SOILS REPORT OF THE DES BEE DOVE MINE (783.21)

(See Maps 2-14, 2-15 and 2-16)

C-CUT AREAS

These are areas disturbed in order to effectively gain sufficient work area to carry out mining operations. Sandstone and shale bedrock are exposed. In general, these areas have chemical and physical properties which will support plant growth. The major problems are steepness and aridity.

F-FILL AREAS

These areas are nearly level (parking areas) and steep slopes (more than 25%). The material derived from sandstone and shale with some coal waste is capable of supporting plant growth. The parking lots and storage areas may have places where undesirable conditions for plant growth have developed; these areas must be covered with suitable growth media before revegetation can be successful.

Ro-R-U - Rock Outcrop - Rubble Land - Lithic Ustorthents, 40-70% Slopes

Rock Outcrop is dominantly from sandstone and shale. The boulders in the Rubble Land are from sandstone (75%).

Ustorthent soils are shallow and formed in material derived from sandstone. Permeability is moderately rapid in the soil material above the rock (25%).

Taxonomic classification[1] is loamy-skeletal mixed mesic Lithic Ustorthents. Pedon description follows:

A

0-4 inches; pale brown (10YR 6/3) very gravelly loam; olive brown (2.5Y 5/4) when moist; weak, fine granular structure; friable, slightly sticky, slightly plastic; few fine, medium and coarse roots; common fine and few medium pores; 55% gravel; moderately calcareous, carbonates are disseminated; moderately alkaline (pH 8.3); abrupt wavy boundary.

C

4-14 inches; light gray (2.5Y 7/2) extremely flaggy, fine sandy loam, light yellowish brown (2.5Y 6/4) when moist; massive; very friable; few fine, medium, and coarse roots; 40% flagstone; 30% channers; strongly calcareous, carbonates are disseminated; strongly alkaline (pH 8.8); abrupt smooth boundary.

R

14 inches; sandstone.

Included in mapping are areas of material which have sloughed and been deposited by gravity in small areas (less than 100 sq. ft.). The soil material is deeper than Ustorthent soils, and is characterized in Table 2. These areas are of such limited extent that they are of no consequence as a local source of cover material for revegetation.

Samples from the cut-and-fill slopes and the

undisturbed slopes near the mine portal were analyzed. The results are shown in Tables 1 and 2 of the Revegetation Section along with coal waste. There is no indication that any of these materials will not support plant growth.

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4/16/90

DES BEE DOVE SEDIMENTATION POND

This pond is cut into Chipeta soil and Mancos shale. The soil is classified as a clayey, mixed, calcareous mesic, shallow Typic Torriorthent. The moisture regime is aridic. The soil material above the shale is about 15 inches thick. The soil and shale are high in gypsum. The vegetation is dominated by saltbush.

No soil samples were analyzed at this site.

DES BEE DOVE/WILBERG JUNCTION ROAD

In March 1985, soil samples were taken at four (4) locations along the Des Bee Dove/Wilberg Junction Road as indicated on map 5-6. The samples were taken from drill holes at two (2) foot intervals. Results of sample analyses are presented on pages 2-126.2 through 2-126.4.

Soil samples were taken in areas adjacent to the junction road and the mine facilities area in 1989 (see map 2-15 and 5-6). These samples will be analyzed for the following parameters:

Texture (% sand, silt, clay)

SAR (meq/l)

pH (standard units)

Ec (mmhos/cm)

Saturation Percentage (%)

Organic Carbon (%)

Total N (%)

Available Phosphorus (mg/Kg)

Available Potassium (mg/Kg)

Water Extractable Boron (mg/Kg)

Water Extractable Selenium (mg/Kg)

Acid-Base Potential

Available Water (%)

1/3 and 15 atmospheres

Soluble Ca, Mg and Na (meq/l)

The results of the analyses are presented on pages 2-126.5 through 2-126.14.

NPI

417 Wakara Way
Salt Lake City, Utah 84108
(801) 582-0144
TELEX 820832NPISLC

March 29, 1985

UP & L
Box 899
Salt Lake City, UT 84108
ATTN: Mr. C.E. Shingleton, Director of Permitting, Compliance & Services

Dear Mr. Shingleton:

Please find enclosed the analytical results for soil textural classification, pH, electrical conductivity (EC) and sodium absorbtion ratio (SAR) for the 49 soil samples submitted March 22, 1985.

Analytical methodologies are as outlined in Diagnosis and Improvement of Saline and Alkali Soils, USDA Handbook 60.

Any questions may be directed to me.

Thank you for your patronage.

Sincerely,

Von Isaman

Von Isaman
Manager NPI Soil
Testing/Plant Tissue
Analysis Laboratory

VI:jb

DEJ-BEE-COVE HAUL ROAD

APRIL 1,1985

FOR:
UTAH POWER & LIGHT CO.
MINING & EXPLORATION DEPT.
BOX 899
SALT LAKE CITY, UT 84110

ATTEN: MR. CHRIS SHINGLETON

BY:
NPI SOIL TESTING/PLANT TISSUE
ANALYSIS LABORATORY
417 WAKARA WAY
SALT LAKE CITY , UT 84108

VON ISAMAN (801) 582-0144 EXT. 371

SAMPLE No.	pH	EC mmhos/cm	Sand (%)	Silt (%)	Clay (%)	Texture Class *	Ca (meq/l)	Mg (meq/l)	Na (meq/l)	SAR
1 DH 2	8.12	9.5 P	35.28	26.72	38	CL F	22	15	121	26 P
1 DH 4	7.82	9.98 P	22	34.56	43.44	CF-P	22	19	127	28 P
1 DH 6	8.21	10.58 P	37.28	28	34.72	CL F	30	28	162	30 P
1 DH 8	8.08	7.58 F	39.28	30.72	30	CL F	28	33	71	13 P
1 DH 10	8.08	8.55 P	30	28.56	41.44	CF-P	24	22	103	21 P
1 DH 12	8.01	10.79 P	43.28	26.72	30	CL F	24	15	151	34 P
1 DH 14	7.82	10.14 P	45.28	25.28	29.44	SCL G	23	18	139	31 P
1 DH 16	8.17	8.78 P	30	31.28	38.72	CL F-P	28	37	104	18 P
1 DH 18	7.87	8.03 P	41.28	26.72	32	CL F-P	24	20	81	17 P
1 DH 20	7.72	8.68 P	47.28	24	28.72	SCL G	27	22	95	19 P
1 DH 22	7.78	7.68 F	47.28	22.72	30	SCL G	25	23	67	14 P
1 DH 24	7.98	7.29 F	49.28	22.72	28	SCL G	27	22	68	14 P
1 DH 26	7.78	8.12 P	51.28	22.72	26	SCL G	26	22	75	15 P
1 DH 28	8.05	7.14 F	47.44	19.84	32.72	SCL G	32	27	72	13 P
1 DH 30	7.72	8.18 P	55.28	16.72	28	SCL G	24	24	74	15 P
2 DH 2	7.88	9.02 P	39.28	30	30.72	CL F P	23	18	113	25 P
2 DH 4	7.86	10.36 P	47.28	23.28	29.44	SCL G	22	13	126	30 P
2 DH 6	8.19	9.62 P	51.28	23.28	25.44	SCL G	24	10	131	32 P
2 DH 8	8.01	10.03 P	49.28	25.28	25.44	SCL G	22	9	157	40 P
2 DH 10	7.66	9.84 P	48.16	23.84	28	SCL G	39	32	132	22 P
2 DH 12	8.02	10.05 P	39.44	25.84	34.72	CL F-P	30	42	127	21 P
2 DH 14	8.03	10.81 P	37.28	30	32.72	CL F-P	23	20	142	30 P
2 DH 16	8.08	10.64 P	43.76	24.96	31.28	CL F-P	23	19	140	30 P
2 DH 18	8.02	10.61 P	45.76	20.96	33.28	SCL	22	18	136	30 P
2 DH 20	7.98	9.44 P	45.44	24.56	30	SCL	26	51	123	20 P
2 DH 22	7.97	8.95 P	48.88	21.12	30	SCL	35	48	112	17 P
2 DH 24	8.01	9.36 P	53.76	17.68	28.56	SCL	23	16	124	28 P
2 DH 26	7.81	9.61 P	52.48	21.68	25.84	SCL	23	17	117	26 P
2 DH 28	8.05	10.03 P	50.48	20.96	28.56	SCL	22	15	131	30 P
2 DH 30	7.81	9.52 P	50.48	21.68	27.84	SCL	24	15	128	29 P
2 DH 32	7.83	10.24 P	52.48	21.68	25.84	SCL	23	14	128	30 P
2 DH 34	7.89	10.45 P	56.48	21.68	21.84	SCL	24	16	139	31 P
2 DH 36	7.86	10.78 P	58.48	19.68	21.84	SCL	24	16	134	30 P
2 DH 38	7.98	9.23 P	38.88	29.12	32	CL	28	17	141	30 P

*C =CLAY CL=CLAY LOAM L=LOAM LS=LOAMY SAND S= SAND SC=SANDY CLAY SCL=SANDY CLAY LOAM SL=SANDY LOAM
SI=SILT SIC=SILTY CLAY SICL=SILTY CLAY LOAM SIL=SILTY LOAM

SAMPLE No.	pH	EC mmhos/cm	Sand (%)	Silt (%)	Clay (%)	Texture Class *	Ca (meq/l)	Mg (meq/l)	Na (meq/l)	SAR
3 DH 2	8.13	4.36 F	47.44	30.56	22	LG	26	34	28	5 F
3 DH 4	8.12	5.73 F	45.44	32.56	22	LG	35	21	28	5 F
3 DH 6	8.18	5.62 F	55.2	26.96	17.84	SLG	30	30	27	5 F
3 DH 8	8.24	6.92 F	49.44	25.84	24.72	SCLG	26	49	37	6 F
3 DH 10	8.04	6.74 F	57.2	22.96	19.84	SLG	26	34	34	6 F
3 DH 12	8.07	5.89 F	55.2	24.96	19.84	SLG	28	30	32	6 "
3 DH 14	8.02	5.63 F	57.2	22.96	19.84	SLG	26	30	30	6 "
3 DH 16	8.01	5.36 F	56.48	22.96	20.56	SCLG	28	28	28	5 "
4 DH 2	8.85	2.61 F	59.28	23.28	17.44	SLG	3	33	24	6 "
4 DH 4	8.14	9.21 P	53.44	25.84	20.72	SCLG	22	17	63	14 P
4 DH 6	8.06	9.13 P	49.44	27.12	23.44	SCLG	45	41	44	7 F
4 DH 8	8.15	6.01 F	47.44	29.84	22.72	LG	28	35	24	4 G
4 DH 10	8.28	6.37 F	60	22	18	SLG	26	30	38	7 F
4 DH 12	8.16	6.17 F	48	28	24	SCLG	27	32	34	6 "
4 DH 14	8.22	6.21 F	50.72	26	23.28	SCLG	41	33	33	5 "
4 DH 16	8.04	5.92 F	46.88	28.56	24.56	LG	27	33	31	6 "

*C =CLAY CL=CLAY LOAM L=LOAM LS=LOAMY SAND S= SAND SC=SANDY CLAY SCL=SANDY CLAY LOAM SL=SANDY LOAM
SI=SILT SIC=SILTY CLAY SICL=SILTY CLAY LOAM SIL=SILTY LOAM

Client : Utah Power & Light Co.-Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS1A
Sample Date Time: Unknown

Lab No. : 90-SI/00208
Date Received: 03/16/90

Parameters

Saturation %	50.1 ?	%	
pH, saturated paste	7.0	units	1
Conductivity, sat. paste	2.39	mmhos/cm	1
Calcium, soluble	15.9	meq/l	1
Magnesium, soluble	10.2	meq/l	1
Sodium, soluble	6.2	meq/l	1
Potassium, soluble	1.7	meq/l	1
Sodium Absorption Ratio	1.7G		
Nitrogen, total Kjeldahl	.16 L	%	
Nitrate as N, soluble	5.1	mg/kg	6
Phosphorus, extractable	-1 L	mg/kg	3
Organic Matter	5.8 ?	%	
Boron, soluble	1.2	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.03	%	
Neutralization Potential	17.2	% as CaCO3	
Acid-Base Potent (CaCO3)	171	Tons/1000T	
Coarse Fragments > 2mm	37.8 U	%	
Sand	67.	%	
Silt	20.	%	
Clay	13.	%	
Texture	SL		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS2A
Sample Date Time: Unknown

Lab No. : 90-SI/00209
Date Received: 03/16/90

Parameters

Saturation %	33.	%	
pH, saturated paste	7.5	units	1
Conductivity, sat. paste	.41	mmhos/cm	1
Calcium, soluble	3.2	meq/l	1
Magnesium, soluble	1.4	meq/l	1
Sodium, soluble	.3	meq/l	1
Potassium, soluble	.1	meq/l	1
Sodium Absorption Ratio	0.2		
Nitrogen, total Kjeldahl	.06	%	
Nitrate as N, soluble	.9	mg/kg	6
Phosphorus, extractable	4	mg/kg	3
Organic Matter	2.0	%	
Boron, soluble	.5	mg/kg	2
Selenium, soluble	.03	mg/kg	2
Sulfur, total	.02	%	
Neutralization Potential	16.6	% as CaCO3	
Acid-Base Potent (CaCO3)	165	Tons/1000T	
Coarse Fragments > 2mm	46.7 V	%	
Sand	40.	%	
Silt	41.	%	
Clay	19.	%	
Texture	L		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

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Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS3A
Sample Date Time: Unknown

Lab No. : 90-SI/00210
Date Received: 03/16/90

Parameters

Saturation %	35.	%	
pH, saturated paste	7.3	units	1
Conductivity, sat. paste	.46	mmhos/cm	1
Calcium, soluble	4.5	meq/l	1
Magnesium, soluble	1.0	meq/l	1
Sodium, soluble	.2	meq/l	1
Potassium, soluble	.1	meq/l	1
Sodium Absorption Ratio	0.1		
Nitrogen, total Kjeldahl	.10	%	
Nitrate as N, soluble	2.2	mg/kg	6
Phosphorus, extractable	5	mg/kg	3
Organic Matter	3.2	%	
Boron, soluble	.5	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.03	%	
Neutralization Potential	17.5	% as CaCO3	
Acid-Base Potent (CaCO3)	174	Tons/1000T	
Coarse Fragments > 2mm	42.9 U	%	
Sand	47.	%	
Silt	33.	%	
Clay	20.	%	
Texture	L		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS4A
Sample Date Time: Unknown

Lab No. : 90-SI/00211
Date Received: 03/16/90
Not Beside Lined Sample

Parameters			
Saturation %	46.	%	
pH, saturated paste	8.3 P	units	1
Conductivity, sat. paste	22.00 P	mmhos/cm	1
Calcium, soluble	17.3	meq/l	1
Magnesium, soluble	232.8	meq/l	1
Sodium, soluble	257.5	meq/l	1
Potassium, soluble	1.6	meq/l	1
Sodium Absorption Ratio	23.0 P		
Nitrogen, total Kjeldahl	.04	%	
Nitrate as N, soluble	17.3	mg/kg	6
Phosphorus, extractable	-1	mg/kg	3
Organic Matter	1.6	%	
Boron, soluble	1.1	mg/kg	2
Selenium, soluble	.5	mg/kg	2
Sulfur, total	.81	%	
Neutralization Potential	9.3	% as CaCO3	
Acid-Base Potent (CaCO3)	68	Tons/1000T	
Coarse Fragments > 2mm	55.3	%	
Sand	30.	%	
Silt	55.	%	
Clay	15.	%	
Texture	SIL		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

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Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS5A
Sample Date Time: Unknown

Lab No. : 90-SI/00212
Date Received: 03/16/90

Parameters

Saturation %	30.	%	
pH, saturated paste	7.3	units	1
Conductivity, sat. paste	.67	mmhos/cm	1
Calcium, soluble	5.5	meq/l	1
Magnesium, soluble	2.5	meq/l	1
Sodium, soluble	1.2	meq/l	1
Potassium, soluble	.3	meq/l	1
Sodium Absorption Ratio	.6		
Nitrogen, total Kjeldahl	.08	%	
Nitrate as N, soluble	1.4	mg/kg	6
Phosphorus, extractable	2	mg/kg	3
Organic Matter	4.1	%	
Boron, soluble	.7	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.04	%	
Neutralization Potential	16.1	% as CaCO3	
Acid-Base Potent (CaCO3)	160	Tons/1000T	
Coarse Fragments > 2mm	34.5	%	
Sand	57.	%	
Silt	29.	%	
Clay	14.	%	
Texture	SL		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

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Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS6A
Sample Date Time: Unknown

Lab No. : 90-SI/00213
Date Received: 03/16/90

Parameters

Saturation %	30.	%	
pH, saturated paste	7.4	units	1
Conductivity, sat. paste	.71	mmhos/cm	1
Calcium, soluble	6.2	meq/l	1
Magnesium, soluble	2.1	meq/l	1
Sodium, soluble	.6	meq/l	1
Potassium, soluble	.3	meq/l	1
Sodium Absorption Ratio	.3		
Nitrogen, total Kjeldahl	.05	%	
Nitrate as N, soluble	.8	mg/kg	6
Phosphorus, extractable	2	mg/kg	3
Organic Matter	2.6	%	
Boron, soluble	.6	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.05	%	
Neutralization Potential	16.0	% as $CaCO_3$	
Acid-Base Potent ($CaCO_3$)	158	Tons/1000T	
Coarse Fragments > 2mm	28.7	%	
Sand	54.	%	
Silt	30.	%	
Clay	16.	%	
Texture	SL		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS7A
Sample Date Time: Unknown

Lab No. : 90-SI/00214
Date Received: 03/16/90

Parameters

Saturation %	31.	%	
pH, saturated paste	7.5	units	1
Conductivity, sat. paste	1.06	mmhos/cm	1
Calcium, soluble	6.5	meq/l	1
Magnesium, soluble	3.0	meq/l	1
Sodium, soluble	3.7	meq/l	1
Potassium, soluble	.2	meq/l	1
Sodium Absorption Ratio	1.7		
Nitrogen, total Kjeldahl	.11	%	
Nitrate as N, soluble	1.1	mg/kg	6
Phosphorus, extractable	1	mg/kg	3
Organic Matter	3.9	%	
Boron, soluble	.9	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.04	%	
Neutralization Potential	17.0	% as CaCO3	
Acid-Base Potent (CaCO3)	169	Tons/1000T	
Coarse Fragments > 2mm	40.8	%	
Sand	54.	%	
Silt	28.	%	
Clay	18.	%	
Texture	SL		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS8A
Sample Date Time: Unknown

