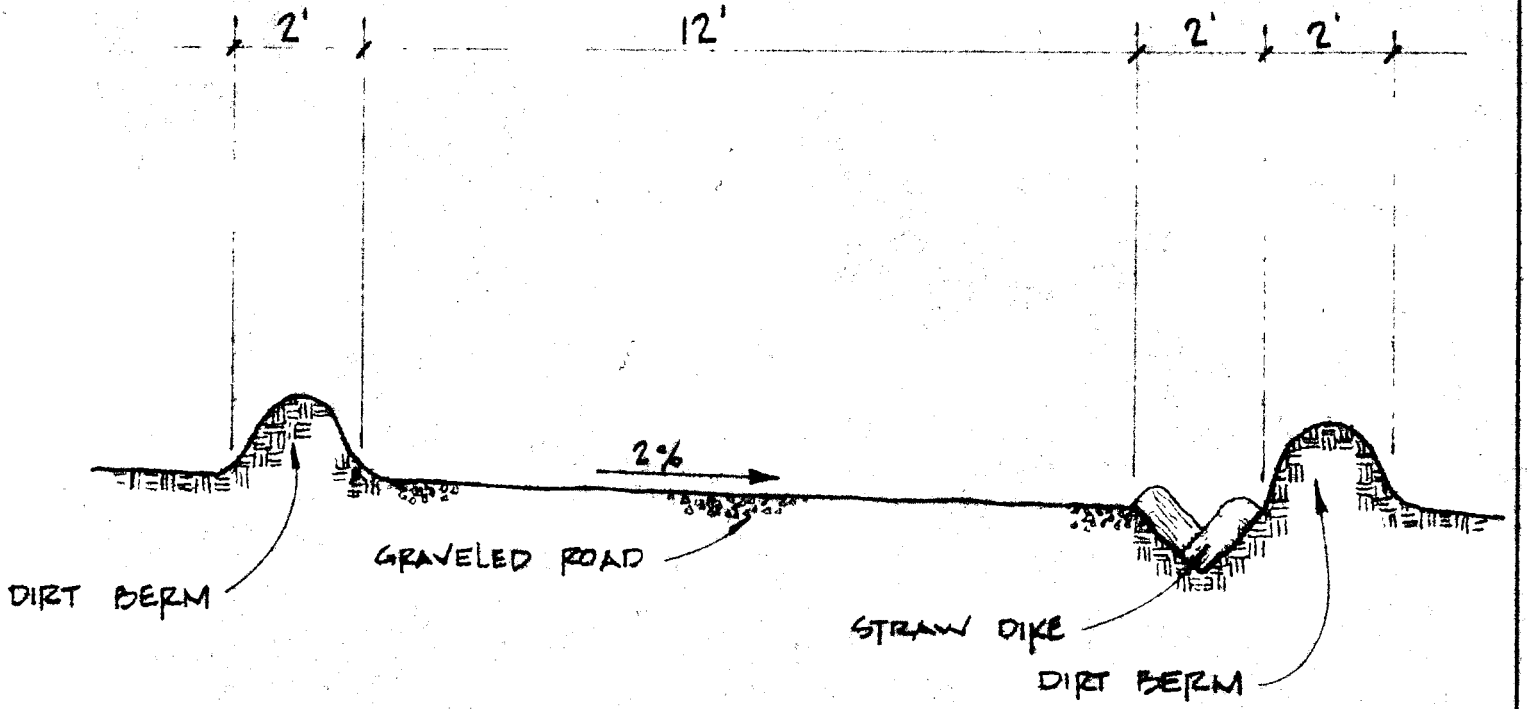
MINED UPON RETREAT

PANEL #1

MAIN EAST

9TH EAST

8TH WEST



TYPICAL ROAD CROSSECTION

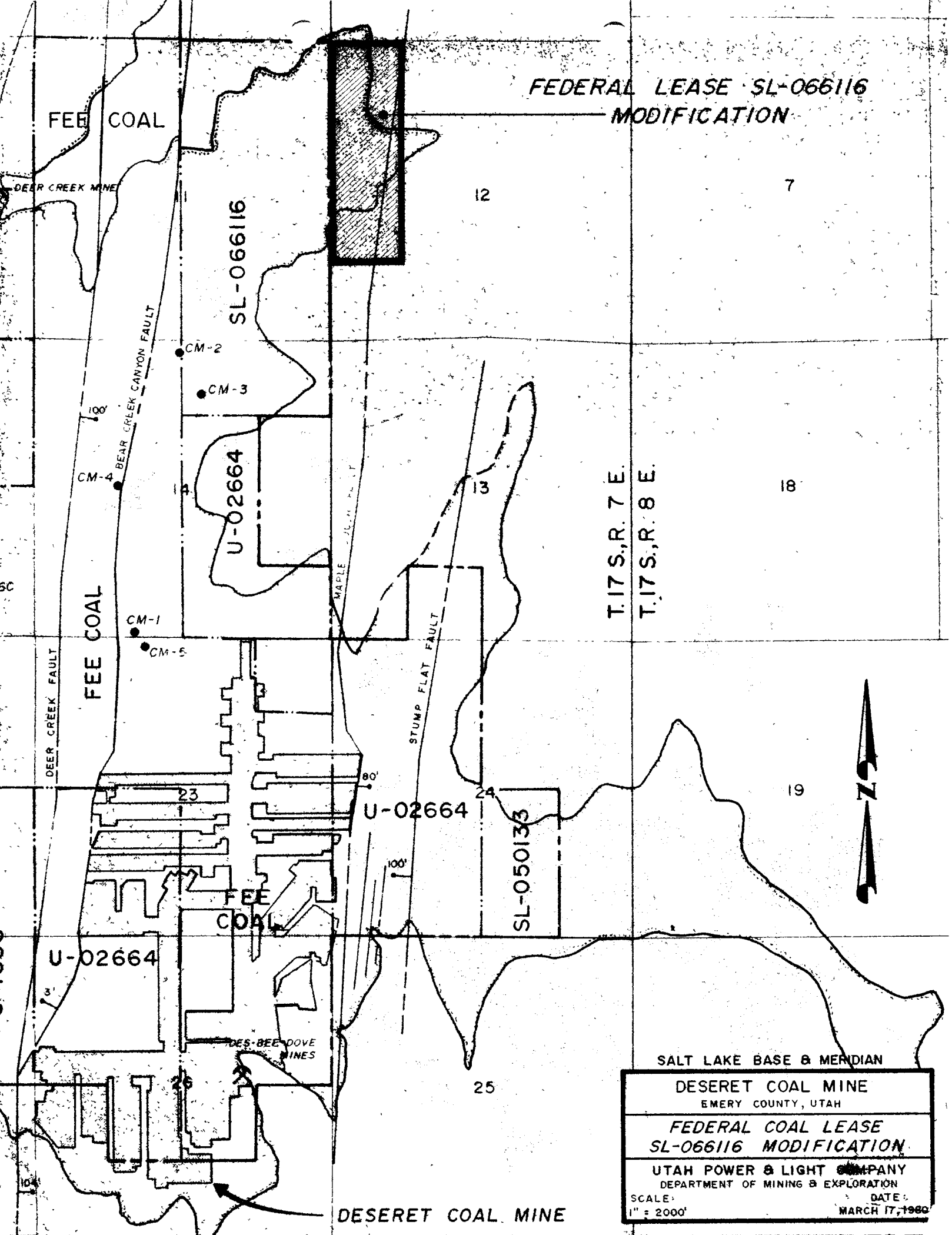
EMERY MINING CORP.

HUNTINGTON, UTAH 84528

TYPICAL ROAD CROSSECTION
PUMPHOUSE ROAD · DES·BEE·DOVE

MARK	REVISIONS	DATE

DRAWN BY: BLP	APPROVED BY: LJG	DRAWING NO. C/S-391A
SCALE: 1" = 3'	DATE: SEPT. 3, 1980	



SALT LAKE BASE & MERIDIAN

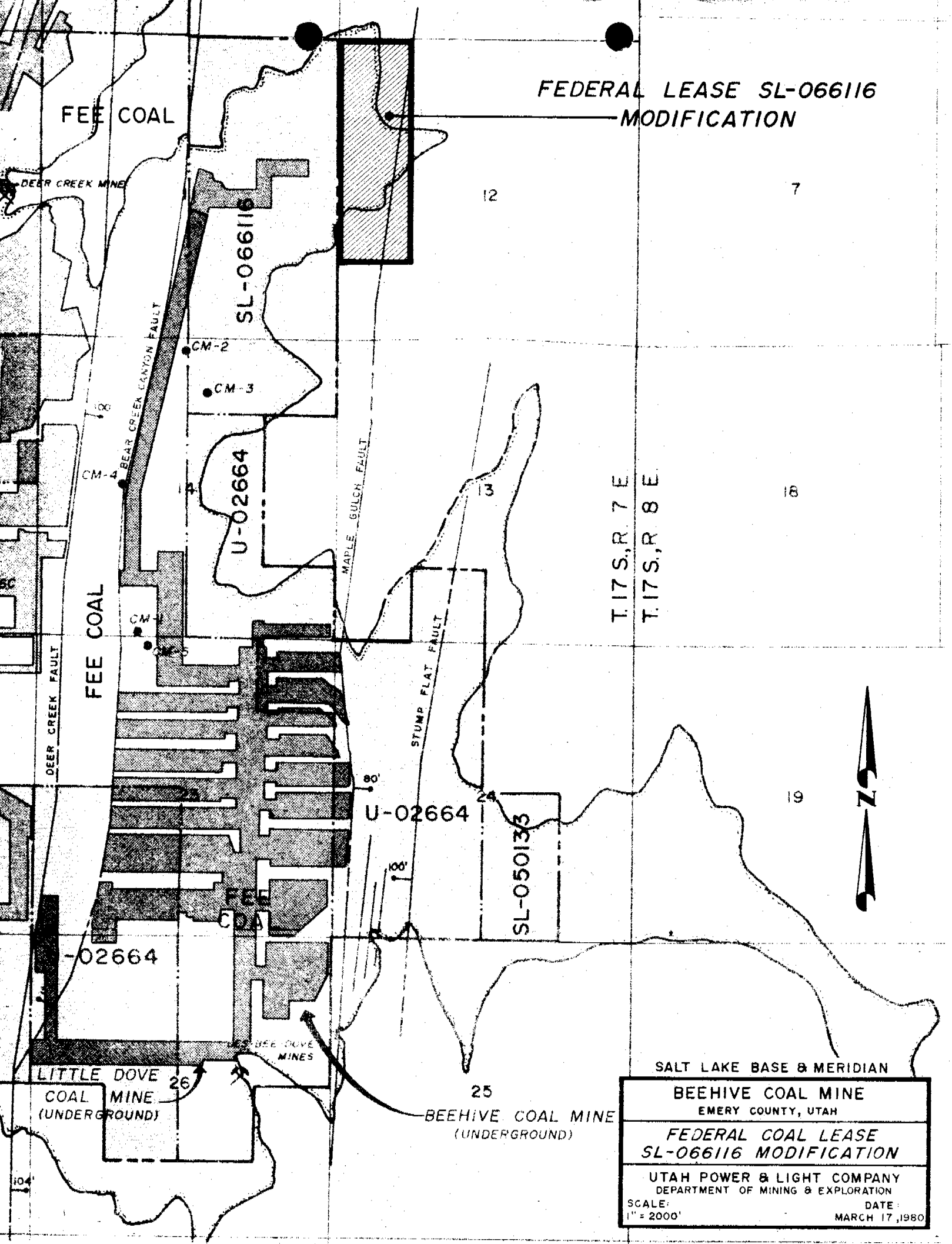
DESERET COAL MINE
EMERY COUNTY, UTAH

FEDERAL COAL LEASE
SL-066116 MODIFICATION

UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION

SCALE: 1" = 2000'

DATE: MARCH 17, 1980


FEDERAL LEASE SL-066116
MODIFICATION
FEE COAL
DEER CREEK MINE
SL-066116
CM-2
CM-3
CM-4
BEAR CREEK CANYON FAULT
U-02664
MAPLE GULCH FAULT
FEE COAL
CM-1
CM-5
DEER CREEK FAULT
STUMP FLAT FAULT
U-02664
SL-050133
FEE COAL
-02664
DEE DOVE MINES
LITTLE DOVE COAL MINE (UNDERGROUND)
BEEHIVE COAL MINE (UNDERGROUND)
12
7
13
18
19
24
25
26
T.17S.,R.7E.
T.17S.,R.8E.
N
SALT LAKE BASE & MERIDIAN
BEEHIVE COAL MINE
EMERY COUNTY, UTAH
FEDERAL COAL LEASE
SL-066116 MODIFICATION
UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION
SCALE:
1" = 2000'
DATE
MARCH 17, 1980

EMERY MINING CORPORATION

A SAVAGE BROTHERS COMPANY

RECEIVED
NOV 06 1984
DIVISION OF OIL
GAS & MINING

November 2, 1984

TO FILE #15
ACT/015/017

Mr. D. Wayne Hedburg
Permit Supervisor/
Reclamation Hydrologist
Division of Oil, Gas and Mining
Natural Resources and Energy
4241 State Office Building
Salt Lake City, Utah 84114

Regarding: Des-Bee Sediment Storage Plan

Dear Mr. Hedburg:

Enclosed is the additional material requested by DOGM.

Due date is October 31, 1984.

Sincerely,

Larry J. Guymon

Larry J. Guymon, P.E.
Construction Manager

LJG/nw

cc: Bill Zeller
Jim Hamlin
Morgan Moon

P.O. Box 310 • Huntington, Utah 84528 • (801) 687-9821

DES BEE DOVE SEDIMENT STORAGE

HYDROLOGIC ANALYSIS

The sediment storage area has two separate areas for hydrologic considerations. Area one is an unaffected drainage area including the highway and the inside shoulder of the horizontal curve which drains around the stored sediments. The runoff from this area is collected and discharged downslope in a seven foot steel half-round culvert. This area includes 11,500 square feet or 0.264 acres. Area two consists of the disturbed area within the highway curve that drains onto the sediment area and is discharged down another 7 foot half-round culvert and into the sediment pond. This area includes 10,840 square feet or 0.249 acres. These structures are required to carry the runoff from a 10 year, 24 hour rainfall event. The design value for the 10 year, 24 hour storm is 2.2 inches, from Volume VI - UTAH, Precipitation - Frequency Atlas of the Western United States by the National Oceanic and Atmospheric Administration.

The capacity of the culverts is calculated using the Manning Equation:

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

Where Q = flow, cubic feet per second

N = Mannings coefficient of Roughness

A = Cross sectional area of flow

R = Hydraulic Radius = Cross sectional area divided by the wetted perimeter.

S = Slope of the Hydraulic grade line.

For a 7 foot diameter steel plate culvert Manning's N = 0.032. The slope for the culverts is conservatively taken as 33%. Therefore the maximum flow rate is:

$$Q = \frac{1.49}{0.032} \times \frac{1}{2} \frac{\pi 7^2}{4} \times \left(\frac{\frac{\pi 7^2}{2 \times 4}}{\frac{\pi 7}{2}} \right) \times (.33)^{.5}$$

Q = 747 cubic feet per second.

The runoff is calculated using the rational formula Q = C i A where:

Q = flow in cubic feet per second

C = runoff coefficient

i = intensity of rainfall, inches per hour, for a rainfall event with a duration equal to the time of concentration of the water shed.

A = area of watershed, acres.

The value of C can be conservatively taken as 1.0 without changing the out come of the analysis. The time of concentration of each watershed is equal to the length of time required for water to flow from the most distant point in the watershed to the culvert inlet.

The length of the flow path for area one is 1160 feet. The slope of the ditch along the highway is 8%. The velocity of flow is 5.7 feet per second from B. J. Barfield, et al, APPLIED HYDROLOGY AND SEDIMENTOLOGY FOR DISTURBED AREAS, 1981 (Appendix 1). The time of concentration is 1160 - 5.7 = 204 seconds or 3.39 minutes. The length of the flow path for area two is 550 feet with an average slope of 5%. From Barfield, this gives a velocity of 2.3 feet per second. The time of concentration is 550 - 2.3 = 239 seconds or 3.99 minutes. Following the method on pages 15 and 16 of the Precipitation - Frequency Atlas, NOAA, the values of rainfall amounts for the 5, 10, 15 and 30 minute storms with a return interval of 10 years are determined. Then by applying curve fitting techniques and the method of least squares a relationship is derived between the duration and the rainfall.

$$\text{Rainfall} = 0.128\ (\text{duration})^{0.558}$$

Duration	Rainfall
5 Minutes	.305 Inches
10 Minutes	.473 Inches
15 Minutes	.599 Inches
30 Minutes	.830 Inches
3.39 Minutes	.253 Inches
3.99 Minutes	.289 Inches

The intensities are equal to the rainfall divided by the duration or 4.5 and 4.4 inches per hour for acres one and two respectively. Using the Rational Formula the total flows can now be calculated.

Area one $Q = 1.0\ (4.5)\ (0.264)$

$= 1.19$ cubic feet per second

Area Two $Q = 1.0\ (4.4)\ (2.49)$

$= 1.10$ cubic feet per second

It is obvious that these flow rates do not exceed the capacity of the seven foot half-round culverts.

APPENDIX 1

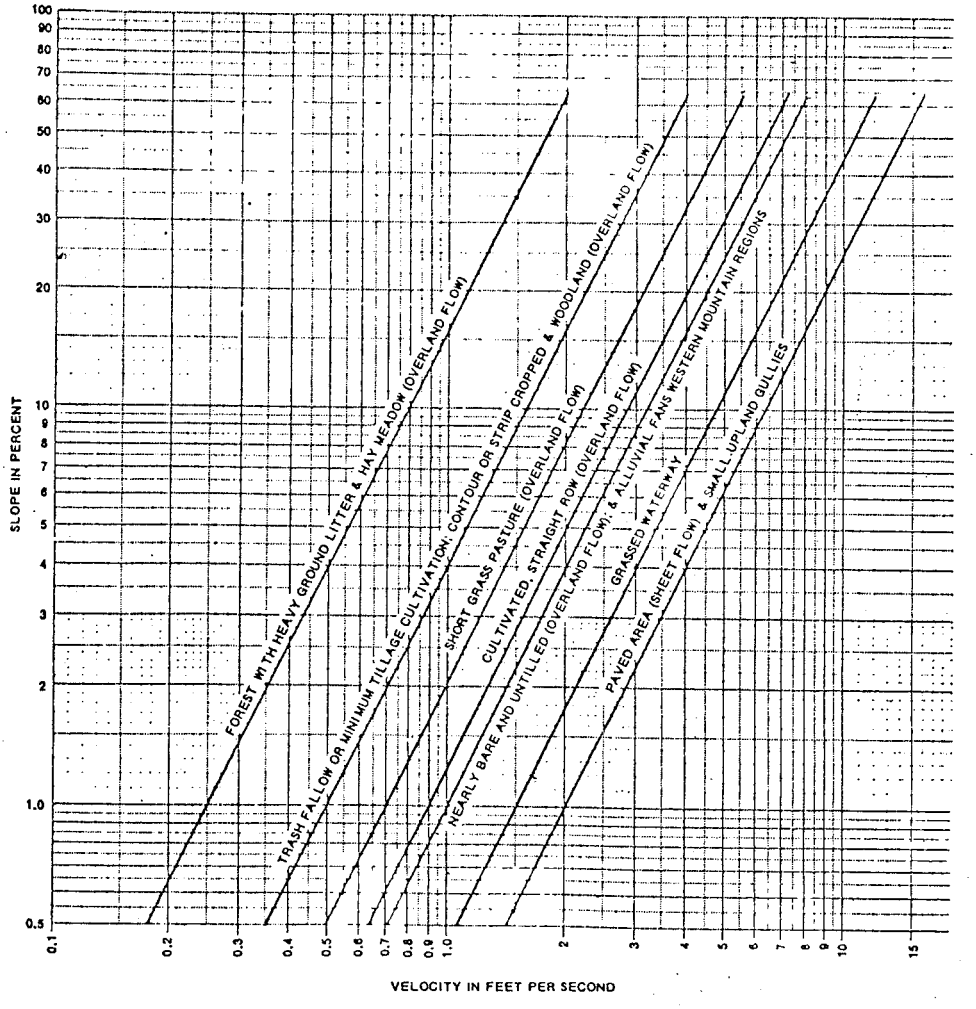


Figure 2.34. Velocities for upland method of estimating t_c.

SEDIMENT STORAGE PLAN

DES-BEE-DOVE ACT/015/017

INTRODUCTION

This additional information is submitted in response to a request made in a letter from D. Wayne Hedburg dated August 24, 1984. As agreed to those areas that are addressed are: stability, drainage control, monitoring, revegetation and final reclamation and permitting.

DISCUSSION

Stability:

As stated in the stability analysis section it is our contention that the soil parameters determined by Pittsburgh Testing Laboratories are below the actual. These additional test samples have been taken to support our contentions and once this data becomes available it will be supplied.

It is further stated that the actual factor of safety is at least 1.5 and even if failure did occur it doesn't present a hazard to the health and safety of the public because of its remote location.

Monitoring:

As part of the quarterly inspection required by UMC 817.71 (i) two observation wells will be installed to monitor ground water flow, if any. (See attached as-built map for location of the wells).

Revegetation:

Will be done according to original submittal.

Reclamation:

During final reclamation the two 7' diameter half round culverts will be removed from the face of the fill.

Material needed to backfill the sediment pond will be taken from this area.

Permitting:

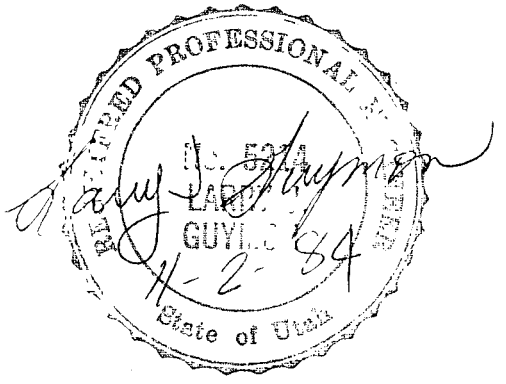
Both land management agencies involved have given there approval for permanent disposal of this material. (See attached BLM right-of-way U-53809 and State Lands and Forestry letter dated October 30, 1984, modifying SULA 436.

Drainage Control:

As requested by the BLM in the right-of-way the rip-rap channel for the undisturbed drainage was replaced by a 7' diameter half round culvert. (See as-built map).

CERTIFICATION

I certify that I am a registered professional engineer in the State of Utah and I do also certify that this report is true and correct to the best of my knowledge and belief.



Larry J. Guymon, P.E. 5214

DES BEE DOVE SEDIMENT STORAGE

STABILITY ANALYSIS

The reconstruction of the earth slope which forms the downhill side of the sediment storage site was completed in August 1984. Soil tests were conducted to determine the type of material and the in-place density. The slope is composed of a weathered shale material, classified as an inorganic clayey silt of low plasticity, or ML by the Unified Soil Classification System (Exhibit A). The minimum in-place density was 120 pounds per cubic foot (Exhibit B). Triaxial shear tests were conducted to determine the strength parameters of the soil. The effective stress parameters received from the laboratory were cohesion of 210 pounds per square foot and an internal friction angle of 21 degrees (Exhibit C, Sample 2). The permeability was tested and found to be 2.59×10^{-7} centimeters per second (Exhibit D, Sample 2).

An investigation was conducted to determine the foundation material upon which the earth slope rests. Shale bedrock was determined to be located about five feet below the original ground surface elevation (Exhibit E). The earth slope has been monitored to determine if any water is seeping from the downhill face. To this date, the slope is dry and shows no signs of ground water, either flowing or static. Two wells will be drilled to allow monitoring of the phreatic surface within the slope on a quarterly basis.

ANALYSIS:

The Simplified Bishops Method of Slices was used to determine the stability of the final slope (Exhibit F). This method relies on the shear strength parameters to provide resistance to movement, therefore any small error in determining the cohesion and angle of internal friction can seriously decrease the factor of safety against failure of the slope. Based on the test data that has been received to date, the safety factor of the slope is 1.43. We believe this value is below the actual safety factor against failure because the friction angle from the tests is extremely low. We have initiated additional tests to better define the actual in-place shear strength of the soil material. Based on the Unified Soil Classification of ML, we believe the friction angle should be higher than 21 degrees. A table of average effective shear strengths is given by Y.H. Huang, Stability Analysis of Earth Structures, 1983 (Exhibit G), which shows the average friction angle for an ML material to be 32 degrees with variance of 2 degrees. I discussed this material with two soil testing consultants, Dr. Ralph Rollins, of Rollins, Brown and Gunnhell, Inc., and Mr. Tony Hovik of Delta Geotechenical Consultants, both of which agreed that the friction angle of an ML material should be above 21 and closer to 30 degrees. The low values obtained by Pittsburgh Testing Laboratory are possibly explained by the following reasons. First, the rate of load application on the triaxial test must be carefully controlled because too fast a rate on the silty material will result in erroneous values, below the actual values. Second, the test specimens were remolded to a dry density of 106 pounds per cubic foot when the in-place dry density was 120. This low density would result in lower shear strength values.

If the stability analysis were based on a cohesion of 100 psf and friction angle of 28 degrees and the remaining parameters are unchanged, the safety factor would be 1.5.

CONCLUSION

The earth slope on the sediment storage area is constructed of a clayey silty of low plasticity and compacted to a dry density of 120 pounds per cubic foot. The minimum safety factor against failure of the earth slope is 1.43. The actual safety factor is probably higher and can only be verified by further tests, which are in progress.

EXHIBIT A

Johansen & Tuttle ENGINEERING, INC.
BOX 487 • CASTLE DALE, UTAH 84513 • TELEPHONE (801) 381-2523

August 3, 1984

Emery Mining Corp.
P.O. Box 310
Huntington, Utah
84528

Attn: Thomas Faucheux

Re: Soil Tests

Dear Mr. Faucheux,

Attached are results of soil tests performed at your request. The tests were performed in our laboratory using methods accepted by the U.S. Bureau of Reclamation and ASTM. Please call if you have any questions concerning the results.

Sincerely,

David R. Ariotti

David R. Ariotti

DRA/lj

Test For: Emery Mining Corp.
Date: August 3, 1984
Sample No. 2

FEATURE:

Sample consists of poorly graded material minus 200 thru 2 inches. The large fragments can be broken with some effort. There are conspicuous balls of material which can be broken between fingers. The larger fragments cannot be scraped or marked with the thumbnail. The entire sample is grey-brown in color, typical of mancos shale formations in this area.

Soil Consistency Tests

Liquid Limit	30.0
Plastic Limit	26.5
Plasticity Index	3.5

As Received Gradation

Screen Size	Weight	Percent Retained	Percent Passing
# 4	.91 lb.	47.4	52.6
# 16	.68 lb.	35.4	17.2
# 200	.28 lb.	14.6	2.6
-# 200	.05 lb.	2.6	

Washed Gradation

# 4	.06 lb.	3.4	96.6
# 16	.25 lb.	14.1	82.5
# 200	.01 lb.	.6	81.9
-# 200	1.45 lb.	81.9	

Unified Soil Classification

ML - Inorganic clayey silt of low plasticity

EXHIBIT B

Johansen & Tuttle ENGINEERING, INC.
BOX 487 • CASTLE DALE, UTAH 84513 • TELEPHONE (801) 381-2523

August 29, 1984

Emery Mining Corporation
P.O. Box 310
Huntington, Utah 84528

RE: Soil tests embankment near Wilberg Mine

ATTN: Larry Guymon

Dear Larry:

Results of sand cone field density tests taken August 28, 1984 are summarized as follows:

Test No.	Location	Percent Compaction
1	Sediment Storage 16' below face of dike 4' below grade	102.6
2	Sediment Storage 31' below face of dike 5' below grade	109.0
3	Upper Spillway	104.8

Compaction testing was performed according to AASHTO T-99-A. I have enclosed copies of the moisture-density graph for your reference.

If you have any questions or require further assistance please call.

