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APPENDIX XVI

PART H

GOLDEN EAGLE NESTING/CLIFF SUBSIDENCE
MONITORING PLAN

PREFACE

The following monitoring plan was developed in 1986 in cooperation with the U.S. Fish and Wildlife Service, Utah Division of Wildlife Resources and Utah Division of Oil, Gas and Mining. A number of reports have been completed since initiation of the study. These include Annual Reports submitted to USFWS, as required by Federal Fish and Wildlife Permit PRT-708354, and to the DOGM and DWR. Reports for 1986, 1987 and 1988 are in the DOGM files. Additionally, a comprehensive report addressing impacts to high interest resources, including golden eagles, was produced in December 1987. The report, entitled "Assessment of Mining Related Impacts in Newberry Canyon", is also on file at the DOGM.

The following permits have been issued in conjunction with the golden eagle monitoring plan: (1) USFWS Federal Fish and Wildlife Permit PRT-708354, (2) DWR Certificate of Registration SCC-SL-444. Copies of these permits follow this page.

New development and/or changes in the study, as well as current data, will be reflected in Annual Monitoring Reports which are submitted in January of each year.



DEPARTMENT OF THE INTERIOR U. S. FISH & WILDLIFE SERVICE
 U.S. FISH AND WILDLIFE SERVICE P. O. Box 25486 DFC
 Denver, Colorado 80225

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

UTAH POWER AND LIGHT COMPANY
 P.O. BOX 899
 SALT LAKE CITY UT 84110

2. AUTHORITY-STATUTES 16 USC 668(a) REGULATIONS (Attached) 50 CFR part 13 50 CFR 22.21	
3. NUMBER PRT-708354	
4. RENEWABLE <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	5. MAY COPY <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
6. EFFECTIVE 1/ 1/89	7. EXPIRES 12/31/90

8. NAME AND TITLE OF PRINCIPAL OFFICER (If #1 is a business) DAVID SMALDONE	9. TYPE OF PERMIT EAGLE SCIENTIFIC COLLECTING
--	--

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

SECTION 27, 28, 29 AND 30, T17S, R7E, S1M, UTAH.

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY OR RENEWAL OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

and any other person(s) under the direct control of, employed by, or under contract to the permittee only to the extent necessary in accomplishing the purpose authorized below.

D. Permittee is authorized to remove any INACTIVE eagle nest(s) either through direct or indirect methods.

E. Permittee, and any other person(s), shall carry a copy of this permit whenever exercising its authority.

F. In the event an active eagle nest or other active bird of prey nest is discovered in the possible direct subsidence impact area, permittee shall contact Bob McCue or his representative (801) 524-5630 immediately.

G. In the event any active eagle or any active bird of prey nest and/or young, in the interests of their self preservation, must be removed, Utah Power and Light Co. will provide

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

12. REPORTING REQUIREMENTS
 FIRST ANNUAL REPORT DUE 1/10/90
 ANNUALLY BY JANUARY 10 FOR PRECEDING CALENDAR YEAR ENDING
 DECEMBER 31 OUTLINED IN 50 CFR 13.45.

ISSUED BY <i>Bernadette A. Christie</i>	TITLE CHIEF, PERMIT SECTION, DN-6	DATE 1/12/89
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ORIGINAL

those resources necessary to effect this removal. This removal shall be in concert with expertise supplied by the U.S. Fish and Wildlife Service and the amount of costs associated with this removal shall be borne by the company. The determination of reasonableness will be determined by David Smaldone or his representative and Assist. Regional Director/LE, USFWS, Terry L. Grosz or his representative.

H. Subsidence monitoring will be conducted as outlined in the monitoring plan supplied by Utah Power & Light Company.

I. Permittee shall maintain records as required in 50 CFR 13.46.

J. Annual reports are required under any professionally recognizable format by January 10.

K. Permittee is authorized to salvage bald and golden eagles found dead near or around power poles. All eagle

carcass pick-ups shall be reported ASAP to USFWS, Special Agent, Salt Lake City, Utah, (801) 524-5632. Carcasses shall be placed with USFWS, Salt Lake City, Utah or Utah Division of Wildlife Resources.

\$5.00 fee paid WAIVED

STATE OF UTAH
DIVISION OF WILDLIFE RESOURCES
CERTIFICATE OF REGISTRATION FOR COLLECTING WILDLIFE

This Certificate of Registration authorizes UTAH POWER & LIGHT MINING DIVISION
VAL PAYNE
(Name of Registrant)
of P.O. Box 310 Huntington, Utah 84528
(Complete Address)

to collect , capture and/or trap and release , transport , temporarily possess (live wildlife)
and/or possess (dead wildlife) to be used in scientific research, educational processes or nonprofit
public display:

Number To Be Collected	Common Name	Scientific Name
	Authorized to take as many as four eagle nests in Newberry Canyon. Taking is limited to INACTIVE NESTS only to be lost through actions resulting	
	from coal mining subsidence. At the time of taking of inactive nests, mitigation must be provided to Southeastern Region of the Division of Wildlife Resources. ALL OTHER STIPULATIONS AS SET FORTH BY THE USFWS MUST BE ADHERED TO.	

Collection privileges are limited to the following counties:
Emery County

Methods of collecting:
(see above)

This Certificate of Registration (for which a WAIVED fee has been paid) is valid for the following period: January 1, 1989 to December 31, 1989. A full report of all activities must be filed with the Division of Wildlife Resources within fifteen (15) days of the expiration date hereof.