Lab No. : 90-SI/00215
Date Received: 03/16/90

Parameters

Saturation %	35.	%	
pH, saturated paste	7.6	units	1
Conductivity, sat. paste	.63	mmhos/cm	1
Calcium, soluble	4.3	meq/l	1
Magnesium, soluble	2.4	meq/l	1
Sodium, soluble	1.0	meq/l	1
Potassium, soluble	.1	meq/l	1
Sodium Absorption Ratio	.6		
Nitrogen, total Kjeldahl	.09	%	
Nitrate as N, soluble	3.5	mg/kg	6
Phosphorus, extractable	2	mg/kg	3
Organic Matter	3.1	%	
Boron, soluble	.9	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.03	%	
Neutralization Potential	17.4	% as CaCO3	
Acid-Base Potent (CaCO3)	173	Tons/1000T	
Coarse Fragments > 2mm	38.3	%	
Sand	49.	%	
Silt	33.	%	
Clay	18.	%	
Texture	L		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS9A
Sample Date Time: Unknown

Lab No. : 90-SI/00216
Date Received: 03/16/90

Parameters

Saturation %	35.	%	
pH, saturated paste	7.7	units	1
Conductivity, sat. paste	.72	mmhos/cm	1
Calcium, soluble	4.0	meq/l	1
Magnesium, soluble	3.6	meq/l	1
Sodium, soluble	1.0	meq/l	1
Potassium, soluble	.7	meq/l	1
Sodium Absorption Ratio	.5		
Nitrogen, total Kjeldahl	.13	%	
Nitrate as N, soluble	2.2	mg/kg	6
Phosphorus, extractable	3	mg/kg	3
Organic Matter	4.3	%	
Boron, soluble	1.5	mg/kg	2
Selenium, soluble	.02	mg/kg	2
Sulfur, total	.05	%	
Neutralization Potential	17.0	% as CaCO3	
Acid-Base Potent (CaCO3)	168	Tons/1000T	
Coarse Fragments > 2mm	39.7	%	
Sand	47.	%	
Silt	35.	%	
Clay	18.	%	
Texture	L		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

Client : Utah Power & Light Co. -Mining Div.
Address : P.O. Box 310
Huntington, UT 84528
Attn. : Val Payne
Project : JS314734

Sample Matrix: Soil
Sample ID: SS10A
Sample Date Time: Unknown

Lab No. : 90-SI/00217
Date Received: 03/16/90

Parameters

Saturation %	39.	%	
pH, saturated paste	7.6	units	1
Conductivity, sat. paste	.42	mmhos/cm	1
Calcium, soluble	2.6	meq/l	1
Magnesium, soluble	2.1	meq/l	1
Sodium, soluble	.3	meq/l	1
Potassium, soluble	-.1	meq/l	1
Sodium Absorption Ratio	0.2		
Nitrogen, total Kjeldahl	.09	%	
Nitrate as N, soluble	1.5	mg/kg	6
Phosphorus, extractable	2	mg/kg	3
Organic Matter	2.8	%	
Boron, soluble	.5	mg/kg	2
Selenium, soluble	-.01	mg/kg	2
Sulfur, total	.04	%	
Neutralization Potential	17.9	% as CaCO3	
Acid-Base Potent (CaCO3)	178	Tons/1000T	
Coarse Fragments > 2mm	36.7 U	%	
Sand	23.	%	
Silt	50.	%	
Clay	27.	%	
Texture	CL/L/SIL		

Remarks:

1 Saturated Paste Extraction
3 AB-DTPA Extraction
6 Water Extraction
7 Potassium Chloride Extraction

Note: Negative sign "-" denotes that the value is less than "<"

Frank E. Polniak, Inorganic Lab Supervisor

Frank E. Polniak

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Revised 11/21/83

I-E-R / E **Typic Ustochrepts-Lithic Ustorthents-Rock Outcrop loamy-skeletal, shallow association, 40-60% slopes.**

These soils are mostly loamy-skeletal and lithic with areas of sandstone outcrops.

In this map unit, Typic Ustochrepts make up about 50%, Lithic Ustorthents about 25%, and Rock Outcrop and Rubble Land about 20%; included are small areas of Mollisols on north and east-facing slopes.

The Ustochrepts can be generally described as follows: pale brown gravelly loam or sandy loam surface layer, with 25% sandstone fragments, 35 cm thick, underlain by a pale brown gravelly or stony loam, with 35-50% sandstone fragments, 100 cm thick.

The Ustorthents are mostly shallow, underlain by rock within 50 cm of the surface.

Rubble Lands are those areas where the soils are covered by large boulders so close together that there is little area between the boulders for plants to grow.

Rock Outcrop is exposed areas of bedrock. These areas are often nearly vertical cliff walls in canyons.

Mp / B **Pachic Cryoborolls, loamy and loamy skeletal, 10-25% slopes.**

These are dark-colored soils in which the surface soil is more than 50 cm thick. Included in mapping are Typic Cryoborolls, Mollic Cryoboralfs, and Typic Cryochrepts. Pachic Cryoborolls can be generally described as follows: a very dark grayish-brown loamy surface layer 60 cm thick, overlying a grayish-brown loamy subsoil 30 cm thick, and

underlain by a pale brown gravelly sandy loam substratum containing 50% sandstone fragments.

Mt C **Typic Cryoborolls, loamy and loamy-skeletal, 25-40% slopes**

These are dark-colored soils under mixed conifer, sagebrush, and grass. Included are areas of Pachic Cryoborolls and Mollic Cryoboralfs. Cryochrepts are on windswept ridges. The Typic Cryoborolls can be generally described as follows: a dark grayish brown loamy surface layer about 40 cm thick, underlain by a pale brown clayey subsoil 40 cm thick, over a light gray calcareous substratum with up to 50% sandstone fragments.

References

1. Soils maps of Utah Power and Light mine sites: Deer Creek, Deseret, and Wilberg.
2. General soils map of Utah.
3. Soils map of a test area in T14S, R5E through 9E.
4. Soils map of Northwest Carbon, Inc., Rilda Canyon and Trail Creek Mine sites.

Sediment Pond - Des-Bee-Dove Mines (see Map 2-16)

Ch-B/B Chipeta - Badlands complex, 10-25% slopes, eroded.

This Map Unit is composed of shallow soils derived from Mancos shale and Badlands. Chipeta soils make up about 60% of this unit. They occur on side slopes and rounded ridge crests. The Badlands are very steep, eroded areas where there is essentially no soil. Badlands make up about 35% of this unit.

Inclusions are along drainageways where alluvium has accumulated in areas of less than one acre.

Chipeta silty clay loam, 3 to 20% slopes, eroded

The Chipeta soil is shallow and well-drained. It has formed from alkaline, gypsum-bearing, marine shale.

Present vegetation is mat saltbush, Gardner saltbush, and shadscale.

Permeability is slow. Available water capacity is 3 inches. Runoff is medium, and erosion potential is moderate.

This soil is in Capability Subclass VIIe, non-irrigated.

Taxonomic Classification is clayey, mixed (calcareous), mesic, shallow Typic Torriorthent.

Pedon description follows:

Ap--0 to 13 cm; grayish brown (2.5 Y 4/2 moist, 6/2 dry) silty clay loam; moderate, medium fine angular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; calcareous; clear, smooth boundary.

C1--13 to 33 cm; grayish brown (2.5 Y 4/2 moist, 6/2 dry) silty clay loam; moderate, medium fine angular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; calcareous; clear, wavy boundary.

C2cs--33 to 43 cm; dark grayish brown (2.5 Y 4/2 moist, 6/2 dry) silty clay.

Cr--43 cm+; weathered Mancos shale.

Badlands are severely eroded areas with little soil, and are dominated by relatively unaltered shale.

Revised 11/21/83

The Soils at the Mine Site (2-15)

Soil	Range Site	Yields* Favorable	Yields* Unfavorable
Chipeta	Desert Shallow Shale	200	100
Beenom	Mountainy Stony Loam	2000	1200
Sunup	Semi-Desert Shallow Loam (Pinyon-Juniper)	600	275
Comodore	Woodland (Douglas Fir)	No Data Available	

The Soils in the Generalized Soils Map For the Permit Area (2-14)

Would fall into:

High Mountain Loam	Shrub or Aspen	2700	1250
High Mountain Loam		3000	1400
Woodland		Not assigned a range site - no data available.	

* Pounds of air dry production per acre per year.

Reference

Wilson, L., et al, 1975. Soils of Utah. Utah. Agricultural Experiment Station Bulletin 492. Pages 80-94. Utah State University, Logan, Utah 84322.

Revised 11/21/83

FISH AND WILDLIFE RESOURCES INFORMATION (783.20)

As required by the regulations the application has consulted with the D.O.G.M., the D.O.W.R. and U. S. Fish & Wildlife Service. An on-site field investigation of each mine site was conducted. In addition, the applicant felt to properly mitigate wildlife concerns a consultant (Jarvis) was retained to provide both wildlife baseline information and, in consultation with the U. S. Fish & Wildlife Service, initiate any necessary studies and identify any possible conflicts between wildlife and mining operations. This report is included in this section. Notwithstanding Judge Flannery's decision, applicant feels that without baseline data a proper wildlife mitigation plan cannot be developed.

As the Jarvis report and the D.O.W.R. baseline data are for the most part redundant, applicant has chosen to include only the consultant's report in this application but has included the mitigation and impact avoidance procedures as recommended by the D.O.W.R. in the Fish & Wildlife Protection Plan. The applicant has the D.O.W.R. complete baseline studies on file and copies have been sent to all concerned state and federal management agencies.

Mine Plan Area

The UP&L lease area covers the south half of East Mountain in the Wasatch Plateau. Life zones range from Upper Sonoran below the mines to Canadian on top. The three mines are located in steep rocky canyons on the south and east slopes of the mountain.

Methods

The mine plan was submitted to D.O.G.M. who, in turn, consulted the respected wildlife agencies for recommendations. Based on the Board's guidelines most of the wildlife information was obtained from existing records and publications. A field survey was conducted in 1981 to assess the occurrence of raptors and migratory birds nesting at the Cottonwood fan portal construction site. This survey is included in the Wilberg application.

Wildlife habitats were coordinated with the designations used in the vegetative survey. With the vegetative map and the species list for the Wasatch Plateau a list of species likely to occur in the mine area was developed (Table 1).

Wildlife Habitats

The habitats within the mine plan area are rated as 2 by Bob Scott and others for coal lands of Utah (Scott, 1977). Around the mines the cliffs are considered raptor nesting habitat with the slopes below and the flat lands above the cliffs as raptor feeding areas. The lower slopes and alluvial fans below the mines are rated as deer winter range. All elk range is above the mines on the top of East Mountain (Table 2) (see Maps 2-17 and 2-18).

The habitats at the Wilberg Mine and Des-Bee-Dove Mines are designated as pinyon-juniper with many open rock and cliff areas. At the Deer Creek Mine some riparian habitat exists along Deer Creek below the mine. The south

facing slopes of this steep canyon are covered with pinyon-juniper and the north facing slopes are covered with a mixed conifer stand.

The habitat designations are listed below:

S - Sagebrush
G - Grassland
SD - Salt Desert Shrubs
R - Riparian
P-J - Pinyon-Juniper
MC - Mixed Conifer (includes Aspen Groves)

a. Sagebrush - All the sagebrush communities are situated between 8,000 and 10,000 foot elevations along the top of the East Mountain plateau. They exist as short sage communities generally on ridge tops and flats. Aspen groves are scattered through the sagebrush communities on the flats and along the edges. A few areas around springs still harbor small wet meadows.

b. Grassland - Two small areas on ridges in tributaries of Cottonwood Creek.

c. Salt Desert Shrub - This plant community is located on the lower slopes adjacent to the access road to the Des-Bee-Dove Mines.

d. Riparian - The streams are small and flow through steep narrow canyons. Consequently the riparian zone is very narrow often less than 30 yards wide. The vegetative composition varies from the broad-leafed trees and shrub plant community normally depicted as characteristic of riparian

areas to many areas where there is only an increased density of conifers and/or aspen.

e. Pinyon-Juniper - This pygmy forest is located on steep slopes and talus slides that are crowned by near vertical to vertical rock escarpments. In many areas especially on the south face of East Mountain the forest consists of scattered trees growing amidst huge rocky cliffs and rough rock piles. Where steep canyons occur the pinyon-juniper forest is only found on south facing slopes or on rocky exposed ridges. In many areas where the pinyon-juniper grades into the mixed conifer stands a mountain brush plant community exists as an ecotone between the two tree dominated plant communities. These areas are generally confined to a single slope of less than 200 acres.

f. Mixed Conifer - The mixed community is spread all over East Mountain, on the top, the slopes, and in the steep side canyons. Below 8,000 feet elevation conifers are found only on north facing slopes in steep canyons. Fir species generally dominate the stands along with spruce and a scattering of aspens at the sagebrush interface.

Wildlife List (See Table 1)

Species of Special Significance

The species listed here and their habitat requirements are discussed in the following paragraphs. This list was derived from Utah Division of Oil, Gas and Mining's guidelines and from Utah Division of Wildlife Resources' status list (DOGM, 1980 and UDWR, 1979).

Species	Status	Habitat	Comments
Western Bluebird (*Sialia mexicana*)	Federal Migratory	MC,P-J	Probably occurs within disturbed area
American Peregrine Falcon (*Falco peregrinus*)	T & E	All	Does not occur, no sightings
Bald Eagle (*Haliaeetus leucocephalus*)	T & E	All	Winter visitor
Snowshoe Hare (*Lepus americanus*)	DWR limited	MC	Probably occurs on permit area but not in disturbed area
Northern Flying Squirrel (*Glaucomys sabrinus*)	DWR limited	MC	" "
Red Bat (*Lasiurus cinereus*)	DWR limited	MC	" "
Utah Mountain Kingsnake (*Lampropeltis pyromelana*)	DWR limited	R,P-J,MC	Possibly occurs in disturbed area
Utah Milksnake (*Lampropeltis triangulum*)	DWR limited	MC	Probably occurs on permit area but not in disturbed area
Tiger Salamander (*Ambystoma tigrinum*)	DWR questioned	R	" "

Threatened and Endangered

A letter from U. S. Fish and Wildlife Service dated November 6, 1980. "To the best of our knowledge, no endangered or threatened plant species or critical habitat

for threatened or endangered wildlife species occur in the disturbed areas of the subject mining operations."

Raptors

The raptors in this area are listed in prior paragraphs. Further discussions are found in the early parts of this discussion.

Effects of Mining Operations on Fish and Wildlife

The Deer Creek, Des-Bee-Dove and the Wilberg Mines are currently operating. Their effects on wildlife are now historical and the species affected have either emigrated from the disturbed sites, adjusted to the disturbances or expired due to loss of habitat. The primary losses were probably raptor nesting sites around the mines and deer winter range from road construction. At the Deer Creek Mine some riparian habitat was destroyed at the mine site.

The lower open slopes are used by raptors on the escarpment face for hunting activities where an abundance of rodents and small birds provide a prey base. Wintering migrants also utilize these same habitats for hunting. The vehicle traffic and human presence continue to disturb the natural hunting patterns. Data from the period prior to mining is lacking to evaluate the present situation (Land Use Map 2-17).

The traffic on the mine access roads kills an unknown number of deer each year. The percent loss to the wintering deer herds is unknown. Some raptor disturbance continues at

the mines and along the access roads which transect some of their hunting territory.

Following is a summary of certain reptile and amphibian species referred to in Utah Division of Oil, Gas and Mining letter to Utah Power and Light dated December 5, 1980.

a. Utah Mountain Kingsnake - These snakes are widely distributed throughout the mountains of Utah in specific localized drainages. The habitat requirements are drainages with wet meadows, brushy riparian areas and perennial streams. They use rocky south facing slopes adjacent to riparian habitat for denning.

   The drainages around East Mountain lack these components for a preferred environment because many of the streams are eroded and lack meadows. Thus it is doubtful these snakes inhabit any of the disturbed areas.

b. Utah Milksnake - This snake could occur in the riparian areas and in the mixed conifer habitat. Most likely place would be in that portion of the drainages with mixed conifer vegetation. This habitat type is far removed from any disturbed areas.

c. Tiger Salamander - These salamanders prefer quiet pools, ponds, or springholes. Since most of these water types occur on top of East Mountain it is doubtful any tiger salamanders would be disturbed by proposed construction.

Game Species

- Mule Deer (Odocoileus 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).
- Elk (Cervus canadensis) - Elk inhabit the sagebrush, and forest areas at the upper elevations on East Mountain, 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 census included larger groups only and does not reflect a total population estimate (Dolton, 1977).
- Mountain Lion (Felis concolor) - This species inhabits rugged mountains and forest areas in the region and may occasionally occur on East Mountain (Dolton, 1977).

- 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).
- Mountain Cottontail (Sylvilagus nuttalli) - Mountain cottontails inhabit brushy areas and forests, particularly on rocky slopes throughout the mine region (USDI Bureau of Land Management, 1976).
- 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. The greatest density of the species in Utah is in the northern Wasatch Range (Rawley and Bailey, 1972).
- 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 northwest of the mine property (Rawley and Bailey, 1972).
- Chukar Partridge (Alectoris graeca) - This species prefers steep, rock, 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.

- Mourning Dove (Zenaidura macroura) - This is an important game bird in many parts of North America. Mourning doves prefer open field and forest edge habitat, but occur over a broad range of vegetation types throughout the 48 conterminous United States. The species occurs in pinyon-juniper and forest edge habitat on East Mountain.

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 with 25 miles of the site in the winter of each of the past three years (Dolton, 1977). It is probably a winter visitor 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 Wilberg Mine property as:

DECLINING: Any species of animal which, although still occurring in numbers adequate for survival, has been greatly depleted and continues to decline. A management program included protection or 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 area available to permit a reliable assessment of the status of the species.

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

- Bobcat (*Lynx rufus*) Declining. Fur prices in recent years have resulted in high harvests. The species is presently under consideration for total protection until the current population trend is reversed. Bobcats probably occasionally use the habitats present on the mine property.
- Whitetail Jackrabbit (*Lepus townsendi*) Status questioned. Inhabits sagebrush flats in the region and may occur on site.