Sincerely,

David R. Ariotti

David R. Ariotti

DRA/tt

Enclosures

Form R-263
Rev. 5-76

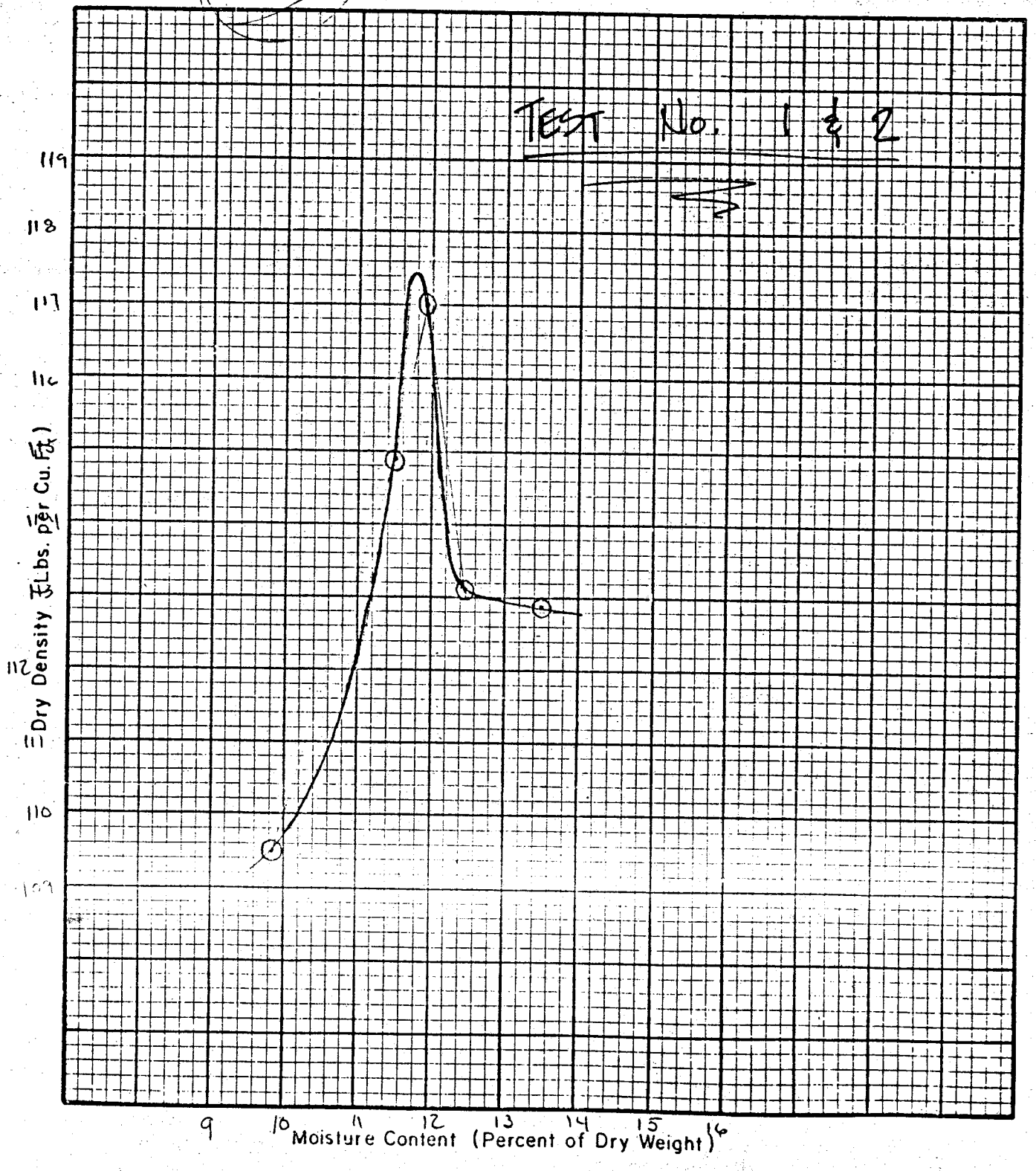
Moisture-Density Graph

Project Name Sediment Pond Lab No. _____

Project No. _____ Date Sampled 8/28/84

Method of Compaction _____ Date Tested 8/28/84

Max. Dry Density 119.4 lbs/ft.^{3} Optimum Moisture 11.8 %



Form R-263
Rev. 5-76

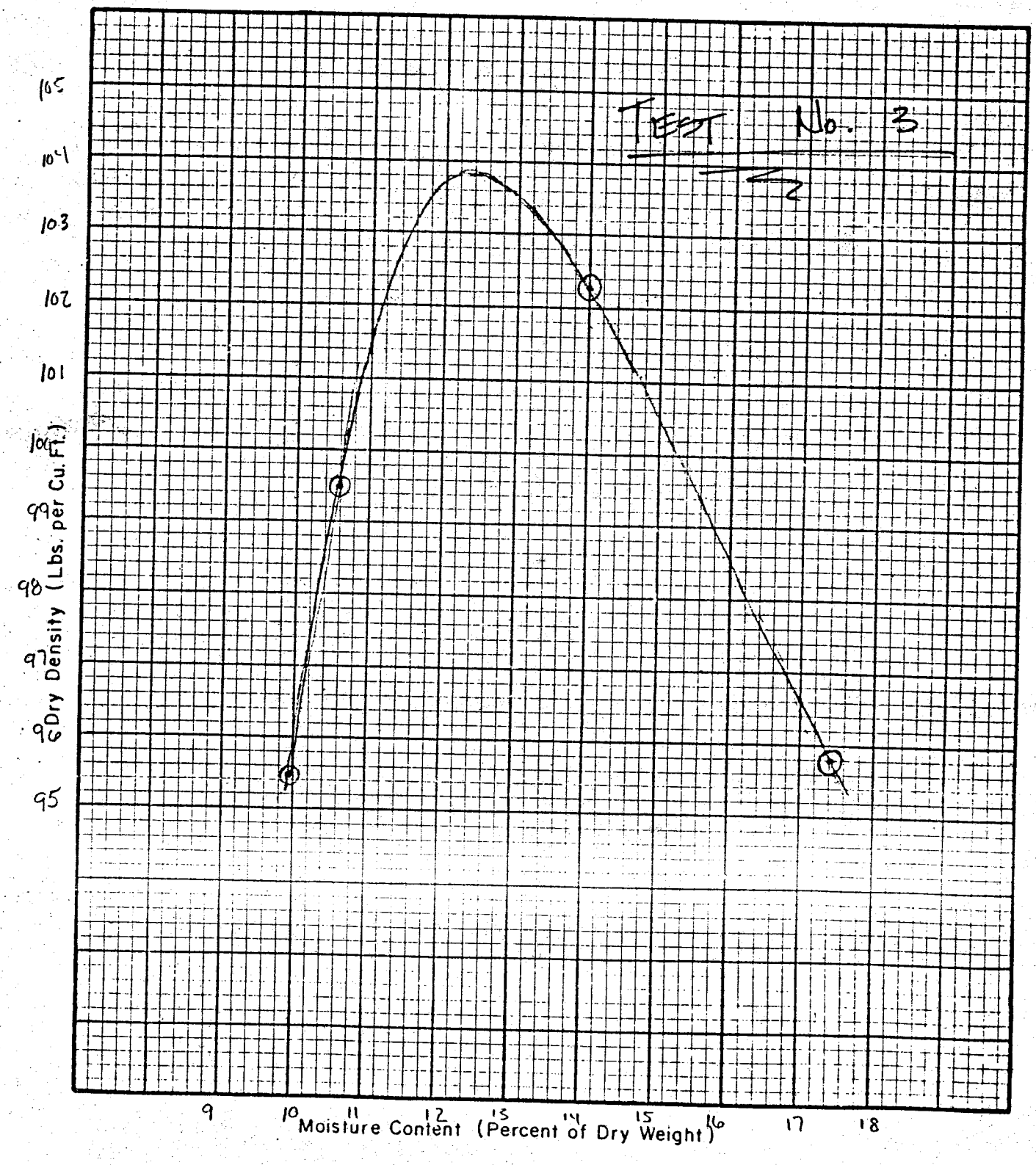
Moisture-Density Graph

Project Name Upper Spill Way — Lab No. _____

Project No. _____ — Date Sampled 8/28/84

Method of Compaction _____ — Date Tested 8/29/84

Max. Dry Density 103.8 lbs/ft.^{3} — Optimum Moisture 12.4 %



Sample 2:

Soil Description: Dark gray, gravelly silty clay.

Total Stress: Cohesion, c = 140 psf
Internal friction angle, ϕ = 16 degrees.

Effective Stress: Cohesion, c' = 210 psf
Internal friction angle, ϕ' = 21 degrees.

Specimen No.	Wet Density PCF	Dry Density PCF	Molding Water Content, %	Moisture Content After Test, %
1	117.8	106.6	10.5	17.6
3	117.0	106.1	10.3	16.7

Specimen No. 2 failed during the saturation process.

The graphs of Mohr's circles in terms of both total and effective stress are shown on the attached sheets.

Should any questions arise, please feel free to contact us.

PITTSBURGH TESTING LABORATORY

John D. Cannon

John D. Cannon, P. E.
Manager, Jacksonville Dist.

Staff Engineer: V. Winn

Pittsburgh Testing Laboratory

EXHIBIT C

27-001
PTL-JACKSONVILLE
1450 LANE AVENUE
JACKSONVILLE FLORIDA 32205
904/783-4300

REPORT

No. 1

ORDER NO. SLC-5947

DATE 10-23-84

RECEIVED
OCT 25 1984
EMERY MINING CORP.
ENGINEERING

Reported to: Pittsburgh Testing Laboratory
Salt Lake City, Utah.

Client: Emery Mining Co.

Reference: Triaxial Compression Tests.

****

Pittsburgh Testing Laboratory has completed the triaxial test conducted on two soil samples received from the client.

The triaxial test was performed on the portion of soil material that passed a 3/4 inch sieve opening. Three specimens were remolded for each soil sample. The specimens were consolidated for a period of 24 hours, then saturated using a back pressure of 70 psi. The confining pressures of 10, 20, and 30 psi were applied to conduct the triaxial test. Pore water pressure measurement was made during the application of deviator stress. The triaxial test was consolidated-undrained (cu). Test results are as follows:

Sample 1:

Soil description: Very dark gray to black gravelly silty clay and coal, pieces of broken brick.

Total Stress: Cohesion, c = 3740 psf
Internal friction angle, ϕ = 22 degrees.

Effective Stress: Cohesion, c' = 2440 psf
Internal friction angle, ϕ' = 32 degrees.

Specimen No.	Wet Density, PCF	Dry Density, PCF	Molding Water Content, %	Moisture Content, %
1	129.4	115.6	11.9	[illegible]
2	128.9	115.7	11.4	13.8
3	128.2	113.6	12.8	13.5

Continued...

Pittsburgh Testing Laboratory

EXHIBIT C

27-001
PTL-JACKSONVILLE
1450 LANE AVENUE
JACKSONVILLE FLORIDA 32205
904/783-4300

REPORT

No. 1

ORDER NO. SLC-5947

DATE 10-23-84

RECEIVED
OCT 25 1984
EMERY MINING CORP.
ENGINEERING

Reported to: Pittsburgh Testing Laboratory
Salt Lake City, Utah.

Client: Emery Mining Co.

Reference: Triaxial Compression Tests.

****

Pittsburgh Testing Laboratory has completed the triaxial test conducted on two soil samples received from the client.

The triaxial test was performed on the portion of soil material that passed a 3/4 inch sieve opening. Three specimens were remolded for each soil sample. The specimens were consolidated for a period of 24 hours, then saturated using a back pressure of 70 psi. The confining pressures of 10, 20, and 30 psi were applied to conduct the triaxial test. Pore water pressure measurement was made during the application of deviator stress. The triaxial test was consolidated-undrained (cu). Test results are as follows:

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Internal friction angle, ϕ = 22 degrees.

Effective Stress: Cohesion, c' = 2440 psf
Internal friction angle, ϕ' = 32 degrees.

Specimen No.	Wet Density, PCF	Dry Density, PCF	Molding Water Content, %	Moisture Content, %
1	129.4	115.6	11.9	[illegible].0
2	128.9	115.7	11.4	13.8
3	128.2	113.6	12.8	13.5

Continued...

PITTSBURGH TESTING LABORATORY

ESTABLISHED 1881

1450 LANE AVENUE NORTH, JACKSONVILLE, FLORIDA 32205

AREA CODE (904) 783-4300

FORM 3: JA

TRIAXIAL COMPRESSION TEST

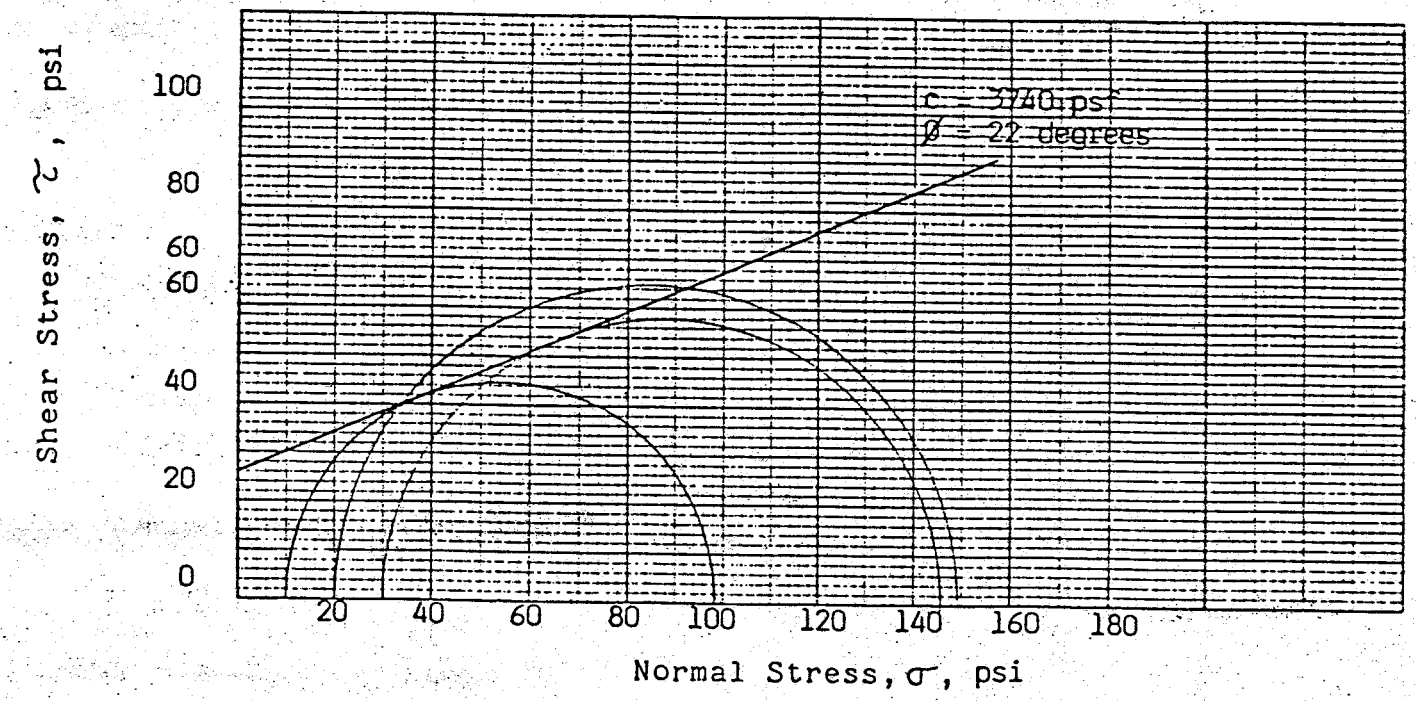
Soil Description:
Very dark gray to black gravelly silty clay and coal, pieces of broken brick.

Order No.: SLC-5947
Client: Emery Mining Co.
Boring No.:
Sample No.: 1
Depth:

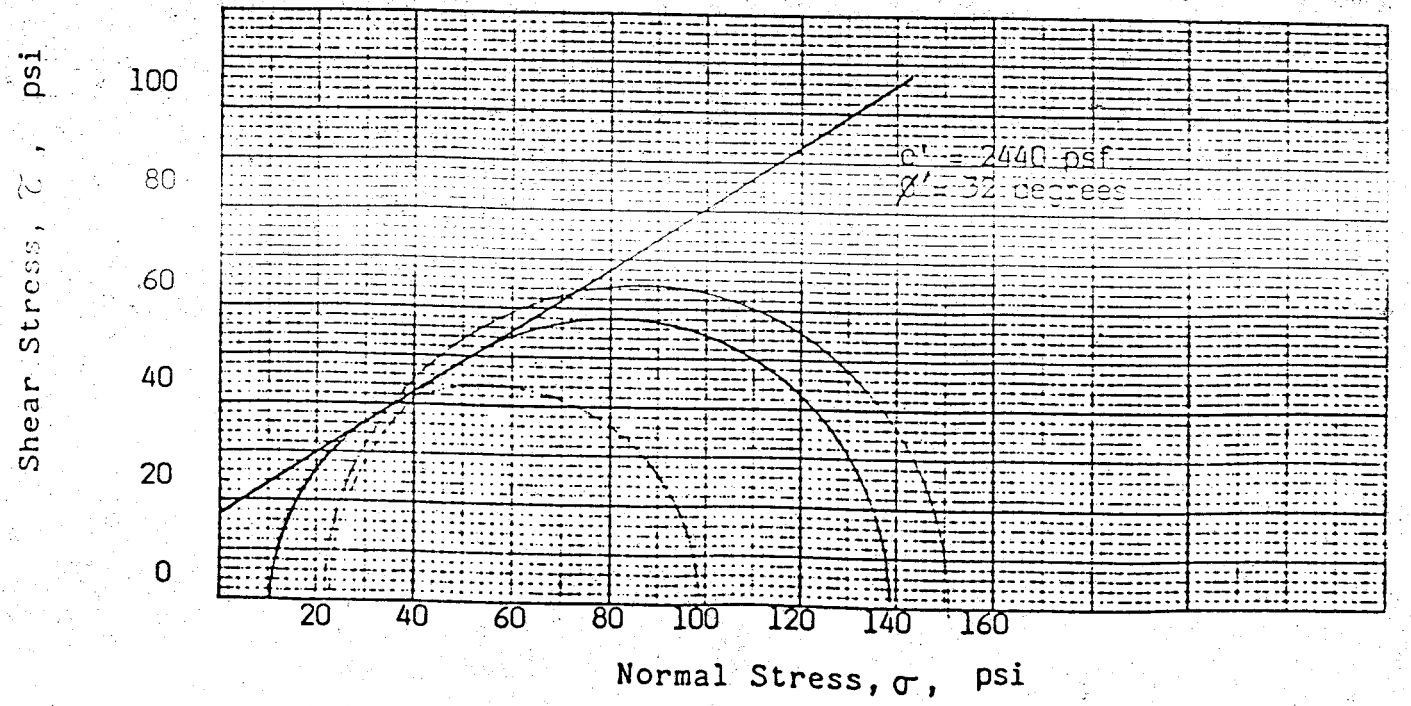
Plotted by: VW

Date: 10-12-84

Graph of Mohr's Circles (Total Stress)



Graph of Mohr's circle (Effective Stress)



PITTSBURGH TESTING LABORATORY
ESTABLISHED 1881
1450 LANE AVENUE NORTH, JACKSONVILLE, FLORIDA 32205

AREA CODE (904) 783-4300

FORM 92-3A

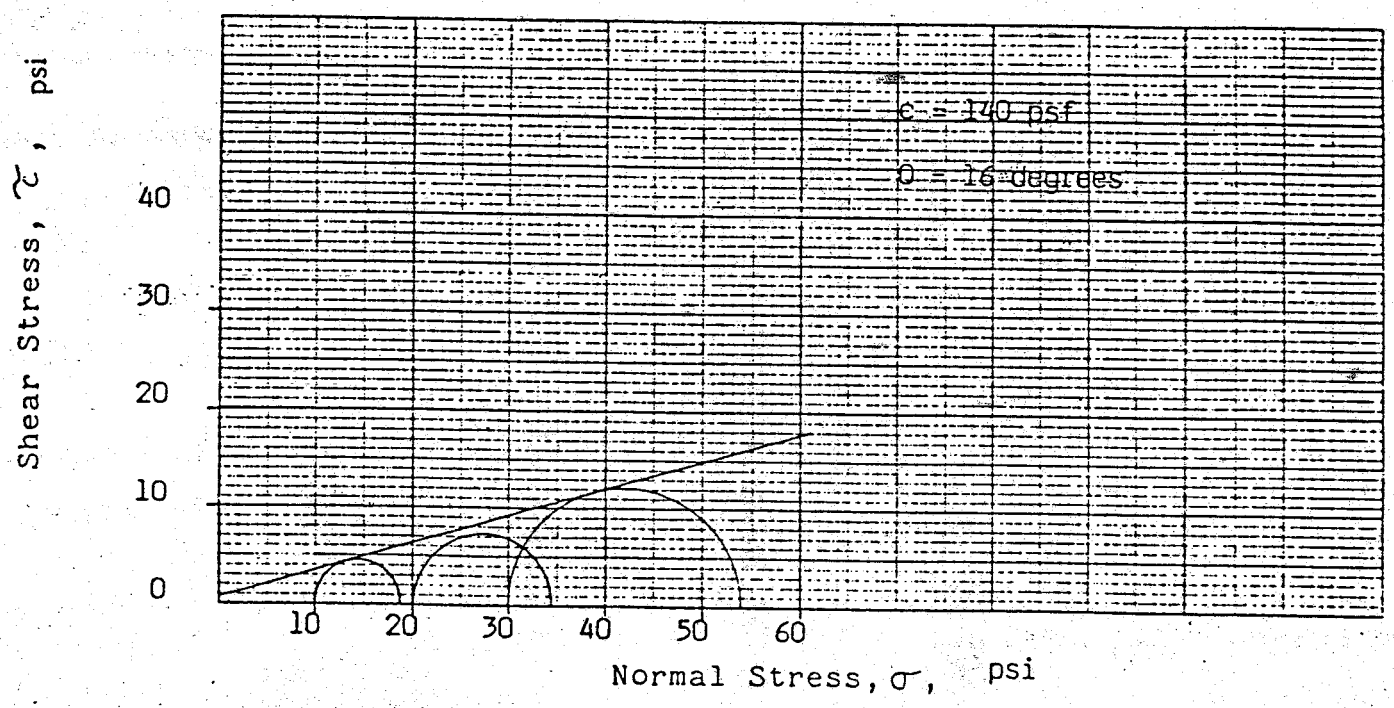
TRIAXIAL COMPRESSION TEST

Soil Description:
Dark gray gravelly silty clay.

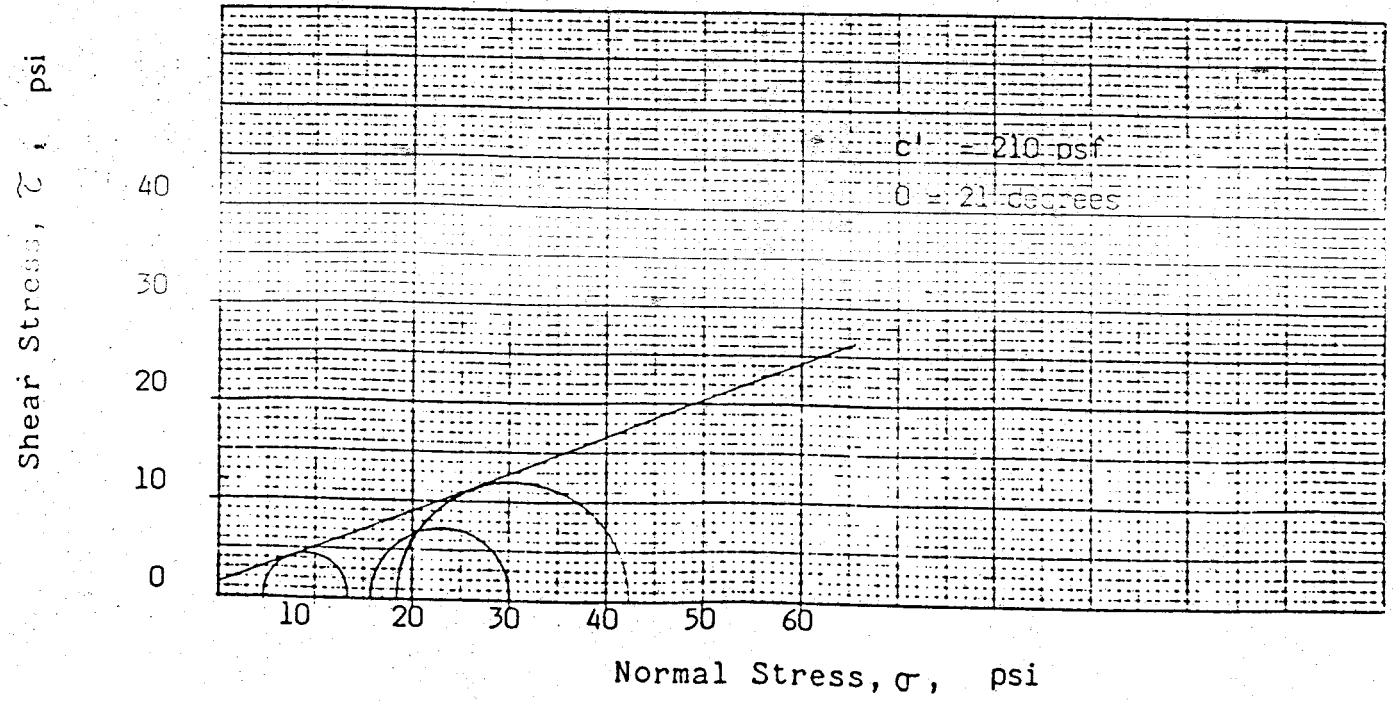
Order No.: SLC 5947
Client: Emery Mining Co.
Boring No.:
Sample No.: 2

Plotted by: V.W. Date: 10-12-84 Depth:

Graph of Mohr's Circles (Total Stress)



Graph of Mohr's circle (Effective Stress)



Pittsburgh Testing Laboratory

EXHIBIT D

PTL-JACKSONVILLE

REPORT

No. 2

ORDER NO SLC-5947

DATE 10-23-84

Reported to: Pittsburgh Testing Laboratory
Salt Lake City, Utah.

Client: Emery Mining Co.

Reference: Permeability Tests

Gentlemen:

Pittsburgh Testing Laboratory has completed permeability tests conducted on two soil samples received from the client.

The permeability tests were conducted according to procedure described in the "Laboratory Soils Testing", EM 1110-2-1906 issued by the Department of the Army, 1970. The specimens were saturated using a back pressure of 70 psi for a period of 3 days. The back pressure was then reduced to zero. A constant head of 5 psi (≈11.54 ft head of water) was then applied to measure the coefficient of permeability. Test results are as follows:

Sample No. 1:

Soil Description: Very dark gray to black gravelly silty clay and coal, pieces of broken brick.

Wet Density: = 130,0 pcf
Dry Density: = 116.5 pcf
Molding Water Content: = 11.6%
Moisture Content after Test: = 13.1%
d
Specimen Length: = 5.6 inch
Specimen Diameter: = 2.8 inch
Constant Head = 5 psi ≈ 11.54 ft
Start Date: = 10/15/84.

Date	Elapsed Time, Seconds	Flow Q, Cm^3	Temperature of Water ° C	Coefficient of Permeability k 20, cm/sec
10-19-84	258600	37.4	27	1.08×10^{-7}

Sample No. 2

Soil Description: Dark gray gravelly silty clay

Wet density = 117.3 pcf
Dry density = 105.6 pcf
Molding water content = 11.1%
Moisture content after test = 17.7%

Specimen length = 5.6 inch
Specimen diameter = 2.8 inch
Constant bead = 5 psi ≅ 11.54 foot
Start date = 10/15/84

Date	Elapsed Time Seconds	Flow Q, cm^3	Temperature of water, °C	Coefficient of permeability, k20, cm/sec
10-19-84	29520	10.3	27	2.59×10^{-7}

Should any questions arise, please feel free to contact us.

Respectfully submitted,

PITTSBURGH TESTING LABORATORY

John D. Cannon, P.E.
Manager, Jacksonville District

JDC/er

Staff Engineer: V. Winn

EXHIBIT E

REPORT ON

DES-BEE-DOVE MINE

SEDIMENT RETENTION DIKE

SITE INVESTIGATION

Prepared by:

Dale Grange

Geological Engineer

Emery Mining Corporation

October, 1984

Introduction

This study is being prepared so that bedrock location information previously prepared by International Engineering, Inc. concerning the Des-Bee-Dove sedimentation pond can be expanded to include the sediment storage site. It is located just north of the sedimentation pond and was constructed in response to a flood which deposited a large amount of sediment in the sedimentation pond and which required removal.

Drilling and Soils Testing

Figure 1 shows the locations of the five boreholes which were drilled by Raymond International in August, 1978, before the sediment pond was constructed. The holes were drilled to establish the depth to bedrock. The drill logs associated with these holes are included in this report.

Figure 1 was included as part of the original site report prepared by International Engineering. Their discussion of areas A through D are summarized later in this report. The laboratory soil test results of the soils in the area were also included as part of the site investigation for the sedimentation pond but are not reproduced here. They would be representative of the sediment storage area due to the close proximity of the two structures.

Site Geology

Figure 2 shows the relative locations of the two structures. The sediment storage site is located 100'-400' north of the existing sediment pond. Both sites are located in the drainage which serves the Des-Bee-Dove mines.

The area is near the base of the slope formed by the Masuk shale member of the Mancos shale formation as it grades from a steeply sloped formation below the Starpoint sandstone to a gentle sloping valley floor forming formation.

Above the Masuk are interbedded deposits of predominately sandstones and shales which form alternating slopes and near-vertical cliffs. These deposits are the source of the sedimentary debris accumulations in the sediment pond and storage areas consisting of clays, sand, gravel and boulders. Masuk shale forms bedrock in this area.

Bedrock Location

Shale bedrock can be expected to be found within about four to five feet of the exposed weathered shale exposures in the area. Where course changes in the erosional channel have occurred, additional deposits of sedimentary debris may increase this depth by several feet. Borehole C-3, for example, which is located at the site of a refilled channel meander, showed a debris thickness of 29.5' which was the greatest thickness found.

As shown in figure 1, areas A through D were examined by International Engineering for bedrock location around portions of the sediment pond dam, pond perimeter and pond area.

Area A consists of debris material overlying shale. Bedrock occurs five to ten feet below the bottom of the streambed. Area B is an area of shale outcrop which has been weathered to a depth of only two to three feet.

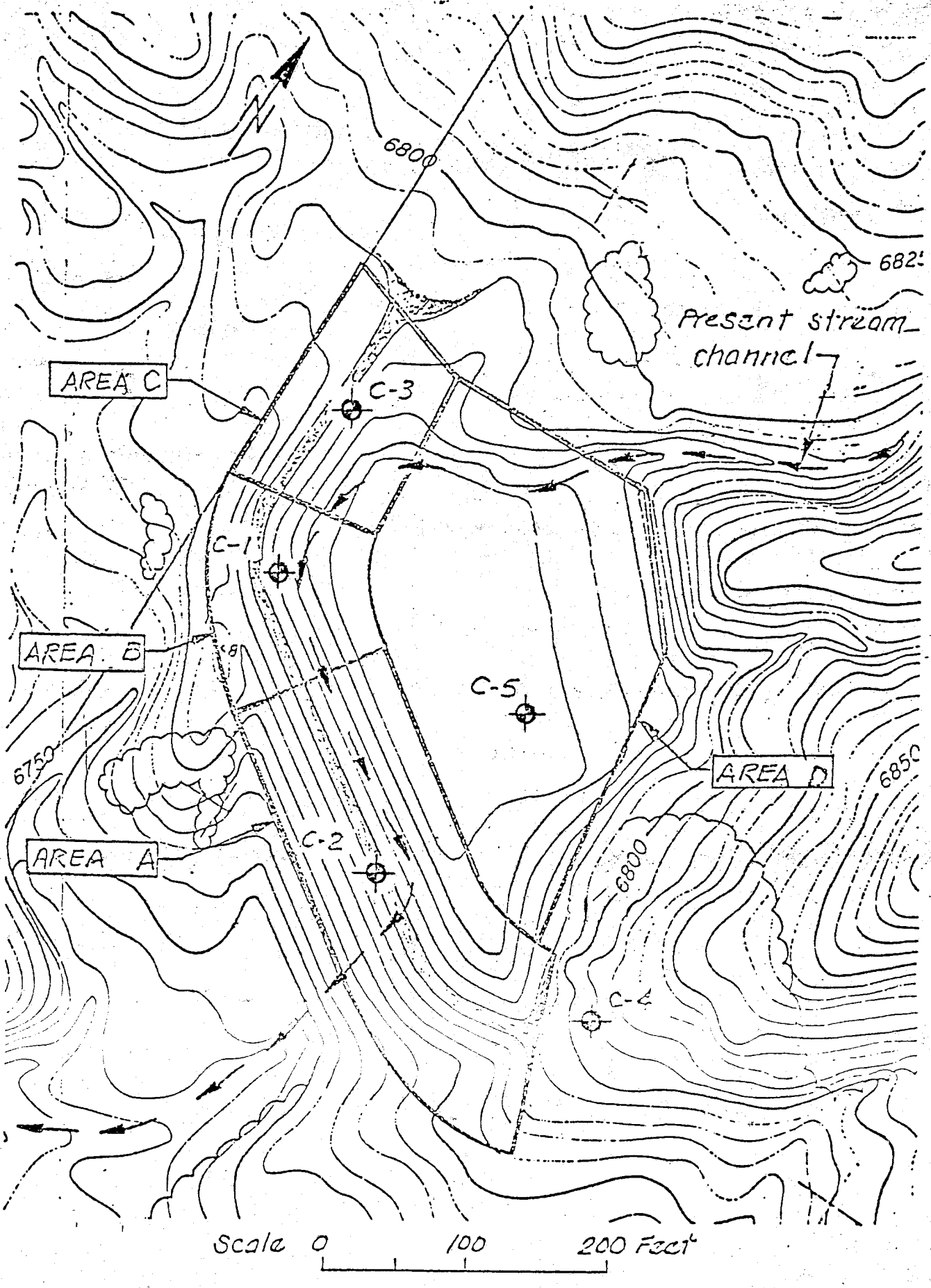
Area C consists of debris material in a refilled erosional channel. This is the location of the thickest debris material in the area. Area D also consists of shale overlain by debris material of a lesser thickness.