Issued this 12th day of April, 1989, under authority granted by the Wildlife Resources Code of Utah, and through the Director, Utah State Division of Wildlife Resources, 1596 West North Temple, Salt Lake City, Utah 84116.

VIOLATION OF ANY OF THE RULES AND REGULATIONS PERTAINING TO COLLECTION, CAPTURE AND/OR TRAP AND RELEASE, TRANSPORTATION, OR POSSESSION OF WILDLIFE SHALL BE CONSIDERED A MISDEMEANOR AND SHALL BE PROSECUTED AS SUCH. IN ADDITION, ANY VIOLATION SHALL BE CAUSE FOR IMMEDIATE REVOCATION OF THIS CERTIFICATE OF REGISTRATION.

Val Payne
Signature of Registrant

By: Angie Deek
Wildlife Registration Coordinator
(Title)

- White - - Registrant's Copy
- Green - - Law Enforcement Copy
- Yellow - Regional Office Copy
- Pink - - Accounting Copy

GOLDEN EAGLE NESTING/CLIFF SUBSIDENCE
MONITORING PLAN

May, 1986

INTRODUCTION

Active Golden Eagle nests have been located by the Fish and Wildlife Service (FWS) within the boundaries of Utah Power & Light Company's (UP&L) coal mining properties (see Map CM-10587-WB). Several nest clusters are situated on vertical sandstone cliffs which overlie the longwall panels in the Cottonwood Mine (see Maps CM-10651-CW, 2 sheets, and CM-10752-CW)

There is concern among regulatory agencies that mining related subsidence and cliff spalling may impact eagle nesting. Therefore, Utah Power & Light will implement the following monitoring plan to identify potential impacts on these species.

OBJECTIVES

1. To collect information on nest location, nest status and nesting success of Golden Eagles within the study area.

2. To monitor the effects of subsidence on Golden Eagles nests in potentially impact areas.

3. Collection of nest and subsidence monitoring information to develop methods to eliminate or minimize adverse subsidence related impacts on Golden Eagles in the study area and to serve as guidance to avoid or resolve similar resource conflicts in the future.

STUDY AREA

For the purpose of this monitoring effort, the study area will require a Golden Eagle nest taking permit and will consist of that area referred to as Newberry Canyon which overlies the Sixth and Seventh East longwall panels in the Cottonwood Mine. All nests subject to potential subsidence in Newberry Canyon will be included for determination of impacts on nesting (see Map CM-10651-CW 2 of 2 and CM-10587-WB).

This area will be monitored for cliff subsidence and spalling. A portion of representative cliffs, beyond the limits of predicted subsidence, will be monitored for spalling, as a control site to provide comparative data.

Additionally, an aerial nest inventory survey will be conducted within a ten mile radius area as indicated on map CM-10680-EM in early 1987.

PERSONNEL AND EQUIPMENT

Nest inventory surveys will be conducted by the following qualified personnel:

U. S. Fish and Wildlife Service - Mike Lockhart
(FWS) or
Bruce Waddell

Utah Division of Wildlife
Resources (DWR) - Miles Moretti
Utah Power & Light Company - Val Payne
(UP&L)

A Jet Ranger or Lama helicopter with complete onboard communications, capable of transporting three (3) field personnel will be used. Both the helicopter and the pilot involved in the nest inventory surveys will be certified to meet FWS requirements.

Cliff subsidence monitoring will be conducted by UP&L engineering personnel using total station Electronic Distance Metering (EDM) equipment and standard surveying practices.

METHODOLOGY

An aerial nest inventory survey was completed in May 1986, within a ten mile radius area of Newberry Canyon. Similar Golden Eagle nest inventory surveys will be completed during the 1987 breeding season. Data developed will be similar to that discussed in the FWS publication Raptor Nest Information Management System, RAPA file and RAPB file.

Surveys will be conducted using a helicopter and observers as previously stated. Similar to the 1986

surveys, the work will be completed by flying near the cliff nest sites at a speed and proximity such that nests are observable.

The inventory flight will be conducted and observed by FWS at approximately mid-incubation (mid-April). During the flight, suitable cliff nest sites within a ten mile radius of Newberry Canyon will be examined for Golden Eagle nests. The appropriate file data and nest status will be recorded for observed nests. The location of all raptor species nests observed in Newberry Canyon, will be recorded.

In addition to the 1986 inventory flight, eagle activity within the ten mile radius area will be observed and recorded, for a twelve (12) month period beginning June, 1986.

Photogrammetric subsidence monitoring in Newberry Canyon will be completed as presently outlined in the UP&L Subsidence Monitoring Plan. In addition, cliff subsidence monitoring will be accomplished through the use of EDM equipment.

Prior to longwall mining, a permanent control station will be located (horizontally and vertically) from which the cliff nesting area can be observed. Four reflector prisms will be installed on the cliff above the nest area. The prisms will be located (horizontally and vertically) in reference to the permanent control station. This will provide a method of determining both horizontal and vertical

movement in the cliff strata. This method of observation will facilitate correlation of surface subsidence with the position of the longwall face.

Initial pre-mining observations will provide baseline information for the cliff strata. Once extraction of the longwall panel begins, observations will be conducted at two (2) month intervals if the nests in Newberry Canyon are inactive. However, if an active pair of eagles is present in Newberry Canyon, EDM monitoring will be completed each month during the breeding season (February through June) and at two-month intervals during July through January.