- Sandhill Crane (Grus canadensis) Limited. A few individual migrate through the region (Robbins et al, 1966).
- Fox Sparrow (Passerella iliaca) Status questioned. Suitable habitat for the species occurs at upper elevations on East Mountain on the mine property.
- 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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Stebbins, R. C., 1966, A Field Guide to Western Reptiles and Amphibians, Houghton Mifflin Company, Boston, Mass.

UDWR, 1979, Status of Selected Animal and Plant Species in Utah (revised) Salt Lake City, Utah.

TABLE I

VERTEBRATE SPECIES OF THE WASATCH PLATEAU

Fishes:

Species	Status	Habitat	Probable Occurence on UP & L Leases
Cutthroat trout	C	lakes, streams	
Rainbow trout	C	"	
Brown trout	C	"	
Brook trout	L	"	
Carp	C	"	
Utah chub	C	"	
Leatherside chub	C	streams	
Longnose dace	U	"	
Speckled dace	C	"	
Redside shiner	C	lakes, streams	
Bluehead sucker	C	"	
Mountain sucker	L	streams	
Mottled sculpin	C	"	
Largemouth bass	C	lakes	

Amphibians:

Tiger salamander	C	R, MC	X
Great Basin Spadefoot toad	C	S	X
Western toad	K	R	X
Woodhouse's toad	C	G,S	
Chorus frog	C	S	X
Leapord frog	C	R	X

Reptiles:

Species	Status	Habitat	Probable Occurence on UP & L Leases	
Collared Lizard	C	SD		X
Leopard Lizard	C	SD		
Eastern Fence Lizard	C	SD,P-J		X
Sagebrush Lizard	C	SD,P-J		X
Tree Lizard	C	P-J		X
Side-blotched Lizard	C	SD	X	
Short-horned Lizard	C	SD,P-J,S,MC		X
Western Whiptail	C	SD		
Rubber Boa	C	MC		X
Striped Whipsnake	C	SD,P-J		X
Racer	C	S,MC		X
Ringneck Snake	K	R,MC		X
Gopher Snake	C	SD,P-J,S		X
Milk Snake	K	MC		X
Sonora Mountain Kingsnake	K	R,P-J,MC		X
Western Terrestrial Garter Snake	C	R,P-J,MC		X
Common Garter Snake	K	R		X
Night Snake	C	SD		
Midget Faded Rattlesnake	C	P-J		X

Birds:

Common Loon	U	Lakes
Horned Grebe	R	"
Eared Grebe	C	"
Western Grebe	C	"
Pied-billed Grebe	C	"

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Double-crested Cormorant	U	"	
Snowy Egret	C	Marshes	
Great Blue Heron	C	"	X
Black-crowned Night Heron	C	"	
American Bittern	U	"	
White-faced Ibis	C	"	
Whistling Swan	O	"	
Canada Goose	C	"	
White-fronted Goose	R	Marshes	
Snow Goose	U	"	
Ross's Goose	O	"	
Mallard	C	"	X
Gadwall	C	"	
Pintail	C	"	
Green-winged Teal	C	"	X
Blue-winged Teal	C	"	
Cinnamon Teal	C	"	
American Widgeon	C	"	
Northern Shoveler	C	"	
Wood Duck	R	"	
Redhead	C	Lakes	
Ring-necked Duck	U	"	
Canvasback	C	"	
Greater Scaup	U	"	
Lesser Scaup	C	"	

Birds cont.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Common Goldeneye	U	Lakes	
Bufflehead	U	"	
Ruddy Duck	C	"	
Hooded Merganser	R	Streams	
Common Merganser	C	Streams	
Red-breasted Merganser	C	"	
Turkey Vulture	C	All	X
Goshawk	C	MC	X
Sharp-shinned Hawk	U	MC,S	X
Cooper's Hawk	C	R,MC,P-J	X
Red-tailed Hawk	C	All	X
Swainson's Hawk	U	S,P-J	X
Rough-legged Hawk	C	SD	X
Ferruginous Hawk	U	SD	X
Golden Eagle	C	All	X
Bald Eagle	E	All	X
Marsh Hawk	C	SD	
Osprey	U	Lakes	
Praire Falcon	C	P-J	X
Peregrine Falcon	E	All	
Merlin	C	P-J	X
American Kestrel	C	R,SD,P-J	X
Blue Grouse	C	MC	X
Ruffed Grouse	C	MC	X
Sage Grouse	C	S	
California Quail	C	R	

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Chukar	C	SD	
Ring-necked Pheasant	C	Fields	
Sandhill Crane	R	Marshes	
Virginia Rail	C	"	
Sora Rail	U	"	
Common Gallinule	R	"	
American Coot	C	"	
Semipalmated Plover	U	"	
Snowy Plover	U	"	
Killdeer	C	S	X
Mountain Plover	R	Marshes	
American Golden Plover	U	"	
Black-bellied Plover	C	"	
Common Snipe	C	S	X
Long-billed Curlew	U	Marshes	
Willet	U	"	
Spotted Sandpiper	C	S	X
Solitary Sandpiper	U	Marshes	
Greater Yellowlegs	U	"	
Lesser Yellowlegs	C	"	
Pectoral Sandpiper	U	"	
Baird's Sandpiper	U	"	
Least Sandpiper	C	"	
Western Sandpiper	C	"	
Sanderling	U	"	
Short-billed Dowitcher	U	"	
Long-billed Dowitcher	C	"	

Birds Con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Marbled Godwit	C	Marshes	
American Avocet	C	"	
Black-necked Stilt	C	"	
Wilson's Phalarope	C	"	
Northern Phalarope	C	Lakes	
Herring Gull	U	"	
California Gull	C	"	
Ring-billed Gull	C	"	
Franklin's Gull	C	"	
Bonaparte's Gull	U	"	
Forsters Tern	C	"	
Common Tern	U	"	
Black Tern	C	"	
Caspian Tern	U	"	
Band-tailed pigeon	U	MC	
Rock Dove	C	P-J	
Mourning Dove	C	All	X
Yellow-billed Cuckoo	K	R	
Barn Owl	K	P-J	
Screech Owl	U	R	X
Flammulated Owl	K	MC	X
Great Horned Owl	C	All	X
Pygmy Owl	K	R,P-J	X
Burrowing Owl	L	SD	

Birds Con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Long-eared Owl	C	P-J	X
Short-eared Owl	C	Marshes	
Saw-whet Owl	K	MC	X
Common Nighthawk	C	SD	X
Poor-will	C	P-J	X
Black Swift	U	MC	X
White-throated Swift	C	P-J	X
Black-chinned Hummingbird	C	R	X
Broad-tailed Hummingbird	C	All	X
Rufous Hummingbird	C	MC	X
Calliope Hummingbird	C	MC	X
Belted Kingfisher	U	R	
Common Flicker	C	MC	X
Yellow-bellied Sapsucker	C	MC	X
Hairy Woodpecker	C	MC	X
Downy Woodpecker	C	R	X
Northern Three-toed Woodpecker	U	MC	X
Western Kingbird	C	SD	
Cassin's Kingbird	U	P-J	X
Eastern Kingbird	C	R	
Ash-throated Flycatcher	C	SD	
Says Phoebe	C	SD,P-J	
Willow (Traill's) Flycatcher	C	S	X
Hammond's Flycatcher	U	MC	X

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Dusky Flycatcher	C	MC	X
Gray Flycatcher	K	S,P-J	X
Western Flycatcher	C	MC	X
Western Wood Peewee	C	MC	X
Olive-sided Flycatcher	U	MC	X
Horned Lark	C	SD	X
Violet-green Swallow	C	All	X
Tree Swallow	C	S	X
Bank Swallow	C	R	
Rough-winged Swallow	C	R	
Barn Swallow	C	P-J	X
Cliff Swallow	C	P-J	X
Purple Martin	U	MC	X
Steller's Jay	C	MC	X
Gray Jay	R	MC	X
Scrub Jay	C	R,P-J	X
Black-billed Magpie	C	R,P-J	X
Common Raven	C	All	X
Common Crow	O	R	
Pinion Jay	C	S,P-J	X
Clark's Nutcracker	C	MC	X
Black-capped Chickadee	C	MC	X
Mountain Chickadee	C	MC	X
Plain Titmouse	C	P-J	X
Bushtit	C	MC	X
White-breasted Nuthatch	C	MC	X
Red-breasted Nuthatch	C	MC	X

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Pygmy Nuthatch	C	MC	X
Brown Creeper	C	MC	X
Dipper	C	R	
House Wren	C	MC	X
Rock Wren	C	SD,P-J	X
Canyon Wren	C	P-J	X
Bewick's Wren	C	P-J	X
Long-billed Marsh Wren	L	marshes	
Mockingbird	U	R	
Gray Catbird	U	R	
Sage Thrasher	C	S	X
American Robin	C	R,MC	X
Hermit Thrush	C	MC	X
Swainson's Thrush	C	MC	X
Veery	U	R	
Western Bluebird	U	MC,P-J	X
Mountain Bluebird	C	S,MC	X
Townsend's Solitaire	C	MC,P-J	X
Blue-gray Gnatcatcher	C	R	X
Golden-crowned Kinglet	U	MC,P-J	X
Ruby-crowned Kinglet	C	MC	X
Water Pipet	C	plains	
Bohemian Waxwing	U	R,MC	X
Cedar Waxwing	C	woodlands	
Northern Shrike	U	SD	
Loggerhead Shrike	C	SD	
Starling	C	All	X

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Solitary Vireo	U	R,P-J	X
Warbling Vireo	C	R	X
Orange-crowned Warbler	C	MC	X
Nashville Warbler	U	MC	X
Virginia's Warbler	C	P-J	X
Yellow Warbler	C	R	
Magnolia Warbler	U	MC	X
Yellow-rumped Warbler	C	MC	X
Black-throated Gray Warbler	C	P-J	X
Townsend's Warbler	U	MC	X
MacGillivray's Warbler	C	R	X
Yellowthroat	L	R	
Yellow-breasted Chat	C	R	
Wilson's Warbler	C	R	X
American Redstart	U	R	
House Sparrow	C	cities	
Western Meadowlark	C	SD	
Yellow-headed Blackbird	C	marshes	
Red-winged Blackbird	C	"	
Northern Oriole	C	R	
Rusty Blackbird	O	R	
Brewer's Blackbird	C	R	
Common Grackle	A	R	
Brown-headed Cowbird	C	R	X
Western Tanager	C	MC	X
Black-headed Grosbeak	C	R	X
Lapland Longspur	R	G	

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Indigo Bunting	R	R	
Lazuli Bunting	C	R,S	X
Green-tailed Towhee	C	S, P-J	X
Rufous-sided Towhee	C	S	X
Lark Bunting	O	SD	
Savannah Sparrow	C	G	
Grasshopper Sparrow	R	G	
Vesper Sparrow	C	S, SD	X
Lark Sparrow	C	S, SD	X
Sage Sparrow	U	S, SD	X
Dark-eyed Junco	C	MC	X
Gray-headed Junco	C	MC	X
Tree Sparrow	U	R	X
Chipping Sparrow	C	MC,P-J	X
Brewer's Sparrow	C	S,SD	X
Harris Sparrow	U	P-J	
White-crowned Sparrow	C	P-J	X
Fox Sparrow	K	R	X
Lincoln's Sparrow	U	R	
Song Sparrow	C	G	X
Black-throated Sparrow	U	S,P-J	X
Evening Grosbeak	C	MC	X
Cassin's Finch	C	MC	X
House Finch	C	All	X
Pine Grosbeak	U	MC	X
Rosy Finch	C	S	
Pine Siskin	C	MC	X

Birds con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
American Goldfinch	C	R,P-J	X
Lesser Goldfinch	C	P-J	X
Red Crossbill	U	MC	X
Mammals:			
North Water Shrew	C	R	
Merriam Shrew	U	S,MC	X
Vagrant Shrew	C	R	
Masked Shrew	C	R	
Dusky Shrew	C	MC	X
Little Brown Myotis	C	P-J	X
Fringed Myotis	U	SD, P-J	X
Long-Eared Myotis	C	MC	X
Long-legged Myotis	C	P-J	X
Yuma Myotis	U	P-J	X
California Myotis	C	"	X
Small-footed Myotis	U	"	X
Silver-haired Bat	C	MC	X
Western Pipistrelle	C	P-J	X
Big Brown Bat	C	"	X
Red Bat	U	MC	X
Hoary Bat	U	"	X
Western Big-eared Bat	C	P-J	X
Pallid Bat	C	SD	
Mexican Free-tailed Bat	C	SD	X
Pika	C	MC,P-J	X
White-tailed Jackrabbit	C	S	X

Mammals con't.

Species	Status	Habitat	Probable Occurence on UP & L Leases
Snowshoe Hare	C	MC	X
Black-tailed Jackrabbit	C	SD,P-J	X
Mountain Cottontail	C	S,G	X
Desert Cottontail	C	SD,P-J	X
White-tailed Prairie Dog	C	SD	
Red Squirrel	C	MC	X
Rock Squirrel	C	SD,P-J	X
Uintah Ground Squirrel	C	G, S	X
Golden-mantled Ground Squirrel	C	S,MC	X
Whitetail Antelope Squirrel	C	SD	X
Yellow-bellied Marmot	C	S,MC	X
Northern Flying Squirrel	C	MC	X
Least Chipmunk	C	S,SD,P-J	X
Uintah Chipmunk	C	MC	X
Cliff Chipmunk	U	P-J	X
Northern Pocket Gopher	C	G, S	X
Valley or Botta Pocket Gopher	C	G,S, P-J	X
Ord Kangaroo Rat	C	SD, P-J	X
Great Basin Pocket Mouse	C	SD	X
Beaver	C	R	X
Western Harvest Mouse	C	G, R	X
Canyon Mouse	C	P-J	X
Deer Mouse	C	All	X
Brush Mouse	C	P-J	X
Pinion Mouse	C	P-J	X
Desert Wood Rat	C	SD, P-J	X
Bushy-tailed Wood Rat	C	MC, P-J	X

Mammals con't

Species	Status	Habitat	Probable Occurence on UP & L Leases
Meadow Vole	C	S	X
Mountain Vole	C	S	X
Richardson's Vole	C	R	X
Longtail Vole	C	S, R	X
Black Rat	C	Mines	X
Norway Rat	C	"	X
House Mouse	C	"	X
Western Jumping Mouse	C	R	
Porcupine	C	MC	X
Coyote	C	All	X
Red Fox	C	MC	X
Kit Fox	U	SD	
Gray Fox	C	P-J	X
Black Bear	C	MC	X
Ring-tailed Cat	C	P-J	X
Raccoon	O	R	X
Short-tailed Weasel	R	P-J	X
Long-tailed Weasel	C	R	X
Mink	L	streams	
Black-footed Ferret	E	SD	
Marten	R	MC	X
Badger	C	S,MC,P-J	X
Striped Skunk	C	P-J	X
Spotted Skunk	C	R	X
River Otter	R	streams	

Mammals con't

Species	Status	Habitat	Probable Occurence on UP & L Leases
Bobcat	C	MC,P-J	X
Cougar	C	Mc,P-J	X
Mule Deer	C	All	X
Moose	L	R	
Rocky Mountain Elk	C	MC	X

TABLE I
KEY

Status - Population

C	-	Common, Widespread and Abundant
U	-	Uncommon, Widespread but not Abundant
R	-	Rare, Seldom Seen.
E	-	Endangered, Candidate for Extinction
T	-	Threatened, Candidate for Endangered
L	-	Limited, Restricted to a Specific Habitat
K	-	Status Unknown

Habitat

S	-	Sagebrush
G	-	Grassland
SD	-	Salt Desert Shrub
R	-	Riparian
P-J	-	Pinyon-Juniper Forest
MC	-	Mixed Conifer (Includes Aspen Groves)

TABLE II

Wildlife Rankings of Habitat within Mine Plan Area

Mine	Section	Ranking[a]	Principal Use
Deer Creek	T 17 S R 7 E Sec. 10	2	DWR
Des-Bee-Dove	T 17 S R 7 E Sec. 26	2	DWR
Wilberg	T 17 S R 7 E Sec. 27	2	DWR
Cottonwood Fan Portal Zone	T 17 S R 7 E Sec. 30	1	EWR[b] DWR
	T 17 S R 6 E		EWR[b]
	Sec. 25	1	DWR
	Sec. 36	2	DWR

[a] (Scott, 1977)
[b] No longer considered elk winter range

LAND USE INFORMATION (783.22)

Deseret-Beehive-Little Dove Mines are conglomerated into a single surface mining complex located in a dry wash contributary to Grimes Wash. Mining had its beginning about 1940 and has grown incrementally through the years. No information on production is available (see 3-1). Land use prior to mining was grazing and wildlife (local land users).

The vegetation communities adjacent to the disturbed area are classified as pinyon-juniper along the steep eroded sandstone ledges. Lower elevations are dominated by desert saltbush in Chapeta soils and Mancos shales (see Soils Information).

Topography of the general area dictated its uses; i.e., the lower valleys provided year-round farming and ranching and the higher sediments of the Wasatch Plateau are utilized for summer grazing as it is today.

Currently on the BLM lands in the permit area the livestock use is spring grazing with cattle on the benches (April 1 - June 10). The East Grimes and West Grimes allotments, divided east of Danish Bench, are stocked at 19.4 acres/AUM and 16 acres/AUM for a total of 317 and 263 AUM's respectively. These allotments are judged in fair condition with a downward trend (BLM letter, 1982).

Very little grazing by cattle occurs on the steep slopes above the benches because of the difficult access and scarcity of forage.

The grazing of the USFS lands is confined to East Mountain under an approved rest rotation system (USFS, 1979). Nine permittees graze 486 cattle from June 21 to September 10 for a total of 1,296 AUM's. The range condition is judged good with a static to upward trend. The stocking rate is 11 acres/AUM. All of the cattle use is restricted to the upper slopes and top of East Mountain.

Elk use East Mountain for summer range but winter on the western slopes in the Cottonwood Creek drainage. Mule deer also summer on the mountain and winter on the benches and slopes of the southern and eastern portion of East Mountain from the mouth of Cottonwood Creek around to Rilda Canyon in the Huntington Creek drainage. These ranges are rated as high priority winter range by Utah Division of Wildlife Resources. Critical areas are sensitive areas within high priority areas required to sustain and perpetuate deer during crucial periods of their life cycle. Current herd management levels are one deer/20 acres of winter range (UDWR, 1982)(Map 2-18).