The sediment storage dike area was examined to determine it's position in relation to the shale bedrock and erosional debris accumulations. Four locations, cross-section points 0+00, 1+60, 2+85, and 3+95, are shown on figure 2.

Cross section point 0+00 is located at the western most edge of the dike. This point appears at one time to be located next to a small tributary drainage which drops steeply from the Starpoint sandstone. Shale bedrock can be expected to be located five to ten feet below the surface but may be less due to its position above the predominate drainage channel into which it would flow.

Cross-section points 1+60, 2+85 and 3+95, progressing to the east along the sediment retention dike, occur along a line where the original surface was on an upsloping ridge of weathered shale. Sedimentary debris material deposits would not be expected at these points. Shale bedrock would be expected to be located within five feet of the surface along this line.

FIGURE 1



CHURCH MINE POND SITE

PLAN

C-3

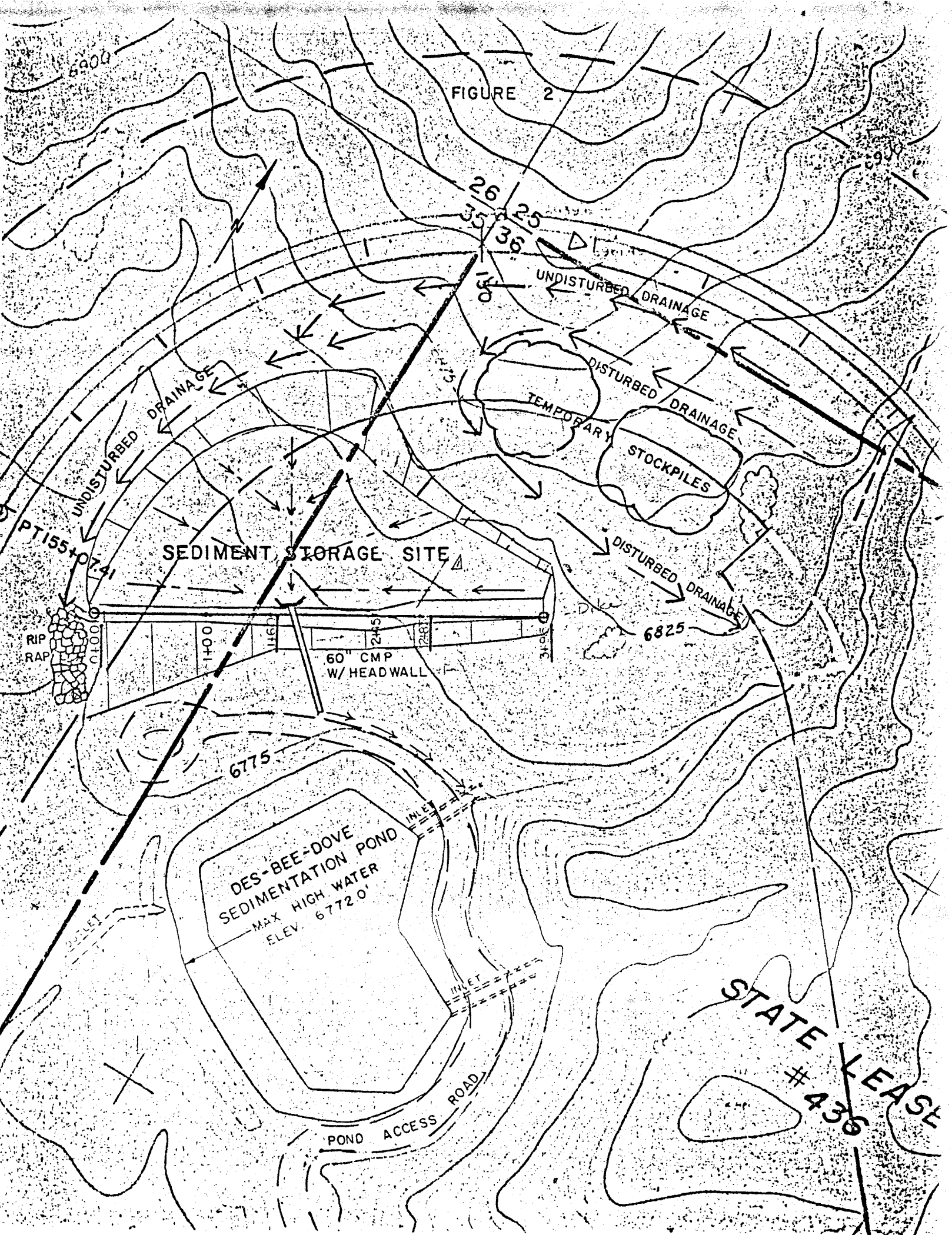


FIGURE 2
6900
6900
26
35
36
25
UNDISTURBED DRAINAGE
DISTURBED DRAINAGE
TEMPORARY
STOCKPILES
UNDISTURBED DRAINAGE
DISTURBED DRAINAGE
PT 155+07.41
SEDIMENT STORAGE SITE
RIP RAP
1+00
60" CMP
W/ HEADWALL
6825
6775
DES-BEE-DOVE
SEDIMENTATION POND
MAX HIGH WATER
ELEV. 6772.0'
INLET
INLET
OUTLET
POND ACCESS ROAD
STATE LEASE
#436

INTERNATIONAL ENGINEERING CO., INC.

SHEET 1 OF 1

DRILL LOG

PROJECT: UTAH POWER & LIGHT				JOB NO. 8069-01	HOLE NO. C-1
SITE: CHURCH MINE POND	BEGUN: 8-29-78	COMPLETED: 8-29-78	HOLE SIZE:	ANGLE FROM HORIZ. & BEAR: 90°	
COORDINATES:	DEPTH/EL GROUND WATER: NOT ENCOUNTERED	GROUND EL.:		DEPTH/EL. TOP OF ROCK: 5.0' /	
DRILLING CONTRACTOR: RAYMOND INTERNATIONAL	CORE RECOV LENGTH/%: 52.5" / 88%	SAMPLES: 3	CORE BOXES: 1	DEPTH/EL. BOTTOM OF HOL: 14.5' /	
DRILL MAKE AND MODEL: CME 55	LOGGED BY: P. R. THUENER				

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
SPT	12, 17, 16, 23			Smooth, difficult drilling		1–4		#1	Sandy CLAY (CL-CH), grey, medium to high plasticity, fine to coarse sand size fragments of shale, gravel sizes up to 3/4", hard, dry [SHALE, moderate to severe weathering, occasional calcite
4" auger						5	3	2	SHALE, dark grey, friable to thinly horizontally laminated, horizontal fractures, dry
SPT	50, 51			Very difficult drilling		6–8			9.5'–10.3': Closely fractured, horizontal parting at approx. 1".
3 5/4" Tricone				Cleaned hole to 9.5'		9			10.3'–11.5' Moderately fractured, calcite on fractured surfaces, parting at approx. 2" to 3".
NX Core barrel	ROD = 77%	60"	52.5"	Smooth, easy drilling. Using water. Brown returns, good circulation.		10–12			11.5'–11.9' Closely fractured, parting at approx. 1/2"
						13–14			11.9'–14.5' Calcite on some fractures, parting at approx. 6"
				8-29-78		15–17			Bottom of hole at 14.5'

HOLE NO. C-1

INTERNATIONAL ENGINEERING CO., INC. SHEET 1 OF 2

DRILL LOG	PROJECT UTAH POWER & LIGHT			JOB NO. 2069-01	HOLE NO. C-2
SITE CHURCH MINE POND	BEGUN 8-29-78	COMPLETED 9-29-78	HOLE SIZE	ANGLE FROM HORIZ. & BEA 90°	
COORDINATES	DEPTH/EL GROUND WATER NOT ENCOUNTERED	GROUND EL.	DEPTH/EL. TOP OF ROCK 21.0' /		
DRILLING CONTRACTOR RAYMOND INTERNATIONAL	CORE RECOV LENGTH/% 42" / 100%	SAMPLES 3	CORE BOXES 1	DEPTH/EL. BOTTOM OF HO 26.5' /	
DRILL MAKE AND MODEL CME 55	LOGGED BY: J. COGIN				

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
6" Auger				Grinding at 1.2'		1			Clayey SILT (ML), brown, with cobbles, very loose, dry [w]orking pr
						2			Silty CLAY (CL-CH), brown, mediu to high plasticity, soft, occasion gravel, dry
						3			
						4			Gravel
SPT	20 18 29					5		#1	
						6			
3 3/4" Tricone bit				Using water Cuttings - ochre brown, red and gray		7			Boulder, sandstone 7.0-11.5'
						8			
						9			
						10			
						11			
						12			angular coarse sand and fin gravel size sandstone fragme grey, fresh, hard
						13			
						14			
						15			Cobble, sandstone 14.5-15.2
						16			Clayey SAND and GRAVEL (SC-GC with angular sandstone gravel sized fragments, brown/red
SPT	15 21 37					17		#2	Grading more clayey

HOLE NO. C-2

INTERNATIONAL ENGINEERING CO., INC. SHEET 2 OF 2

DRILL LOG | PROJECT: UTAH POWER & LIGHT – CHURCH MINE | JOB NO: 8069-01 | HOLE NO: C-2

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
5¾" Tricone bit	20 / 100	5" / 2.5'				18, 19, 20, 21		3	Silty CLAY (CL), brown, low plasticity, with some gravel
NX Core barrel		42"	42"	Using water Losing circulation (70%)		22, 23, 24, 25, 26			SHALE, grey, slightly weathered to fresh, horizontally laminated 23.0'-23.75' Moderately to severely fractured, slight weathering 23.75'-26.5' Fresh, some vertical fractures with calcite on fracture surfaces
						27			Bottom of hole at 26.5'

HOLE NO. C-2

INTERNATIONAL ENGINEERING CO., INC. SHEET 1 OF 2

DRILL LOG	PROJECT: UTAH POWER & LIGHT	JOB NO. 9069-01	HOLE NO. C-5

SITE	BEGUN	COMPLETED	HOLE SIZE	ANGLE FROM HORIZ. & BEAR.
CHURCH MINE POND	8-29-78	8-29-78		90°

COORDINATES	DEPTH/EL GROUND WATER	GROUND EL.	DEPTH/EL. TOP OF ROCK
	NOT ENCOUNTERED		~6.4'/

DRILLING CONTRACTOR	CORE RECOV LENGTH/%	SAMPLES	CORE BOXES	DEPTH/EL. BOTTOM OF HOL
RAYMOND INTERNATIONAL	—	6	—	29.5'/

DRILL MAKE AND MODEL	LOGGED BY:
CME 55	J. Cogan

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
6" Auger						1			Silty CLAY (CL), light grey, low plasticity, medium stiff, dry
						2			
						3			Clayey SAND / Sandy CLAY (SC/CL) light grey to brown, coarse sand, loose / soft, dry
	—								
SPT	20					4		#1	Silty CLAY (CL-CH), grey, medium to high plasticity, dry
	27			slow drilling		5			SHALE [Boulder?] 5.0'-9.0'
						6			
3¾" Tricone bit				Using water Easy drilling Circulation OK		7			Softer at 7.0'
				Hard drilling 8.0'-10.0'		8			SANDSTONE boulder, hard
						9			
	24					10			
SPT	60							#2	Clayey SAND (SP) with gravel, Red to grey, coarse sand, dense to very dense
	53			Rapid drilling 11.5'-14.5'		11			
						12			loose 11.5'-14.5'
						13			
						14			
	100/3"					15		3	Sandy GRAVEL, coarse sand to 1½" gravel, dense, trace clay (GP)
						16			Fine gravel, trace clay
						17			

HOLE NO. C-5

INTERNATIONAL ENGINEERING CO., INC. SHEET 2 OF 2

DRILL LOG | PROJECT UTAH POWER & LIGHT – CHURCH MINE POND | JOB NO. 104-4-01 | HOLE NO. C-3

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
5¾" Tricone bit						18			As above, clayey SAND (SP)
						19			
	74					20		#4	
SPT	36			Circulation deteriorating					
	46					21			SAND (SP), white, medium grained
									Clayey SAND (SP), as above
						22			
						23			
						24			
	4					25		#5	
SPT	6								
	6								
						26			Gravelly CLAY (CH), grey, rounded gravel, high plasticity
						27			SHALE, grey, fresh, horizontally laminated, calcite on fractures.
SPT	100	5"		Attempted sample – hole caving, smooth drilling				#6	
						28			
						29			
						30			Bottom of hole at 29.5'

HOLE NO. C-3

INTERNATIONAL ENGINEERING CO., INC. SHEET 1 OF 1

DRILL LOG	PROJECT: UTAH POWER & LIGHT	JOB NO.: 8069-01	HOLE NO.: C-4

SITE	BEGUN	COMPLETED	HOLE SIZE	ANGLE FROM HORIZ. & BEARIN
CHURCH MINE POND	8-30-78	8-30-78		90°

COORDINATES	DEPTH/EL GROUND WATER	GROUND EL.	DEPTH/EL. TOP OF ROCK
	NOT ENCOUNTERED		10.0/

DRILLING CONTRACTOR	CORE RECOV LENGTH/%	SAMPLES	CORE BOXES	DEPTH/EL. BOTTOM OF HOLE
RAYMOND INTERNATIONAL	24"/100%	2	1	16.0/

DRILL MAKE AND MODEL	LOGGED BY:
CME 55	J. COGAN

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO.	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
6" Auger						1–5			Silty CLAY (CL), brown, with some sand and rounded gravel, dry
SPT	8					5–6		#1	Brown to dark brown, fine sand, loose, no gravel
	13								
	20								
3 3/4" Tricone bit				Using water Hard drilling 6.5'-9.0' Brown returns		6–9			Trace silt, moist, very stiff to hard
				Grey returns		9–10			Grey, no silt, very stiff
	100					10–11		2	SHALE, grey, horizontally laminated, calcite crusts between laminations, striations spaced at 1/2", soft to medium hard.
NX Core barrel		24"	24"	Using water		11–16			
						16–17			Bottom of hole at 16.0'

HOLE NO. C-4

INTERNATIONAL ENGINEERING CO., INC.

SHEET 1 OF 5

DRILL LOG

PROJECT: UTAH POWER & LIGHT | JOB NO. 8039-01 | HOLE NO. C-5

SITE: CHURCH MINE POND | BEGUN: 8-30-73 | COMPLETED: 8-31-73 | HOLE SIZE: | ANGLE FROM HORIZ. & BEAR: 90°

COORDINATES: | DEPTH/EL GROUND WATER: NOT ENCOUNTERED | GROUND EL.: | DEPTH/EL. TOP OF ROCK: 37.5'/

DRILLING CONTRACTOR: RAYMOND INTERNATIONAL | CORE RECOV LENGTH/%: — | SAMPLES: 5 | CORE BOXES: — | DEPTH/EL. BOTTOM OF HOL: 37.5'/

DRILL MAKE AND MODEL: CME 55 | LOGGED BY: J. COGAN

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
6" Auger				Hard drilling		1–11			Gravelly CLAY (CL), brown, stiff, fine, rounded gravel, medium plastic, dry.
SPT	11					5		#1	Silty
	25					6			
	64					7			Boulder, Sandstone, light brown, fine grained moderately weathered
						8			No gravel
	31	12"				10		#2	Medium to high plasticity (CL-CH)
	50	6"				11			
3 3/4" Tricone bit				Using water		12–17			Sand (SP), brown, red, grey, coarse with some rounded gravel

HOLE NO. C-5

INTERNATIONAL ENGINEERING CO., INC. SHEET 2 OF 3

DRILL LOG | PROJECT: UTAH POWER & LIGHT - CHURCH MINE | JOB NO: 8309-01 | HOLE NO: C-5

SAMPLE DATA: TYPE TOOL AND DIA.	METHOD N-BLOW COUNT	ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING—DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION — PHYSICAL DESCRIPTION
	10					18			Clayey GRAVEL (GC-GP) with some sand, some rounded [illegible], low plasticity, dense
SPT	23								
	29					19			
3 3/4" Tricone bit				Easy drilling					
						20			
						21			
				Losing some water		22			
						23			
						24			
						25			
						26			
				Lost all circulation		27			
						28			Clayey SAND and GRAVEL (GC/SC) coarse sand, soft clay
						29			
	9					30			
SPT	11							4	Rounded gravel (sandstone), no clay, medium dense
	13			Add bentonite at 31.5'		31			
				Easy drilling					
				No circulation		32			
						33			
						34			
				Slower drilling		35			? ? ? ? ?
						36			SHALE, grey, horizontally laminated, soft to medium hard

HOLE NO C-5

INTERNATIONAL ENGINEERING CO., INC.

SHEET 3 OF 3

DRILL LOG

PROJECT: UTAH POWER & LIGHT – CHURCH MINE

JOB NO: 8069-01

HOLE NO: C-5

SAMPLE DATA: TYPE TOOL AND DIA.	SAMPLE DATA: METHOD N-BLOW COUNT	SAMPLE DATA: ADVANCE	RECOVERY	REMARKS: WATER LEVELS, WATER RETURN, DRILLING FLUID, CASING DEPTH	ELEVATION	DEPTH	GRAPHIC LOG	BOX/SAMPLE NO	MATERIAL CLASSIFICATION: PHYSICAL DESCRIPTION
3 3/4" Tricone bit				No circulation		37			As above, SILTLE
SPT	100	3"						5	
						38			bottom of hole at 37.7'

EXHIBIT F

SIMPLIFIED BISHOP METHOD OF SLICES

(Lambe & Whitman 1969, p. 365)

To analyze a slope for stability, a trial and error process is used to determine the safety factor against failure. A diagram is prepared of the slope and a proposed failure mass with a circular arc failure line is drawn and then broken up into a series of vertical slices. The forces and moments on each slice are summed to determine the total moments acting on the failure mass and the factor of safety is taken as the ratio of the moments resisting movement to the moments initiating movement. The equation for the factor of safety F is

$$F = \frac{\sum_{i=1}^{i=n} [\bar{c}\,\Delta x_i + (W_i - u_i \Delta x_i) \tan \bar{\phi}][1/M_i(\theta)]}{\sum_{i=1}^{i=n} W_i \sin \theta_i}$$

where

$$M_i(\theta) = \cos \theta_i \left(1 + \frac{\tan \theta_i \tan \bar{\phi}}{F}\right)$$

n = # of slices

$\bar{c}$ = effective cohesion kips per square foot

Δx_i = width of ith slice

W_i = weight of ith slice, kips

= width x average height x density

u_i = pore pressure or neutral stress

ϕ = angle at internal friction of soil, degrees

θ_i = angle of base of ith slice

F = Factor of safety

Where the slopes are not saturated and are in a drained condition with long term loading, the neutral stresses are 0, then

$$F = \frac{\sum (c\, x_i + W_i \tan \phi)\ [1/M_i(\theta)]}{\sum W_i \sin \theta_i}$$

Because F is present on both sides of the equation (M_i (θ) is a function of F), then a value of F in $M_i(\theta)$ is assumed and the equation is then solved to obtain a value for F. If the assumed value equals the result, then the assumption is correct. If the assumed value does not equal the result, then a new value is used in $M_i(\theta)$ and the process is repeated until it closes on the correct answer.

A computer program was developed to solve for F when certain basic parameters are given, using the equation above and assuming the failure would be a toe failure, because the fill slopes are located on firm base.

The basic parameters required are cohesion, density, angle of internal friction, the width of each slice, the average height of each slice, and the angle at the base of each slice.

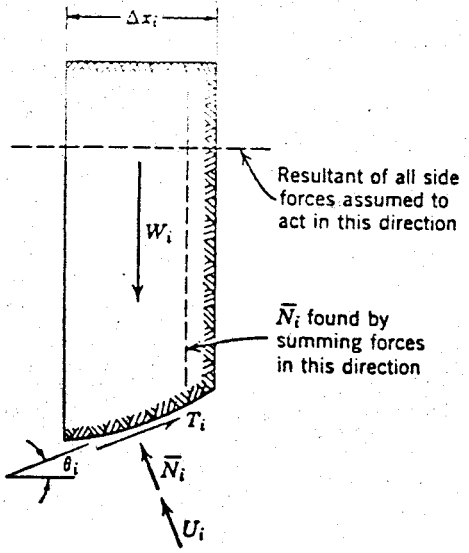


EXHIBIT G

Table 3.1 Average Effective Shear Strength of Compacted Soils.

UNIFIED CLASSIFICATION	SOIL TYPE	PROCTOR COMPACTION: MAXIMUM DRY DENSITY pcf	PROCTOR COMPACTION: OPTIMUM MOISTURE CONTENT %	AS COMPACTED COHESION c_o tsf	SATURATED COHESION c_{sat} tsf	FRICTION ANGLE ϕ deg
GW	well graded clean gravels, gravel-sand mixture	>119	<13.3	*	*	>38
GP	poorly graded clean gravels, gravel sand mixture	>110	<12.4	*	*	>37
GM	silty gravels, poorly graded gravel-sand-silt	>114	<14.5	*	*	>34
GC	clayey gravels, poorly graded gravel-sand-clay	>115	<14.7	*	*	>31
SW	well graded clean sands, gravelly sands	119±5	13.3±2.5	0.41±0.04	*	38±1
SP	poorly graded clean sands, sand-gravel mixture	110±2	12.4±1.0	0.24±0.06	*	37±1
SM	silty sands, poorly graded sand-silt mixture	114±1	14.5±0.4	0.53±0.06	0.21±0.07	34±1
SM-SC	sand-silt-clay with slightly plastic fines	119±1	12.8±0.5	0.21±0.07	0.15±0.06	33±3
SC	clayey sands, poorly graded sand-clay mixture	115±1	14.7±0.4	0.78±0.16	0.12±0.06	31±3
ML	inorganic silts and clayed silts	103±1	19.2±0.7	0.70±0.10	0.09±*	32±2
ML-CL	mixtures of inorganic silts and clays	109±2	16.8±0.7	0.66±0.18	0.23±*	32±2
CL	inorganic clays of low to medium plasticity	108±1	17.3±3	0.91±0.11	0.14±0.02	28±2
OL	organic silts and silty clays of low plasticity	*	*	*	*	*
MH	inorganic clayey silts, elastic silts	82±4	36.3±3.2	0.76±0.31	0.21±0.09	25±3
CH	inorganic clays of high plasticity	94±2	25.5±1.2	1.07±0.35	0.12±0.06	19±5
OH	organic clays and silty clays	*	*	*	*	*

*denotes insufficient data, > is greater than, < is less than
(After Bureau of Reclamation, 1973; 1 pcf=157.1 N/m³, 1 tsf=95.8 kPa)

Mews 4211

Moab District
San Rafael Resource Area
P. O. Drawer AB
Price, Utah 84501

2890
U-53809
(U-067)

C.C. Bill Zeller
Jim Hamlin
Morgan Moon

RIGHT-OF-WAY
U-53809

Section A

1. There is hereby granted, pursuant to Title V of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1761), a nonexclusive, nonpossessory right-of-way to:

Utah Power and Light Company
P. O. Box 899
Salt Lake city, Utah 84110

In case of change of address the Holder shall immediately notify the Authorized Officer.

2. To use, subject to terms and conditions set out below, the following described Public Land.

Salt Lake Meridian
T. 17 S., R. 7 E.,
Sec. 35, E½NE¼NE¼NE¼

3. Description of the right-of-way facility and purpose:

The right-of-way is for a sediment storage area which is to be stabilized in place and rehabilitated. The right-of-way is 200 feet wide and 660 feet long and contains 3.04 acres, more or less.

A map showing the location of the right-of-way over the above described Public Land is attached hereto as Exhibit "A".

Terms and Conditions

Section B

1. The right-of-way Holder agrees to comply with all the applicable regulations contained in 43 CFR 2800.

2. If the right-of-way Holder violates any of the terms and conditions to this grant, the Authorized Officer, after giving written notice may declare the grant terminated.

3. This grant is subject to all valid rights existing on the effective date of this grant.

4. There is hereby reserved to the Authorized Officer the right to grant additional rights-of-way or permits for compatible uses, on, over, under, or adjacent to the lands involved in this grant.

5. The Holder shall comply with the applicable Federal and State laws and regulations concerning the uses of pesticides (i.e., insecticides, herbicides, fungicides, rodenticides, and other similar substances) in all activities/operations under this grant. The Holder shall obtain from the Authorized Officer approval of a written plan prior to the use of such substances. The plan must provide the type and quantity of material to be used; the pest, insect, fungus, etc., to be controlled; the method of application; the location for storage and disposal of containers; and other information that the Authorized Officer may require. The plan should be submitted no later than December 1 of any calendar year that covers the proposed activities for the next fiscal year (i.e., December 1, 1984, deadline for a fiscal year 1986 action). Emergency use of pesticides may occur. The use of substances on or near the right-of-way shall not be used if the Secretary of the Interior has prohibited its use. A pesticide shall be used only in accordance with its registered uses and within other limitations if the Secretary has imposed limitations. Pesticides shall not be permanently stored on Public Lands authorized for use under this grant.

6. The Holder agrees not to exclude any person from participating in employment or procurement activity connected with this grant on the grounds of race, creed, color, national origin, and sex. To ensure against such exclusions, the Holder further agrees to develop and submit to the proper reviewing official specific goals and timetables with respect to minority and female participation in employment and procurement activity connected with this grant. The Holder will take affirmative action to utilize business enterprises owned and controlled by minorities or women in its procurement practices connected with this grant. Affirmative action will be taken by the Holder to assure all minorities or women applicants full consideration of all employment opportunities connected with this grant. The Holder also agrees to post in conspicuous places on its premises which are available to contractors, subcontractors, employees, and other interested individuals, notices which set forth equal opportunity terms; and to notify interested individuals, such as bidders, contractors, purchasers, and labor unions or representatives of workers with whom it has collective bargaining agreements, of the Company's equal opportunity obligations.

7. The right-of-way herein granted is subject to the express covenant that it will be modified, adapted, or discontinued if found by the Secretary to be necessary, without liability of expense to the United States, so as not to conflict with the use and occupancy of the land for any authorized works which may be hereafter constructed thereon under the authority of the United States.

8. The Holder shall indemnify the United States against any liability for damage to life and property arising from the occupancy or use of Public Lands under this grant.

9. All survey monuments, witness corners, reference monuments and bearing trees must be protected against destruction. Any damaged or obliterated markers must be reestablished in accordance with accepted survey practices at the expense of the Holder.

10. The right-of-way shall be relinquished to the United States if the authorized use is no longer needed.

11. Compliance shall be in accordance with the terms and conditions as specified herein and in Exhibit "B", attached hereto and made a part hereof.

12. In consideration for this use, the Holder shall pay to the Department of Interior-BLM the sum of sixty dollars ($60.00) a year; $300 for each five-year period beginning the effective date of this grant and before the anniversary date of each succeeding five-year period; or $1,200 for the full term of this grant provided, however, that charges for this use may be readjusted whenever necessary to place the charges on the basis of fair market value of use authorized by this grant. This right-of-way grant is not in force unless the Holder has paid the rental fee in advance.

13. This right-of-way grant shall terminate 20 years from the effective date of this grant unless prior thereto it is relinquished, abandoned, terminated, or otherwise modified pursuant to the terms and conditions of this grant or of any applicable Federal law or regulation.

a. This grant is subject to review at the end of 20 years from the date of this decision, and at regular intervals thereafter not to exceed 10 years.

b. This grant may be renewed so long as it is still being used for the purposes granted, and is operated and maintained ~~in~~ accordance with all the provisions of this grant and pursuant to the regulations under which it is granted. If renewed the right-of-way will be subject to regulations existing at the time of renewal, and such other terms and conditions deemed necessary to protect the public interest.

Section C

The effective date of this right-of-way grant is the date of execution by the Authorized Officer.

The undersigned agrees to the terms and conditions of the right-of-way grant.

The right-of-way is executed this 24th day of August, 1984.

Utah Power & Light Company
Name of Organization, Company or Corp.

August 23, 2004
Termination Date

By: _____
Senior Vice President

Assistant Secretary

Date: August 3, 1984

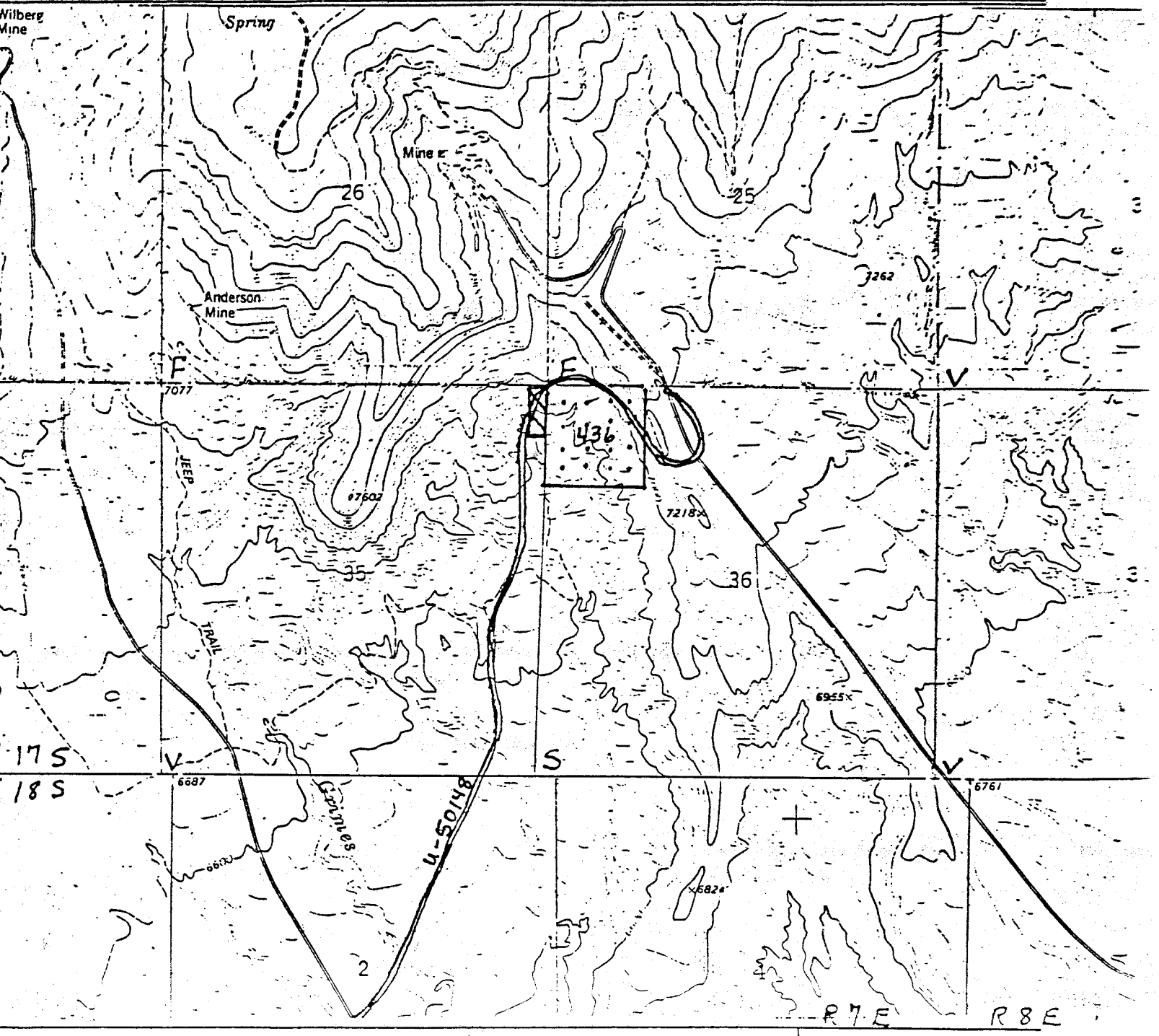
Area Manager

(Seal)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SITE MAP

Serial Number
U-53809



LAND OWNERSHIP KEY AND ADDITIONAL TOPOGRAPHIC SYMBOLS

	R/W U-53809		
	Public Land		
P	Private Land		
S	State Land		
	State Lease 436		

Scale: 1" =

OTHER DATA

Location:
T. 17 S., R. 7 E., SLM
Sec 35, E½NE¼NE¼NE¼
Map Source: "Red Point"
USGS 7½' Quad.