Fracturing and spalling of the cliff face will be determined by a ground station photo/grid system. A permanent photo station will be located from which photographs of the nesting area cliff face can be taken (see map CM-10587-WB, NC Control Location). Photographs will be taken using a 35mm SLR camera with a telephoto lens. Statistically adequate photographic sampling of the cliff face, which represents affected and control situations, will be made to determine the relative degree of spalling. If beneficial, a grid system will be superimposed upon the photographs whereby areas of fracturing and/or spalling can be better identified. The grid would be of adequate complexity to allow replications and pooled data analysis. Photographic sampling will be conducted according to the same schedule as the EDM monitoring.

Eagle activity associated with active nests in the Newberry Canyon study area will be monitored in conjunction with EDM and photographic data collection. Nest activity data will be recorded on the Nest Activity Data Form correlated with underground mining activities. EDM measurements and cliff spalling data.

Subsidence and Golden Eagle nest monitoring will continue until *major subsidence has ceased, or until such time that data demonstrates a conflict between Golden Eagle nesting and cliff subsidence does not exist.

Data will be reported in UP&L's annual Subsidence Monitoring Report. However, significant subsidence events which affect nests will be immediately reported to Utah DOGM, OSMRE, FWS and DWR. If it is determined that mine related subsidence is going to impact an active eagle nest, Utah Power & Light shall be responsible for salvage.

COMPENSATION - MITIGATION

A stated objective of the monitoring plan is to use the plan data, "to develop methods to eliminate or minimize adverse subsidence related impacts on Golden Eagles". Therefore, specific mitigation or compensation measures

*Major subsidence represents 80% of extracted seam height.

cannot be identified until the impacts are defined. However, in accordance with the requirements of the applicable statutes, regulations and permits related to the monitoring plan, UP&L will cooperate with FWS in developing appropriate mitigation or compensation measures if adverse subsidence related impacts occur. Possible compensation or mitigation measures may include:

1. Creation of artificial nest sites or structures.
2. Relocation of nests.
3. Salvage or relocation of nestlings.
4. Habitat enhancement.

UP&L will obtain current information on recent activities related to Golden Eagle nest manipulation for use in developing compensation or mitigation measures.

TABLE I

UTAH POWER & LIGHT COMPANY
 MINING DIVISION
 COTTONWOOD MINE - GOLDEN EAGLE STUDY
 (10 Mile Radius Area)
 (1986 and 1987 Surveys Conducted by UP&L, UDWR and USFWS)
 (1988 Survey Conducted by UP&L and UDWR)

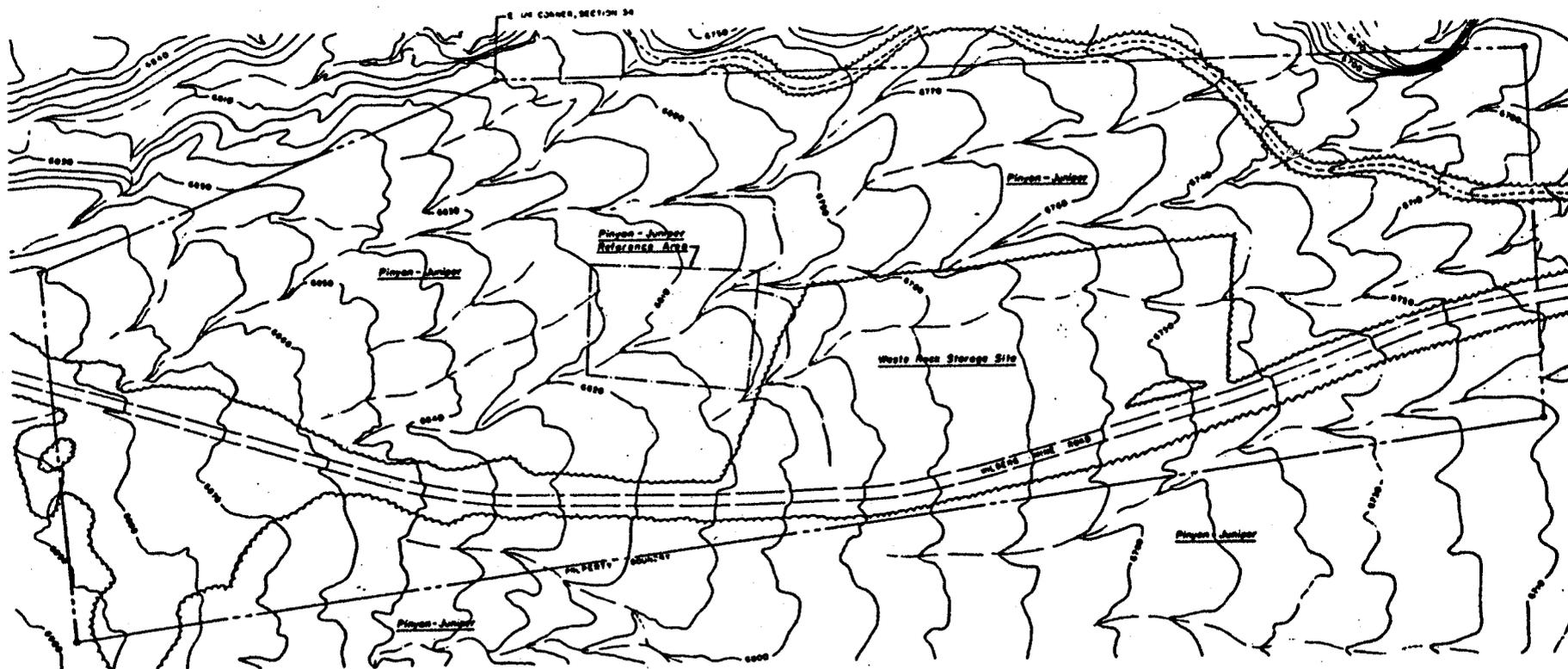
<u>NEST NO.</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
4	Inactive	Tended	Active (2 eggs), Failed
5 A,B	1 Not Found 1 Inactive	2 Inactive	1 Tended 1 Inactive
6	Inactive	Inactive	Tended
7	Not Observed	No Data	Inactive
8	Inactive, Delap.	No Data	Not Found
16 A,B,C,D,E,F	4 Inactive, 1 Tended	5 Inactive, 1 Not Found	Not Observed
17 A,B,C	3 Inactive	3 Inactive	3 Inactive
18 A,B,C	2 Inactive, 1 Tended	2 Tended, 1 Inactive	2 Tended, 1 Inactive
19 A,B	2 Tended	2 Tended	2 Inactive
22 A,B,C	2 Inactive, 1 Not Found	3 Inactive	Not Observed
26 A,B,C,D,E,F	Inactive	5 Inactive, 1 Active- Failed	Not Observed
27 A,B,C,D	3 Inactive, 1 Active (1 Young)	1 Inactive, 2 Tended 1 Active (2 Young)	Not Observed
30 A,B,C,D	2 Inactive, 1 Tended	4 Inactive	Not Observed