The total forage productivity of the pinyon-juniper range on the benches is 100-324 lbs./acre, dry weight. The pinyon-juniper range on the rockland soils of the steep slopes is lower, estimated at 25-100 lbs./acre, dry weight. The desert shrub range productivity is 100-285 lbs./acre, dry weight. See Vegetation section for productivity details.

The BLM also recognizes the sand and gravel resources on these benches and has designated specific areas for

excavation and processing to aid in community expansion. The BLM visual resource management system rates the benches as Class IV and the cliff faces as Class III. Both of these classifications allow for modification of the land through man's activities. The USFS also rates the south end of East Mountain as modification or partial retention, a scenic value similar to BLM's Class IV and III respectively.

The Land Use Plan for the Wasatch Plateau designates no recreation development or timber sales on East Mountain but does specify the improvement of big game range, protection of watersheds and reconstruction of the Cottonwood Creek road for coal hauling. The south end of the mountain is not in a known oil or gas field and the reserve potential is judged as low.

REFERENCES

Bureau of Land Management June 1979. San Rafael Unit Resource Analysis and Management Framework Plan. Price, Utah.

Emery County Zoning Plat Books. Castledale, Utah.
U. S. Forest Service May 1979. Land Management Plan Ferron-Price Planning Unit. Manti-LaSal National Forest. Price, Utah.

Utah Division of Wildlife Resources May 1982. Utah Big Game Investigations and Management Recommendations 1981-1982. Publication #82.3.

See land use map in the map section (2-17).

A-1 Agricultural Zone, contains the primary farming areas of the county.

RA-1 Residential-Agricultural Zone, this is the area with the communities and the adjacent or intermixed agricultural lands.

M&G-1 Mining and Grazing Zone, all of the county lands outside of the communities, farming areas and forest service boundary.

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Revised 1/27/84

I-1 Industrial Zone, specific areas near communities and highways reserves for industrial development.

Ce-1 Critical Environmental Zone, general designation for all private lands within the forest boundary.

Ce-2 Critical Environmental Zone, specific designation for certain land parcels especially those adjacent to recreation sites in the forest.

PRIME FARMLAND INVESTIGATION (783.27)

After investigating all the lands within the permit boundaries of the Des-Bee-Dove Coal Mine it is determined that these lands do not qualify as "Prime Farmlands" for the following reasons:

1. Historically the lands prior to construction were not used as crop land.
2. The slopes of and surrounding the portal area exceed 10 percent.
3. There is no developed water supply qualifying as an irrigation source.

Following is a negative determination from the U. S. Soil Conservation Service.

United States
Department of
Agriculture

Soil
Conservation
Service

P. O. Box 11350
Salt Lake City, UT 84147

Nobember 10, 1983

RECEIVED
NOV 1 4 1983
MINING AND
EXPLORATION

C. E. Shingleton
Director of Permitting,
Compliance and Services
Mining and Exploration
Utah Power & Light Company
P. O. Box 899
Salt Lake City, Utah 84110

Dear Mr. Shingleton:

Keith E. Beardall, District Conservationist, Price, Utah, has handled the field investigation concerning the area described in your letter of November 1, 1983.

According to observations and data collected, there are no prime farmland soils in the sites A, B, and C (designated on the map you furnished). Soils in these sites are too steep or above established irrigation systems which eliminate the soils from the Prime Farmland category.

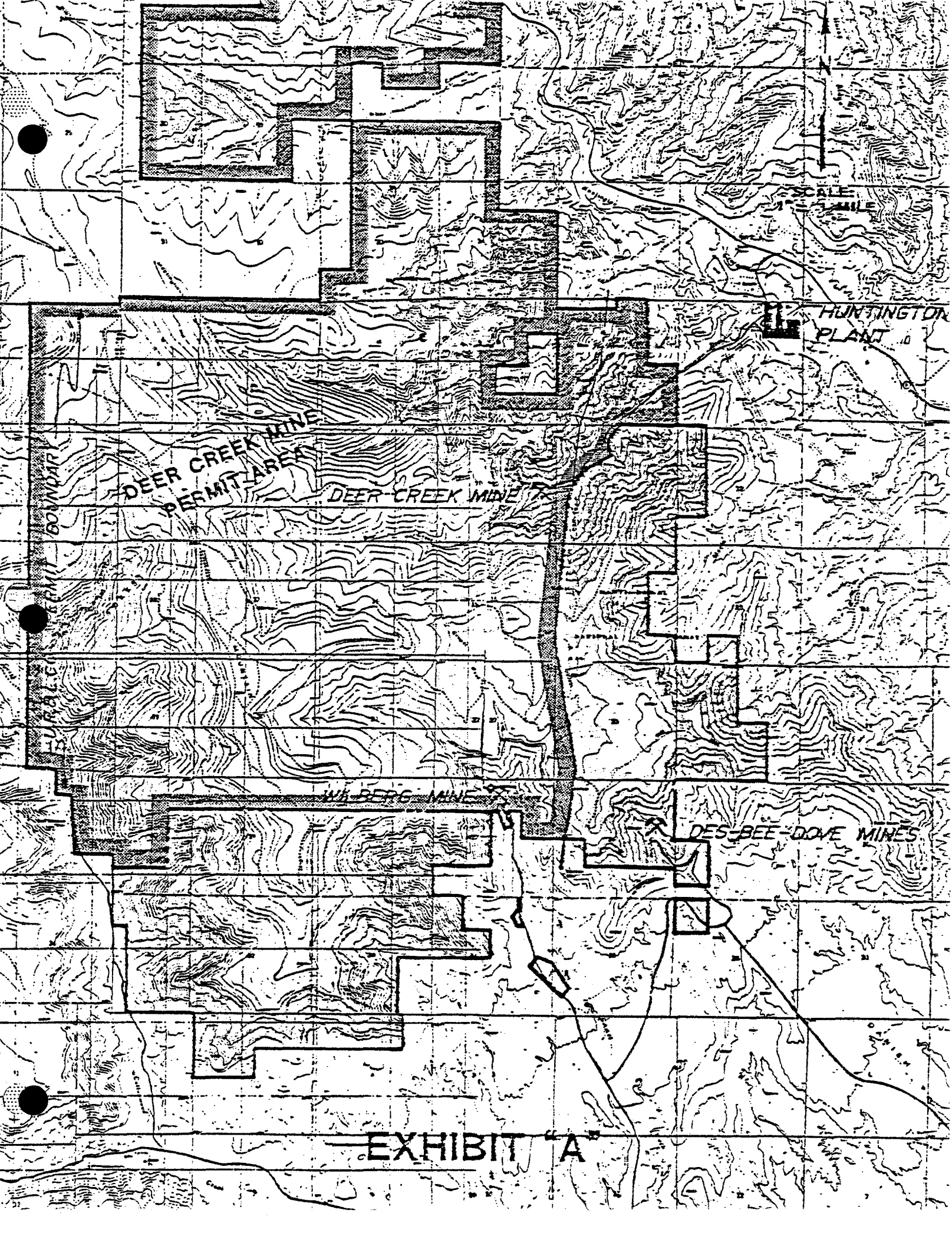
We are retaining the map and your correspondence in this office for future reference. Should you need additional information please call us.

Sincerely,

Ferris Allgood

FERRIS P. ALLGOOD
State Soil Scientist

The Soil Conservation Service
is an agency of the
Department of Agriculture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1 MILE
HUNTINGTON
PLANT
DEER CREEK MINE
PERMIT AREA
DEER CREEK MINE
PERMIT BOUNDARY
WALBERG MINE
DES-BEE-DOVE MINES

EXHIBIT "A"

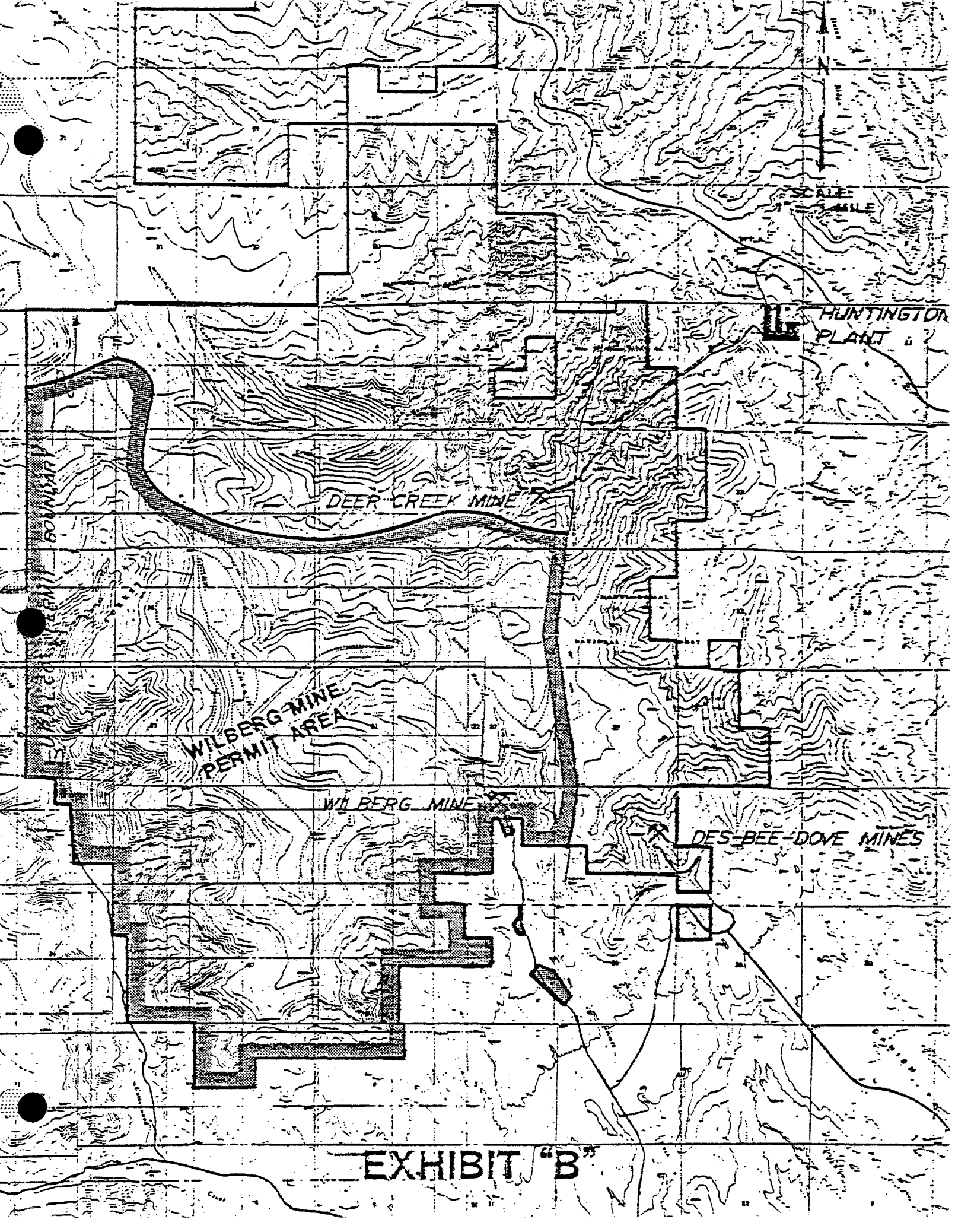
N
SCALE:
1 MILE
HUNTINGTON
PLANT
DEER CREEK MINE
WILBERG MINE
PERMIT AREA
WILBERG MINE
DES-BEE-DOVE MINES

EXHIBIT "B"

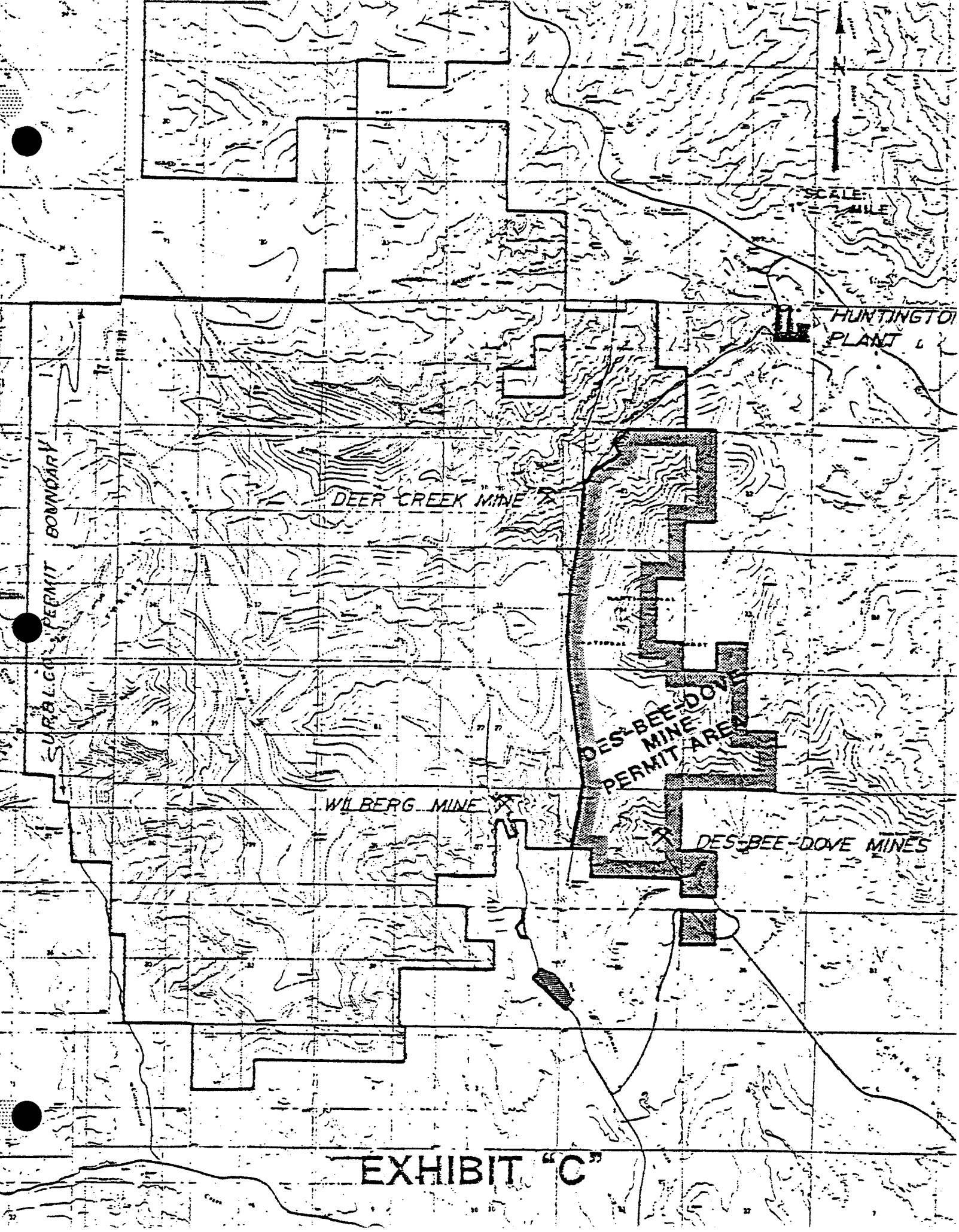
SCALE:
1" = MILE
HUNTINGTON
PLANT
DEER CREEK MINE
SURBLGO PERMIT BOUNDARY
DES-BEE-DOVE
MINE
PERMIT AREA
WILBERG MINE
DES-BEE-DOVE MINES

EXHIBIT "C"

ALLUVIAL VALLEY FLOORS (785.19)

The statutory definition of alluvial valley floors is as follows: "'alluvial valley floor' means the unconsolidated stream laid deposits holding the streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities but does not include upland areas which are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slope wash, together with talus, other mass movement accumulation and windblown deposits." The surface facilities located at the Deer Creek, Wilberg, and Church underground mines are situated in relatively narrow canyons which slope up directly from the draining stream. The canyons lack any soil development and do not contain irrigatable land which could be used for agricultural purposes. The canyons in which the surface facilities are located contain deposits of mass movements, slope wash, debris erosion and sheet runoff. The area is classified as an upland and nonirrigation area and, therefore, cannot be considered as an alluvial valley floor. Furthermore, disturbance or interruption of aquifers within the underground mine complex will have no effect on downstream alluvial valley floors, insomuch as the water will eventually reach the downstream portions of the drainage system through one system or another.

and slopes of the southern and eastern portion of East Mountain from the mouth of Cottonwood Creek around to Rilda Canyon in the Huntington Creek drainage. These ranges are rated as deer winter range by Utah Division of Wildlife Resources. Current herd management levels are one deer/20 acres of winter range (UDWR, 1982) (see Maps 2-18 and 2-19).

The total forage productivity of the pinyon-juniper range on the benches is 100-324 lbs/acre, dry weight. The pinyon-juniper range on the rockland soils of the steep slopes is lower, estimated at 25-100 lbs/acre, dry weight. The mixed conifer range productivity is 167-290 lbs/acre, dry weight. See Vegetation section for productivity details.

The BLM also recognizes the sand and gravel resources on these benches and has designated specific areas for excavation and processing to aid in community expansion. The BLM visual resource management system rates the benches as Class IV and the cliff faces as Class III. both of these classifications allow for modification of the land through man's activities. The USFS also rates the south end of East Mountain as modification or partial retention, a scenic value similar to BLM's Class IV and III respectively.

The Land Use Plan for the Wasatch Plateau designates no recreation development, or timber sales on East Mountain but does specify the improvement of big game range, protection of watersheds and reconstruction of the Cottonwood Creek road for coal hauling. The south end of the mountain

DES-BEE-DOVE MINE OPERATION

Mining began as early as 1898 in the unnamed canyon where the Des-Bee-Dove Mine is located. The original mine workings, called the Griffith Mine, were limited in extent due to the rugged terrain and poor access. The Griffith workings were purchased in 1936 by two men, Edwards and Broderick, who fashioned a crude access road and mined until 1938.