SITE PLOT

EXHIBIT B
Special Conditions

1. Prior to beginning construction, the Holder shall arrange a preconstruction or pre-use conference with the Authorized Officer. Contractors and subcontractors shall also be represented at the conference.

2. Before construction may commence, Holder shall designate a representative for field operations who shall be the sole field representative of Holder and Holder's contractors in dealings with the Authorized Officer.

3. The Holder shall construct and maintain right-of-way facilities and structures in strict conformity with the descriptive and technical data which has been furnished to the Bureau of Land Management. Activities which are not in accord with such data may not be initiated without the prior written approval of the Authorized Officer. Approval of variances will not be given unless the need therefore is fully justified by the Holder.

4. The Holder shall comply with applicable federal and state laws and regulations affecting in any manner construction, operation, maintenance or termination of the right-of-way grant.

This grant is for the BLM-administered Public Land only. The Holder is responsible for obtaining permits from the Forest Service, Division of Lands, Forestry and Fire Control, Office of Surface Mining, and Utah Division of Oil, Gas and Mining, as appropriate.

5. The Holder shall protect existing telephone, telegraph and transmission lines, roads, trails, fences, ditches, and like improvements during construction, operation, maintenance and termination of the project. Damage caused by Holder to these systems shall be promptly repaired by the Holder to a condition satisfactory to the Authorized Officer.

6. Unless authorized in writing by the Authorized Officer, travel is restricted to the right-of-way and the existing public road.

7. The Holder shall utilize and operate all facilities and devices in such a way as to avoid or minimize air pollution.

The Holder shall make every reasonable effort to avoid or minimize dust problems. The Authorized Representative may require sprinkling, or other means of dust control.

8. The Holder shall comply with existing county, state and federal laws as concerned with the protection and preservation of game and non-game wildlife species. Construction will not be allowed while deer are wintering in the area as determined by the Authorized Officer, generally about November 30 to May 15.

9. The Holder shall be responsible for prevention and suppression of all uncontrolled fires that are caused by any operation of the Holder associated with the survey, construction, use and maintenance of this site. The Holder will be billed by the Bureau of Land Management for fire suppression and fire rehabilitation cost resulting from uncontrolled burning of right-of-way material.

The Holder shall do everything reasonable, both independently and/or upon rquest of the Authorized Officer to prevent and suppress fires on or near lands to be occupied under this right-of-way, including making available such construction and maintenance forces as may be reasonably obtained for suppression of such fires.

10. The Holder shall immediately bring to the attention of the Authorized Officer any cultural or paleontological resources discovered during operations under this grant. The Holder shall not disturb any cultural or paleontological resources except as instructed by the Authorized Officer. The cost of investigating and protecting cultural resources discovered during operations shall be borne by the Holder.

11. The construction area will be kept clean at all times. All trash, packing material, oil residues, and other refuse or waste materials will be removed from construction areas on Public Land and placed in approved sanitary landfills in a manner acceptable to the Authorized Officer.

12. The dike shall be reinforced as required by the Authorized Officer to protect the existing facilities.

13. A minimum 18" CMP drop pipe (half round or full culvert) with headwall shall be installed to bring water from undisturbed drainage down the fill slope (see Exhibit C).

14. During construction there will be periodic inspections by the Authorized Officer or his designee to ensure compliance.

15. All Public Land areas where soils and surface materials are disturbed through construction or other actions incident to project operations shall be restored to their natural state insofar as practicable by water barring, scarifying, leveling, reseeding or other practices as proposed in the application and as prescribed by the Authorized Officer and to his satisfaction.

Whenever revegation is required, the Holder shall file a report with the Authorized Officer when such planting is completed. The report shall contain information regarding the location of the area; the type of planting or seeding, including mixtures and amounts; the date of planting; and other relevant information as may be required by the Authorized Officer.

Inspection and evaluation of restorative measures taken will be made by the Authorized Officer as soon as it is possible to determine if a satisfactory growth has been established. In no instance shall this vegetative cover check be made until after completion of the first growing season.

16. Seeding shall take place from October 1 to November 30 using seed mixture proposed in application.

17. When all development and rehabilitation have been completed, a joint compliance check of this right-of-way will be made by the Holder and the Authorized Officer to determine compliance with the terms and conditions of this grant. The Holder shall perform at his own expense any required modifications or additional reclamation work needed to comply with the terms of the grant.

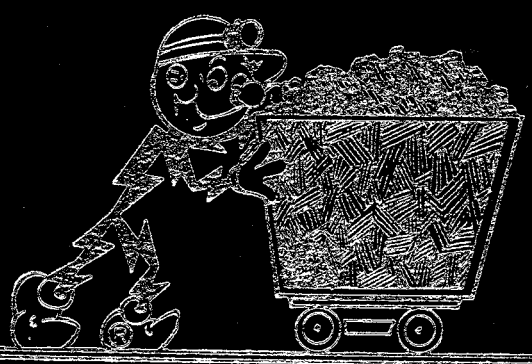
18. If at any time hereafter the Holder wishes to reconstruct, remodel or relocate any portion of this right-of-way hereby granted, or any of the improvements

COAL MINING REPORT

FOR THE

DESERET & BEEHIVE MINES

ACT/015/017



UTAH POWER & LIGHT CO

Mining & Exploration

INTRODUCTION

This report is in response to the new 30 CFR Coal Mining Operating Regulations. Part 211.

Specific inquiries under Part 211 have been answered and are contained within sections as outlined in the table of contents.

For the sake of simplicity a reference section following the table of contents has been added which sequentially coincides with the federal regulations.

Questions which are judged to be for strip mining only are listed but denoted N/A for not applicable.

Table of Contents

REFERENCE TABLE

---

* Not applicable to underground mining.

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* Not applicable to underground mining.

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* Not applicable to underground mining.

30 CFR 211	Requirements	Section	Page
211.10(c)(6)(xiii)	Data on suspended solids under seasonal flow conditions, Impacts of mining operations upon the hydrology of the area.		
(xiv)	Protecting oil, gas wells and resources	General	1
(xv)	Justification for not recovering coal	Mining	54
(211.10(c)(7)	Maps and aerial photographs showing;		
(i)	Topographic drainage and features	Hydrology	Figure 8
(i)	Archeological and cultural features	Archeology	Figure 3
(i)	Roads and vehicular trails	Hydrology	Figure 8
(ii)	Name of water shed	Hydrology	Figure 8
(ii)	Surface streams affected by mine water	Hydrology	Figure 8
(iii)	Plan view	General Location	
	* Cross Sections	Geology	
	Location	Mining	Mine Map
	Strata of overburden	Geology	EM-1-4
	All coal seams	Geology	EM-1-4
	Coal rider seams	Geology	EM-1-4
	Strata beneath coal	Geology	Figure 4
	Next known deeper coal seam	Geology	Figure 4
	Other valuable minerals	Geology	--
	Hydrologic data	Hydrology	Figure 8
	Any other relevant information	Geology	--
	Mineral crop lines	Mining	Mine Map
	Strike and dip of coal seams	Geology	
	Location of known surface mines	Subsidence	Map
	Location of known underground mines	Subsidence	Map
	Location of oil, gas and water wells	General	--
	Location of acquifers	Hydrology	--
	Estimated elevation of water table	Hydrology	--
	Location of:		
	Spoil	Mine Photograph	
	Waste or refuse areas	Mine Photograph	
	* Topsoil preservation area		
	* Impoundments of water		
	* Water treatment facilities		
	* Natural or constructed drain ways		
	Any discharges to any surface body of water		
	* Cross sections of final surface configuration		
(211.10(c)(7)(iv)	Locations of surface structures and facilities	Mine Photograph	
	Suggested Maps:		
	* Final contoured map		
	* Final drainage map		

* Not applicable to underground mining.

30 CFR 211	Requirements	Section	Page
(211.10(c)(7)(iv)	Coal and overburden isopach maps	Geology	Map Packet
	*Mining maps		
(v)	For an underground mine:		
	Planned mine layout	Mining	Map Packet
	Location and dimensions of:		
	Shafts	Mining	Map Packet
	Slopes	Mining	Map Packet
	Drifts	Mining	Map Packet
	Crosscuts	Mining	Map Packet
	Haulage ways	Mining	Map Packet
	Aircourses	Mining	Map Packet
	Rooms	Mining	Map Packet
	Entries	Mining	Map Packet
	Barrier pillars	Mining	Map Packet
	Pillar extraction	Mining	52
	Subsidence detection grid	Mining	Map Packet
(vi)	For auger mining:		
	*Location and diameter of auger holes		
	*Depth to be drilled		
	*Estimated percentage of recovery		

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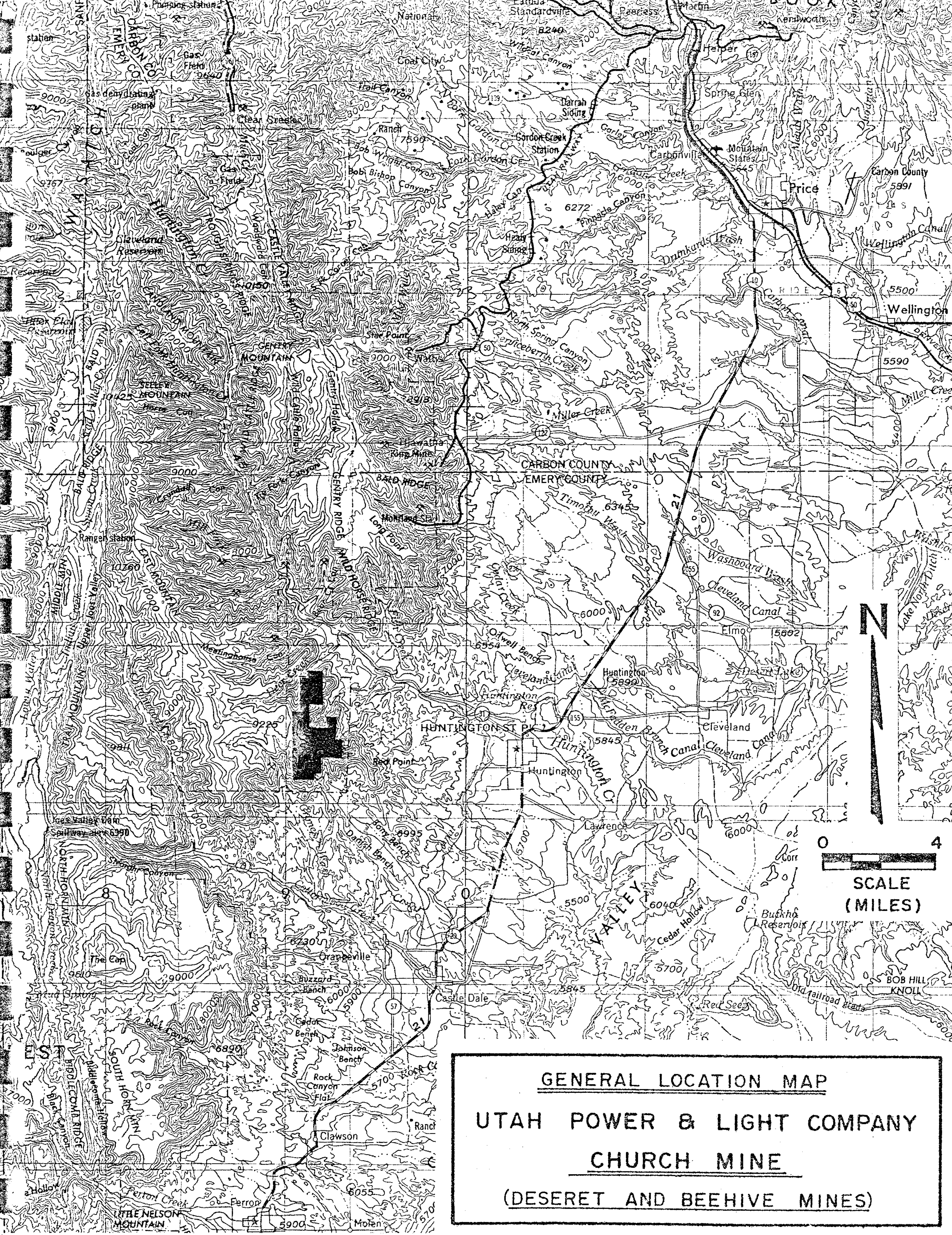
* Not applicable to underground mining.



GENERAL LOCATION MAP

UTAH POWER & LIGHT COMPANY

CHURCH MINE

(DESERET AND BEEHIVE MINES)

GENERAL

Operations of the Church Mine including testing, developing, mining preparation, mining, coal handling and abandonment-reclamation plans, conform to all provisions and standards of applicable State and Federal regulations.

Terms and conditions of leases, permits, licenses and all instructions issued by the Mining Supervisor during the effective operation period have been satisfied. Future stipulations and instructions pertaining to the mining operation of the Church Mine shall comply to the existing regulations at the time of issuance.

There are no minable coal seams above the two coal seams (Hiawatha-Blind Canyon) presently being mined negating impacts to other coal zones. There are no existing oil, gas or water wells within the mining area and no known resources exist above the Beehive and Deseret Mines. Mine plans will be available to operators controlling oil and gas leases when their development plans are initiated.

LAND STATUS

The person responsible for operations under this plan to whom notices and orders are to be delivered is:

Utah Power & Light Company
Attention: Manager of
Mining and Exploration
P. O. Box 899
Salt Lake City, Utah 84110
Telephone: (801) 350-3435

Utah Power & Light Company is the lessee of all Federal Coal Leases as follows:

Lease No. U-02664

Containing 760 acres in two units:

Unit 1:	SE 1/4 SW 1/4	Section 13
	NE 1/4 NE 1/4	Section 23
	W 1/2	Section 24
Unit 2:	SW 1/4	Section 23
	NW 1/4, NE 1/4 SW 1/4	Section 26

All located in Township 17 South, Range 7 East, S.L.M. Utah.

Lease No. SL-050133

Containing 80 acres located in W 1/2 SE 1/4 Section 24, Township 17 South, Range 7 East, S.L.M. Utah.

Lease No. SL-066116

Containing 400 acres located in E 1/2 Section 11 and N 1/2 NE 1/4 Section 14, Township 17 South, Range 7 East, S.L.M. Utah.

All of the surface land described in these coal leases is retained by the United States.

Owners of surface and subsurface other than the United States as follows:

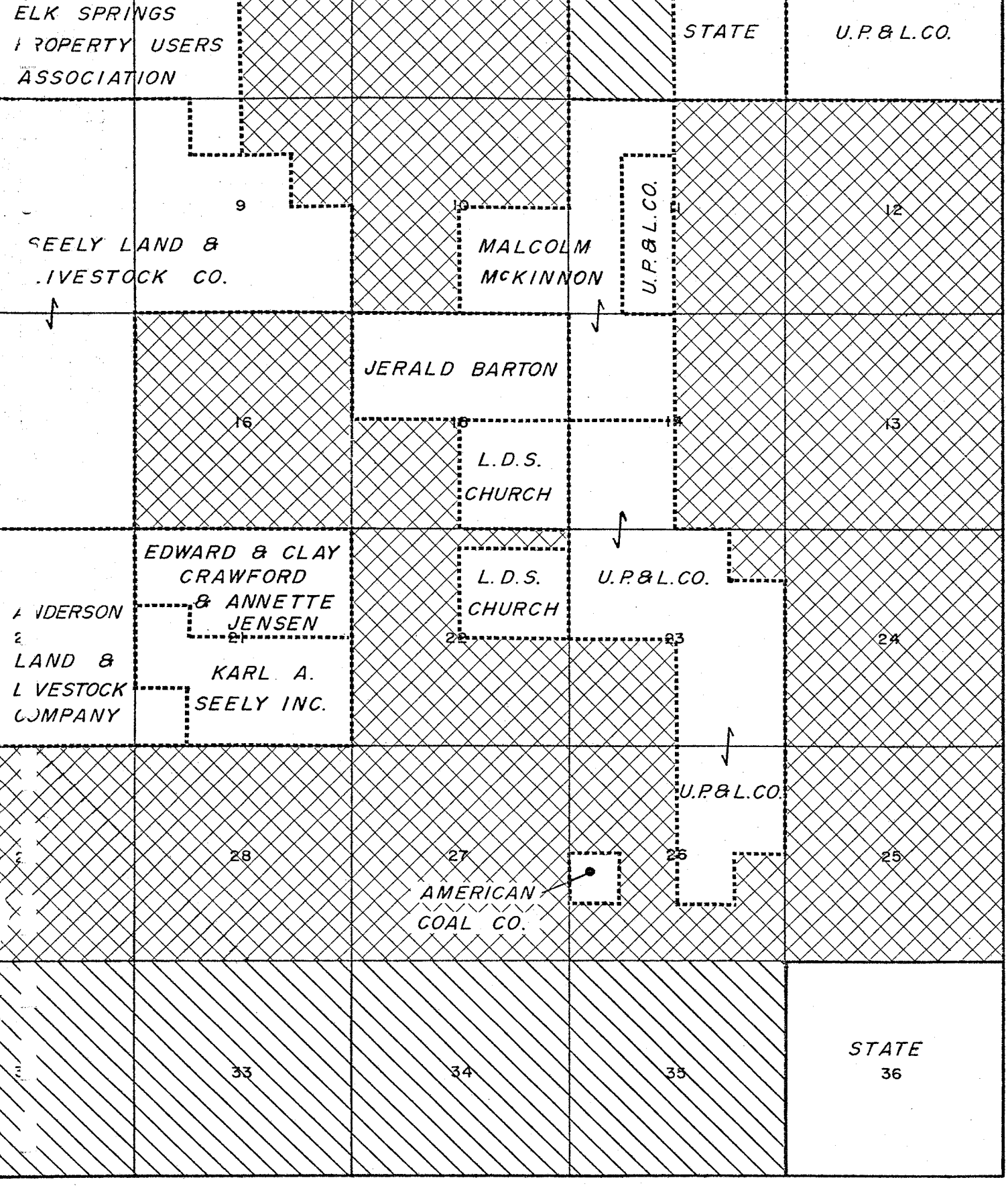
Surface Owners of Record

Description of Land		Name & Address
SE 1/4 NW 1/4, E 1/2 SW 1/4	Section 11	Utah Power & Light Company P. O. Box 899 Salt Lake City, UT 84110
SW 1/4	Section 14	
NW 1/4, SE 1/4, NW 1/4 NE 1/4, S 1/2 NE 1/4	Section 23	
NE 1/4, NW 1/4 SE 1/4	Section 26	
All T17S, R7E S.L.M.		
NW 1/4 SW 1/4 T17S, R7E S.L.M.	Section 26	American Coal Co. P. O. Box 308 Huntington, Utah 84528
E 1/2 NW 1/4 T17S, R7E S.L.M.	Section 14	Malcolm McKinnon (Deceased) 4142 South Main Street Murray, Utah 84107

Subsurface Owners of Record

Description of Land		Name & Address
SE 1/4 NW 1/4, E 1/2 SW 1/4	Section 11	Utah Power & Light Company P. O. Box 899 Salt Lake City, UT 84110
E 1/2 NW 1/4, SW 1/4	Section 14	
NW 1/4, SE 1/4, NW 1/4 NE 1/4, S 1/2 NE 1/4	Section 23	
NE 1/4, NW 1/4 SE 1/4	Section 26	
All T17S, R7E S.L.M.		
NW 1/4 SW 1/4 T17S, R7E S.L.M.	Section 26	American Coal Company P. O. Box 308 Huntington, Utah 84528

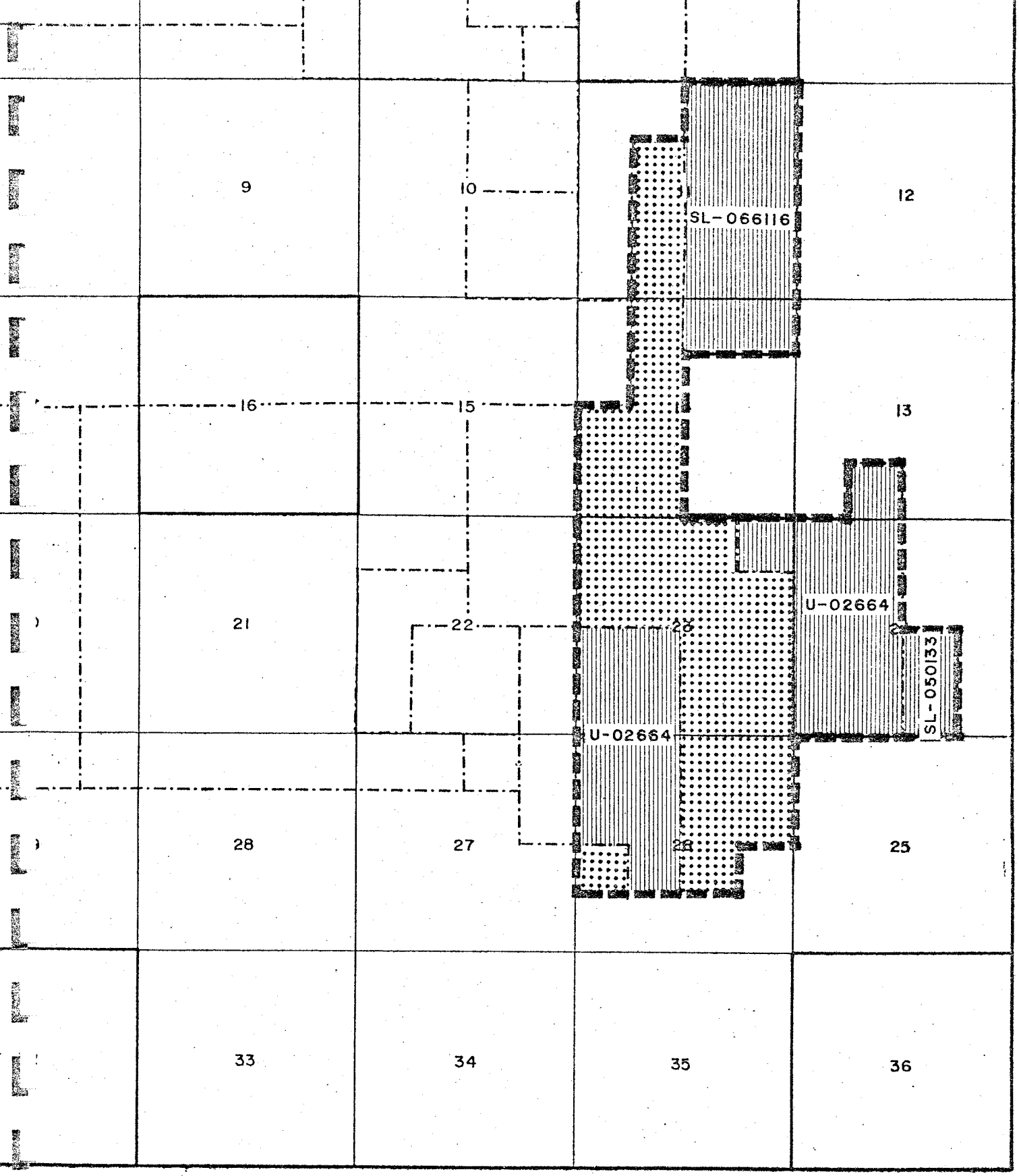
See Figure 1



SURFACE OWNERSHIP MAP

MANTI-LA SAL NATIONAL FOREST

NATIONAL RESOURCE LAND



CHURCH COAL MINE PROPERTY

	FEDERAL COAL LEASES	1240.00 AC.
	FEE COAL LAND	1040.00 AC.
	STATE LEASES	NONE
	TOTAL ACREAGE	2280.00

FIGURE NO. 1

CLIMATOLOGY

The East Mountain mining area is situated on the eastern slope of the Wasatch Plateau and lies approximately two miles to the southwest of the Huntington Canyon Power Plant at an elevation of about 7,000 ft.

Surface Winds

Although no meteorological measurements have been taken in the mining area, the data acquired between 1969 and 1976 in Huntington Canyon indicate that the local circulation in the area is dominated by the same mountain-valley wind regime.

A well-developed mountain-valley wind regime predominates throughout the year in the mining area. During the mid-morning and afternoon periods an up-canyon flow develops in response to differential heating between the canyon air and the air in Castle Valley. This process is reversed during the evening and early morning periods. In addition, along the slopes within the canyon, a smaller scale thermally driven slope flow occurs. Superimposed upon this local circulation are larger scale patterns of gradient flow.

The mountain-valley wind regime shows a seasonal variation with stronger winds occurring during the summer. During the winter period there is a higher frequency of light winds and calm conditions. Wind directions during the winter also show greater variability. On an annual basis down-canyon flow is associated with the highest average wind speeds and accounts for the largest percentage of daily flow. The frequency of up-canyon flow increases during the summer with maximum surface heating.

Wind measurements taken at nearby Meetinghouse Ridge indicate that a similar flow pattern occurs in Meetinghouse Canyon. These general patterns can also be expected to occur near the mining area.

Winds Aloft

The general flow aloft over the central Utah area is a zonal west to east flow which predominates throughout the year except during the summer period when the flow is generally from the southwest. The orientation of the mining area indicates that down-canyon flow will be enhanced by this southwesterly flow aloft.

Winds aloft data taken in Huntington Canyon during 1970 and 1971 show that a low-level wind speed maximum is associated with down-canyon flow and occurs between 200 and 300 ft. AGL. Wind speeds above this level show a general decrease up to approximately 1300 ft. During up-canyon flow the winds aloft tend to be lighter and remain nearly constant with height.

Climatological Data

The nearest stations reporting climatological data are Hiawatha and Castle Dale. Hiawatha lies approximately twelve miles north of the mining area at an elevation of 7,220 ft. MSL and Castle Dale lies approximately fourteen miles to the south-southeast at an elevation of 5,660 ft.

Precipitation

Precipitation in mountainous terrain tends to be extremely variable and generally increases with increasing elevation. The annual average precipitation values recorded at Hiawatha and Castle Dale are

13.07 and 8.76 inches, respectively. Table 1 shows the average monthly precipitation for Hiawatha during 43 years of record. These values are shown only to indicate the general precipitation pattern near the Huntington area.

Table 1. Average monthly precipitation for Hiawatha (1917 to 1960).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Ave. (in.)	.85	1.02	1.01	.92	1.08	.96	1.22	1.97	1.17	1.25	.72	.90

These data show a summer maximum with a fairly uniform distribution throughout the rest of the year. This is characteristic of areas in which thunderstorm activity occurs during the summer and large-scale storms occur during the Fall, Winter and Spring.

Temperature

Daily temperature ranges depend primarily on elevation and local topography. In the Huntington Canyon area where significant mixing occurs minimum temperatures will tend to be warmer than in areas of flat terrain at the same elevation. Table 2 shows monthly and annual averages and extremes for temperatures recorded at Hiawatha during 47 years of record.

Table 2. Monthly and annual averages and extremes for Hiawatha, Utah (1914 to 1960).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Highest	54	57	66	80	86	93	95	93	92	78	63	58	95
Daily Max	32	36	44	55	65	75	82	79	72	59	44	35	56
Average	23	27	34	44	53	62	69	67	59	48	34	26	45
Daily Min	14	18	23	32	40	49	56	55	47	37	24	17	34
Lowest	-12	-18	-1	7	19	26	40	35	25	10	-2	-12	-18
Range	19	18	21	23	24	26	25	24	24	22	19	18	22

A comparison of temperatures recorded at the three monitoring sites in Huntington Canyon with those at Hiawatha, as described by Hovind (1971), predicts a maximum annual temperature variation near the power plant site of 96°F to -12°F. The comparison also indicates a general agreement between plant site maximum and minimum temperatures and those from Hiawatha. The following relationships were suggested:

Maximum temperature $T_{plant} = T_{Hiawatha} + 1^{o}F$

Minimum temperature $T_{plant} = T_{Hiawatha} + 6^{o}F$

The dry and wet bulb temperatures, observed at the plant site between December 16, 1969, and March 11, 1971, are summarized in Table 3 in the form of monthly average maximum and minimum values, and monthly extreme maximum and minimum values. The highest dry and wet bulbs were recorded in July, 1970 (95°F and 75°F respectively), the lowest dry bulb in January (-7°F) and lowest wet bulb in February (2°F).

Temperatures in the mining area will be similar to those measured at the plant site with a comparable variation between maximum and minimum values. The elevation difference will tend to decrease the daily maximum temperatures about 2°F.

Table 3. Huntington Canyon plant site, Carbon County Utah - dry bulb and wet bulb summary, December 16, 1969 to March 11, 1971.

	Dry Bulb (°F)				Wet Bulb (°F)			
	Average		Extreme		Average		Extreme	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1969								
December	36.3	24.1	48	9	31.2	21.3	40	7
1970								
January	33.1	20.5	47	9	28.3	18.4	37	6
February	43.5	28.0	53	16	35.7	24.5	43	14
March	41.7	26.7	51	22	34.0	23.4	42	19
April	49.4	31.0	65	24	38.8	26.5	48	21
May	68.1	45.2	82	33	52.7	38.3	61	28
June	73.9	52.0	91	41	58.4	45.1	69	36
July	83.8	61.8	95	52	66.7	54.3	75	47
August	82.8	59.7	91	40	64.4	50.8	70	32
September	69.3	47.9	82	36	52.5	36.7	60	29
October	55.7	38.5	73	27	43.5	31.5	55	22
November	46.2	36.5	55	25	37.1	27.7	43	21
December	36.9	22.9	46	10	34.1	24.6	38	22
1971								
January	33.5	19.9	58	-7	40.0	29.0	45	26
February	35.6	22.8	53	5	28.0	18.1	43	2
March	34.6	19.5	50	8	27.2	15.7	39	5

Stability

In the general area stable conditions are associated with night-time radiational cooling and unstable conditions with day-time surface heating. Stability data from the study by Hovind (1971) are summarized in Table 4. These data show that stable conditions are

generally associated with down-canyon flow and that unstable conditions occur predominantly during up-canyon flow. It should be noted that there are no long-term meteorological records on air-mass stability for the Huntington area and the values shown in Table 4 should be interpreted only as general characteristics.