<u>NEST NO.</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
34	Not Observed	Inactive	Not Observed
36 A,B	Not Observed	Not Found	Not Observed
37 A,B C	Not Observed	2 Inactive 1 Active (1 Young) Outside 10 Mile Radius	Not Observed
53	Not Found	Not Found	Not Found
54 A,B	Not Found	Not Found	Not Found
55	Inactive	Inactive	Inactive (Adults Observed in Area)
56 A B	Not Observed	Not Found Active (1 Young) (New Nest)	Inactive Tended
57	Inactive	Inactive	Inactive
59 A B	Not Found	Not Found	Tended Old, Delapidated First Observation
61 A,B,C A B C	2 Tended, 1 Inactive	Destroyed (Feb. 1987) Destroyed (Sept. 1987) Active (1 Young Fledged)	Active (1 Young Fledged)
62	Tended	Inactive	Inactive
63 A,B	Not Found	Nest Not Found, Perch Site Only	Not Found
67 A,B,C	1 Active (1 Young), 1 Inactive	3 Inactive	Not Observed
68 A,B	1 Inactive, 1 Tended	2 Inactive	Not Observed

<u>NEST NO.</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
70	Tended	No Data	Not Observed
72 A,B	1 Active (1 Young), 1 Inactive	1 Inactive, 1 No Data	Not Observed
74 A,B,C	Not Observed	No Data	Not Observed
75	Not Observed	No Data	Not Observed
78	Not Observed	No Data	Not Observed
80	Not Observed	Not Data	Not Observed
87 A,E	1 Active (1 Young Fledged)	2 Inactive	1 Inactive, (Old) 1 Active (1 Young Fledged)
B	1 Not Found	Not Found	Not Found
C		Status Unknown (located in October 1987)	Inactive
D		Tended	Tended
88 A	1 Tended	Not found	Tended
B	Inactive	1 Tended	Ravens Present at Nest
C		1 Inactive	Inactive
91	Active (1 Young Fledged)	Active (2 Young Fledged)	Inactive
95	Not Observed	4 SISN	Inactive
97 A,B	Inactive	2 Inactive	2 Inactive
98 A,B,C,D,E	1 Active (Incubating Adult), 4 Inactive	1 Occupied - Failed, 4 Inactive	2 Tended 3 Inactive
99 A,B	Inactive	2 Inactive	Inactive (Only 1 Found)
100	Inactive	Inactive	Tended
103 A,B	Inactive	No Data	1 Active (2 Young Fledged) 1 Tended

<u>NEST NO.</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
107 A,B,C	Inactive	3 Inactive	Not Observed
109 A,B,C	Inactive	3 Inactive	Not Observed
111 A,B	Not Found, 1 Inactive	1 Not Found, 1 Inactive	1 Inactive, 1 Tended
113 A,B	Inactive	1 Inactive, 1 Occupied (Pair Present)	Not Observed
114 A,B,C	Inactive (Only 1 Nest Found)	Inactive	Not Observed
115	Inactive	Inactive	Not Observed
116	Inactive, Old Delap.	Not Found	Not Observed
119	Inactive	Inactive	Not Observed
120	Not Observed	Inactive	Not Observed
121	Not Observed	No Data	Not Observed
123 A,B	Not Observed	No Data	Not Observed
124 A,B,C	Not Observed	No Data	Not Observed
190	Inactive	Inactive	Not Observed
191	Not Observed	No Data	Not Observed
296 A,B,C	3 Inactive, Delap.	3 Inactive, Delap	2 Inactive 1 Tended
SW-1/4 Sec.35 T16S, R8E	1 GE: Active (1 Young Fledged)	2 Inactive, 1 Active - Failed (2 eggs)	Not Observed
Sec. 12 T18S, R7E, A,B	1 Tended	2 Tended (Adults Present)	Not Observed

*Amperceded
8/8/00*



Volume 2 after pg 2-122.

Fig. 1. Vegetation map for the Waste Rock Storage Site permit area (wavy line indicates existing vegetation).