Castle Valley Fuel Company purchased the Edwards and Broderick property in 1938. The L.D.S. Church purchased coal lands adjacent to Castle Valley Fuel Company in 1938 and began their operations in that year.

The Church Mine operated under contract to a Mr. Killian of Orangeville until it was closed in 1943 due to World War II. Castle Valley Fuel Company continued to operate until 1947. The L.D.S. Church purchased Castle Valley Fuel's operation in 1947 and combined operations to form Deseret Coal Company, a church welfare project.

Deseret Coal Company continued operations until Utah Power & Light Company acquired it in 1972.

Mining takes place in three main portals, Deseret, Beehive, and Little Dove. Hence the name Des-Bee-Dove Mine. Mine personnel and coal handling facilities are combined to service all three portals. Mine location is shown on Figure 1.

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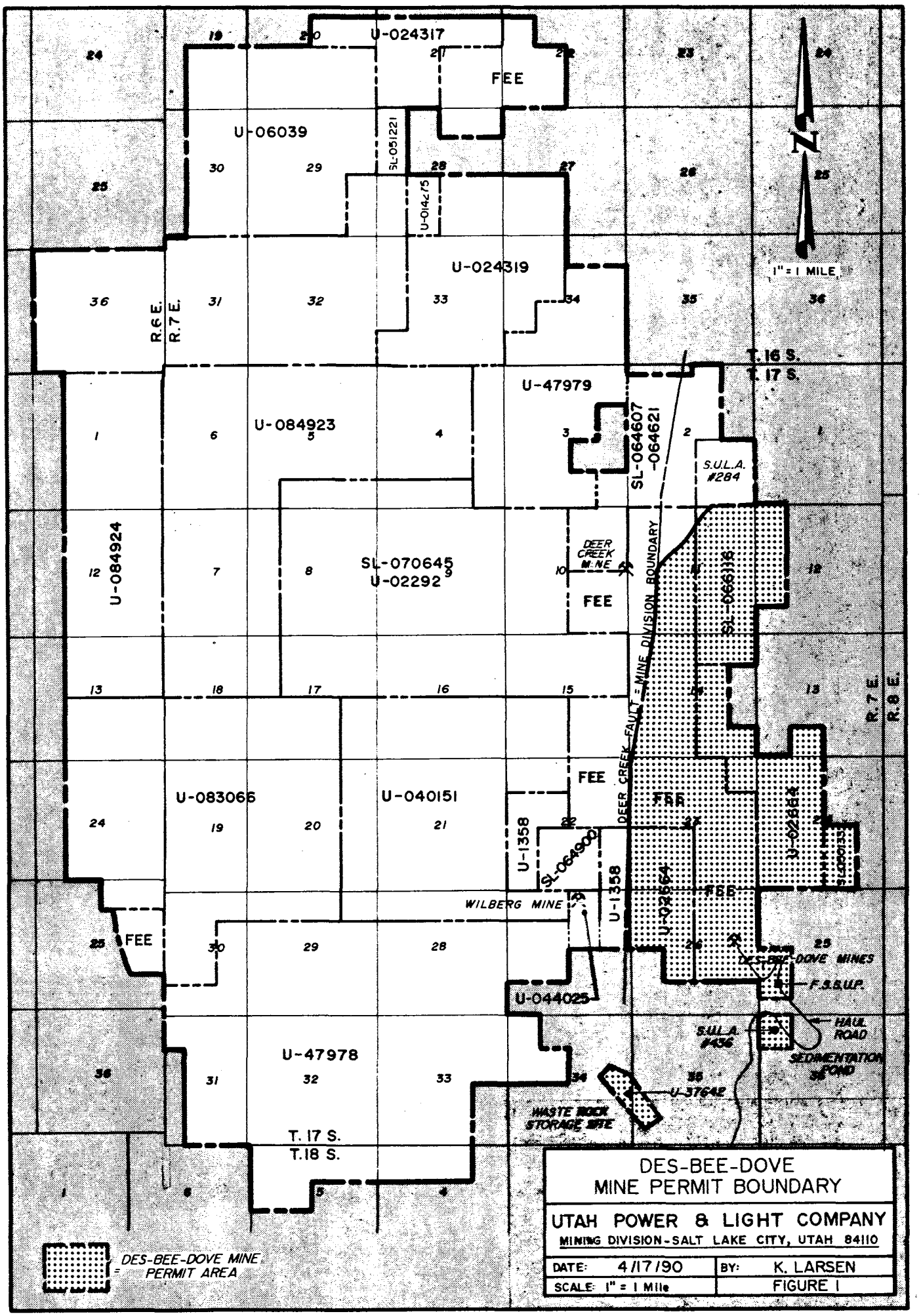
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1" = 1 MILE
R.6 E.
R.7 E.
T.16 S.
T.17 S.
U-47979
U-084923
SL-064607
-064621
S.U.L.A.
#284
U-084924
SL-070645
U-02292
DEER CREEK MINE
FEE
SL-066116
DEER CREEK FAULT = MINE DIVISION BOUNDARY
R.7 E.
R.8 E.
U-083066
U-040151
U-1358
SL-064900
U-02864
WILBERG MINE
DES-BEE-DOVE MINES
F.S.B.U.P.
U-044025
S.U.L.A.
#436
HAUL ROAD
SEDIMENTATION POND
U-47978
U-37642
WASTE ROCK STORAGE SITE
T. 17 S.
T.18 S.
DES-BEE-DOVE MINE PERMIT AREA
DES-BEE-DOVE
MINE PERMIT BOUNDARY
UTAH POWER & LIGHT COMPANY
MINING DIVISION-SALT LAKE CITY, UTAH 84110
DATE: 4/17/90
BY: K. LARSEN
SCALE: 1" = 1 Mile
FIGURE 1

Two mineable seams exist in the Des Bee Dove Mine area. Hiawatha (lower) Seam is mined through Deseret portal. Blind Canyon (upper) Seam is mined through Beehive and Little Dove portals. Approximately 246 acres of mineable coal remain accessible in Blind Canyon Seam from Des Bee Dove Mine. Hiawatha Seam contains approximately 267 acres of mineable coal reserve remaining accessible.

The Des Bee Dove Complex's current recoverable reserves total 8.2 MM tons.

The basic Des Bee Dove mining plan consists of a system of mains and sub-mains connecting a series of room-and-pillar continuous mining sections. Relatively short mine life and limited remaining mineable reserves discount the economics of applying alternate mining methods.

Extracted coal is sized in the Des Bee Dove coal handling facility and trucked predominantly to the Utah Power & Light - Hunter Power Plant, approximately 13 miles.

MINING PLAN (784.11)

The Des Bee Dove mining plan is based on the geologic information outlined in Geologic Section. Good knowledge of the entire property is available from the outcrop and drilling. Detailed knowledge of a smaller part of the property is known from mining operations.

The mining areas are bounded by natural and imposed limits with varying degrees of confidence as to location and extent:

- Lease boundaries - definitely located and invariable in the short term
- Faults - may vary somewhat from currently assumed locations
- Stratigraphic thinning (pinchouts) - mining limits may vary hundreds of feet as information becomes available and as mining recovery economics and practicality are studied further
- Underground burned areas - from a practical point of view are undeterminate prior to mining.

Permit boundary and approximate locations of faults affecting the Des Bee Dove Mine plan are illustrated in Maps 3-1 and 3-2. Faults influencing the mining plan are Maple Gulch Fault, Deer Creek Fault, and Bear Creek Canyon Fault.

Mining limits in Blind Canyon Seam include the 5 foot seam thickness. The underground mining machines now employed in the Des Bee Dove Mine are, by design, limited to a 5 foot coal seam. The Blind Canyon 5 foot thickness roughly parallels the Little Dove main entries for approximately one-half mile and effects only a small portion of the overall reserve. The northern extent of mining in Hiawatha Seam was determined by coal splits which occur at the north end of the current Deseret workings. The interburden in the mineable area where the two seams overlap varies from 70 to 120 feet.

Since mining through Deseret portal is overlain by Beehive and Little Dove mining, detailed scheduling has been undertaken to ensure that the upper seam is mined prior to the

mining of the lower seam while still following good mining practices in generating the mine layout.

The mine layout, as illustrated in Maps 3-1 and 3-2, is an arrangement of room-and-pillar sections interconnected by a system of six-entry mains and sub-mains. This arrangement is predicated on geographical dedication of reserves and available geologic information. Better knowledge of the geology and quality parameters of the coal reserve through additional drilling, mine development work, and continued operating experience at Hunter Power Plant will influence mining techniques and mine plans.

The most recent mine plan comprises 3 sets of main entries, 4 sets of sub-main entries, and 32 room-and-pillar sections. The planned extraction sequence accommodates Beehive and Little Dove first. The sequence of mining at Des Bee Dove is shown on Maps 3-1 and 3-2.

Plans for roof control, ventilation system, and methane and dust control have been submitted to MSHA.

COAL RECOVERY

The maximum amount of economically recoverable coal will be extracted from this mine with the exception of protective coal, which must be left in place to insure the integrity of the mine. This protective coal can be broken into two separate categories of barrier coal and strata control coal.

One hundred (100) foot wide barrier pillars are left between room-and-pillar panels to provide effective strata control over each panel. These barriers also act as fire

isolation barriers, should a combustible incident arise in a panel.

Additional barriers 300 to 500 feet wide are left between room-and-pillar panels and the main entries of the mine. These barriers protect the main entries which contain the major ventilation and transportation routes of the mine.

Upon exhaustion of the reserves in any particular area, the barrier pillars surrounding the main entries will be sequentially extracted along with the pillars of the main entries.

Strata control coal is left in the areas where the floor or roof rock is unstable and subject to failure. This coal will be left as a safety measure, during the development of the section, and will be extracted during the retreat of the section if safely possible.

Using this method of room-and-pillar mining, it is our intention to recover the maximum amount of economically feasible coal in this mine.

It is anticipated that occasions will aries when resource recovery cannot be fully accomplished, as outlined by the mine plan, due to difficult mining conditions. However, before any modification is made, it will first be discussed with the appropriate BLM officials for approval.

Applicant will comply with all special terms and conditions of the federal coal leases.

The following table shows the number of acres affected by mining for each 5 year period.

In areas of seam overlap, only the first mining in the area is considered. Subsequent mining in the other seam is not considered since the area has previously been affected.

TABLE 4

ACRES AFFECTED BY MINING

Time Period	# Acres Affected
1983-1987	337
Next 5 Years Production	360
Surface Facilities	20
TOTAL	717

Abandonment of the coal mine will be accomplished by a series of systematic sealings of worked out areas within the mine. As each section of the mine is extracted, the gob area left behind will be sealed off from the mine atmosphere by constructing seals. These seals will be constructed in accordance with MSHA regulations.

Upon final extraction of the mine, portal seals will be constructed. Prior to any construction, however, BLM officials will be notified and approval obtained.

MINING METHOD

Des Bee Dove Mine is limited strictly to room-and-pillar methods employing continuous mining units.

Figure 2 illustrates the basic configuration of the main entries. A six-entry system is planned for the main headings with openings driven 20 feet wide on 100 foot centers. The pillars created thereby measure 80 feet by 80 feet, a size

which, in the past, has proven sufficient to support the overlying strata.

For development of room-and-pillar sections at Des Bee Dove Mine, three entries will be opened on advance with two or more developed on retreat in conjunction with pillar extraction. Openings are 20 feet wide on 100 foot x 100 foot centers. The sequence of pillar recovery is shown in Figure 3 (near the end of advance and beginning of retreat and pillaring). Figure 4 shows in detail the method planned for recovering individual pillars.

Figure 6 indicates that 60% pillar recovery, leaving a foot of top coal, results in just over 50% coal recovery for configuration planned at Des Bee Dove.

MINE PRODUCTION

Mine production is based on an annual requirement of 725,000 tons from Des Bee Dove Mine. Production requirements are fulfilled by employing three continuous miner units working 235 days per year at an average individual production rate of 515 tons per machine shift. Individual unit production rates vary from the average depending on mining conditions, seam thickness, and operational mode. (Operational modes include: (1) development advance, (2) production advance, and (3) production retreat.)

MINE EQUIPMENT

Many pieces of major underground ancillary equipment are utilized at Des Bee Dove Mine to promote safe and efficient operation of the continuous mining units.

Des Bee Dove Mine is a trackless mine. Men and

materials are delivered by rubber-tired diesel tractors and mantrips throughout the mine. All principal in-mine haulage of coal is by belt conveyor. Of the six entries in the main entry systems, one entry is dedicated mainly to conveyor and one to roadways for diesel haulage.

Table 5 lists the major ancillary equipment used in Des Bee Dove Mine.

TABLE 5

DES BEE DOVE MAJOR UNDERGROUND ANCILLARY EQUIPMENT

Continuous Mining Units	General Mine
4 - Continuous Miners	10- Compressors
8 - Shuttle Cars	19 - Transformers
8 - Scoops	52,240' - 42" Conveyors
4 - Roof Bolters	20,800' - 36" Conveyors
25 - Rock Dusters	33 - Conveyor Drives
6 - Power Centers	6 - Foam Generators
5 - Feeder Breakers	8 - Welders
	8 - Battery Chargers
	8 - Diesel Personnel Tractors
	9 - Diesel Mantrips
	38 - Material and Equipment Trailers
	9 - Diesel Material Tractors
	13 - Tool and Material Carts

ENGINEERING PRINCIPLES AND TECHNIQUES

A variety of engineering principles and techniques are applied in the Des Bee Dove Mine operation. Principles of engineering employed are those associated with standard prudent

mine engineering practice. Employment of knowledgeable, experienced personnel makes application of such principles possible. Engineering design techniques include computer simulation of coal extraction, ventilation, and pumping systems, along with research and testing in rock mechanics and subsidence.

Long-range mine planning by computer simulation plays an important role in design. Computer simulation of coal extraction assists the engineers in projecting annual tonnages and sequencing extraction in sections. Computer based long-range planning helps to maximize annual production and better utilize continuous mining units. The two seam nature of the property and consequent need to extract upper seam sections in advance of lower seam sections increases the value of these simulations.

Ventilation and dust suppression are essential in underground mining operations. Delivering air and water from their respective sources to fulfill these needs can become complicated in a large operation. Simulations of ventilation and hydraulic networks play a significant role in planning for future needs and installing systems for delivery. Des Bee Dove Mine planning includes these ventilation and hydraulics simulations.

SIGNS AND MARKERS

Signs and markers will be made of durable material, such as thin sheet metal, and will be maintained during the conduct of all activities to which they pertain or until bond release. Each type of sign and marker will be uniform design and shape and will be located so as to be easily seen and read.

Perimeter, buffer zone and topsoil markers will be

approximately 10" x 14", be post mounted, and read "Perimeter Do Not Disturb, Buffer Zone Do Not Disturb, or Topsoil" respectively.

On the day in which blasting occurs, a portable sign which says "Warning: Explosives in Use" will be displayed near the entrance sign. The immediate vicinity of blasting will be marked with red flagging or red cones.

A mine permit identification sign will be placed at each point of access from public roads to areas of surface operations and facilities within the permit area. The sign will state the facility's name, owner/operator address and phone number, Utah Reclamation Permit No., MSHA ID No., and NPDES Permit No. The sign size will be approximately 40" wide by 18" high.

Upon cessation of operations or bond release signs and markers will be removed as appropriate.

MINE FACILITIES

INTRODUCTION

Des Bee Dove Mine facilities are located on 20 acres in an unnamed wash on the perimeter of East Mountain. The natural terrain is rocky, dry and very steep with moderate vegetation. Surface facilities include the following: access haul road, sediment pond, earthen structures, coal stockpile, tipple, facility conveyors, parking lot, office-bathhouse-warehouse, underground shop, materials storage areas, access and service roads, mine ventilation fans, power supply and substation, potable water system, sewer treatment system, and drainage systems. Disturbed areas are, mine area proper, 20 acres; access haul road (2.8 miles), 50 acres; and sedimentation pond area, 4.5 acres.

Specific locations of mine facilities are shown on Maps 3-6 and 3-7.

All facility plans are on file at Utah Power & Light Company - Fuel Resources, 324 South State, Salt Lake City, Utah. They are available for public inspection. Facility photographs are in Appendix IX.

With the exception of mine roads and conveyors, a narrative follows explaining the construction, use, maintenance, and removal of the aforenamed facilities.

DAMS, EMBANKMENTS, AND OTHER IMPOUNDMENTS

Sediment Pond - A pond has been designed and constructed for sediment control at Des Bee Dove Mine. The pond design capacity is 19.8 acre-feet, 2.0 acre-feet for sediment and

17.8 acre-feet for runoff. The pond design will impound runoff from the 10 year/24 hour storm as determined from the N.O.A.A. Atlas 2. A grouted rip-rap spillway is installed in the dam to provide controlled release of runoff from storms in excess of the 10 year/24 hour precipitation event.

Construction and design of the pond was under the direction of a registered professional engineer. Details of pond construction are in Appendix VIII together with reconstructed dimensions after the inundation of the 100 year storm of August 1983.

Slopes constructed on fill have been revegetated to minimize erosion.

Maintenance of the sediment pond includes quarterly inspections and discharge monitoring. Copies of inspection reports by a registered professional engineer are submitted to the Division following inspection. The pond will be dredged of sediment when sediment volume is 60% of design capacity.

Reclamation of the pond will complete the proposed Des Bee Dove reclamation process. The pond will be allowed to dry followed by backfilling and grading. Graded contours will be compatible with the natural surroundings. Revegetation will be performed as outlined in Reclamation Plan.

During construction, excess material was placed below and adjacent to the sediment pond. This small disturbance (0.77 acres) has been included in the permit application and will provide the needed reclamation materials for the sedimentation pond after mining. Contemporaneous reclamation includes

revegetation seeding completed in August 1984.

Earthen Structures - Five major earthen structures are utilized at Des Bee Dove Mine for support of facilities. They are identified as follows:

1. Tipple Area Structure
2. Bathhouse Are Structure
3. Coal Stockpile Structure
4. Deseret Portal Structure
5. Beehive Portal Structure

Construction details of earthen structures are included in Existing Structures.

Largest of the earthen structures is the tipple area structure providing 4.1 acres of working area. Tipple, material storage, fuel facility, auxiliary coal stockpile, and access road are supported by this structure.

The bathhouse area structure occupies 2.1 acres and supports office-bathhouse-warehouse, parking lots, and material storage shed. This structure is mostly asphalt surfaced.