The study presented by Hovind (1971) also indicates that an average of six periods of stagnation lasting two to four days will occur during the winter months in the Huntington Canyon area.

Table 4. Percent frequency of occurrence of unstable (B), neutral (D), neutral with lid (D_L), and stable (E) conditions in down canyon and up canyon flow for Huntington Canyon.

MPH	Down Canyon B	D	D_L	E	Up Canyon B	D	D_L	E
				Spring				
<4	0	0	0	0.4	0	0.4	0	1.5
4-12	4.4	23.9	1.9	17.0	7.7	12.0	1.2	0
>12	3.1	11.6	0	14.9	0	0	0	0
	7.5	35.5	1.9	32.3	7.7	12.4	1.2	1.5
				Summer				
<4	0	0	0	0	0.8	0.5	0	0
4-12	1.6	15.7	0	8.7	13.9	20.2	2.0	0
>12	0	13.9	2.3	20.1	0	0.3	0	0
	1.6	29.6	2.3	28.8	14.7	21.0	2.0	0
				Fall				
<4	0	1.5	1.0	2.3	0	2.7	1.2	2.3
4-12	0.5	15.9	1.8	8.6	7.5	17.7	3.3	0.3
>12	0	15.2	0.8	15.1	0	2.3	0	0
	0.5	32.6	3.6	26.0	7.5	22.7	4.5	2.6
				Winter				
<4	0	3.8	2.0	11.5	0	7.0	8.7	3.2
4-12	0.4	11.7	3.6	11.5	0.7	13.4	7.6	2.9
>12	0	1.3	0.4	10.3	0	0	0	0
	0.4	16.8	6.0	33.3	0.7	20.4	16.3	6.1
				Annual				
<4	0	1.3	0.8	3.5	0.2	2.7	2.7	1.7
4-12	1.6	16.5	1.8	11.2	7.6	16.1	3.5	0.8
>12	0.7	10.7	0.9	15.2	0	0.7	0	0
	2.3	28.5	3.5	29.9	7.8	19.5	6.0	2.5

REFERENCES

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ENVIRONMENT

The mine property is in the high plateau and canyonland area of eastern Utah. Principal vegetation communities in the area are spruce-fir-Douglas fir forest and pinyon-juniper woodland. Mine facilities are located on steep, sparsely vegetated slopes in the pinyon-juniper zone at the head of a dry ravine leading into Grimes Wash.

Soils

In the general vicinity of the Beehive-Deseret Mine, soils range from deep, alkaline types in the valleys to very shallow soils and bare rock on the steep slopes of East Mountain (Wilson et al. 1975). The dry, desert soils of the valleys south and southeast of the mine are used mainly for range and pasture. Irrigated cropland occurs in small areas where water is available. These valley soils receive 8 to 14 inches of precipitation and have a low to moderate erosion potential (Wilson et al. 1975).

The soil types of the mountainous areas surrounding the Beehive-Deseret Mine are characteristic of canyon slopes, geologic folds and faulted areas. Bare rock and shallow soils over sandstone bedrock occur over most of the area. These soils support valuable watersheds, recreational areas and wildlife habitat. Runoff in these areas is high and contributes to heavy sedimentation and erosion problems. These erosion characteristics indicate that the revegetation potential in the mine area is poor (Wilson et al., 1975).

Detailed soils descriptions are not available for the immediate area but the Kenilworth and Rockland soil types (USDA and USDI, 1970),

mapped approximately one mile south of the mine, are generally representative of the soils on the mine site.

Vegetation

Two major vegetation types, all characteristic of central Utah (Foster, 1968), occur on the mine property. Pinyon-juniper occurs on the dry, south slopes and intergrades with sagebrush and grassland types at higher evlevations on East Mountain. Spruce-fir-Douglas fir forest occupies the ravines, ridge tops, and the more mesic north slopes at elevations above 8,000 feet (Holmgren, 1972). A small area of riparian woodland occurs on Deer Creek at the northern tip of the mine property. In mesic areas surrounding springs and seeps on the mountain tops, small meadows are present. Due to the intermittent status of streams, the characteristic riparian habitat does not occur in the ravine leading from the mine portal area to Grimes Wash. Plant species characteristic of the pinyon-juniper are listed in Appendix 1. Pinyon pine (Pinus edulis), juniper (Juniperus osteosperma), mountain mahogany (Cercocarpus spp.), and serviceberry (Amelanchier utahensis) are the common woody plant species. These forms provide an open canopy. Pinyon pine and juniper density in the vicinity of the mine ranges from 240 to 420 trees/acre (University of Utah Research Institute, 1975b).

The understory of pinyon-juniper habitat is sparse and consists of scattered clumps of Indian ricegrass (Oryzoposis hymenoides) and forbs. Total vegetative cover in this area is generally less than 10 percent (University of Utah Research Institute, 1975b) because of steep slopes and southern exposure. Much of the remaining surface is bare rock.

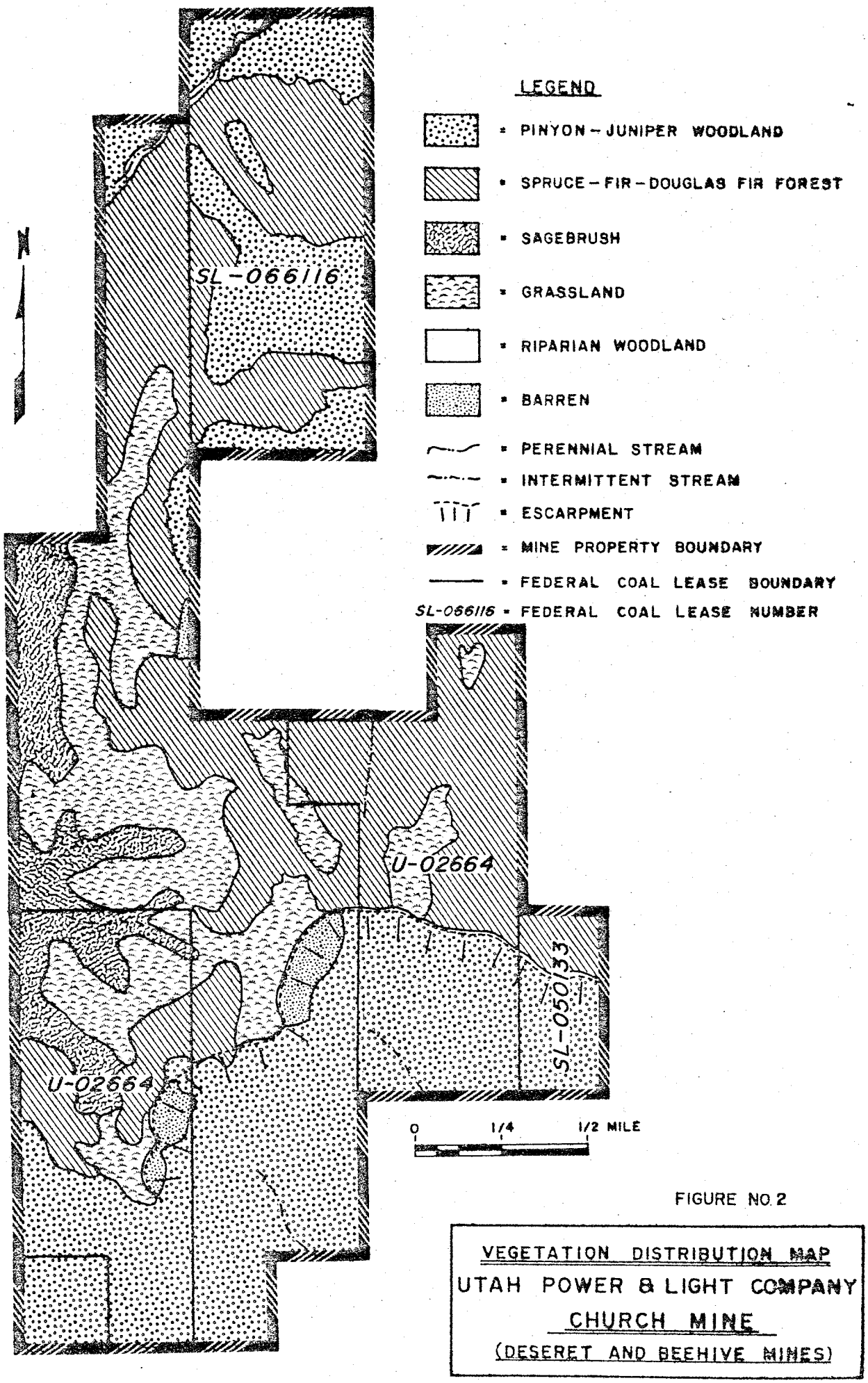

FIGURE NO. 2

VEGETATION DISTRIBUTION MAP
UTAH POWER & LIGHT COMPANY
CHURCH MINE
(DESERET AND BEEHIVE MINES)

Seven plants on the proposed federal list of endangered species (USDI, 1976) (Table 1) occur in Emery County, but no rare or endangered species are known from the immediate mine area (Welsh et al., 1975). Most of the endangered plant species in Emery County occur in the San Rafael Swell (Welsh et al., 1975) in the eastern part of the county.

Fish and Wildlife

1. Habitats - Major habitat types on the mine property support diverse wildlife communities. Although the property boundaries include several habitat types, the mine portal, surface facilities, and access roads are situated entirely within the pinyon-juniper woodland.

A number of important vertebrate species typical of pinyon-juniper habitat within the region. The sparse vegetation and steep, dry conditions present in the mine are less suitable than the densely vegetated area on gently sloping terrain south and east of the mine property for most of these species.

The most conspicuous large mammal in pinyon-juniper habitat in the mine vicinity is the mule deer. Other conspicuous mammal species found in pinyon-juniper habitat area include black-tailed jackrabbit, mountain cottontail, coyote, badger, and striped skunk. Common small mammals include deer mouse, pinyon mouse, least chipmunk, hoary bat, silver-haired bat, and western big-eared bat (Brown et al., 1958).

Typical birds in pinyon-juniper habitat include the mourning dove, pinyon jay, western bluebird, western kingbird, American kestrel, and chipping sparrow (Brown et al., 1958).

Table 1

Proposed Endangered Plant Species Occurring in Emery County*,**

Plant Species	Distribution
Cycladenia jonesii	San Rafael Swell, Emery County; Castle Valley, Grand County
Erigeron maguieri	Calf Spring Wash on San Rafael Swell, Emery County
Eriogonum smithii	San Rafael Desert, Emery County
Festuca dasyclada	Joes Valley, Emery County; Sanpete County, Colorado
Gaillardia flava	Price River, Emery County
Parthenium ligulatum	Duchesne County; Emery County
Sclerocactus wrightiae	San Rafael Ridge, Emery County; Wayne County

* USDI, 1976
** Welsh et al., 1975

Dry surface conditions and the absence of standing water virtually preclude the presence of amphibians from pinyon-juniper habitat in the vicnity of the mine, but several species of reptile are common. The side-blotched lizard, eastern fence lizard, sagebrush lizard, racer, gopher snake, and western rattlesnake are representative species in this habitat type throughout the region (Stebbins, 1966).

There are no fisheries in the vicinity of the Deseret and Beehive mining area. Grimes Wash and the lower portion of Cottonwood Creek drain the mining area and are classified by the State of Utah as Class VI. This indicates that they are of no value as state fisheries.

Open stands of spruce-fir-Douglas fir forest with Douglas fir as a dominant species occurs at the higher elevations and on sheltered north-facing slopes within the study area. Spruce-fir-Douglas fir and pinyon-juniper habitats intermingle over much of the area in canyon bottoms and at intermediate elevations to form a transition zone between the two vegetation types. Elk, snowshoe hare, and blue grouse are important species in these forested areas.

Sagebrush-grassland habitat and some mesic vegetation types occur on the relatively flat upper benches of East Mountain. Mesic meadow habitat is limited to small drainage areas and a few springs. These habitats, combined with the forest edge ecotonal areas, are suitable for a number of wildlife species such as elk, mule deer, ruffed grouse, blue grouse, and snowshoe hare.

The additional moisture, increased vegetation, and structural diversity of the vegetation in the forest-sagebrush-grassland ecotones provide habitat for more vertebrate species than is provided by pinyon-juniper woodland.

2. Important Species - Important wildlife species are defined as those which are of recreational or economic value, are essential to the structure and function of the ecosystems in which they occur, or which have special status (e.g., endangered, declining, protected, etc.) within the region.

Several important species occur on and near the mine site. The status, known distribution in the region and general habitat preference of each are discussed below.

a. Game Species:

o Mule Deer (Odocileus hemionus) - Mule deer range throughout all habitats on the mine property. Pinyon-juniper on the slopes of East Mountain are used as winter range. During other seasons deer concentrations are greater at high elevations. Although deer populations have declined over the past several years, the deer herd and habitat in the mine vicinity are in good condition (Dolton, 1977).

o Elk (Cervus canadensis) - Elk inhabit the sagebrush, meadow, and forest areas at the upper elevations of East Mountain during the winter, but do not ordinarily range into pinyon-juniper habitat. The seven year average of elk censused on East Mountain (1970-1976) was 76 antlerless and two antlered individuals seen per year (Dolton, 1977). This estimate is based on larger groups and does not include all members of the population (Dolton, 1977).

o Mountain Lion (Felis concolor) - This species inhabits rugged mountains and forest areas in the region and may occasionally occur on East Mountain (Dolton, 1977).

o Snowshoe Hare (Lepus americanus) - This species occurs in forested portions of mountainous areas in the region. It inhabits higher elevations on East Mountain (Dolton, 1977).

o Mountain Cottontail (Sylvilagus nuttalli) - Mountain cottontails inhabit brushy area and forests, particularly on rocky slopes throughout the region of the Church Mine (USDI Bureau of Land Management, 1976).

o Blue Grouse (Dendragapus obscurus) - Open conifer stands with brushy understory at higher elevations provide suitable habitat for this species. Blue grouse occur on East Mountain and on most areas in Utah. The greatest density of the species in Utah is in the northern Wasatch Range (Rawley and Bailey, 1972).

o Ruffed Grouse (Bonasa umbellus) - Brushy woodlands (aspens, willows, and conifers) near streams and springs are suitable habitat. This species occurs at higher elevations on East Mountain, but good populations are generally limited to the Wasatch Range (Rawley and Bailey, 1972).

o Chukar Partridge (Alectoris graeca) - This species prefers steep, rocky, semiarid slopes with low shrubs and rock outcrops. This species was introduced in Utah from 1951 to 1968. During this period 185,911 individuals were released at 191 different locations (Rawley and Bailey, 1972). The species is now widely distributed throughout Utah and other western states.

o Mourning Dove (Zenaidura macroura) - This is the most widely distributed upland game bird in North America. Mourning doves prefer open field and forest edge habitat, but occurs over a broad range of vegetation types throughout the 48 conterminous United States. The species

occurs in pinyon-juniper and forest habitat on East Mountain.

b. Special Status Species:

No federally listed endangered or threatened species are known to occur on the site property (USDI Fish and Wildlife Service, 1976). The black-footed ferret (Mustela nigripes), a federally endangered species, has recently been reported near Ferron, several miles south of the site (Dolton, 1977). This species is not likely to occur on mine property because preferred habitat (a prairie dog town) (USDI Bureau of Land Management, 1972a) is not present. American peregrine falcon (Falco peregrinus anatum) has been observed within 25 miles of the site in the winter of each of the past three years (Dolton, 1977). It is probably a winter visitor/resident in the area (USDI Bureau of Land Management, 1972b), although, historically, peregrine falcon aeries existed in the San Rafael swell area 30 miles southeast of the site.

The State of Utah has defined the status of selected animal species (Utah Division of Wildlife Resources, 1976), some of which are likely to occur on or near the Beehive-Deseret mine property as:

DECLINING: Any species of animal which, although still occurring in number adequate for survival, has been greatly depleted and continues to decline. A management program, including protection of habitat manipulation, is needed to stop or reverse the decline.

LIMITED: Any species of animal occurring in limited numbers due to restricted or specialized habitat or at the perimeter of its historic range.

STATUS QUESTIONED: Insufficient data are available to permit a reliable assessment of the status of the species.

Special status species in Utah that might be found near the mine are:

o Bobcat (Lynx rufus) Declining. Fur prices in recent years have resulted in excessive harvests. The species is presently under consideration for total protection until the current population trend is reversed. Bobcats probably occassionally use the habitats present on the mine property.

o Whitetail Jackrabbit (Lepus townsendi) Status questioned. Inhabits sagebrush flats in the region and may occur on site.

o Sandhill Crane (Grus canadensis) Limited. A few individuals migrate through the region (Robbins et al., 1966).

o Fox Sparrow (Passerella iliaca). Status questioned. Suitable habitat for the species occurs at upper elevations on East Mountain on the property.

o Utah Mountain Kingsnake (Lampropeltis pyromelana infralabialis) Limited. Suitable habitat occurs on site. The species is in the region and may inhabit the mine area (Stebbins, 1966).

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Appendix 1

Vascular Plant Species Characteristic of the Pinyon-Juniper Types Occuring in the Vicinity of the Church Mine*

Family	Species	Common Name
Boraginaceae	Cryptantha flava	
Cactaceae	Opuntia polyacantha	Plains Prickly-pear
Chenopodiaceae	Atriplex confertifolia	Shadscale
	Salsola kali	Russian Thistle
Compositae	Artemisia tridentata	Big Sagebrush
	Chaemaechaenactis scaposa	
	Chrysothamnus greenii	Rabbitbrush
	Gutierrezia sarothrae	Matchweed
	Hymenoxys acaulis	
	Thelesperma subnudum	Greenthread
Cruciferae	Arabis holboellii	Rockcress
	Caulanthus crassicaulis	Wild Cabbage
	Descurainia pinnata	Tansy Mustard
	Lepidium montanum	Peppergrass
	Stanleya pinnata	Princess Plume
	Streptanthus cordatus	Twist Flower
Cupressaceae	Juniperus osteosperma	Utah Juniper
Ephedraceae	Ephedra nevadensis	Morman Tea
	Ephedra viridis	Morman Tea
Euphorbiaceae	Euphorbia fendleri	
Gramineae	Agropyron spp.	Wheatgrass
	Bromus tectorum	Cheatgrass
	Elymus salinus	
	Oryzopsis Hymenoides	Indian Ricegrass
	Sitanion hystrix	Squirreltail
	Stipa comata	Needle and Thread
Hydrophylloceae	Phacelia crenulata	Phacelia
Luguminosae	Astragalus mollissimus	
Liliaceae	Yucca harriminiae	Yucca

APPENDIX 1 (Continued)

Family	Species	Common Name
Pinaceae	Pinus edulis	Pinyon
	Pseudotsuga menziesii	Douglas Fir
Polygonaceae	Eriogonum bicolor	Buckwheat
	Eriogonum microthecum	Slenderbrush Erigonum
Rosaceae	Amelanchier utahensis	Serviceberry
	Cerococarpus ledifolius	Curlleaf Mountain Mahogany
	Cerococarpus montanus	True Mountain Mahogany
Scrophulariaceae	Penstemon lentus	Penstemon

*Plant species in this list also include those species encountered on transect 9 (University of Utah Research Institute, 1975a) and transects 17, 18, and 19 (University of Utah Research, 1975b)

Land in the vicinity of the Beehive-Deseret Mine is used for range forage, wildlife habitat, timber, limited recreation, and mineral extraction. The timber value of Douglas and white fir is low. Most of the timber is classified as noncommercial (USDI Forest Service and BLM 1976) since inaccessibility, size class distribution and market conditions limit the economic feasibility of commercial operations.

The mine area is on two range allotments, the Gentry Mountain Cattle and Horses Allotment and the Grimes Wash Unit of the East Mountain Cattle and Horses Allotment. Areas occurring in the Gentry Mountain Cattle and Horses Allotment are classified as non-range because of the steep terrain and large expanse of pinyon-juniper. A portion of the Grimes Wash Unit is suitable range (includes forage-producing areas that are accessible and have available water). The range condition in this unit is classified as poor but is improving (USDI Forest Service and BLM, 1976). Some of the principal species are Letterman's needlegrass, mountain brome, American vetch, lupine, big sagebrush and rabbitbrush. Other sections of the unit are unsuitable and in very poor condition. Both range allotments are managed on a rest-rotation grazing cycle (USDI Forest Service and BLM, 1976).

The disturbance associated with the mine portals and facilities of the Beehive-Deseret Mines is limited to the steep, south slope and dry, mountainous terrain which currently support a sparse stand of pinyon-juniper. The soils are very shallow and rock outcrops are common. These soils have a moderate to high potential for soil erosion and are subject to land slides. Precipitation is low and the effects of the south exposure further limit the effectiveness of any precipitation. The

combination of the arid climate, shallow soils and steep terrain indicate a low revegetation potential. The present sparse vegetation attests to the limited capability of the land. Land use prior to and during the thirty year operation of the Church Mine has remained relatively unchanged and being an underground mine, surface uses are unaffected.

Due to the almost complete surface control of this land by the Forest Service and Utah Power & Light Company, it is not anticipated that any improvements could occur which would allow the land to be put to any higher or better use. Reclamation for land uses different from present use is not recommended.

Reference:

USDI Forest Service and BLM. 1976. Readjustment and Modification of Federal Lease U-02664 and Readjustment of Federal Lease SL-050133. Environmental Analysis Report/Part 23 Technical Examination.

Reclamation will begin following the completion of coal extraction (see mining schedule). Methods of grading, backfilling, soil stabilization and compaction, contouring, soil preparation and fertilization will be according to appropriate technology available at the time of reclamation. Areas of surface disturbance will be prepared and revegetated to a density and permanence at least equal to surrounding natural vegetation.

Seeding and planting - $50/acre plus labor (about $100 total/acre)

Irrigation - none

Fertilizing - $50/acre plus labor (about $100 total/acre)

No significant soil erosion or air pollution is anticipated from mine operation. Surface and ground water is limited in the mine area, therefore no adverse impacts on water quality are expected. Adverse impacts on wildlife, fish, vegetation, crops or timber as a result of sedimentation or toxic discharge from mining activities are also expected to be insignificant. Unpaved roads and the tipple area will be periodically watered to prevent excessive dust.

No hazardous conditions are or will be created by the mine. A Special Land Use Permit has been obtained from the U. S. Forest Service for the surface facilities at the mine, and all permit requirements have been complied with. Environmental and archaeological surveys have been conducted on the mine property to detect any important areas. Results of these surveys indicate that there will be no significant damage to recreational, cultural, scientific, historical, archaeological, or paleontological values on or adjacent to the mine property.

ARCHEOLOGY

East Mountain is a narrow plateau with steep slopes and extends for about twelve miles in a northwest to southeasterly direction. The northern and eastern slopes drain into Huntington Creek while the western and southern slopes drain into Spoon Creek in Upper Joes Valley and into Cottonwood Creek. Both Huntington Creek and Cottonwood Creek drain to the southeast into the Castle Valley system.

The peaks on East Mountain range in elevation between 10,706 feet in the northwest to 9,600 feet in the southeast. The plateau varies in topography from flat to steeply sloping, and ranges from a quarter of a mile to a mile in width. The southwestern slope of the mountain drops 2,750 feet in 1.5 miles while the northeastern slopes are more gentle and decrease from the 10,200 foot to the 7,000 foot elevations in a horizontal distance of about 3.5 miles.

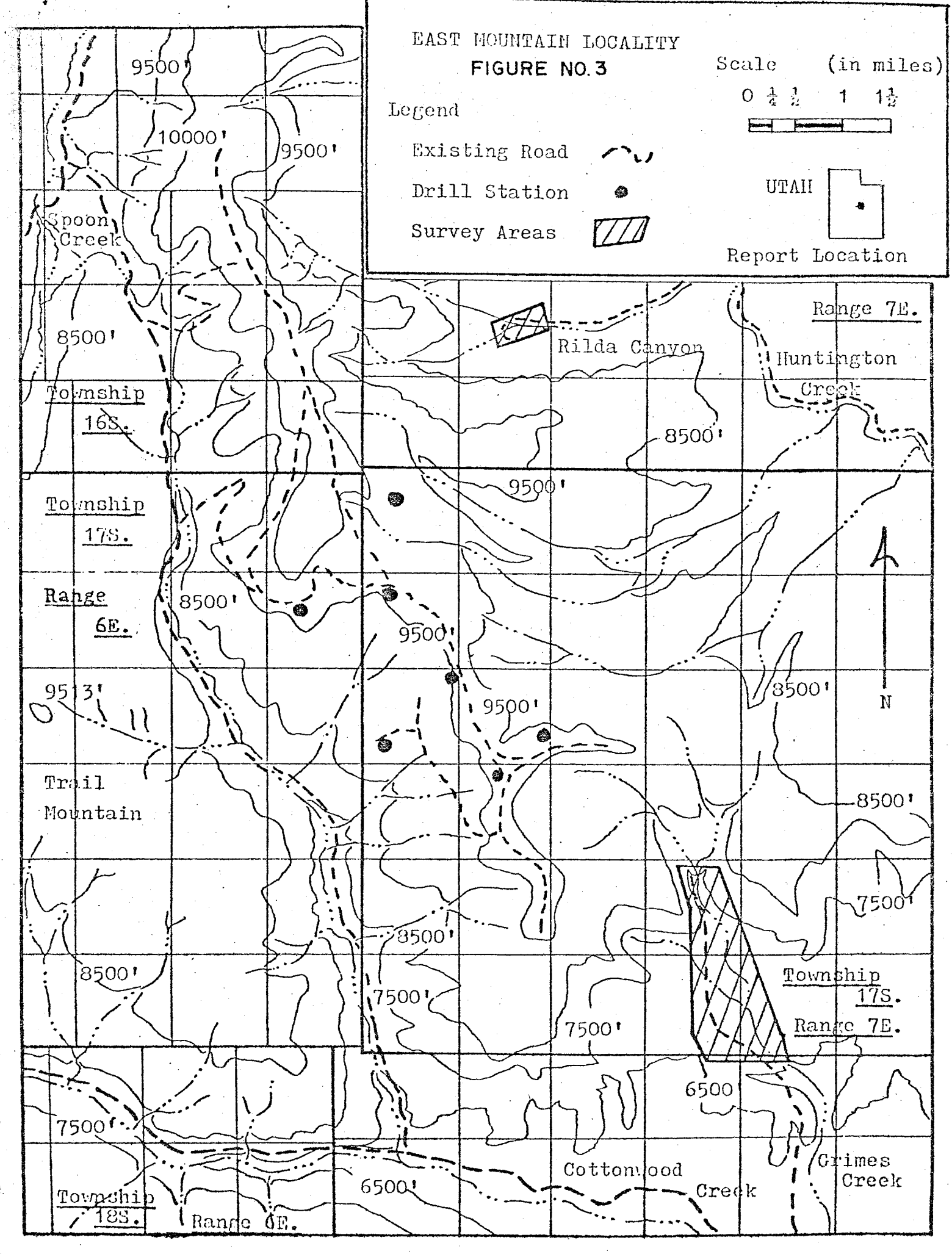
The primary year-round water resources on the mountain result from scattered seeps along the upper slopes draining the mountain's sandstone aquifers which are supplied by seasonal patterns of precipitation.

Because of the mountain's steep slopes, access to its upper meadows and terraces is most easily accomplished on foot by climbing its long, narrow eastern ridges above Huntington Creek, or by climbing the western slopes in the vicinity of Upper Joes Valley and Flat Canyon. Prehistoric access to the plateau was probably predominantly accomplished on those slopes since the steepness and the frequent sandstone cliffs along the southwestern, southern, and southeastern slopes probably discouraged easy movement between the higher meadows and Castle Valley.

Limited surface reconnaissance in the East Mountain locality has been conducted during 1976 and 1977. Research has included surface examinations of potential drill stations on top of the mountain (see Stations 1 through 7 on the attached Fig. 3) and reconnaissance in the Rilda Canyon and Grimes Creek localities (Fig. 3), which are at the 7,750 and the 6,750 to 7,999 foot elevations respectively. No archeological sites or prehistoric cultural materials were observed either on the mountain top or in Rilda Canyon; however, six archeological sites and varying amounts of isolated cultural material were found in the Grimes Creek area.

As an aid to determining the extent and location of presently known prehistoric sites distributed in the area, a records search was carried out involving files of the Antiquities Section of the Division of State History and files of the Environmental Research Section of the Utah Power & Light Company. As a result of these file checks, known prehistoric sites within the East Mountain area can be categorized into three sets, i.e., lower elevation sites located between 5,800 and 7,200 feet, middle elevation sites located between 7,200 and 9,000 feet, and higher elevation sites located above 9,000 feet.

Existing records and current research have demonstrated that prehistoric human activity in the area has diminished as elevation is increased. Newly discovered sites along Grimes Creek, the sites found adjacent to the new Huntington Power Plant and site 42Em176 near the mouth of Huntington Canyon can all be considered as falling in the lower elevation category and are predominantly within the pinyon-juniper ecosystem. In 1971, Raymond Matheny's field crews identified a number of archeological


EAST MOUNTAIN LOCALITY
FIGURE NO. 3
Scale (in miles)
0 ¼ ½ 1 1½
Legend
Existing Road
Drill Station
Survey Areas
UTAH
Report Location
9500'
10000'
9500'
Spoon Creek
8500'
Township 16S.
Township 17S.
Range 6E.
9513'
Trail Mountain
8500'
8500'
Range 7E.
Rilda Canyon
Huntington Creek
8500'
9500'
8500'
9500'
9500'
8500'
N
8500'
7500'
8500'
7500'
7500'
Township 17S.
Range 7E.
6500
7500'
6500'
Cottonwood Creek
Crimes Creek
Township 18S.
Range 6E.

sites in Huntington Canyon which have since been covered by the Huntington Reservoir. Those sites and site 42Em722 in Crandall Canyon can all qualify as falling within the second or middle elevation category which consists primarily of the montane ecosystem.

The higher elevation category which involves the upper montane and sub alpine ecosystems includes only one known site, 42Em721, which is located on Trail Mountain to the west of East Mountain. This site and the majority of sites situated in the middle elevations consist of lithic fragment scatters having low to marginal significance in National Register terms. In contrast, the sites found in the lower elevation zone are not only more abundant, but often are of greater significance, having been the foci of year-round habitation related activities.