BIJ-RESOURCES, INC.	
3rd & Main St., Logan, Utah 84301	
VEGETATION MAP	
Waste Rock Storage Site (1775, 686 S1.8)	
Utahberg Coal Mine, Emery County, Utah	
Utah Power & Light Company	
Scale: 1" = 1/2 MI.	D 920-1001

CHAPTER III RECLAMATION PLAN

Section I General

The Cottonwood/Wilberg Waste Rock Storage Facility consists of 16.9 acres of disturbed land to be used for disposal of underground development waste. An access road 1,435 feet long will be constructed in conjunction with the site and will involve 5 acres of disturbed land. The site is located on public lands managed by the U.S. Department of the Interior, Bureau of Land Management and its principal use is wildlife habitat and livestock grazing. When the facility is completed, reclamation will return the area to these same uses.

Construction of the facility will commence as soon as the permit is issued. Sediment control measures will be put in place to minimize the effects of the initial construction. Straw bales and silt fences will be erected in the natural drainages to treat any runoff during the initial construction period. Interim revegetation will be used on the bare slopes of the soil stockpiles and along the roadway to stabilize and prevent erosion. The topsoil stockpiles will be marked as such. Drainage structures will be constructed and maintained to ensure that they are in good repair and capable of handling the design flow rates. Silt fences will be constructed at the base of the soil stockpiles outside slopes. These silt fences will also be monitored and repaired as needed to ensure they are in good

Superseded 1/30/97

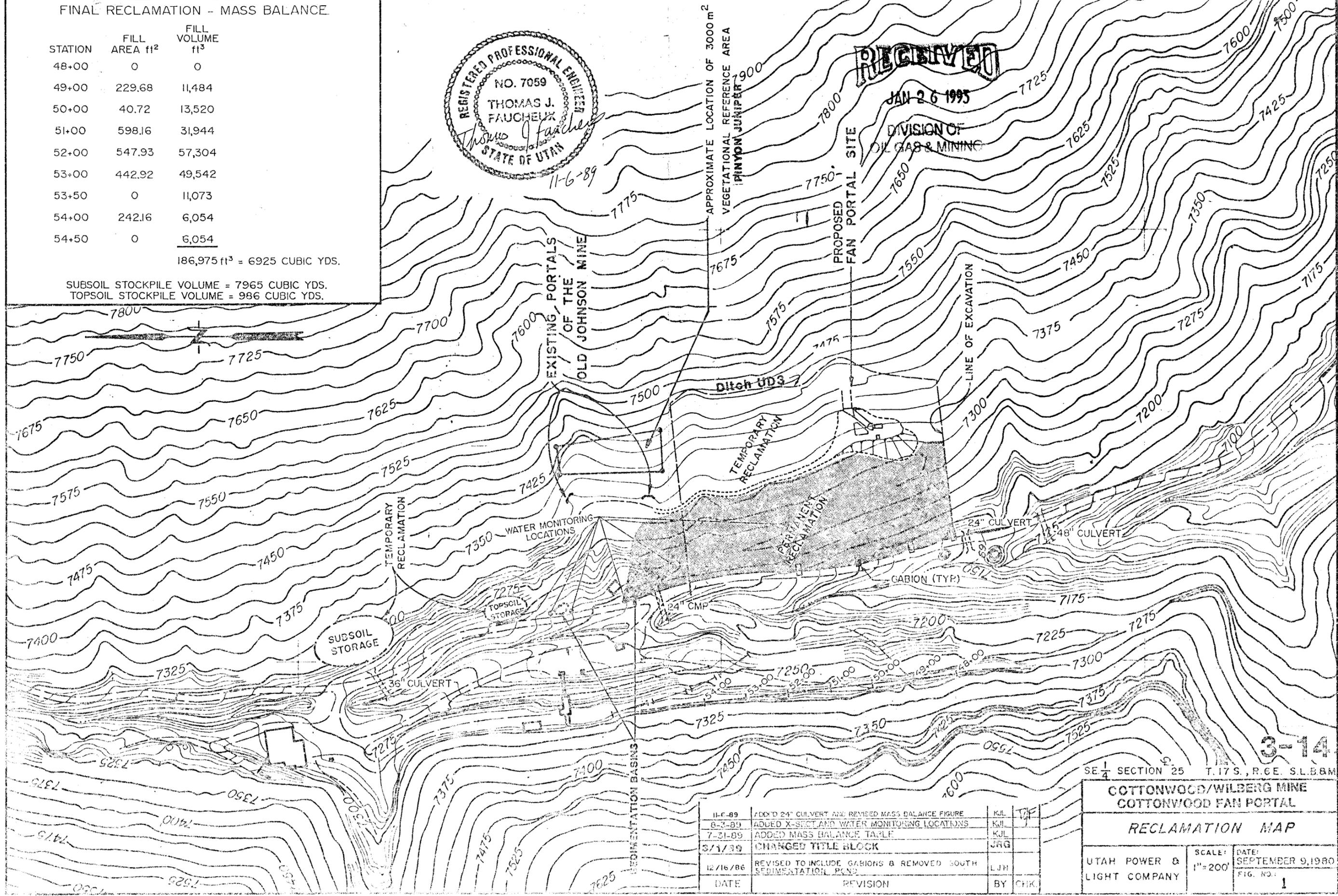
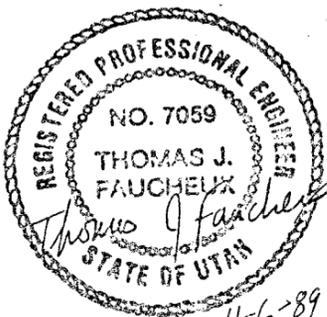
Revised 09/15/89

FINAL RECLAMATION - MASS BALANCE

STATION	FILL AREA ft ²	FILL VOLUME ft ³
48+00	0	0
49+00	229.68	11,484
50+00	40.72	13,520
51+00	598.16	31,944
52+00	547.93	57,304
53+00	442.92	49,542
53+50	0	11,073
54+00	242.16	6,054
54+50	0	6,054

186,975 ft³ = 6925 CUBIC YDS.