Less than one-half acre is occupied by the coal stockpile structure. Short term stockpiles are repeatedly constructed here for surge control of the run-of-mine product.

Deseret portal structure, mostly cut and some fill, is founded on the Starpoint Sandstone. This 0.9 acre structure supports Deseret #1 ventilation fan, main substation, coal transfer structure, conveyors, stacking tube (utilized as a coal transfer), material storage, trash bin, and portal access road.

Beehive portal structure occupies 1.1 acres and

supports material storage, Little Dove conveyor, a coal transfer structure, Little Dove ventilation fan and a trash bin.

Some small road cut structures are utilized for support of the culinary water storage tank, Beehive ventilation fan, Deseret #2 ventilation fan, secondary substation, and auxiliary water storage.

Maintenance of the structures is minimal. Periodic inspections will be made to observe changes in stable structure condition. Resurfacing of parking areas and regrading of graveled surfaces will be done as needed. Surface drainage structures will be inspected and cleaned as needed to ensure proper drainage and promote stability.

Details of earthen structure reclamation are included in Reclamation Plan.

OVERBURDEN AND TOPSOIL HANDLING AND STORAGE

At present, no facilities exist specifically for overburden and topsoil handling and storage at Des Bee Dove Mine. All overburden removed in the mine area has been utilized as construction material for earthen fill structures. The activities occurred prior to 1977.

COAL HANDLING FACILITIES

Des Bee Dove coal handling system is designed to collect coal on a conveyor and transfer system and prepare three separate facility products. A description of the coal handling system follows. Components of the coal handling system are shown on Maps 3-6 and 3-7.

Facility Conveyors - All facility conveyors are

separately identified and discussed in Transportation Facilities.

Transfer Structures - Three separate transfer structures are utilized in the Des Bee Dove coal handling system.

The 16" x 0" run-of-mine product is conveyed out of the mine directly to the stacking tube.

An 80' stacking tube arrangement is utilized to transfer Little Dove coal to the Deseret portal area for transfer to the coal stockpile. The stacking tube transfer collects run-of-mine coal and delivers it to a concrete surge bunker at the base of the tube. Coal is reclaimed via two vibratory feeders at the base of the bunker for transport to the Deseret portal transfer structure.

Deseret portal transfer structure receives run-of-mine product from Deseret portal and Little Dove portal. Coal flow is diverted past an adjustable flop gate onto main and/or auxiliary coal stockpile feed belts.

All transfer structures are steel frame construction on concrete foundations.

Standard mechanical maintenance procedures are applied on transfer structures to ensure smooth operation. Transfer chutes are enclosed and inlets and outlets are rubber curtained to minimize contribution of fugitive dust.

All transfer structures will be dismantled and sold for salvage or scrapped during reclamation. Concrete foundations will be removed, broken up, and used for coarse backfill.

Coal Surge Bin and Stockpile - Coal is collected from the main stockpile feed conveyor in an 800 ton capacity coal

surge bin which delivers directly to a reclaim feeder. The surge bin automatically overflows into auxiliary storage adjacent to the bin.

Run-of-mine product is diverted out the auxiliary stockpile feed conveyor for further stockpiling when the overflow stockpile is filled. Maximum coal stockpile capacity is 10,000 tons. Coal is moved to a reclaim feeder by rubber-tired front-end loader. Stockpiles are usually depleted within one month of original placement.

Maintenance of the stockpile area is minimal. Coal stockpiles are moved and cleaned up as soon as possible to minimize chance of spontaneous combustion. Drainage ditches are kept clear to ensure adequate drainage of the stockpile area.

Prior to final reclamation, all coal will be cleared from the stockpile area. The concrete surge bin will be demolished and used for coarse backfill. The earthen structure supporting the stockpile will be reclaimed as detailed in Reclamation Plan.

Coal Reclaim and Sizing - A single vibratory feeder is utilized to reclaim coal from the short-term stockpile onto a 36" tipple feed conveyor. The run-of-mine product passes two tramp iron magnets before entering the tipple for screening, sizing, and separating. The tipple sizing and separating circuit is illustrated in Figure 7.

Run-of-mine coal is screened of -1 5/8" size before crossing a picking table. Rock and trash are picked from the product stream on the picking table and separated. Rock drops to

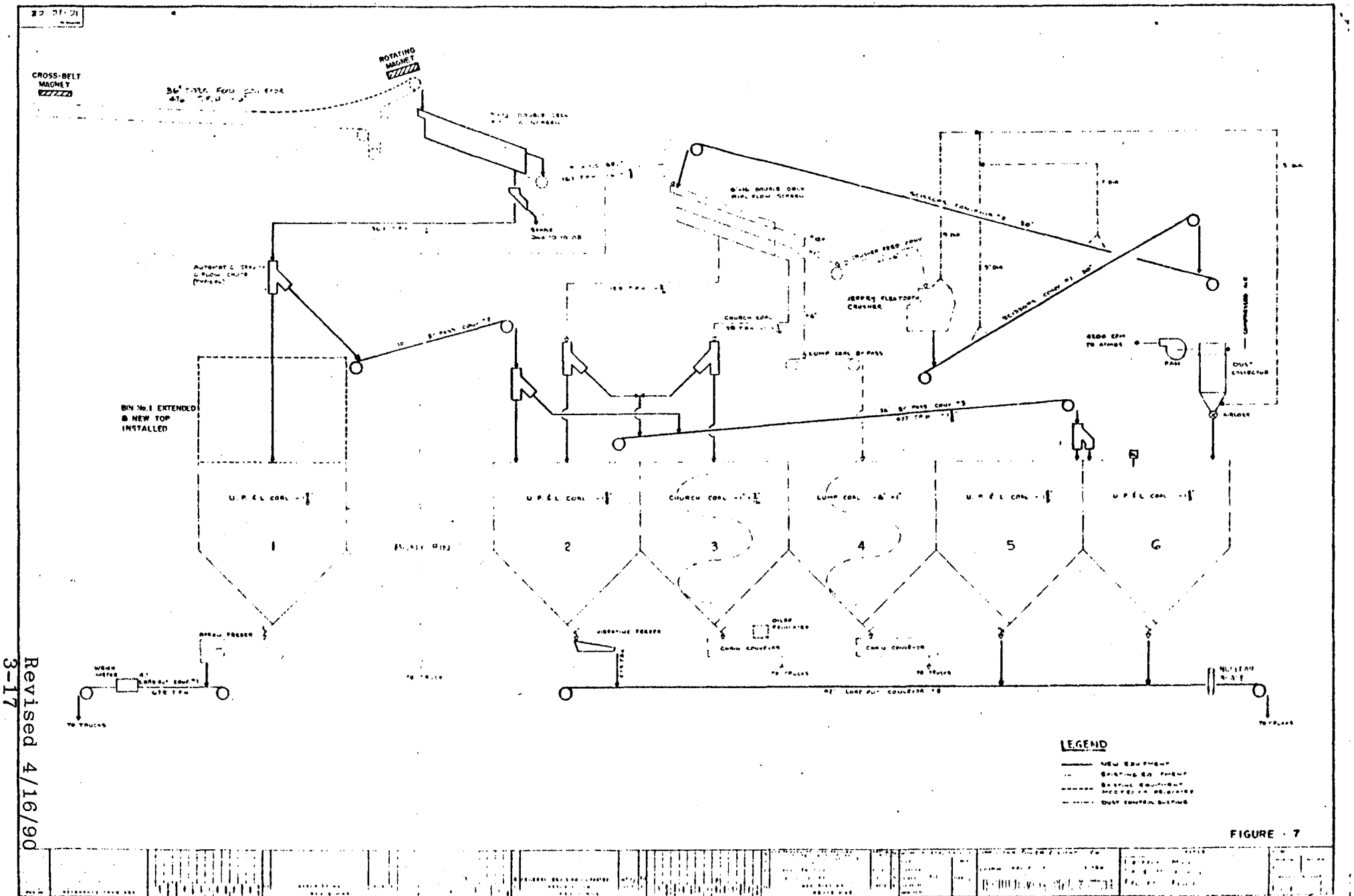

CROSS-BELT MAGNET
ROTATING MAGNET
BIN No.1 EXTENDED & NEW TOP INSTALLED
JEFFREY FLEXTOOTH CRUSHER
DUST COLLECTOR
FAN
AIRLOCK
CHURCH COAL
LUMP COAL
1
2
3
4
5
6
LEGEND

FIGURE - 7

a bony bin and trash is swept to a trash pile beneath the tipple. The -1 5/8" size coal is delivered to a power plant feed bin (bin #1 on Figure 7).

Lump coal (+6") is screened from the product stream and collected in a lump coal bin or delivered for further crushing. All +1" coal from the second tipple screen (double-deck) and excess lump coal are fed through a Jeffrey Flextooth Crusher and recirculated to the double deck screen for further separation.

Two products are collected from the double-deck screen and removed from the product stream. Minus 3/16" size is delivered to a plant feed product bin (bin #2 on Figure 7). Minus 1" to plus 3/16" size is collected for L.D.S. Church stoker coal or diverted to plant feed bins when the stoker coal bin (#3 on Figure 7) is full.

All product bins are installed with overflow bypass systems except the lump coal bin. Using the identification number of Figure 7, bin #1 overflows to bin #2. Bins #2 and #3 overflow to bins #5 and #6.

Bin #1 which collects power plant feed product (-1 5/8") holds 285 tons maximum. All other bins, including the bony (waste rock) bin, hold a maximum 160 tons.

Plant products are generally gravity fed from the bins and conveyed out the base of the tipple into trucks for transport to various destinations. Power plant feed (-1 5/8") is trucked predominantly to UP&L-Hunter Power Plant. Some power plant feed is trucked from Des Bee Dove Mine to UP&L's Carbon Power Plant. Lump coal (+6") is sold to employees or the L.D.S. Church.

Stoker coal is sold to the L.D.S. Church.

Tipple construction is steel frame. Most tipple components are metal construction. Standard building maintenance procedures are applied on the tipple to promote safety and utility. Standard mechanical maintenance procedures are followed to ensure smooth operation and long life of moving parts.

During reclamation, the tipple will be dismantled. metal and mechanical parts will be sold for salvage or scrapped. Concrete foundations will be broken up and used for coarse backfill.

When insufficient trucks are available to adequately deplete the run-of-mine coal stockpile, tipple processed coal is released and placed in a stockpile in the tipple yard. The tipple yard stockpile has a maximum capacity of 8,500 tons. Coal is stockpiled here only temporarily for periods less than a week. Coal is loaded from the stockpile by rubber-tired front-end loader.

The tipple yard stockpile requires no maintenance.

All coal will be removed from the tipple area prior to reclamation. Details of tipple area reclamation are included in Reclamation Plan.

WASTE ROCK AND NON-COAL WASTE DISPOSAL

A copy of waste rock disposal plans for the Des Bee Dove Mine are included in Appendix V. See Cottonwood/Wilberg application for reclamation.

Non-coal waste is hauled from the mine and placed in concrete trash bins near the mine portals. Two concrete bins are

utilized at Des Bee Dove Mine. Locations of these bins are shown on Maps 3-7 and 3-8. Trash is removed from the coal product stream and stacked in a pile beneath the tipple.

Non-coal wastes are collected periodically from the trash bins and tipple trash piles and disposed of in a State approved disposal area.

The trash bins require no maintenance.

During reclamation, concrete trash bins will be broken up and used for coarse backfill.

OTHER MINE FACILITIES

Office-Bathhouse-Warehouse - A 210' x 80' steel frame building is utilized for office, bathhouse, and warehouse facilities at Des Bee Dove Mine. The basic building construction consists of steel reinforced concrete floor, pre-fab steel framing, and heavy gauge aluminum exterior (walls and roof).

Approximately 3,200 sq. ft. are occupied by offices for administrative, clerical, safety, and engineering personnel. Office area interior consists basically of wooden stud framing, sheet rock and wood paneled walls, linoleum floors, and acoustical tile ceilings.

The bulk of the building (8,800 sq. ft.) is dedicated to bathhouse space which includes showers, lockers, bathrooms, and lamp room facilities for miners and supervisors. Interior is basically concrete block walls, bare concrete floors, and open ceilings.

The remaining 4,800 sq. ft. of building space is utilized for storage of small parts, materials, and machinery

requiring cover and security.

Standard building maintenance procedures are followed to maintain the office-bathhouse-warehouse.

During reclamation, usable interior components will be salvaged and the building will be demolished and removed from the premises. Concrete floors and foundations will be broken up and used for coarse backfill material.

Parking Lot - A 1.8 acre asphalt surfaced parking area is located near the office-bathhouse-warehouse for use by mine personnel. Approximately 75 designated parking spaces are provided. A 4 to 6 inch thick asphalt surface covers the parking area. Asphalt berms and steel guard rails line the outside edge of the lot.

Runoff from the parking areas is collected within the asphalt berms and directed through the surface drainage system to the sediment pond. The parking lot is cleared of snow and debris and resurfaced as needed.

Asphalt will be broken up and used for coarse backfill during reclamation.

Underground Shop - An underground maintenance shop is located at Des Bee Dove Mine. It occupies approximately 1,100 sq. ft. just inside the portal opening. The shop entrance is concrete block including an 8' x 15' roll-up steel door. Interior is roof bolted and shot creted walls and ceiling with concrete floor.

The underground shop is used for periodic maintenance and minor overhauls on small equipment such as tractors, scoops,

and trailers.

Standard building maintenance procedures will be followed on the underground shop to ensure good housekeeping and order.

Reclamation for the shop will include salvaging of usable interior components, demolishing the entrance, and sealing and backfilling the portal.

Material Storage Areas - Approximately one acre of the tipple fill structure is designated for material storage. Items stored in this area include new and used equipment and materials such as steel beams, sheet metal, conveyor belt, wood beams, timbers, and power cable. This material storage area is gravel surfaced and fenced. A concrete salt storage bin is also located in this area.

All outside material storage areas are gravel surfaced.

South of the office-bathhouse-warehouse in the parking lot is a material storage shed. The shed is set on steel pipe stands about 3 feet off the ground. It is 150' long, 10' deep and 12' high with a gradually sloping roof. Shed construction is steel walls, roof and shelving with concrete floors except for one small extension of the shed on the far south end which is wood with concrete floor set on the ground. Chain-link gates on the front of the shed provide the required security.

Items stored in the shed are materials and machine parts requiring limited security and cover.

Deseret storage area is located outside the Deseret portals and occupies space either side of the access road to

Beehive portal. Materials stored here include crib blocks, timbers, concrete blocks, bagged rock dust, and roof bolts.

Beehive and Little Dove storage area is just outside Beehive portal. Items stored here are the same as those stored outside Deseret portal.

Maintenance of the outside storage areas is limited to snow and debris removal and resurfacing as needed.

During reclamation, material storage areas will be cleared and reclaimed as outlined in Reclamation Plan.

Fuel Facilities and Oil Storage - Two separate fuel facilities are utilized at Des Bee Dove Mine. They are identified as follows:

1. Lower Fuel Facility
2. Water Tanker Fuel Facility

Lower fuel facility is located on the west side of the tipple yard on a small rock and soil embankment. Two diesel fuel tanks are in use with 1,000 and 500 gallon capacities. One of the tanks is set directly on the fill and one is on a metal stand.

Due to the dry nature of the mine, water was trucked and pumped to the mine for use in coal dust suppression. A 3,000 gallon diesel fuel tank is provided near the pump house for refueling of the water delivery truck. This facility is no longer used but is retained for emergency use.

Fuel tanks are clearly marked identifying the flammable nature of their contents. These facilities are placed to eliminate the chance of collision with mobile machinery.

In conjunction with reclamation, all fuel facilities will be removed and sold for scrap or salvaged.

Mine Ventilation Fans - Four 150 HP, axial flow fans are utilized to ventilate the Des Bee Dove Mines. They are as follows:

1. Deseret #1 Fan
2. Deseret #2 Fan
3. Beehive Fan
4. Little Dove Fan

Each fan is electric motor driven. Each fan ventilates by exhausting air from the mine through a portal opening with the exception of Beehive fan which draws exhaust air through a shallow shaft. All these fan installations are set on concrete foundations.

During operation, the fans are inspected daily and greased as needed. Mechanical maintenance procedures are followed to keep the fans operational at all times.

During reclamation, the fan installations will be dismantled and salvaged. The fan portals will be sealed. The Beehive ventilation shaft will be plugged and capped from within the mine. Concrete foundations will be broken up and used for coarse backfill.

Power Supply and Main Substation - Power is supplied to Des Bee Dove Mine from a 69 KV fed substation which transforms the utility service down to the utilization level of the mine and surface facilities. The utility service line runs to the main substation along the hillside east of the surface facilities.

The power supply system was installed and is maintained by Utah Power & Light Company - Southern Division.

At the end of mine life, the system will be removed by Utah Power & Light Company - Southern Division. Gravel and foundation material from the substation will be used for backfill.

WATER POLLUTION CONTROL FACILITIES

Drainage System - Des Bee Dove drainage system is designed to adequately collect, pass, and control sediment from a 10 year/24 hour precipitation event. No perennial streams are located in the Des Bee Dove drainage. System collection and control are illustrated in Map 3-8.

Runoff is collected from Des Bee Dove drainage "disturbed" and "undisturbed" areas and passed to the sediment pond. The sediment pond and drainages are designed to adequately handle all runoff from the Des Bee Dove drainage.

The drainage system consists of open ditches, bermed roadways, and culverts which collect runoff and divert it into an unnamed tributary of Grimes Wash and ultimately into the Des Bee Dove sediment pond.

Disturbed areas of the Des Bee Dove mining complex totals only 24.5 acres including the sedimentation pond. The area designed for collection and sediment control totals over 297.7 acres (see Sedimentation Pond design calculations Appendix VII). Based on the restrictive topography, this design encompasses all of the canyon in which the mine area is located.

Runoff is handled by an underground piping system

together with ditching along access roads which traverse the mining area (refer to drainage Map 3-8). Diversions are sized and placed using a 10 year/24 hour storm event (calculations included) peak flows approach 200 cfs.

The 24 and 36-inch culverts on pads #1 and #2 have the following flow characteristics with the head water depth to culvert diameter ratio equal to 1. Culverts are installed on a 2% slope.