Conclusions

1) The archeologist can expect to find a greater number of sites and more complex site distributions in the lower elevation zone in contrast to the higher zone;

2) higher elevation sites will generally be found adjacent to pertinent resource locations, e.g., springs, quarries, or game trails;

3) higher elevation sites can also be expected to be found adjacent to the more heavily traveled access routes which linked the canyon floors to the higher terraces;

4) higher elevation sites will probably be more limited in size and in materials than are most sites found at the lower elevations; however, the significance and historic value of higher elevation sites can be expected to increase because of their antiquity potential, scarcity, and their potential for being intact,

5) because of variations in weathering and soil building, high elevation sites will probably be either exposed or immediately adjacent to the surface; lower elevation sites will range from being completely buried by alluvial deposition to being partially destroyed by erosion; and

6) differential weathering and soil building patterns in the higher elevations will permit the archeologist a good opportunity for finding isolated tools having great antiquity.

HYDROLOGY

Physiographic Features

The Deseret and Beehive Mines property encompasses approximately 2,280 acres within the lower Huntington Creek and Cottonwood Creek drainages. The northern and eastern half of the mine property lies within the Deer Creek, Maple Gulch and Stump Flat sub-drainages which collectively encompass about 10,000 acres and contribute to the flow of Huntington Creek. The southern half of the property and the mine portal lie within the Grimes Wash sub-drainage which encompasses about 7,900 acres and contributes to the runoff within the Cottonwood Creek drainage network.

The Grimes Wash Drainage has a south facing aspect and varies in elevation from 5,950 feet at the confluence with Cottonwood Creek to 9,605 feet at the headwaters. The main channel is approximately eight miles in length and has an average gradient of eight per cent. The canyon side slopes adjacent to the Church Mine and Wilberg Mine are very steep, reaching vertical conditions at localized outcroppings of the Castle Gate Sandstone. The elevation increases nearly 1,500 feet from the canyon bottom to the outcroppings above the mines and the average gradient often exceeds sixty per cent in these localized areas.

Surface Runoff and Water Quality

The surface runoff pattern in the area is influenced primarily by local climatology, physiographic features of the drainage and geological characteristics. Streamflow in Grimes Wash and Deer Creek is characterized as intermittant, in which surface runoff to Cottonwood Creek and Huntington

Creek occurs only during periods of spring snow melt, or during periods of high intensity summer rain storms. No surface springs of any significance have been observed in areas adjacent to the Church Mine portals or in areas adjacent to the mine property within the Huntington Creek drainage. However, several springs can be found to the northwest above the Wilberg Mine. These springs together with the discharge from the Wilberg Mine contribute the most significant quantities of base flow to Grimes Wash. The following table and accompanying location map provide a summary of discharges and water quality data that have been compiled to date. The table merely provides an inventory of data that have been gathered by various federal, state and private agencies.

Map #	Station	Approx. Elev.	Flow		Quality (Parts per Million)	
			CFS	GPM	Total Dissolved Solids	Suspended Solids
1	Burnt Tree Spring	9,250	.01	5	450	--
2	Poulson Spring	9,500	.02	11	--	--
3	Trespass Spring	9,400	.01	4	500	--
4	Honeymoon Spring	9,360	.06	30	--	--
5	Woodchuck Spring	9,200	.03	15	490	--
6	Left Fork-Grimes Wash	7,850	.78	350	208	29
7	Wilberg Mine Discharge	8,000	.22	100	475	11
8	Confluence-Left & Right Fork of Grimes Wash	7,300	.81	365	437	57
9	Grimes Wash at Forest Boundary	6,950	1.45	650	439	57
10	Unknown-Left Fork Grimes Wash	9,100	.001	0.4	430	--
11	Unknown	9,200	.001	0.4	--	--
12	Unknown	9,200	.003	1.3	400	--
13	Unknown	9,300	.006	2.7	300	--
14	Crawford Spring	9,250	0			

The surface flow in Grimes Wash below the forest boundary gradually diminishes via evaporation and water movement into fractures or permeable sediments within the streambed regime. Continuous flow information in Grimes Wash is insufficient to formulate an adequate discharge hydrograph, however, the contributing surface runoff to Cottonwood Creek appears to be minimal.

A considerable amount of historical streamflow and water quality information pertaining to Cottonwood and Huntington Creeks has been compiled by the U. S. Geological Survey as well as other Federal, State and private agencies. Pertinent hydrologic data for the two creeks are presented below

	Cottonwood Creek	Huntington Creek
Drainage area in sq. miles (at gauging station)	205	190
Average yearly discharge (acre feet)	70,420 (1909-1970)	70,060 (1909-1970)
Maximum yearly discharge (acre feet)	153,000 (1952)	150,600 (1952)
Minimum yearly discharge (acre feet)	23,673 (1934)	26,320 (1934)
Average instantaneous discharge (cfs)	97.2	96.7
Maximum instantaneous discharge (cfs)	7,220 (Aug. 1, 1964)	2,500 (Aug. 2, 1930)
Minimum instantaneous discharge (cfs)	1.2 (April 18, 1966)*	2.0 (Nov. 5, 1926)

* Natural flow was being stored upstream in Joes Valley Reservoir.

Quality data for Cottonwood and Huntington Creeks are presented below. Values are in milligrams per liter.

Parameter	Cottonwood Creek	Huntington Creek
Total Dissolved Solids		
Average	285	243
Maximum	666	320
Minimum	144	140
Suspended Sediment		
Average	33	28
Maximum	178	75
Minimum	2	5

A portion of the information was obtained after Joes Valley Reservoir was constructed on Cottonwood Creek and after Electric Lake was constructed on Huntington Creek. As a result, the values may not represent the overall drainage basin water quality characteristics.

Subsurface Hydrology

Extensive data on ground water quantity and quality are nearly nonexistant in the area but information will be compiled within the Wilberg and Deer Creek mines in the near future to better assess the impact of mining.

In general, the subsurface hydrology of the area appears to be a function of the inter-relation between geologic and topographic features. The relative position of water bearing sediments, their exposure at outcrops, and the interruption of their continuity from faulting and folding appear to be the most significant factors influencing ground water characteristics.

The stratigraphic units that appear to be the most porous and permeable in the coal-bearing strata include the Star Point Sandstone,

local strata within the Blackhawk and Price River Formations, and the Castlegate Sandstone. Local seeps are evident in the lower portions of the Star Point Sandstone in the incised canyons. The Star Point Sandstone does not appear to be losing water to overlying sediments because no water from below has been introduced into the mines in the Hiawatha Seam.

It is apparent that some "perched" water is present in the sandstones that overlie the Hiawatha and Blind Canyon Seams. These lenticular continental sandstones are locally porous and permeable but usually do not interconnect. Perched water tables appear to be present in the sandstones within the lower portion of the Price River Formation.

The third potential aquifer in the area is the Castlegate Sandstone. It is located about 600' to 800' above the mine workings and consists of fairly coarse-grained massive sandstone that may locally be porous and permeable and may allow the passage of water.

All of the potential water-bearing horizons are locally disrupted by the folding and faulting of strata in the area. The gentle fold known as the Straight Canyon Syncline which crosses the central part of East Mountain, probably induces water to move down-dip and concentrate in the synclinal trough. Faults that offset the sandstone beds may allow water to escape from those beds and migrate down and along the fault planes into the mine workings. Spring melt waters at the surface may also seep down fault planes and may migrate to lower stratigraphic horizons.

Specifically, no underground water has been encountered in the present Church Mine workings and water has to be piped into the mine for operational purposes. Water has been encountered in significant quantities

to the north and west of the mine properties within the Wilberg and Deer Creek Mine workings. It appears that water is descending fault planes from the surface and from perched water tables in the Blackhawk Formation. Once water reaches the Deseret and Beehive Mines, it tends to migrate down-dip to the northwest away from the mine. This accounts for lack of water in the mine workings.

Another factor that influences the lack of water in the Deseret and Beehive Mines is the topography. The topographic relief along the margins of the property is such that the coal-bearing and potentially water-bearing strata are exposed to the surface. All of these strata are exposed high on the mesa cliffs which inhibits recharge of the strata.

The ground water table appears to be nearly non-existent in the vicinity of the Church Mine property.

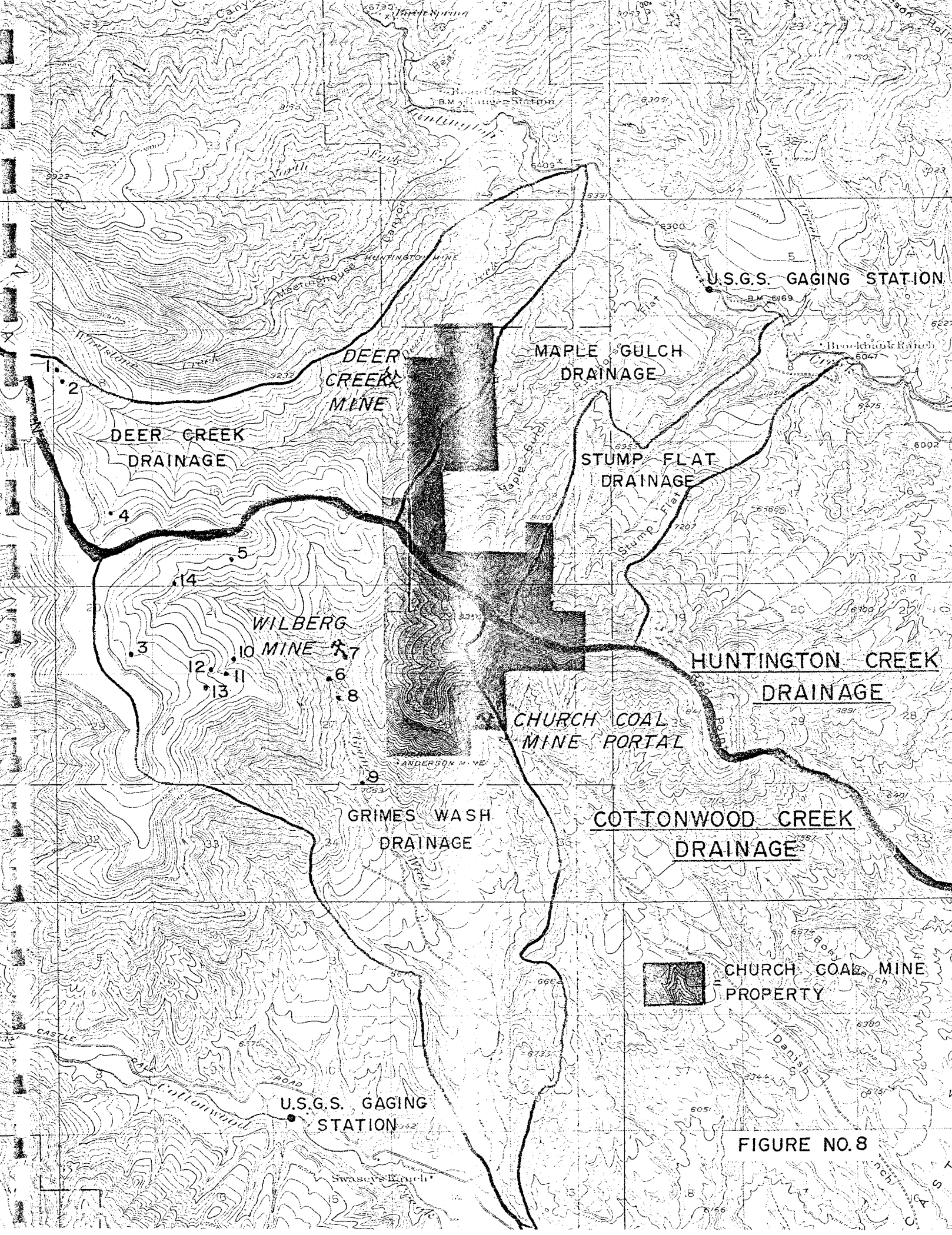

DEER CREEK MINE
DEER CREEK DRAINAGE
MAPLE GULCH DRAINAGE
STUMP FLAT DRAINAGE
WILBERG MINE
CHURCH COAL MINE PORTAL
HUNTINGTON CREEK DRAINAGE
COTTONWOOD CREEK DRAINAGE
GRIMES WASH DRAINAGE
U.S.G.S. GAGING STATION
U.S.G.S. GAGING STATION
CHURCH COAL MINE PROPERTY
1
2
3
4
5
6
7
8
9
10
11
12
13
14

FIGURE NO. 8

MINING

Coal is extracted at the Deseret and Beehive Mines using the standard room-and-pillar method. The mines are being developed on the advance, with workings being created generally northward from the existing portals near the center of Section 26, T. 17 S., R. 7 E. (see Mine Plan Map). An exception to this statement is the current development of the Section 26 area, a block of unmined coal lying close by, and in a westerly direction from, the main mine access.

In contrast to the very early mine workings, the mine plan presented here follows a systematic, ordered approach to coal extraction. Such an approach serves to promote safety, lower production costs, and enhance the overall recovery of the mineral resource.

The Deseret and Beehive Mines are located respectively in the Hiawatha and Blind Canyon Seams. Planning for the two mines has taken into consideration the multiple-seam nature of the operations to the extent that main entries, protective barrier pillars, panel design and so forth are superimposed. Additionally extraction in the upper (Blind Canyon) seam has been, and will continue to proceed, well in advance of that in the lower bed.

Figure 9 illustrates the basic configuration of the main entries and panels. (Because of space limitations the corresponding panel to the left of the main entries has not been shown.) A six-entry system is followed for the main headings with openings driven 20' wide on 100' centers. The pillars created thereby measure 80' by 80', a size which in the past has proven sufficient to support the overburden strata. The center pillar

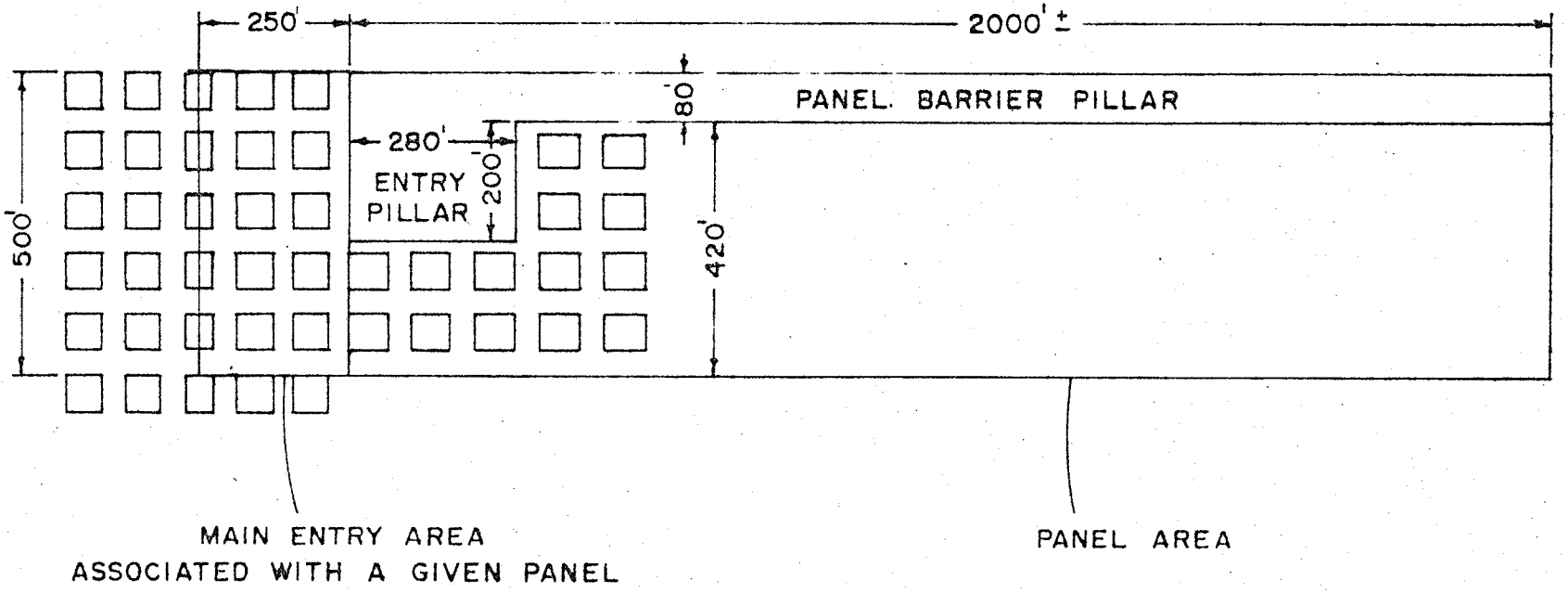


FIGURE NO. 9

CONFIGURATION OF EXTRACTION PLAN FOR THE
DESERET & BEEHIVE MINES

100'

is an exception. In the early days of the mine, the innermost rooms were driven on 80' centers thus leaving a 60' wide pillar. Structural problems have not occurred and, since this configuration increases resource recovery slightly, it has been retained.

Regarding panel development at the Deseret and Beehive Mines, three entries are opened on advance and two are developed on retreat in conjunction with pillar extraction. Openings also are twenty feet wide on 100-foot centers although studies are in progress to determine whether a reduction in panel pillar size may be beneficial to overall resource recovery. The sequence of mining in the panel is shown on the following figure (near the end of advance and beginning of retreat and pillaring). The standard panel is considered 2,000 feet by 420 feet less the entry pillar whose dimensions are 280 feet by 200 feet.

Figure 11 illustrates the cut sequence across a pillar row as presently practiced at the Deseret and Beehives Mines, and Figures 12 and 13 show in detail the methods used recovering individual pillars.

It has been estimated that the mine operator presently is achieving production rates of 594 $\pm$ tons per machine-shift. This is a valid figure within the limits imposed by mine dimensions, shuttle car velocities, loading rates, and location of dump points. However, it is expected that continued working of the seams will extend the haulage distances and bring pressures on the ventilation system, maintenance efficiency, level of supervision, and so forth. For these reasons a production rate of 550 T/machine-shift is used in this report as being reasonably attainable by the operator in the future.

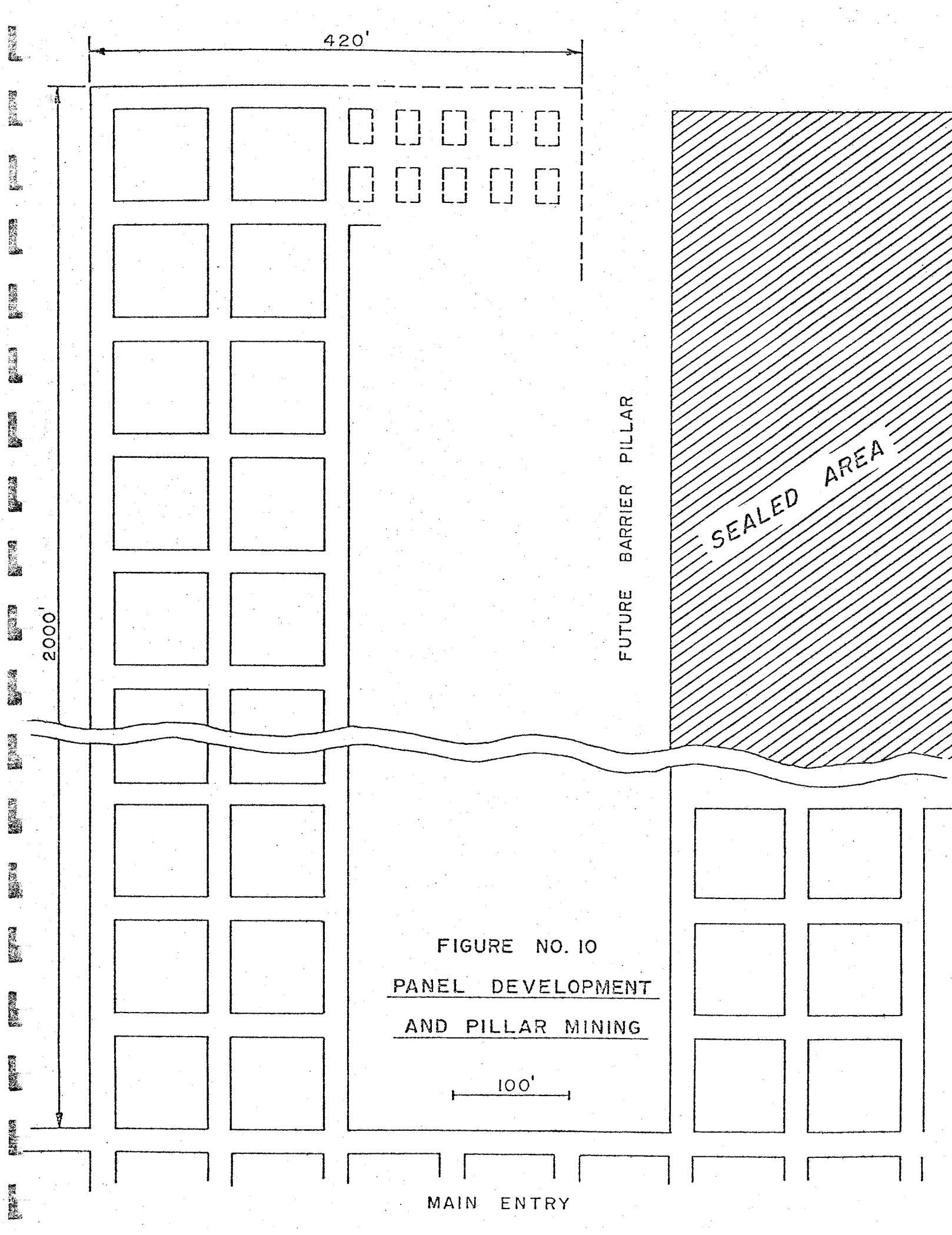


FIGURE NO. 10

PANEL DEVELOPMENT

AND PILLAR MINING

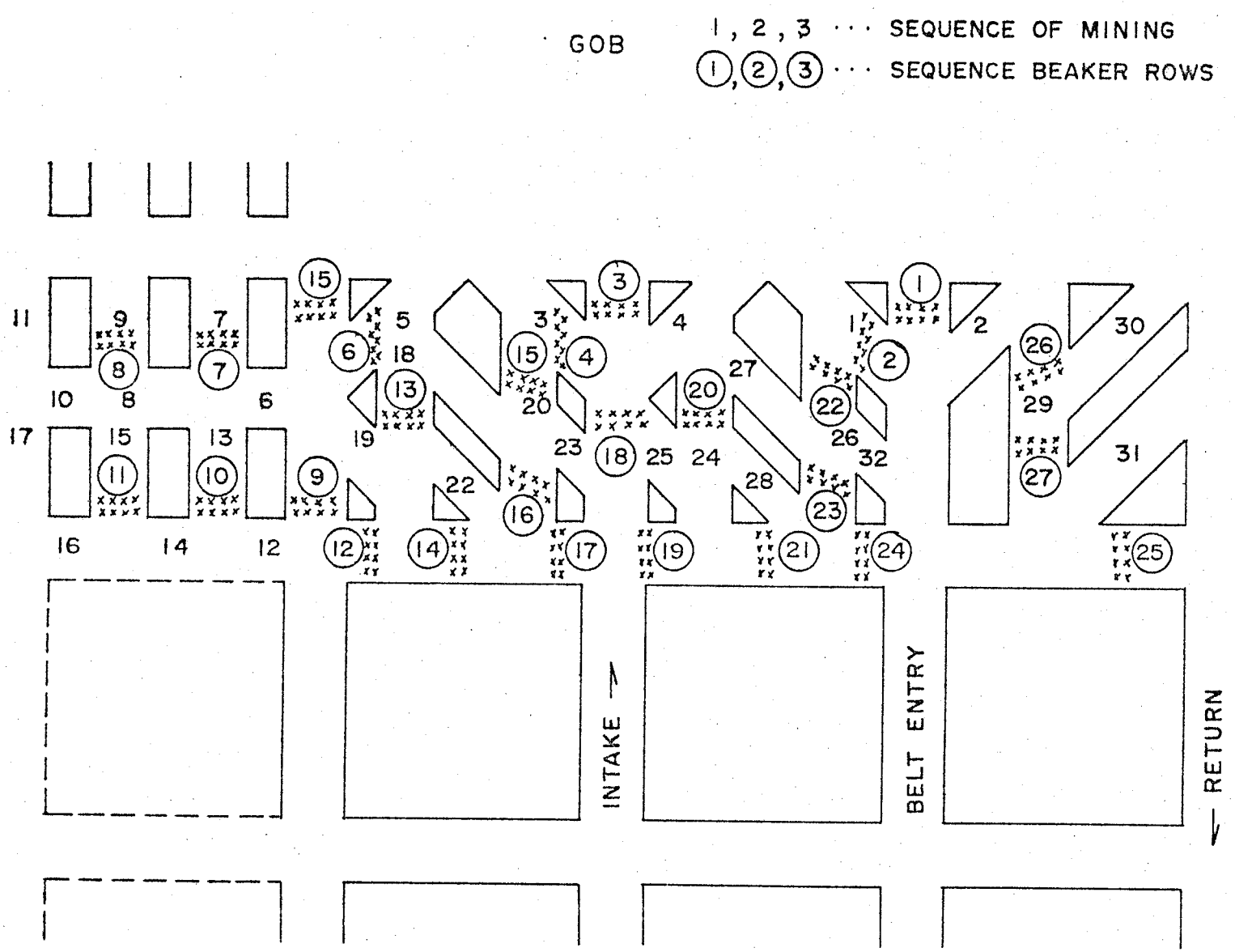


FIGURE NO.11

CUT SEQUENCE ON RETREAT

1. Breaker posts on not more than 4' centers are placed before cuts are made.

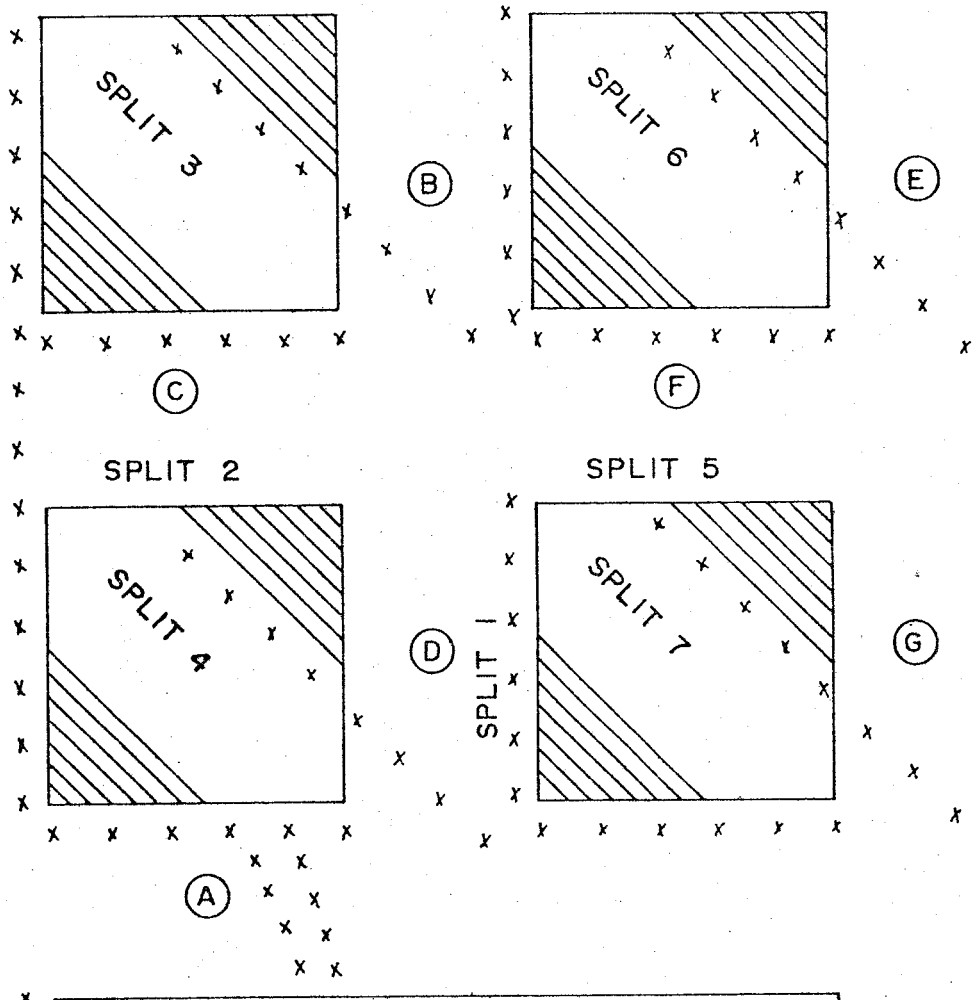
2. Permanent support timbers are not shown on this sketch because of the scale, but will be installed in accordance with our approved plan.

3. When conditions warrant, such as adverse roof, etc. direction of attack of the pillar is optional.

4. Stumps indicated on this sketch may be reduced when roof conditions warrant it.

5. Cut #5 may be bypassed depending on the 5th entry room centers. On 50' centers cut #5 will not be made. On 100' centers it will be made.