SUBSOIL STOCKPILE VOLUME = 7965 CUBIC YDS.
TOPSOIL STOCKPILE VOLUME = 986 CUBIC YDS.



RECEIVED
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DIVISION OF OIL GAS & MINING

3-14

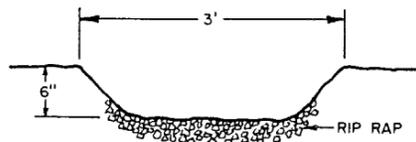
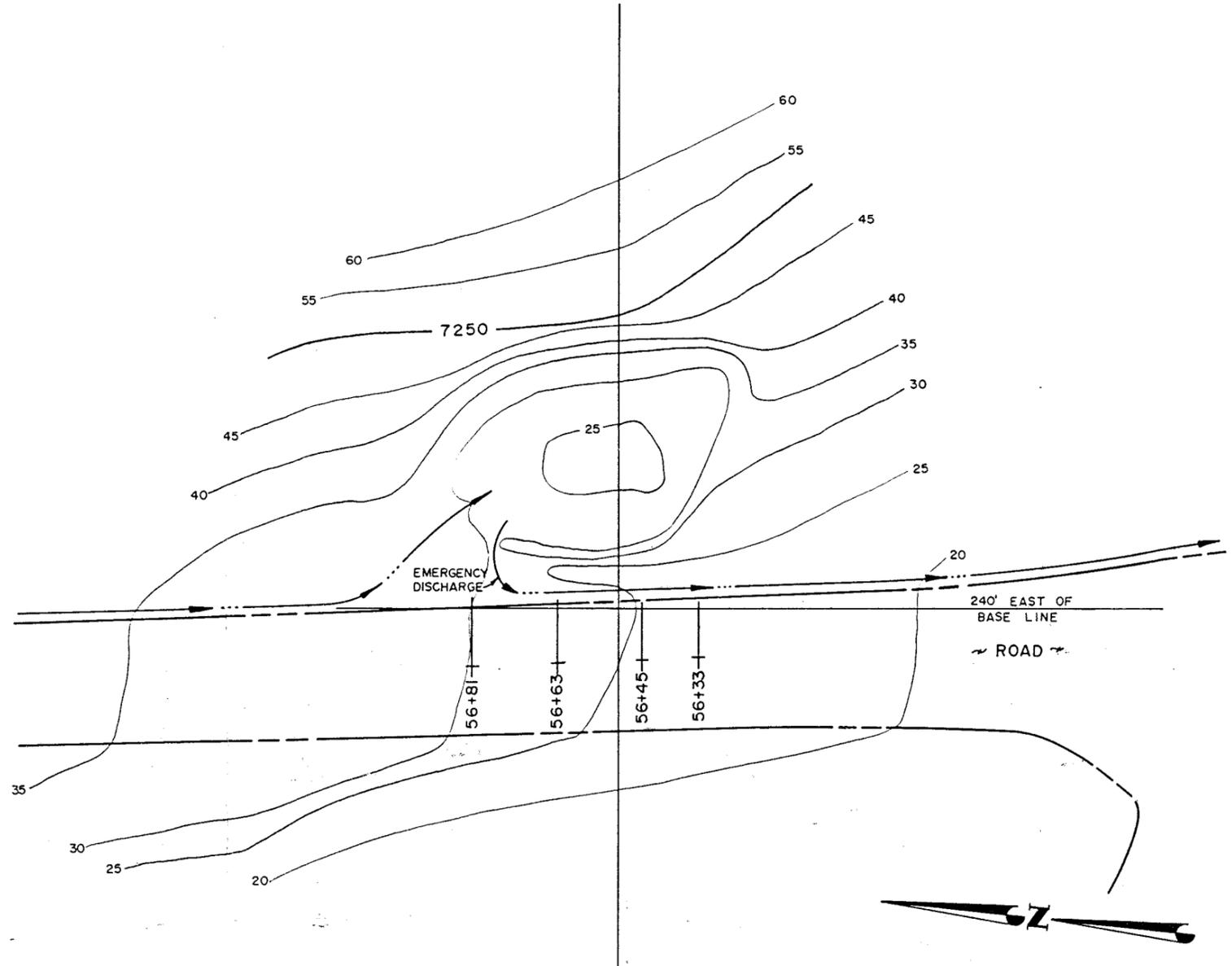
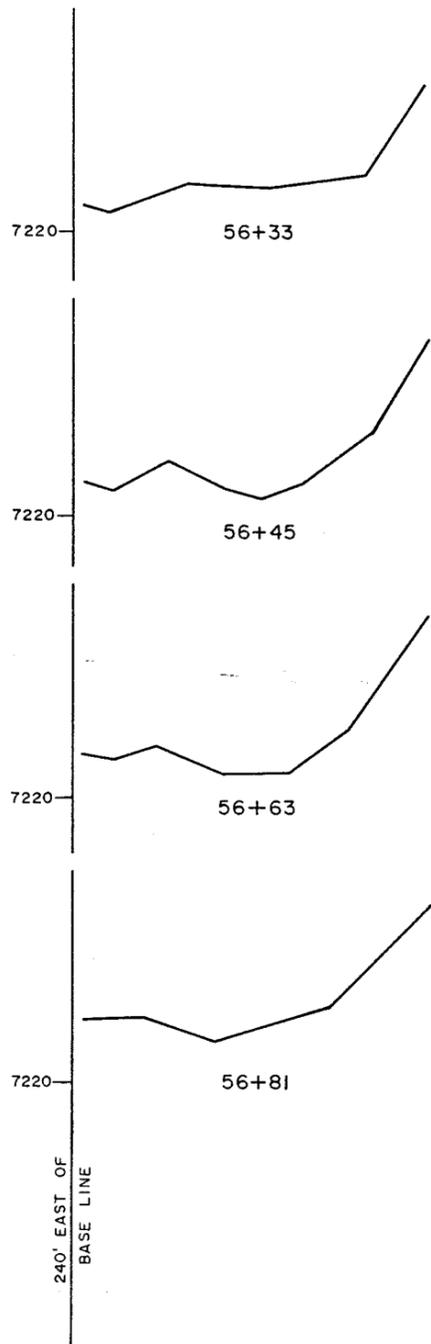
SE 1/4 SECTION 25 T.17 S., R.6E. S.L.B&M