Diameter (inches)	Velocity (fps)	Discharge (cfs)
36	4.2	30
24	3.2	10

Runoff waters flowing off the canyon walls will be collected in the main mining surface drainage system. As the mines are situated in a dry wash, storm runoff is controlled by open ditches and berms constructed within the roadways which winds through the facilities to the bottom of the main loadout structure where a large culvert drains the water into the natural wash bed below the mine proper. Hydrological calculations for the 10 year/24 hour storm event are found in Appendix VII.

The diversion for directing the collected waters is located across the major fill structure (#1). Water is released adjacent to the existing 84-inch half round CMP culvert which drains the entire mine area. See Water collection and diversion drawings in map packet 3-11. All waters drained from either disturbed or undisturbed areas are passed through a 19.8 acre foot sedimentation pond located further down the dry wash channel.

Maintenance on the drainage system consists of annual inspection and cleaning of ditches and culverts. Trash and debris are removed and necessary repairs are made to ensure smooth operation of the system.

During reclamation, a revised drainage system will be installed and made operational. Details are included in Reclamation Plan.

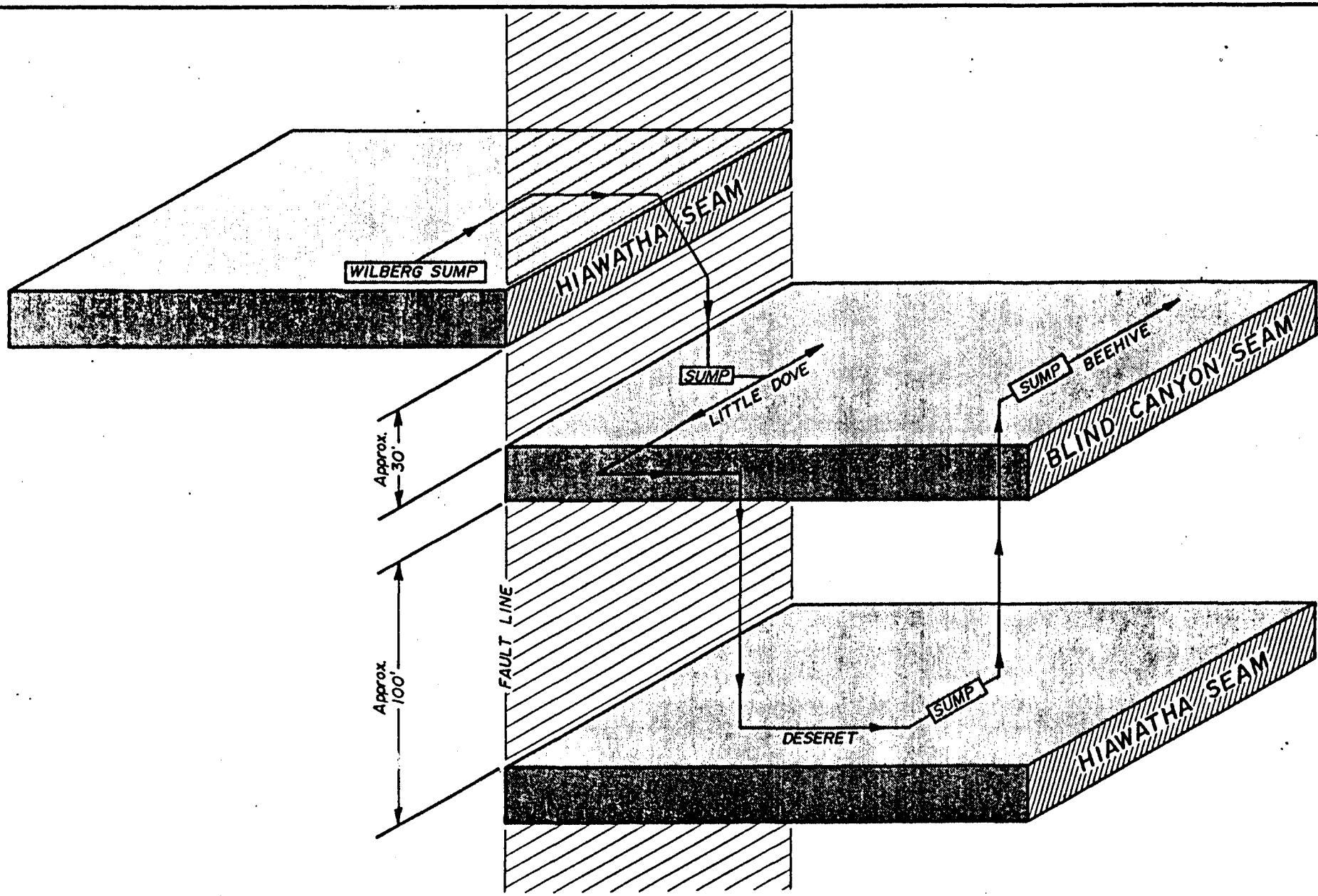
Mine Water - Des Bee Dove Mine is a dry mine. There is no discharge from the mine. Water must be obtained for use in the mine from outside sources.

A potentially stable source of mine water has recently been tapped through Deer Creek Fault from Cottonwood/Wilberg Mine into the Little Dove sump. To better utilize the excess mine water from the Cottonwood/Wilberg Mine, a connection has been made through Deer Creek Fault and water is collected and used in the Des Bee Dove Mine. This source supplies the needs of the entire mining complex (see Figure 1).

Some of the water from Deseret sump is utilized for dust suppression and washdown in the tipple.

The mine water system is maintained to ensure adequate supply to the mine and zero discharge from the mine.

In order to provide one source of water in the mine, a trucking and pumping system has been installed at Des Bee Dove Mine. A tanker truck collects and delivers water from the entrance to Danish Bench road (off State Highway 29) up to a 10,000 gallon buried water tank below the mine area. Water is pumped from the buried tank through a 4" line up to the Deseret



WILBERG TO DES-BEE-DOVE WATER SUPPLY LINE ROUTE DIAGRAM

Figure 1
After pg. 3-29
ADDITION 1-11-85

sump. The trucking and pumping system will be maintained as a backup for the in-mine source.

During reclamation, exterior pipelines, tanks and pumping systems will be dismantled and removed from the premises. Further reclamation will be performed as outlined in Reclamation Plan.

Culinary Water System - A system has been installed to treat water from the Deseret sump for the needs of the mine facility. The water treatment system treats 10 gpm of water for storage and use in the existing culinary water system. The system was designed and installed with approval from the Utah State Department of Social Services.

System maintenance is performed as needed to promote smooth operation of the system and to ensure compliance with State culinary water standards.

During reclamation, the culinary water system will be dismantled and sold for salvage or scrapped.

Sewer Treatment System - Sewage from the office and bathhouse is collected in a single 2,500 gallon septic tank located underground just south of the office-bathhouse-warehouse. Effluent from the septic tank is carried by the 6-inch diameter pipeline to an absorption field located in the tipple area fill structure. The sewer treatment provided fulfills State and local county health codes.

The sewer treatment system requires no maintenance.

For reclamation, the sewer line will be sealed and

remain in place. The septic tank will be opened, pumped dry, backfilled and abandoned. The absorption field will be left to dry out.

UNDERGROUND DEVELOPMENT WASTE DISPOSAL (784.19)

The underground development waste rock disposal plan is found in Appendix V. Reclamation plans are in the Cottonwood/Wilberg Mine application.

TRANSPORTATION FACILITIES (784.24)

Des Bee Dove Mine operation utilizes roads and conveyors in association with facilities described in Operation Plan. All portal facilities are shown on drawings 3-6 and 3-7. A description of the construction, use, maintenance, and removal of each transportation facility at Des Bee Dove Mine follows.

ROADS

Trucks hauling coal from the Des Bee Dove Mines utilize both the county road system and the 2.8 mile long bypass road to access the State road leading to the Hunter Plant.

Prior to completion of the Des Bee Dove Wilberg junction road (June 1983), access to the mines was along a county road located on Danish Bench. Present traffic is routed along the new road to avoid co-mingling with local traffic.

Construction of the 2.8 mile road benefits two small rural communities, Castle Dale and Orangeville, by diverting traffic away from the towns' main streets. Generally, this segment of road is located in heavily eroded blue shale (Masuk Shales) where steep, barren slopes are predominant features.

Surface flows are collected and channeled in small

washes which eventually drain into Grimes Wash.

Widths of the right-of-way vary depending on sizes of the cut-and-fill sections. Of the 86+ acres of road right-of-way approximately 50 acres of disturbance requires reclamation. Reclamation is included under 817.156, 817.24(b), 817.111 - 817.116 and 817.101- 817.103.

ACCESS ROAD

The mine access road is approximately 6,100' long beginning at the mine property and winding past the mine offices, past Deseret portal, and ending near Beehive portal. Plans and selected cross-sections are included in Map 3-9. The portal access road construction consists of compacted soil and gravel surface. Road width averages 20'. Because of the steep terrain in the portal area, large soil berms or steel guard rails have been constructed to promote safety.

Portal access road gradient averages about 10% overall, due again to the steep natural terrain which allows no leeway for more gradual gradients without further extensive construction.

During operation, the mine access road is used daily for access by mine labor and service personnel. Twice yearly, the mine access road is utilized for cattle drives to and from East Mountain grazing area.

Maintenance on the portal access road includes periodic resurfacing, snow removal, and drainage inspection and cleaning as needed.

Details of road removal are included in Reclamation

Plan.

EAST MOUNTAIN ACCESS

A steep, narrow trail was constructed from the Beehive Mine pad to the top of East Mountain. This trail is used for moving cattle to and from federal grazing leases each year.

No improvements are expected during the active mining period.

CONVEYORS

Seven individual conveyors or sets of conveyors are utilized in the Des Bee Dove coal handling and sizing process outside the mine.

1. Little Dove Conveyor
2. Transfer Reclaim Conveyor
3. Deseret Conveyor
4. Main Stockpile Feed Conveyor
5. Auxiliary Stockpile Feed Conveyor
6. Tipple Feed Conveyor
7. Tipple Process Conveyors

All conveyors from portal to stockpile are 42" wide and are idler-supported with the exception of the Main Stockpile Feed Conveyor, which is wire rope-supported. Steel frames for the conveyor supports are anchored to concrete foundations.

The Little Dove Conveyor is a run-of-mine conveyor which brings the coal out of the mine and delivers it directly to the stacking tube transfer.

Transfer Reclaim Conveyor is 100' long and collects coal from the base of the stacking tube transfer and delivers to

the Deseret transfer.

Deseret Conveyor delivers run-of-mine coal production from Deseret and Beehive mine operating sections to Deseret transfer. An in-mine coal transfer delivers coal from Beehive Mine to Deseret Mine.

Main and Auxiliary Stockpile Feed Conveyors deliver coal to the run-of-mine stockpile area.

Tipple Feed Conveyor is 36" wide and delivers coal from the run-of-mine coal stockpile to the tipple for screening, crushing, separating, and loading.

Tipple Process Conveyors are incorporated in the tipple operation. Size details and tipple process association for these conveyors are illustrated in Figure 7 in Operation Plan.

Standard mechanical maintenance procedures are followed to ensure smooth operation and long life of the facility conveyors.

During reclamation, the conveyors will be dismantled and sold for salvage. Concrete foundations will be broken up and used for coarse backfill.

OFFSITE SUPPORT FACILITIES (785.21)

The only offsite support facilities are the underground development waste disposal site shared with the Cottonwood/Wilberg Mine and the sedimentation pond which is detailed in the Existing Structures section.

BLASTING PLAN

A Blasting Plan is included in Appendix VI.

DIVERSIONS (784.22)

Des Bee Dove Mine operation will not require further runoff diversion in the permit area until reclamation. Specific procedures for diversion during reclamation are described in Reclamation Plan. Existing runoff diversions are described in Operation Plan.

INSITE PROCESSING (785.22)

There are no in-site processing activities or plans for such activities associated with Des Bee Dove Mine.

EXPERIMENTAL PRACTICES (786.13)

No experimental underground mine practices are being conducted at Des Bee Dove Mine.

AIR POLLUTION CONTROL PLAN (784.26)

In accordance with UMC 817.95, air pollution control measures have been applied and will be applied throughout the life and subsequent reclamation of the Des Bee Dove Mine.

The main service road and parking lots are asphalt surfaced. Service roads to the mine portals are gravel surfaced. Vehicular traffic on these roads is controlled to minimize contribution to fugitive dust. During operation, service roads are used daily at low speeds for access by service and labor personnel.

The steep natural terrain restricts unauthorized travel on other than established roads and limits vehicle speeds on roadways that are established.

Fugitive dust control procedures are implemented in the coal handling process. Little Dove run-of-mine belt conveyor is covered. Belt scrapers are installed on most conveyors to reduce

coal dust generation. Coal sizing and handling from stockpile to truck are completely enclosed in the Des Bee Dove tipple. A vacuum system in the tipple helps reduce coal dust generation during crushing and screening plus assists in tipple housekeeping. Transfer points in the tipple are enclosed, rubber curtained at inlets and outlets, and are equipped with dust collection hoods.

The high moisture content of the coal at Des Bee Dove Mine provides dust control throughout the coal handling process. Analysis of samples taken during processing show an average 8.0% inherent and surface moisture content in 775 samples. Table 8 is a copy of the sample analysis data. Coal dust generation is reduced throughout the handling process by the dampening effect of this moisture.

The captive nature of the Des Bee Dove Mine product nearly eliminates the possibility of spontaneous combustion conditions developing. Long-term stockpiling within the permit area is unlikely. Maximum stockpile duration is approximately one month. Care is taken to ensure that short-term stockpiles are completely cleared away prior to restockpiling.

OPERATION PLAN EXISTING STRUCTURES (784.12)

Under the definition of Existing Structures, as found in Environmental Statement for the Surface Mining Control and Reclamation Act of 1977, is as follows:

EXISTING STRUCTURES

The types of structures which may be affected by the regulations in the preferred alternative concerning existing

TABLE 8

UP&L MINING DIVISION
FUEL QUALITY

PROXIMATE ANALYSIS
DESERET,BEEHIVE,LITTLE DOVE BELT
ANALYZED BY CENTRAL FUELS LABORATORY

03/30/90
CARE003

TIME PERIOD	TONNAGE ACTUAL	/ REPRESENTED
- 01/01/78 12/31/87	5697236.0	5175291.0

(AS RECEIVED)	# OF SAMPLES	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM	WEIGHTED AVERAGE
	********** STATISTICAL ANALYSIS **********					
%MOISTURE	2903	8.04	1.19	3.36	25.05	7.85
%ASH	2903	10.74	2.33	5.72	27.93	10.71
%VOL. MATTER	2903	40.16	1.28	33.03	45.56	40.14
%FIX. CARBON	2903	41.09	1.70	28.76	47.81	41.30
%BTU\LB	2903	11749.78	403.08	9072.00	12704.00	11779.05
%SULFUR	2903	0.56	0.09	0.29	1.04	0.53
%AIR DRY LOSS	1652	5.93	1.08	0.22	12.22	5.87

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structures are roads and associated structures, fills, berms, benches, waste banks, discharge structures, diversions, rail loops, rail sidings, rail spurs, refuse areas, shafts, spoil pipes, utility lines, terraces, drains, wells, exploration holes, boreholes, barricades, fences, bridges, culverts, storage areas, mine buildings, tipples, storage or repair facilities, surge ponds, processing plants, slurry pipelines, conveyors, and other man-made structures or areas disturbed by mining.

"Existing Structures" by definition, as interpreted by applicant, means <u>everything constructed by man for mining purposes</u>.

To apply the stated provision of UMC 784.12 to all entities becomes somewhat confusing especially when addressing structural components such as buildings, warehouses, tipples and processing plants.

Monitoring and evidence of how such facilities meet Subchapter "K" seems irrelevant in that the performance standard has no specification to gauge structural worthiness. Unless Subchapter "K" regulates to the building itself but rather the earthen structure upon which such building is situated (explanation by Hardaway).

Nevertheless, to complete the requirements of this subchapter, applicant chooses to identify all <u>Existing Structures</u> and shall describe the structure (earthen) on which such facility rests.

For the sake of organization and simplicity, we have decided to list the various structures by grouping of associated

structures. Group I (Hydrological Association). This group association will list those facilities such as underground diversion, surface drainage systems and sedimentation ponds. Group II shall list and incorporated all surface facilities, building, conveyors, power lines, storage tanks, etc., and all facilities related with operations as they pertain to coal processing. Group III lists only earthen structures, i.e., fills, embankments, roads and earthen berms.

GROUP I (HYDROLOGICAL)

SURFACE DRAINAGE

With the exception of the parking lot and bathhouse-warehouse-office facilities, the Des Bee Dove Mines are located within a narrow, steep, dry wash and are connected by a single access road (see surface drainage Map 3-8).

The bathhouse and parking lot are graded and ditched to divert runoff waters to the main wash drainage by ditching and culverts.

At the upper section of the loadout area (large fill) where the access begins, the grade reduces to 4 1/2% and drainage is accommodated by a 42" culvert that directs the water to an 84" half-round culvert near the fill face. A drop inlet at the access to the loadout area and an open ditch along the fuel storage area also direct runoff to the 84" culvert.

Hydrological assumptions and calculations are included in the final reclamation section (see 10 year/24 hour event). Peak flows of 106 cfs are anticipated to swell beyond the access road ditch capacity, thus the access road itself will serve as a

channel for brief periods of 10 or 15 minutes during heavy precipitation.

Historically, the mine area has controlled surface runoff for forty years.

SEDIMENTATION POND

To meet both State and Federal regulations governing clean water and effluent discharges a 19.8 acre foot sedimentation pond was constructed in 1979. Pond sizing is such as to collect the runoff waters from a 10 year/24 hour storm for the entire drainage area. Sediment storage volume was designed for .1 acre foot per acre disturbed by mining.

Design drawings, hydrological calculations, methodology and monitoring cross sections are included in Appendicies VII and VIII.

Because of limited space and precipitous land forms surrounding the Des Bee Dove complex, the sedimentation pond was located away from the surface facilities area and placed at the mouth of the dry wash that drains the mine site. Sited on state lands under Utah State Land Lease #436 (reference, Drainage Map 3-8), this sedimentation pond has been assigned an U.P.D.E.S. permit whose identification number is UT-0023591. Only one discharge point is associated with the permit.

The sediment pond is monitored each quarter for embankment integrity and sedimentation volume remaining in the pond. An annual report is submitted to the regulatory authority summarizing quarterly inspections.