6. Extra breaker posts will be placed if needed.



LEGEND: x = TIMBER

FIGURE NO.12
PILLAR EXTRACTION PLAN

1. Breaker post on not more than 4' centers shall be installed as shown at position A prior to starting split No. 1.

2. Breaker posts shall be installed at position B similar to those at position A before starting split No. 2.

3. Breaker posts shall be installed at position C similar to A before starting split No. 3.

4. Breaker posts shall be installed at position D similar to A before starting split No. 4.

5. Breaker posts shall be installed at position E similar to A before starting split No. 5.

6. Breaker posts shall be installed at position F similar to A before starting split No. 6.

7. Breaker posts shall be installed at position G similar to A before starting split No. 7.

8. Stumps indicated on this sketch may be reduced when roof conditions warrant it

9. Pillars of different dimensions may be mined using a similar sequence.

10. Direction of attack of the pillar is optional.

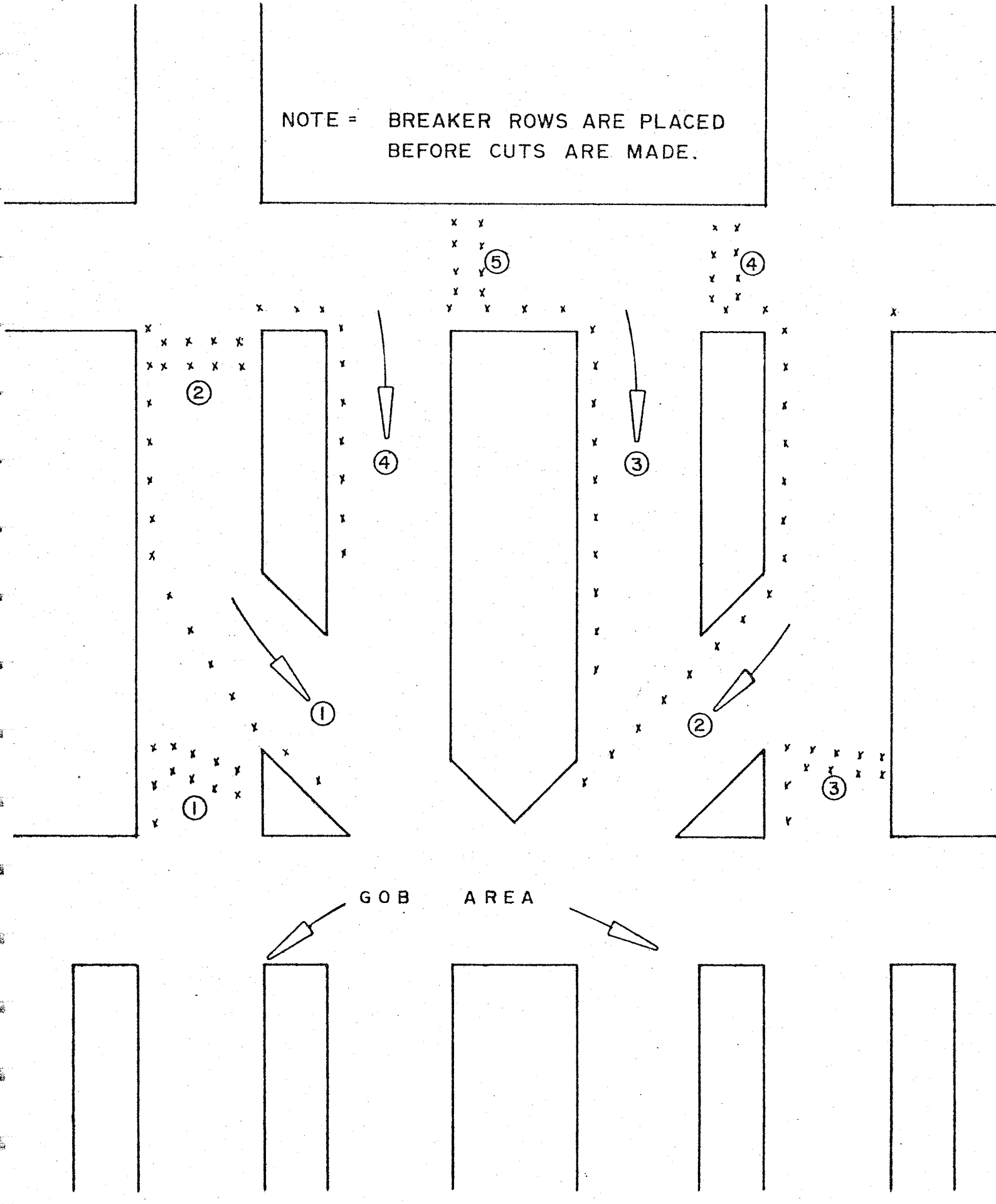


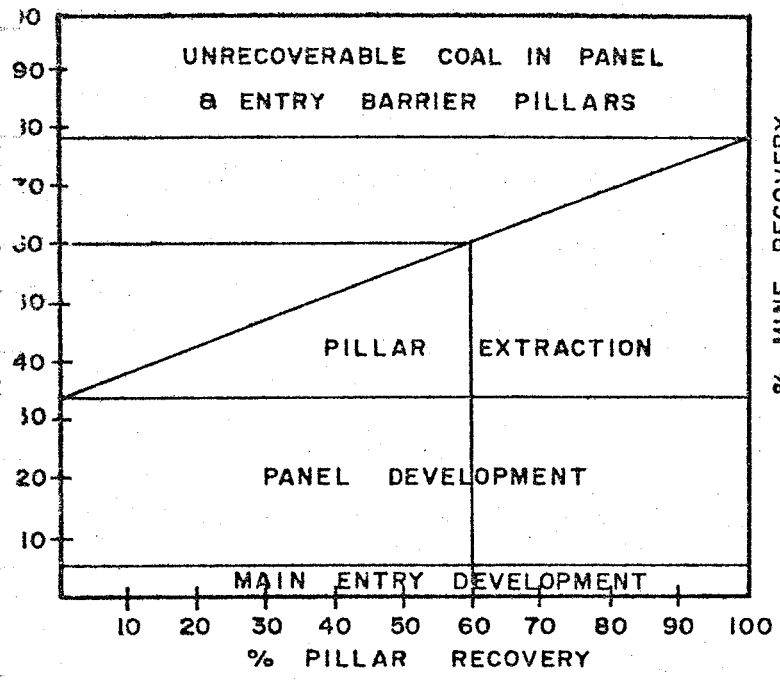
FIGURE NO.13
PILLAR EXTRACTION PLAN

With a given systematic plan of panel development, coal recovery becomes largely dependent upon the relationship of mining height to seam thickness and the percentage extraction of the pillars. Based on Figure 9, the following illustration presents several charts comparing expected reserve recovery to variations in these two factors. It is believed that maximizing pillar extraction ($80\%^{+}_{-}$) would ultimately improve roof control during the remaining mine life. Realistically, however, recoveries on the order of 60% may be the best to be expected. Sixty percent pillar recovery has been used as the base figure in this report.

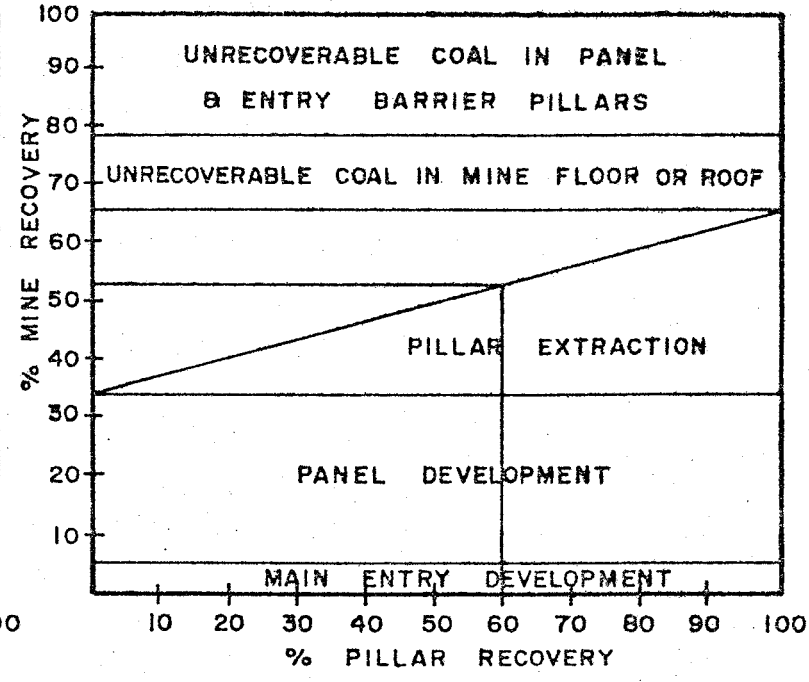
The immediate roof above both coal seams changes facies from an indurated sandstone to a relatively weak shale. Exposure to the air causes the shale to deteriorate, resulting in local falls and upward stoping of the roof until a stratum is reached which is sufficiently competent to span the entry opening. In actual mining practice, a foot of top coal is left to protect the shale from air-slacking and to provide increased safety for the workers.

Figures 5 and 6 illustrate the general variability of coal seam thickness in the Deseret and Beehive Mines. It is difficult to anticipate these thickness changes underground and, with existing equipment, nearly impossible to consistently extract coals whose thickness exceeds 10'. If the panel entries are driven high in the thicker coals, it may then be possible to "gouge" the floor on retreat and recover a portion of the bottom coal. Consistent with safety considerations, this approach has been instituted at both mines and will continue to be an integral part of future mining practice.

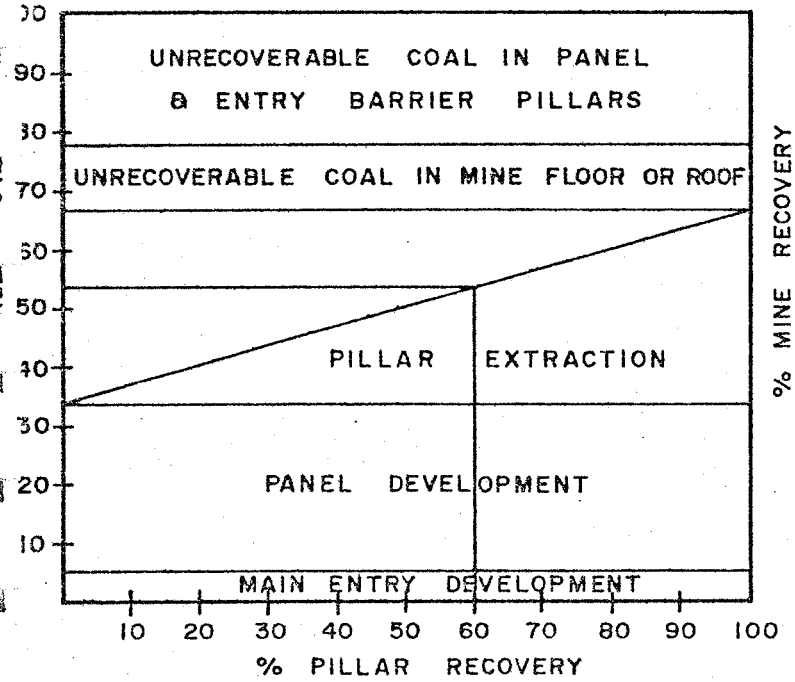
An examination of Figure 14 indicates that 60% pillar recovery in combination with leaving a foot of top coal results in just over 50% mine



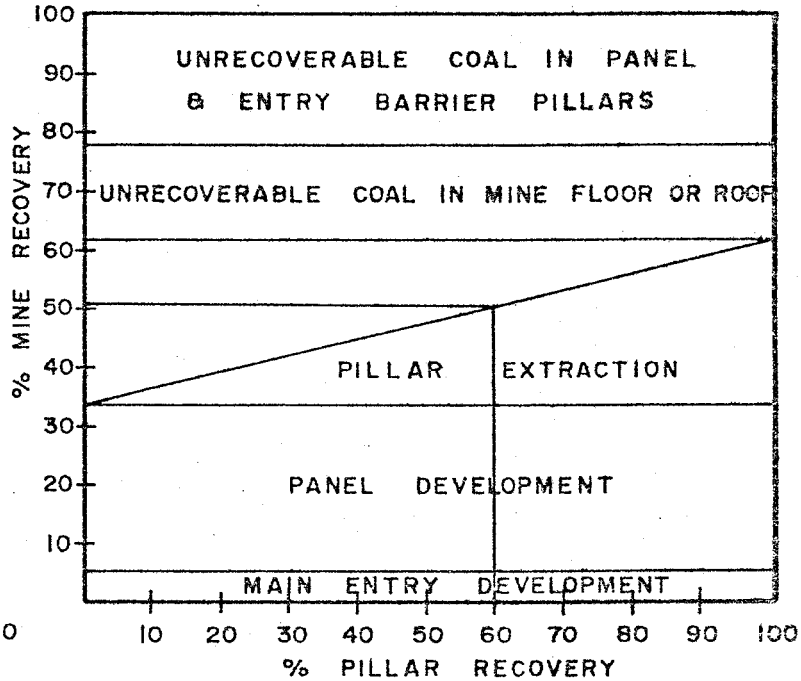
FULL SEAM MINING



6' MINING IN 7' SEAM



8' MINING IN 9' SEAM



10' MINING IN 12' SEAM

FIGURE NO.14

RELATIONSHIP OF OVERALL MINE RECOVERY TO PILLAR RECOVERY BASED UPON THE SYSTEMATIC EXTRACTION PLAN FOR THE DESERET AND BEEHIVE MINES

recovery for the panel configuration in use at the Deseret and Beehive operations.

The sequence of developing panels in a given coal mine is dependent upon the annual production requirements, mining efficiency, and the geologic parameters of the coal deposit. Coal requirements were based on the 1977 production rate of 1,343,000 tons, a figure presumed to be representative of the future demands made upon the Deseret and Beehive operations. As noted previously, a mining efficiency of 550 tons/machine-shift was selected as reasonably attainable for the operator. This translates into the need for five sections operating two shifts/day, 235 days/year in order to achieve the 1.343 MM tons/year required coal output.

Indications are that the Blind Canyon seam is of slightly better quality than the underlying Hiawatha. Complete geologic data are lacking, but it is believed that the Blind Canyon is uniformly thicker than the Hiawatha as well. These factors, coupled with the need to keep the upper seam developed in advance of the lower bed, strongly suggest that three of the five sections operate in the Blind Canyon seam.

A major geologic factor influencing the mining sequence is the presence of faults striking generally N. 7° E. The diagram on the following page is a schematic cross-section showing the effect of faulting in the eastern area of the property, the faults effectively breaking the reserves into discrete blocks. Surface mapping has indicated the possibility of a 400' wide shear zone extending through the center of the graben area between the Maple Gulch and Stump Flat Faults, and there is some preliminary indication that the Blind Canyon seam east of the Stump Flat Fault may thin to

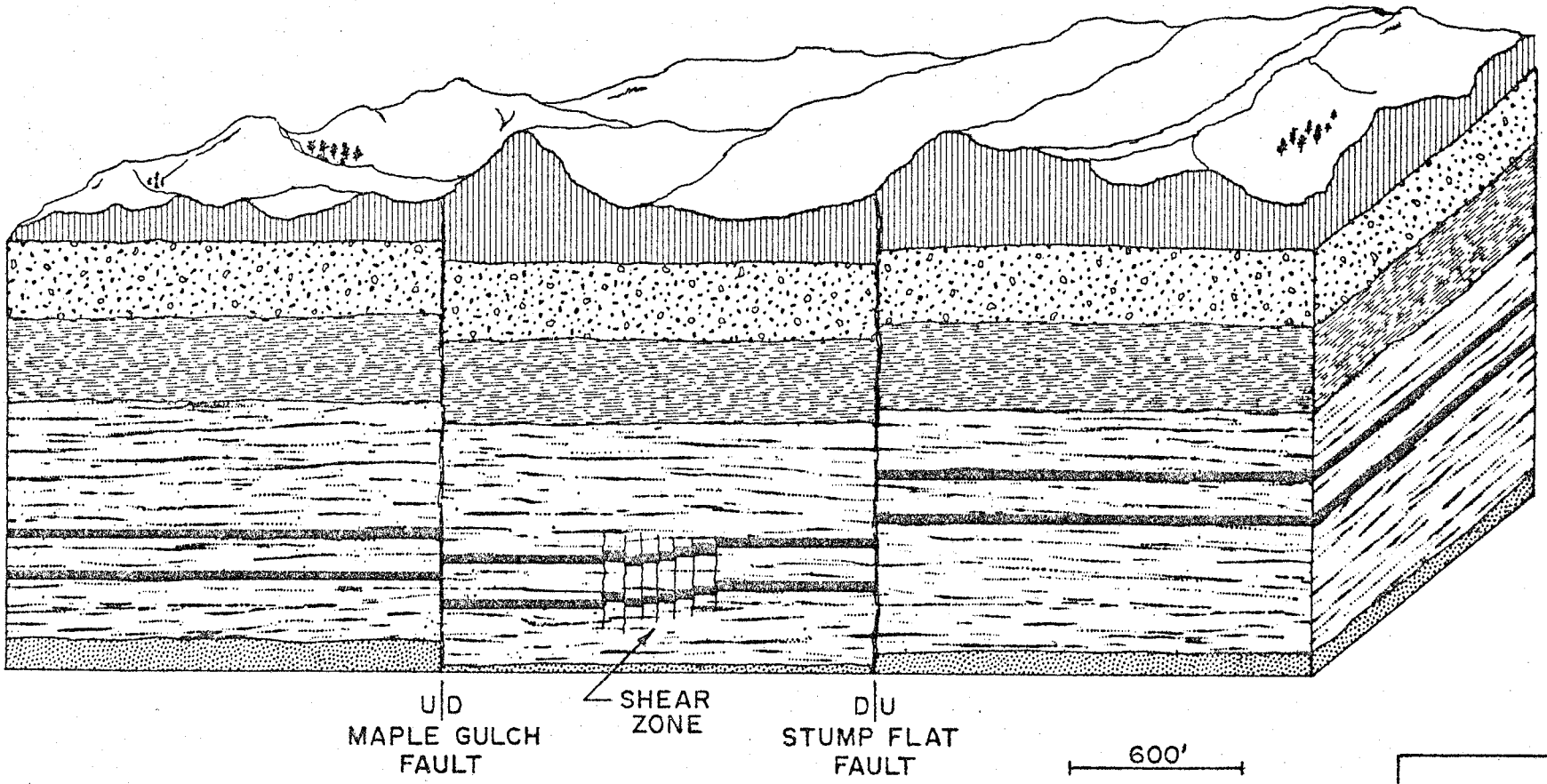
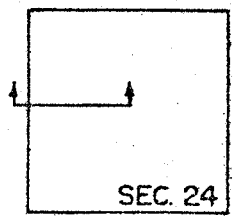


FIGURE NO. 15

E-W CROSS SECTION THROUGH THE WESTERN STUMP FLAT AREA ILLUSTRATING THE EFFECT OF FAULTING ON THE BLIND CANYON & HIAWATHA COAL SEAMS.



less than mineable thickness (currently 5'). These three factors will have a major bearing on the eventual approach taken to extract the coals in the two blocks, but a firm decision cannot be made until additional geologic data are collected and further engineering and economic studies are undertaken.

Initially, third east in the Hiawatha seam (Mine Plan Maps) will be designated as a potential main entry to the coals east of the Maple Gulch Fault. An up-ramp will be developed across the fault to gain access to the Blind Canyon seam in the graben area, and entries will be driven east to determine the presence of the shear zone. If the shear zone is absent and/or the ground is sufficiently stable, the entries will be continued in the upper bed to the Stump Flat Fault where exploration holes will be drilled to ascertain the mineability of both seams east of this fracture. It is expected that at least one surface drill hole will be completed for this purpose as well.

Should both seams prove to be of mineable thickness, an economic decision will be made as to whether internal access to the coal east of the Stump Flat Fault is preferable, or whether new portals should be developed on the south facing slope in Section 25, T. 17 S., R. 7 E. If the upper seam is less than mineable thickness, is split, or is badly clinkered, an up-ramp would undoubtedly be driven across the Stump Flat Fault, and the Hiawatha Seam would be developed internally. Mining would be on the retreat, with overall extraction proceeding westward to the present mine area. In this scenario a down-ramp would also be constructed across the Maple Gulch Fault from the Hiawatha to the Hiawatha Seam to provide recovery of the lower coal bed within the graben.

An alternate approach will be effected if the exploration entries in the graben area (Blind Canyon Seam) show the presence of the shear zone and associated unsafe ground conditions. In this event, the seams east of the Stump Flat Fault will be entered through new portals in Section 25 and the possibility exists that the graben area will go unmined. It is expected that data will be developed sufficiently in 1977 to allow decisions in this matter. Diagrammatically the decision tree is presented in Figure 16; of course, the Geological Survey will be kept appraised of pertinent information as it is received.

A geologic factor which may affect the mining plan proposed at this time is coal thickness variability, presently not known with any degree of certainty. Seam thinning may render some areas unmineable that are projected for extraction. In this report a 10' mining height has been postulated for the Blind Canyon seam and an 8' height for the Hiawatha. To the extent that the coal exhibits greater thicknesses, it is assumed the excess remains in the roof or floor. Lesser thicknesses could presumably be mined at full seam height in areas exhibiting good roof and floor characteristics, dependent primarily on the tolerance of the generating stations for an attendant increase in ash content.

Another factor is the extent to which outcropping coal has undergone spontaneous combustion. Bituminous coals are not so well known for burning as are the subbituminous and lignite ranks. Because of the rapid increase of overburden away from the outcrops in the mine area (thereby tending to deprive the coal of moisture and oxygen) it is believed that the coal will not have suffered degradation more than 100' in from an exposure. Panel boundaries have been developed upon this premise, although there have been

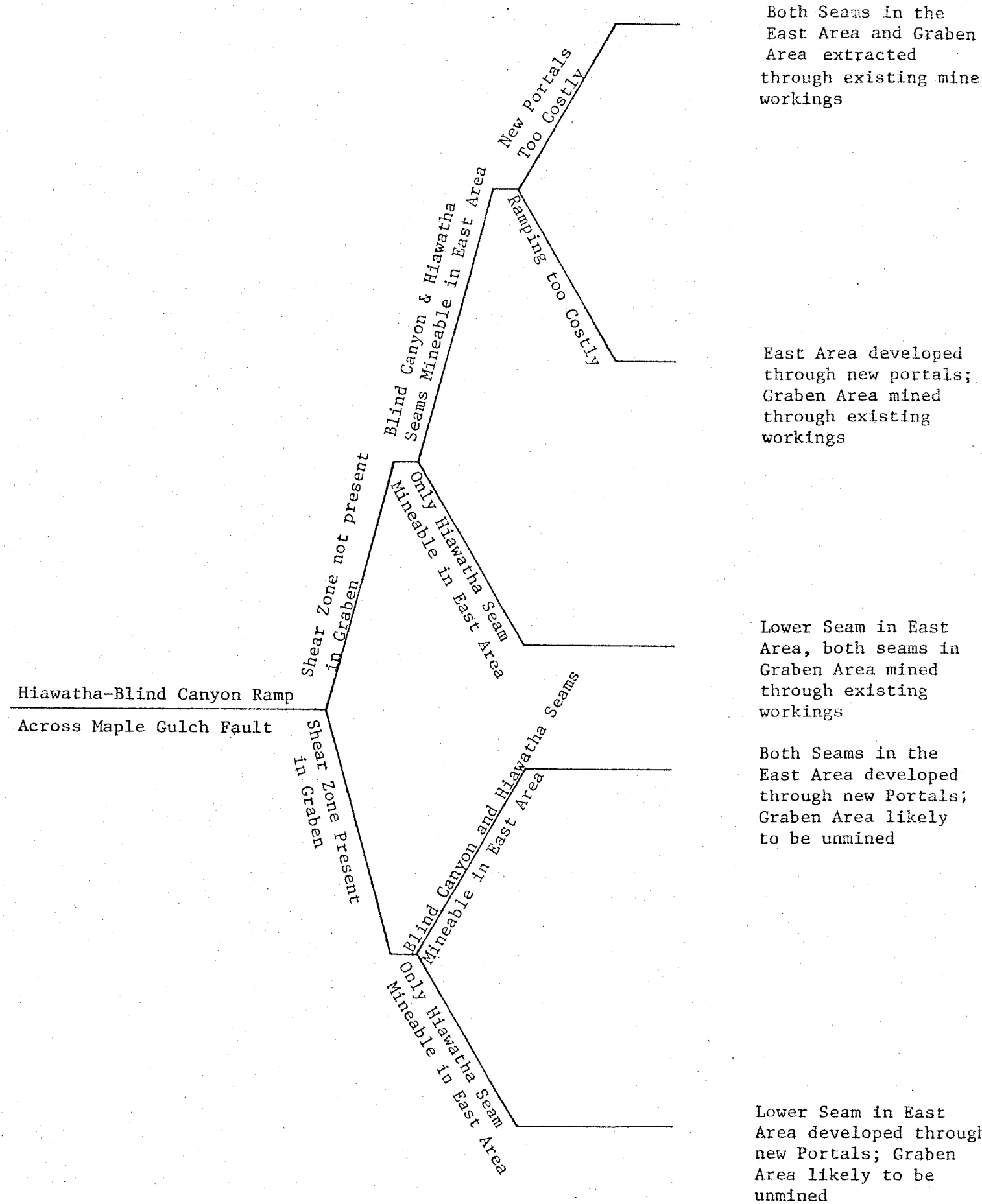


FIGURE NO. 16

Decision Tree Regarding Mining Approach in the Graben and East Mine Areas

some indications of temperature increases in the eighth east panel in the Blind Canyon Seam nearly 400' away from the Maple Gulch Fault. Also, narrow peninsulas of outcrop (as in Section 24) are assumed to be completely burned until proven differently.

A final geologic parameter which is recognized but has not been factored into the mining layout concerns coal seam splits. The Blind Canyon seam has been found in the course of mining to exhibit a major parting in the area of the sixth east and seventh east panels. Whether this continues northward, or eastward into the graben area, is not known, but the panel design assumes favorable conditions until proven otherwise by drilling or development.

The mine area (for both seams) has been broken into six units:

1. Section 26 - the southwestern portion of the mine remaining undeveloped to date.
2. Present Mine - includes the northward extension of main entries to outcrop in Maple Gulch and the panels developed from these entries bounded by the Bear Creek Canyon and Maple Gulch Faults.
3. Graben - the entries and panels lying between the Maple Gulch and Stump Flat Faults.
4. East Fault - the entries and panels located eastward of the Stump Flat Fault.
5. North Mine - the area continuing northward between Maple Gulch and Deer Creek Canyon.
6. West Fault - the triangular wedge of ground bounded by the Bear Creek Canyon and Deer Creek Faults.

Basically, the approach followed in developing the sequence of mining involved giving priorities to the units listed above, calculating the machine-months for mining the units (or sub-units if necessary), and then assigning the number of sections operating in a given unit to achieve a logical development pattern. Uppermost in importance was the need to maintain extraction in a unit on the Blind Canyon seam at least 12 machine-months in advance of mining on the Hiawatha.

Access to the East area should receive first attention to determine the possibility of mining this block as an extension of the existing workings. Section 26 is also of high priority as entries on the Hiawatha seam will have to be left open and maintained until panel extraction is complete. The graben area can be pulled on retreat back to the main workings, this latter area in the interim serving as a surge to allow flexibility in the more important scheduling. Upon completion of the Present Mine area, the North Mine can be initiated.

The orientation of the North Mine area is thought to be advantageous as it allows good reserve recovery and permits up-dip development (mitigating potential water problems). The main access paralleling the Bear Creek Canyon Fault is not particularly desirable but at the time the entries are driven considerable knowledge should have been gained on the fault characteristics.

Little is known of the geologic conditions to be expected in the West Fault area. Mining was conducted in the Blind Canyon Seam from an outcrop in Deer Creek Canyon during the middle 1940's, but the mine has been idle since that time. Three possible approaches are under consideration:

1. Re-enter the original workings extending the mine to the south
2. If sufficient room exists, bypass the workings adjacent to one of the faults and develop the virgin reserves from the Deer Creek Canyon outcrop
3. Ramp across the Bear Creek Canyon Fault from the Present Mine area and transport the coal through the existing portals.

Again, geologic, engineering, and economic studies will need to be compiled before deciding on one of these alternates. It is anticipated that such data can be developed within a one-to-two-year period and that the final decision will be consistent with sound engineering practices and the principles of resource conservation.

The charts (Figure 17) detail the mining sequence by section, mine area, seam, and time for the next five years. This is intended to be a broad guide to future mine development, and will undoubtedly be altered because of specific operational factors and the development of more detailed knowledge on seam characteristics. It has been assumed that the shear zone in the Graben area will not materialize and that the West Fault area will be developed by ramping internally.

A variety of engineering principles and techniques will be followed in both the mining and reclamation operations. Rock mechanics studies, for example, are a necessary part of mine planning since the stability of the openings directly affects personnel safety as well as mine production. The Beehive Mine was the site of a U. S. Bureau of Mines sponsored study to measure the behavior of panel pillars under the effects of an approaching

cave line. Results from this program, combined with on-going stress testing, indicates the possibility of reducing panel pillar size without significant stress increase. If this proposition proves valid, a greater proportion of panel coal can be extracted on development, and overall resource recovery may be improved.

Unit mine operations have been simulated by the use of digital computers. Optimization of the various operations will serve to maximize the efficiency of the mine; in conjunction with long-range mine planning, it will be possible to avoid non-systematic mining, the by-passing of otherwise recoverable coal, the creation of unneeded barrier pillars, and so forth.

Studies are in progress to determine improved methods of pillar extractions, recovery of super-thick coal, and a minimum economic seam thickness. The effects of subsidence will be analyzed, and the Company will cooperate fully with the U. S. Geological Survey in assessing the need, or establishing, a subsidence monitoring system.

Surveys will be kept current and shall provide the basis for records and reports concerning resource recovery, areas of surface disturbance and reclamation progress. Necessary roads and ditches will be surveyed and constructed to current civil engineering standards. No water retention facilities requiring earthwork, dams, or settling ponds are anticipated as the area of disturbance caused by the mining operations is quite small and the mines themselves are almost totally devoid of water.

Solid waste and refuse are stored at the mine portals and are periodically transported to existing land fill dump areas for disposal.

The mines have been divided into six areas or units which are predicated for development on a priority basis. Estimated starting dates for mining these areas are as follows:

	Present Mine	Section 26	East Fault	Graben	West Fault	North Mine
Blind Canyon Seam (Beehive Mine)	In Operation	5-77	10-79	2-82	2-83	2-87
Hiawatha Seam (Deseret Mine)	In Operation	5-79	9-80	7-84	5-86	5-90

Within the coming 5-year period it is anticipated that operations will be complete only in the following areas:

Present Mine Area - Blind Canyon Seam

Section 26 Area - Blind Canyon and Hiawatha Seam

Except for the possibility of opening new portals for mining the East Fault Area, no land surface should be directly affected by the coal mining operations. Should additional portals be required in Section 25, T. 17 S., R. 7 E., the amount of disturbed land is presently estimated to be less than 20 acres including access roads.

A number of approaches are in practice, or are currently under analysis at the Deseret and Beehive Mines to effect maximum recovery of mineral resources. These techniques or studies include:

1. Mine design based on a systematic, rather than random, method of coal extraction.
2. Incorporation of long-range mine planning techniques to ensure proper sequences of coal extraction. For example,

overlying seams will be mined in advance of the lower beds, vertical alignment of workings will be maintained, and so forth.

3. Introduction of rock mechanics principles and studies to assess the stability of reduced panel pillar sizes.
4. Analyses of alternate methods to achieve better pillar recovery.
5. Initiation of efforts to improve recovery in thick seams by subgrade coal extraction during the retreat phase of panel mining.
6. Engineering and economic studies to assess the feasibility of producing coal from seams too thin to be presently considered economic.

At the end of the mine life (or as areas are abandoned), every effort will be taken to recover main entry pillars, main entry barrier pillars (consistent with MESA regulations), and those blocks of unmined coal which were not extracted with the systematic panel layout. This latter category, for example, would include the wedge of coal in the North Mine area between the main entries and the Bear Creek Canyon fault.

The upper seam will be exhausted prior to the lower bed. At the time of abandonment, equipment will be salvaged and all entrances will be permanently sealed.

After mining operations are complete on the lower seam, both the underground equipment and surface structures will be dismantled and removed from the property. These mine entrances will likewise be sealed.

Disturbed surface areas on public lands will undergo regrading, some topsoil emplacement where deemed necessary, and revegetation. These operations will be conducted in accordance with the various Federal and State regulations existing at the time of mine abandonment.

The Bear Canyon bed is present intermittently above the Blind Canyon seam. Underground drilling has been conducted by the Utah Power & Light Company from inside the adjoining Deer Creek Mine. Most of the drilling to date indicates that the Bear Canyon coal has a thickness of 0.5 - 1.5', with some holes failing to intersect any mineralization at the expected stratigraphic position.