COTTONWOOD/WILBERG MINE
COTTONWOOD FAN PORTAL

RECLAMATION MAP

UTAH POWER & LIGHT COMPANY
SCALE: 1"=200'
DATE: SEPTEMBER 9, 1980
FIG. NO. 1

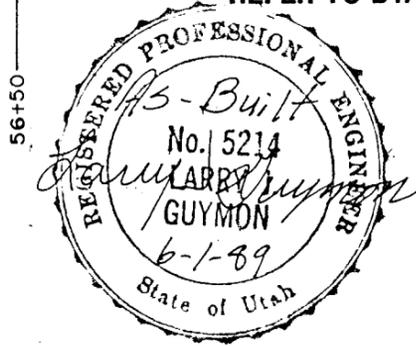
DATE	REVISION	BY	CHK.
11-6-89	ADD'D 24" CULVERT AND REVISED MASS BALANCE FIGURE	KJL	TJF
8-3-89	ADDED X-SECT AND WATER MONITORING LOCATIONS	KJL	
7-31-89	ADDED MASS BALANCE TABLE	KJL	
3/1/89	CHANGED TITLE BLOCK	JAG	
12/16/86	REVISED TO INCLUDE GABIONS & REMOVED SOUTH SEDIMENTATION POND	LJH	



DISCHARGE DETAIL
NO SCALE

3-10

REFER TO DWG. NO. CM-10501-CP FOR LOCATION