Volume of pond includes sediment storage from the

disturbed area of mining equal to .1 acre foot per acre disturbed. Combined volumes of 17.7 acres of runoff waters from a 10 year/24 hour storm and 2.0 acre feet of sediment storage totals 19.7 acre feet of pond volume. Design volume by cross sections equals 19.8 acre feet (see CM-10555-DS). Sediment monitoring has been ongoing since pond completion April 9, 1980.

On August 12, 1983, a 2.51 inch storm fell within the drainage area treated by the sedimentation pond. This storm inundated the water diversions, collection and storage facilities. Major cleanup operations required heavy equipment to remove debris and sediment trapped in the pond. Changes which occurred during the dredging operation are shown on a resubmitted, as built, drawing. These changes are slight in nature and do not change the operational function of the pond.

The pond is designed to contain totally the runoff from a 10 year/24 hour storm event and the sediment load equalling .1 acre foot per disturbed acre by mining. Per regulations UMC 817.46 dewatering will meet effluent discharge limitations and a minimum 24-hour detention. Sediment shall be removed from the pond when sediment accumulations reach 60% of the design storage volume or when 1.2 acre feet of sediment is measured in the pond.

Measured sediment accumulation since the pond was activated shows normal cycle of storm carried sediments from the contributing area is about 1.0 acre foot per year.

SEDIMENT STORAGE VOLUME

Present location of the dewatering stand pipe is set to accommodate five feet of clearance between a full sediment load

and the decant elevation.

Operation of the pond requires all storm waters collected to be held for a minimum of twenty-four (24) hours before being released to the receiving drainage. The decant system will allow the water to be drained.

To meet the full 17.7 acre feet of volume needed for the required 10 year/24 hour storm event, the pond will be drained dry with exception of the remaining trapped sediment and water which is below the decant elevation.

The sediment will be cleaned at 60% of the design volume.

GROUP II (SURFACE FACILITIES AND STRUCTURES)

Des Bee Dove is an abbreviation for Deseret, Beehive and Little Dove Mines. Two mines, Beehive and Little Dove Mine, are located in the upper seam (Blind Canyon), and the Deseret Mine is located in the lower seam (Hiawatha). Separated vertically by 140 feet, the portal facilities are literally one upon the other.

Individual photographs of each major surface facility are included in Appendix IX.

Mine development over the past forty years has seen a constant change of surface facilities. Tipple, loadout, and conveyors have undergone changes from modification to complete rebuilding. Specific dates of construction and completion are not possible in all cases and shall be noted as such.

Utah Power and Light Company purchased these mines in 1972. Since that time major reconstruction of the certain

facilities has taken place, most notably, the bathhouse, parking lot and their structures.

The following list includes the major surface facilities located at the Des Bee Dove Mines, their approximate date of construction, mine association and other relevant information.

Excepting the two large structures that support the bathhouse and loadout facilities, most surface structures are located on three small platforms cut on sandstone ledges located astride the drainage, or wash, and will be further discussed in Group III of this chapter.

Plans and drawings for each structure are on file in Company's Fuel Resources office at 324 South State, Salt Lake City, Utah, for review by the regulatory authority.

Company states each facility used for handling, processing and transporting coal has been designed by a registered professional engineer. Also, the bathhouse-shop-warehouse building was engineered to meet acceptable state and federal building codes. Facilities meet applicable regulations of Subchapter "K" and require no modifications.

DES BEE DOVE MINE FACILITIES

FACILITY	PHOTO	APPROX. CONSTRUCTION DATE
Office-Bathhouse-Warehouse	Included	Mid- 1972
Material Storage Shed		Early 1978
Underground Shop	Included	Early 1981
Tipple	Included	1952-1978
Beehive Trash Bin		Aug. 1980
Deseret Trash Bin	Included	Aug. 1980
Culinary Water Storage Tank		1972
Pumphouse and Mine Water Storage System		1972
Parking Lot	Included	Mid-1977
Main Substation	Included	1975
Deseret Fan #1	Included	1977
Deseret Fan #2	Included	1972
Beehive Fan	Included	1972
Little Dove Fan	Included	1976
Conveyors -		
Little Dove	Included	1977-78
Deseret		1975
Transfer Reclaim		1975
Main Stockpile Feed		1975
Aux. Stockpile Feed		1975
Coal Surge Stockpile	Included	1952
Material Storage Areas	Included	Varied
Fuel Facilities		July 1980
Salt Storage Bin		1987

* Note: Many construction dates are based on the most recent facility modification.

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DIVERSION OF WATER INTO AN UNDERGROUND MINE (817.55)

As the mines are virtually dry, water for drinking and mining must be piped into the mine (see Page 3-27).

All water is stored underground where sedimentation and filtration occurs prior to its use in the mining machinery. No water is discharged to the surface at any time.

Water quality meets provisions of section 817.42 and does not disrupt the hydrological balance of the underground water regime as no water exists.

HAZARD ANALYSIS - Wilberg Mine to Little Dove Water Diversion

The main water sump located in the Wilberg Mine is formed by a low lying area in the original (old) mine workings. Because the downdip side of these workings has not been intersected by any of the modern entries, this forms an ideal sump without the addition of any dam structures to retain the water. The average storage capacity of 12.9 acre feet is maintained by pumping excess water out of the mine in accordance with an NPDES permit at a maximum rate of 475 gpm. The pumps are automatically activated by water level floats.

Water is also pumped from the Wilberg Mine sump to the Des Bee Dove Mines via a four-inch aluminum underground piping system. The pipeline is located along the Main North 1st Left entry and the First North belt entry to the Deer Creek Fault. The pipeline then crosses the fault through two 3-inch diameter boreholes drilled at an angle of -30° from horizontal. The end of the pipe is located immediately above the main Little Dove sump located at crosscut 38-40 Main North. Water is pumped into

the sump at a maximum rate of 200 gpm.

The Little Dove sump is formed by three entries which were driven downdip in a westerly direction to intersect the fault. To increase the storage capacity of the sump, dams are constructed of two cinderblock walls four feet high separated by four inches of compacted bentonite. At maximum level, the sump could contain 1.09 million gallons of water but normally the level of the sump is kept below 0.5 million gallon storage. If the sump were filled to maximum capacity and one or all of the three dams would rupture, water would flow in a north direction in the west most entry of First North. Because these dams are only increasing the storage capacity of the sump by less than 0.3 acre feet the water would quickly dissipate to less than a foot in depth within 1,000 feet of the sump. Nowhere along the 1st North Little Dove entries is there a low area of the mine working significant enough to cause ponding of the water to block escape by the workers. With the dip of the beds in a west-north-west direction only the westernmost entry would be affected leaving the other five entries dry (see Map 3-11).

GROUP III (EARTHEN STRUCTURES)

The mining complex consists of five (5) major earthen structures (refer to Map 3-10). They are (1) the tipple, coal storage pile and storage yard area; (2) bathhouse-warehouse-office building and parking lot structure; (3) Deseret portal area; (4) upper coal storage area structure; (5) Beehive and Little Dove portal area.

Structure No. 1 (Tipple and Material Storage Area)

Of the five sites, the tipple area is largest. This structure was constructed prior to 1977. Waste rock, boney coal and coal fines which, at that time, had no commercial value, were systematically disposed of by end-dumping over a spoil pile then covered with a thick soil mantle.

Volume calculations show approximately 200,000 cubic yards make up this structure which is located in a small wash drainage within the permit area. Structure will be unaffected by subsidence as the fill is situated below the elevations of both coal seams.

Slope stability of the tipple pad area is discussed in Existing Structures - Stability Analysis which follows.

As company plans to leave the fill in place in the final reclamation plans and based on the fact that the structure was constructed without a subdrain system, the following geological report is submitted as a demonstration that the area is void of springs and seeps.

AREA GEOLOGY

The Des Bee Dove tipple area is located in a dry wash which has been naturally eroded into the bedrock. The walls of this wash are steep near its bottom and slope upward to rock ledges and cliffs which surround the area. The rock walls which form the abutments for the tipple yard consist of alternating zones of sandstone, siltstone and mudstone along the contact of the Starpoint Sandstone and Masuk Shale. The floor of the wash consists of thinly bedded mudstone. All of these rocks form a

competent foundation for the tipple yard.

Although no hydrologic mapping was made of the wash prior to its filling with waste rock, the available data overwhelmingly supports the conclusion that ground water does not flow from the bedrock into the mine waste area. The outcrop escarpment at the stratigraphic horizon of the waste dump (Starpoint-Masuk contact) has been hydrologically mapped for miles on each side of the area and no springs have been located or associated with this horizon. The tipple yard and Des Bee Dove mines are located in an area void of ground water, primarily because of existing faults and escarpments that circumvent the area isolating it from the ground water flow present throughout other areas of East Mountain. Geologically, the rock formations in the area of the tipple yard dip in a northwest direction into the mountain. Any water which might flow into the strata would flow down the dip away from the fill structure.

From a geologic and hydrologic standpoint, the area of the Deseret tipple yard is stable. The rock outcrops in the wash from competent abutments for the waste dump. Monitoring (visual observation) of the site throughout more than 40 years of operation support this conclusion.

Test borings have shown the structure is largely composed of coal waste and covered with a 10-foot mantle of subsoil material excavated from the parking lot structure. This covering seals the coal from surface water and possible spontaneous combustion. Covering material was analyzed for acceptance as a plant growth medium (see soils section) and found

acceptable.

Surface water is presently directed away from the slope face and directed through an 84" half-round culvert to intersect the natural drainage channel below the fill structure.

Chemical analyses of the overburden and coal indicates only trace amounts of iron and sulfur. Present covering meets UMC 817.103 (covering coal and acid and toxic forming materials).

As no ground water exists and surface waters are protected from penetrating the coal core, company states no pollution of water occurs. During operations, sediment shall be collected and controlled by an existing sedimentation pond located down drainage from this structure.

Structure No. 2 (Bathhouse and Parking Lot)

Constructed in 1972, this structure is not a balanced cut and fill section. Excess material was hauled to the spoil fill (site 1) and was used as a covering. Measuring 350 by 190 feet and with the parking lot which measures 400 by 65 feet combined, provides working space of 2.1 acres.

This platform (structure) was constructed using acceptable earth work design practices, i.e., fill portion was built in wetter layer and compacted with a mechanical compactor. Company plans to reconstruct this structure on final reclamation. Stability meets stated factor of safety in UMC 817.101. A stability analysis is provided in the Appendix (Rollins).

No monitoring is planned for this structure. No ground water affects the fill itself (see Geological Report Structure No. 1) and surface waters are drained by ditching.

No modification is planned as structure meets performance standards of Subchapter "K".

Structure No. 3 (Deseret Portal)

A strip of level ground, whose base is the basal member of the Hiawatha Coal Seam, which is a massive sandstone outcrop formed by weathering of the dry wash. A 170 by 250 feet landing serves as the Deseret Portal area which supports the mining facilities such as access road, shop area, fan portal installation, power substation and some material storage.

Structure No. 4 (Coal Storage and Surge Pile)

A small, natural semi-circle sits on bedrock formed by the dry wash channel measures approximately 180 feet. A spur road serves as its only access.

Structure No. 5 (Beehive and Little Dove Mine Portals)

This flat pad sits approximately 140 feet vertically above the Deseret Mine. Both mines (Beehive and Little Dove) are level entry mines located at the coal outcrop (Blind Canyon Seam).

Constructed from stripped materials along the coal seam and anchored with down-sloped bin walls, this area measures 400 feet long by 140 feet wide. Structure is located on sandstone outcrops again weathered by the drainage with the dry wash.

Structures 3, 4 and 5 are all small disturbances interconnected by one access road.

Stability is unquestionable in that all are located on solid sandstone foundations. The upper area (Structure No. 5) is susceptible to subsidence only after final mining and pillar

removal from the lower seam. It is proposed to leave sufficient entry barriers and pillars within the Deseret portals to support the reclamation work of the Beehive and Little Dove portal areas (see Existing Structures - Stability Analysis).

No monitoring is proposed for these three structures. No modification is planned for the three active sites as company states they meet the performance standards of Subchapter "K">

ROADS - HAUL ROAD, ACCESS ROAD AND MOUNTAIN ACCESS (CATTLE TRAIL)

HAUL ROAD

As previously described in the Existing Structures introduction "roads" are considered existing structures (SMERA-EIS).

Prior to 1982 the haul road was an extension of a county road which is maintained by the county to the permit boundary line. Provision for mining within 100 feet of a public road is given by definition of UMC 761.5 and UMC 761.114(i). As the road was evolved over years of upgrading no engineering maps or cross-sections area available. Company submits instead a 100' = 1" topography map (3-7).

Company states the roads, with the exception of the Des Bee Dove Wilberg junction road, are pre-existing with existing valid rights and are exempt from design standards as stated under UMC 700.11(e) i.

Stability analyses were not conducted on road beds, cut slopes or embankments as stability has been proven by time and use.

Hydrological balance for the road includes hard

surfacing, berms and ditching to accommodate a 10 year/24 hour storm event. No streams are crossed and road pitch does not exceed the stated maximums of UMC 817.152.

The mine area is in excess of five (5) miles from any live or perennial stream, fishery or fee property owner. Adjacent ownership is controlled by both the Bureau of Land Management and the US Forest Service who reviewed this operation plan.

MINES ACCESS ROAD

A short, steep, winding and unpaved road runs from the tipple area up a bulldozed grade to the warehouse building. It then switches to run upward along a blasted grade, past Coal Storage Pile No. 1 to the Deseret portal area where it crosses the drainage to traverse southerly along the outcrop of the Hiawatha Seam for 650 feet to another switch back. The base of the coal seam forms the road bed against the near-vertical bluffs. Above the switch back, the road follows a grade partially against a natural cliff and partly against a blasted bank. At 650 feet on this tangent, it intersects the access trail to the top of the mountain. The Little Dove-Beehive portal area begins 150 feet beyond this intersection.

Hydrological protection of the road is described in the surface drainage section. Actually, the road serves as the major drainage channel during peak flows from a 10 year storm event. All sediment carried from this road is recovered in the sedimentation pond located down drainage from the mine site.

Road beds, cut slopes and embankments are proven stable

after two decades of use. Road covering consists of crushed rock.

Company states that soil siltation and water quality and quantity have been protected by use of a sedimentation pond, temporary revegetation, limited use and speeds afforded to this road.

EAST MOUNTAIN ACCESS AND CATTLE TRAIL

Originally constructed in 1971 as a four-wheel drive access, this steep trail provides the only other access to the East Mountain plateau besides the Cox dugout road located in Cottonwood Canyon which normally remains snow-bound until mid-June or later. Uses include twice a year cattle drive for cattle grazing on the east portion of the plateau. Need of this access goes beyond the life of the Des Bee Dove Mines.

Company contends that this access is exempt from the regulations based on usage and purpose.

EXISTING STRUCTURES - STABILITY ANALYSIS

Of the five (5) separate and independent earthen structures used for mining purposes only fill Structure No. 1 or the tipple pad fill, will remain after mining has ended.

Final reclamation of this structure includes a major drainage channel diversion to route the required 100 year storm event around the fill and back into its natural channel. Provisions have been made to control water velocity and erosion (see Final Reclamation map).

This fill structure was built mostly during active mining during the early "forties" and covered with a heavy soil

mantle in 1977.

Stability analyses of both major fill Structures No. I and No.2 were conducted in 1980 and 1981. Site #2, the bathhouse area, was determined to have a 1.47 safety factor which is sufficient to claim compliance. Site #1, the tipple and loadout structure, was assigned a 1.3 to 1.4 safety factor (see Appendices X and XI).

Additional analysis was done on the slope using the "Simplified Bishop Method of Slices" to determine what modifications needed to be made to modify the slope to meet the 1.5 criterion.

Changing the slope to 1V-2H would result in a minimum safety factory of 1.7 (see Appendix X).

Assumptions were:

Existing material:

$\phi = 27^{o}$

c = 100 psf

γ = 70 pcf

no ground water

Added material:

$\phi = 40^{o}$

c = 0

γ = 120 pcf

no ground water

Three radii were used in the analysis,

r = 300' SF = 1.74

r = 250' SF = 1.68

r = 165' SF 1.70

Therefore SF = 1.7 1.5 OK

Thus, based on the above data and calculations the decision was made to modify the slope to a 1V:2H slope with a rock toe buttress.

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 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 bases.

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.

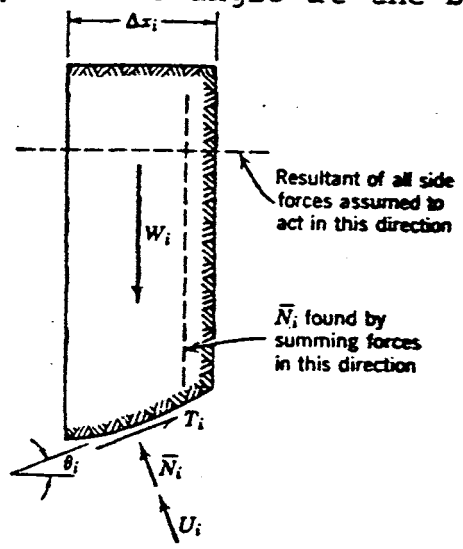

Fig. 24.13 Forces considered in simplified Bishop method of slices.

In September of 1984 the out-slope of structure #1 was modified to meet a 1 to 2 (1V:2H) slope insuring stability beyond the required 1.5 safety factor. Material was dozed from the top of the fill to the toe where it was continually compacted forming an earthen key. As the cut was made at the top, fill was formed at the bottom. On completion there were approximately 5,000 cubic yards moved requiring 10 days.

No slope changes were planned for final reclamation. Required safety factor for final reclamation in 1.3. Slope measurement will be checked after mining and before final reclamation to guarantee safety factors are met.

DES BEE DOVE MINE PORTAL STABILITY

Assumptions

1. Mining in the Deseret Mine will stop at the 200 foot overburden line (maximum overburden supported by remaining pillars is 200 feet).
2. Pillar identified on the map will not be extracted.
3. Minimum pillar size left (50' x 50' x 8').
4. Strength of 50' x 50' x 8' pillar = 2310 psi (USBM formula developed for Beehive Mine).
5. Load on pillar (200 feet maximum overburden) Sp = 431 psi.
6. Safety factor = 5.4.