This information, together with the fact that the Bear Canyon seam has a tendency to be strongly burned on outcrop, suggests that this coal would not be present in economic thickness above the Beehive and Deseret Mines. Thus the full extraction methods practiced at these operations, and the attendant subsidence, will not affect the future recovery of any viable, overlying, economic coal reserves, it will be necessary to leave a portion of the coal intact within the Hiawatha-Blind Canyon mining area for both safety purposes and economic considerations. Every reasonable effort will be made, however, to minimize the amount of coal rendered unrecoverable in the future.

MAJOR EQUIPMENT IN USE AT THE BEEHIVE AND DESERET MINES

Item	No.
Continuous Miner	6
Shuttle Car	12
Locomotive	3
Tractor	6
Loader	10
Man Haul	7
Compressor	13
Drill	2
Cutter	1
Roof Bolter	5
Rock Duster	11
Trickle Duster	6
Pressure Tank	5
Transformer	18
Oil Switch	12
Power Center	5
Scales	5
Belt Deluge System	7
Feeder Breaker	7
Belt Drive	13

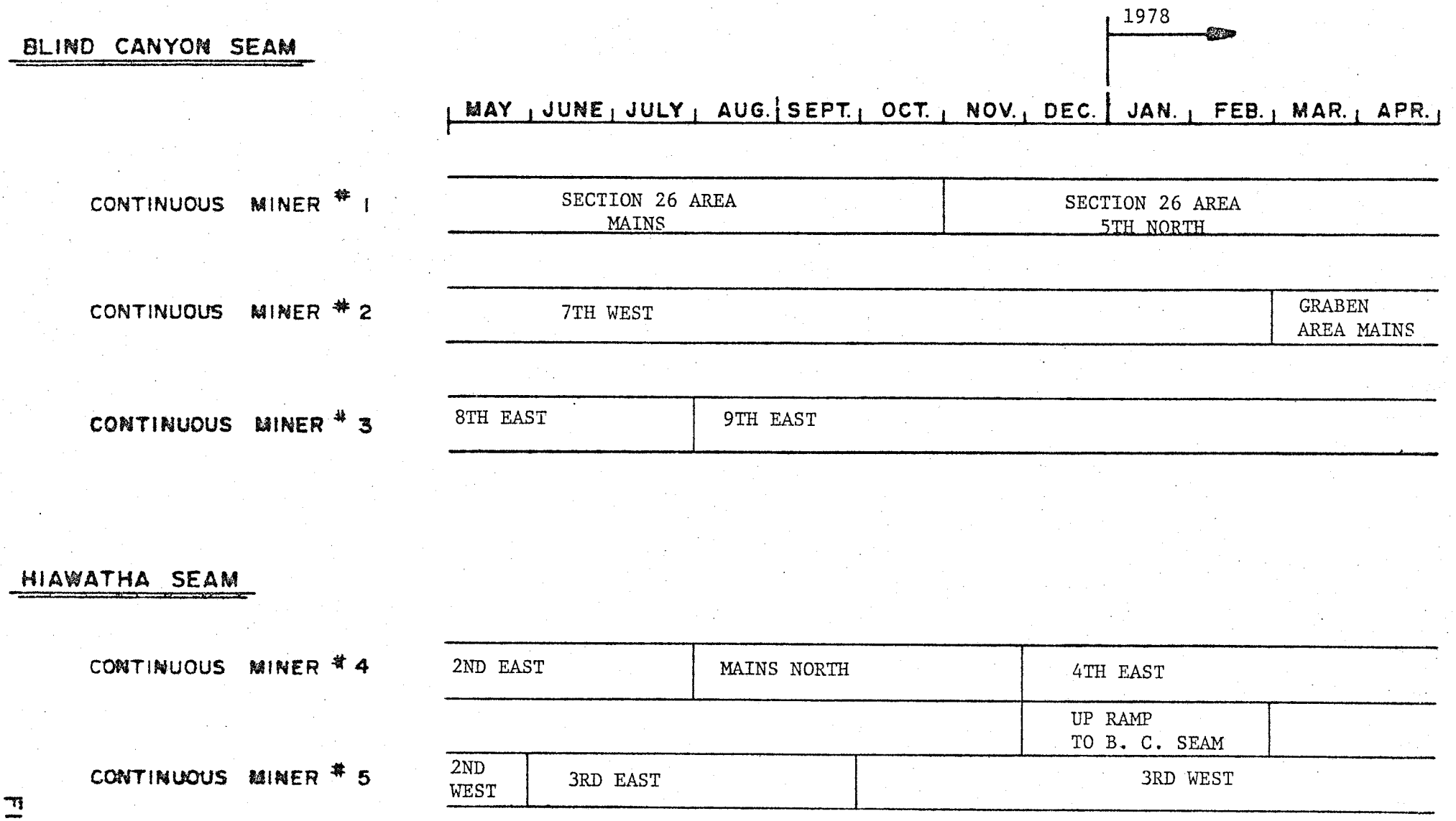


FIGURE NO. 17

PROPOSED SEQUENCE OF MINING, DESERT & BEEHIVE MINES, EMERY COUNTY, UTAH

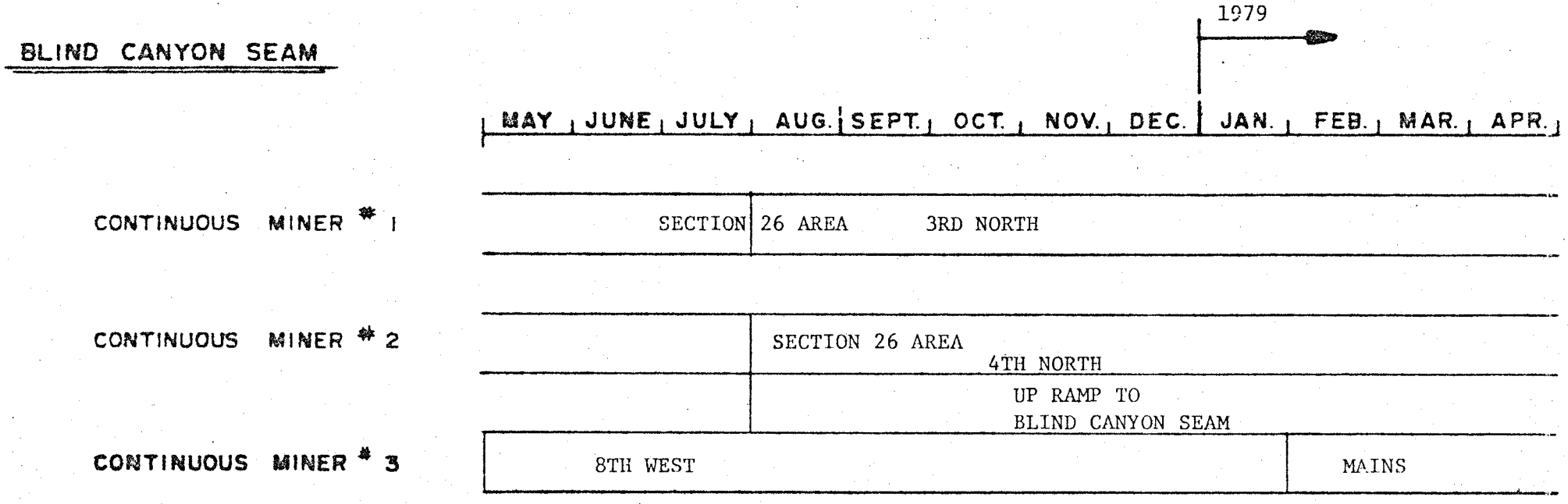


FIGURE NO. 17

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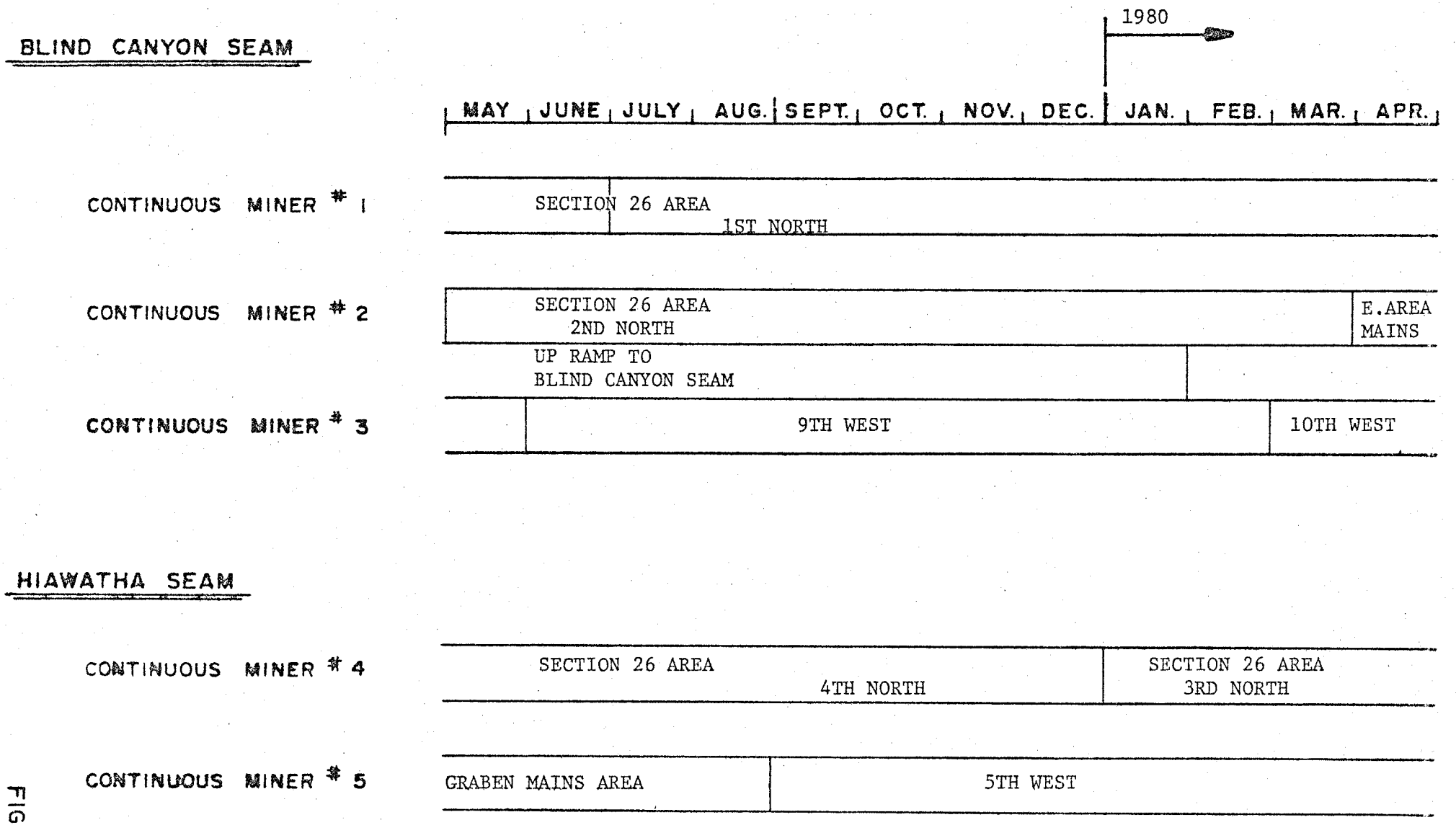

FIGURE NO 17

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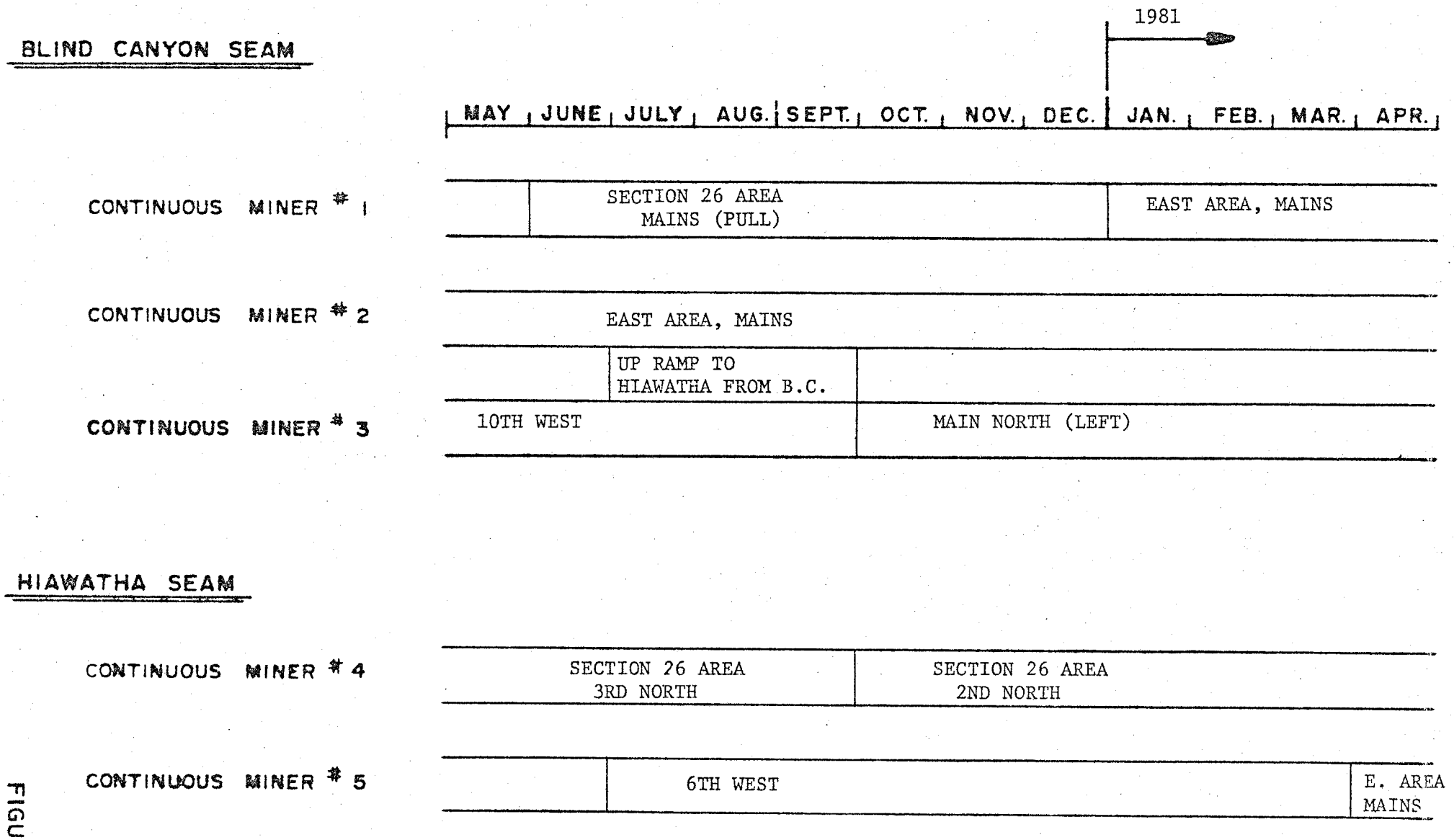


FIGURE NO. 17

PROPOSED SEQUENCE OF MINING, DESERT & BEEHIVE MINES, EMERY COUNTY, UTAH

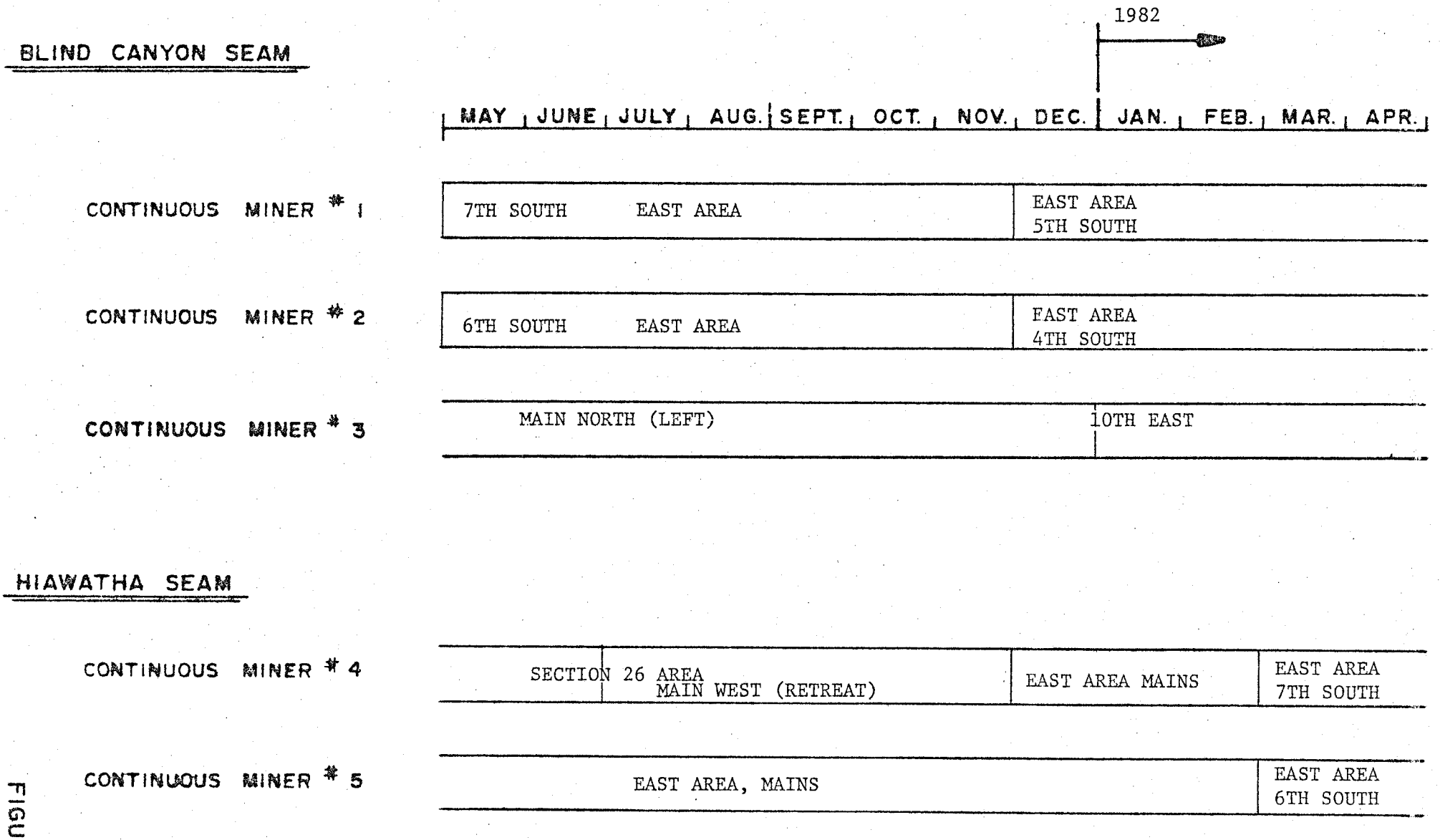


FIGURE NO. 17

PROPOSED SEQUENCE OF MINING, DESERT & BEEHIVE MINES, EMERY COUNTY, UTAH

BLIND CANYON SEAM

1983 →

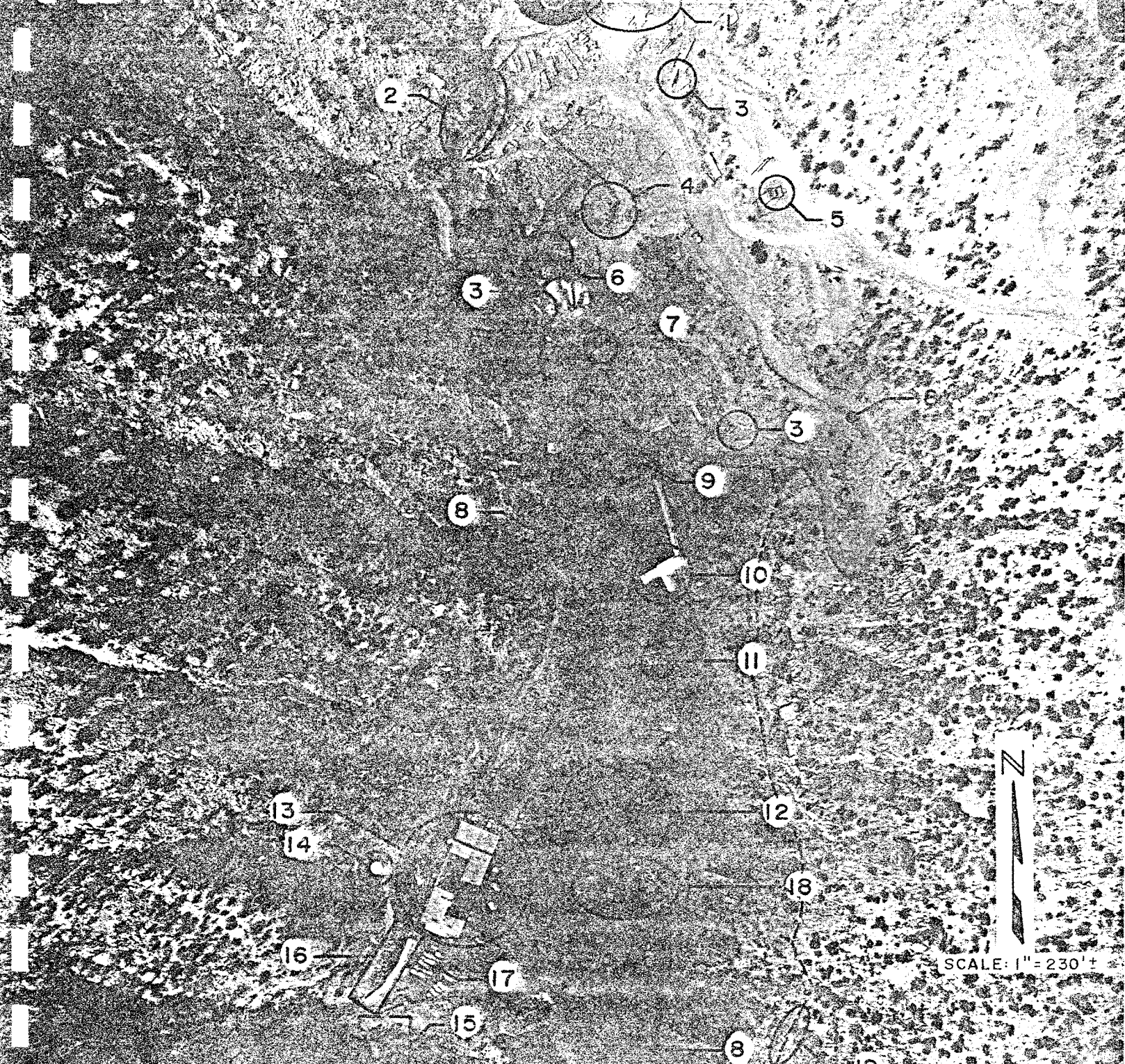
	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.
CONTINUOUS MINER # 1			EAST AREA 3RD SOUTH						EAST AREA MAINS (RETREAT)			
CONTINUOUS MINER # 2			EAST AREA 2ND SOUTH						EAST AREA 1ST NORTH			
CONTINUOUS MINER # 3	10TH EAST					11TH EAST						

HIAWATHA SEAM

CONTINUOUS MINER # 4	EAST AREA 7TH SOUTH				EAST AREA 5TH SOUTH				EAST AREA 3RD SOUTH			
CONTINUOUS MINER # 5	EAST AREA 6TH SOUTH				EAST AREA 4TH SOUTH				EAST AREA 2ND SOUTH			

FIGURE NO. 17

PROPOSED SEQUENCE OF MINING, DESERT & BEEHIVE MINES, EMERY COUNTY, UTAH



SURFACE FACILITY MAP

CHURCH MINE

(DESERET & BEEHIVE MINES)

UTAH POWER & LIGHT COMPANY

1-BEEHIVE PORTAL
2-LITTLE DOVE PORTAL
3-FAN
4-STACKING TUBES
5-SWITCHING STATION
6-DESERET PORTAL
7-SUBSTATION
8-ACCESS ROAD
9-LIVE STORAGE AREA
10-TIPPLE
11-PROPOSED LOCATION OF NEW SCALES
12-DEAD STORAGE
13-OFFICE, WAREHOUSE, & BATHOUSE
14-WATER STORAGE TANK
15-FUTURE ADDITION TO PARKING LOT
16-LOADING DOCK
17-PARKING LOT
18-MATERIAL STORAGE
19-WATER LINE

RECLAMATION

Reclamation as it applies to underground mining concerns both surface and subsurface disturbances. Underground disturbances, or coal extraction, are appropriately discussed in the mining section and requires no further explanation in this text.

Areas of greatest surface disturbance associated with underground mining are, of course, the portal and service facilities immediately adjacent to the mine entrance (see photo). The Church Mine is no exception, as depicted in the photograph showing the access road, bathhouse office building, parking area, and tipple are clustered near the mine entrances at an elevation of 7,650 feet in a moderately steep terrain.

It would be little more than guessing to predict at this time just what reclamation procedure would be in force at the end of the mine's life, which is presently estimated at fifteen years. However, it is safe to assume that all surface facilities would be removed and salvaged and the spoil, coal storage, and trash storage piles would be hauled off the property.

Road restoration can only be gauged by today's standards which require outsloping water bars and seeding. Large graded areas would be stabilized with contoured ditching and seeding.

Exploration disturbances are restored on a yearly basis in conjunction with separate exploration permits. Reclamation and restoration of federal coal lease surfaces shall conform to the existing regulations of the appropriate state and federal agencies at the time of abandonment.

thereon, the prior written approval of the Authorized Officer must be obtained. No such approval will be given unless the request is fully justified by the Holder and is authorized by law. Where necessary, the Holder shall make application under appropriate regulations.

19. No assignment shall be recognized unless or until it is approved in writing by the Authorized Officer in accordance with 43 CFR 2803.6-3 and 2803.6-4.

STATE OF UTAH
NATURAL RESOURCES
State Lands & Forestry

Scott M. Matheson, Governor
Temple A. Reynolds, Executive Director
Ralph A. Miles, Division Director

Southeastern Region • No. 6 South First East • Moab, UT 84532 • 801-259-6316

October 30, 1984

Mr. Larry Guymon
Emery Mining Corporation
P.O. Box 310
Huntington, UT 84528

RE: SULA 436

Dear Mr. Guymon:

This office acknowledges that permission has been granted to Emery Mining Corporation to commence with the reconstruction of sediment ponds and other associated work on Special Use Lease No. 436.

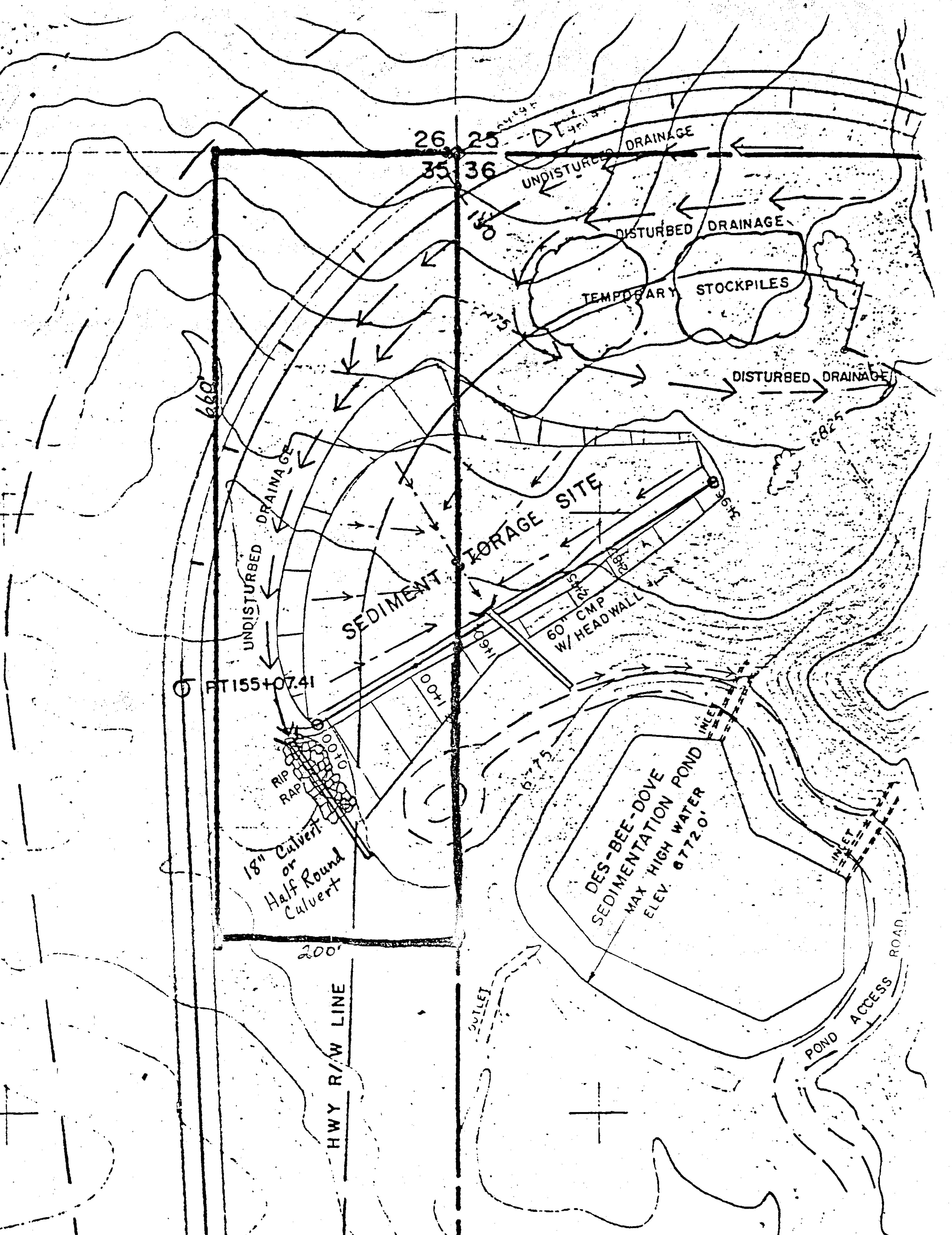
The only stipulation to this permission is that the fences around the ponds be reconstructed to prevent livestock from entering the site.

Sincerely,

Stan Baker

Stan Baker
Land Specialist

SB/jjp



26 25
35 36
UNDISTURBED DRAINAGE
DISTURBED DRAINAGE
TEMPORARY STOCKPILES
DISTURBED DRAINAGE
6825
SEDIMENT STORAGE SITE
UNDISTURBED DRAINAGE
60" CMP W/HEADWALL
PT155+07.41
RIP RAP
18" Culvert or Half Round Culvert
660'
200'
6775
INLET
INLET
DES-BEE-DOVE SEDIMENTATION POND
MAX HIGH WATER ELEV. 6772.0'
OUTLET
HWY R/W LINE
POND ACCESS ROAD