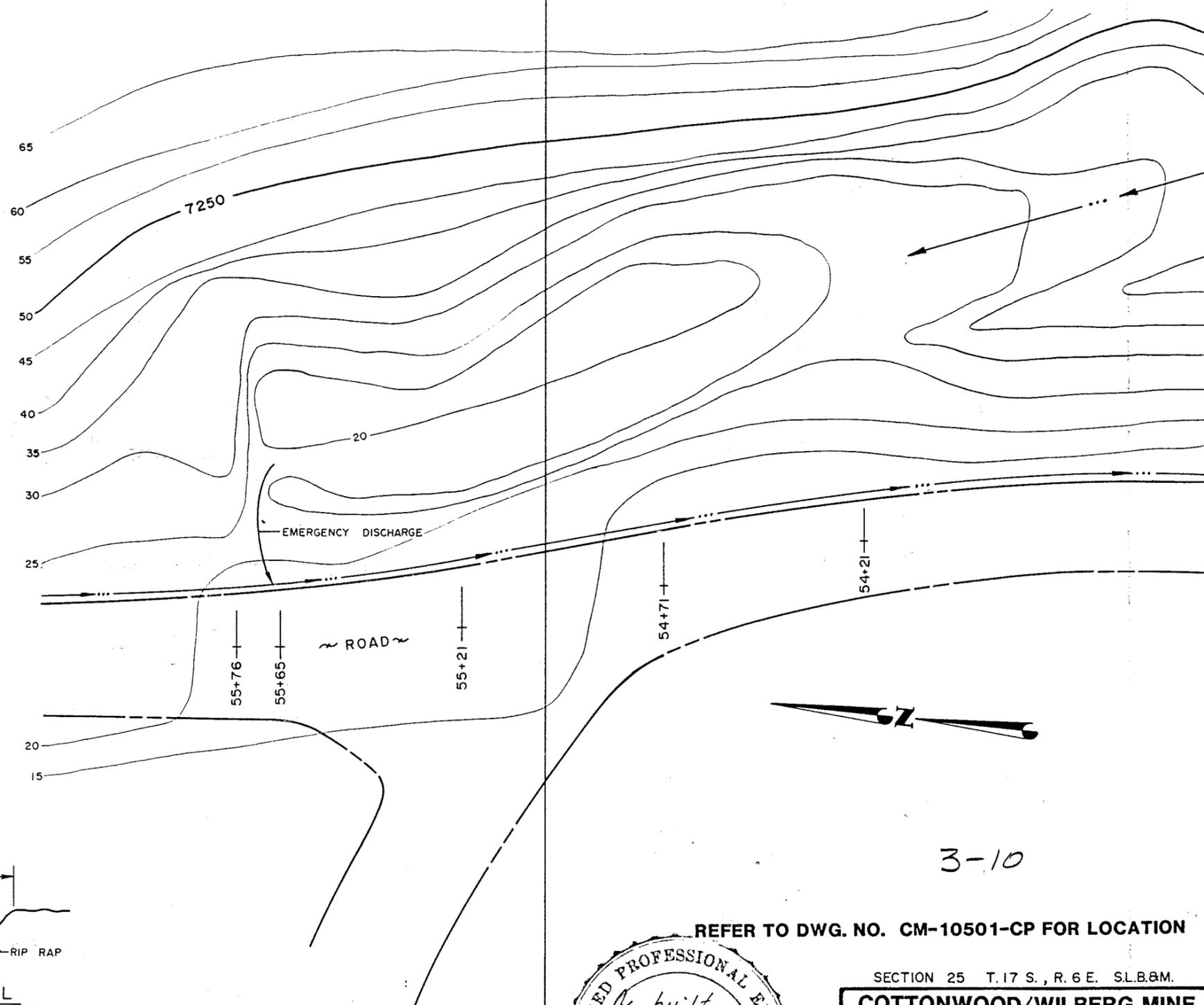
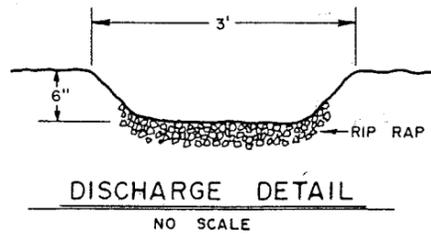
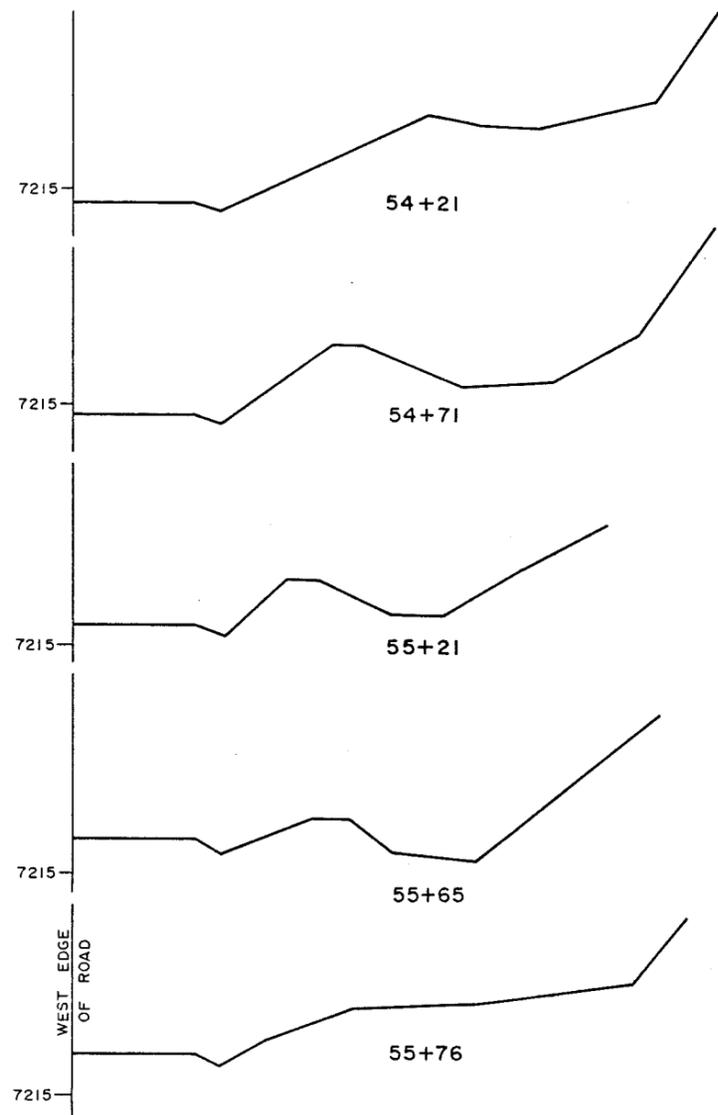
SECTION 25 T.17 S., R.6 E. S.L.B&M.

**COTTONWOOD/WILBERG MINE
COTTONWOOD FAN PORTAL**

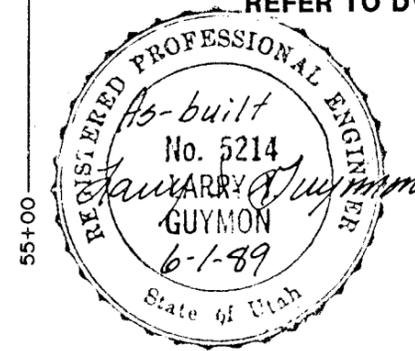
**NORTH SEDIMENT BASIN
DETAILS & CROSS SECTIONS**

UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION

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DATE: NOV. 20, 1980	CHECKED BY:	CM-10353-CP



REFER TO DWG. NO. CM-10501-CP FOR LOCATION



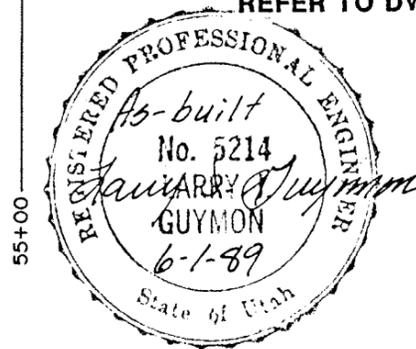
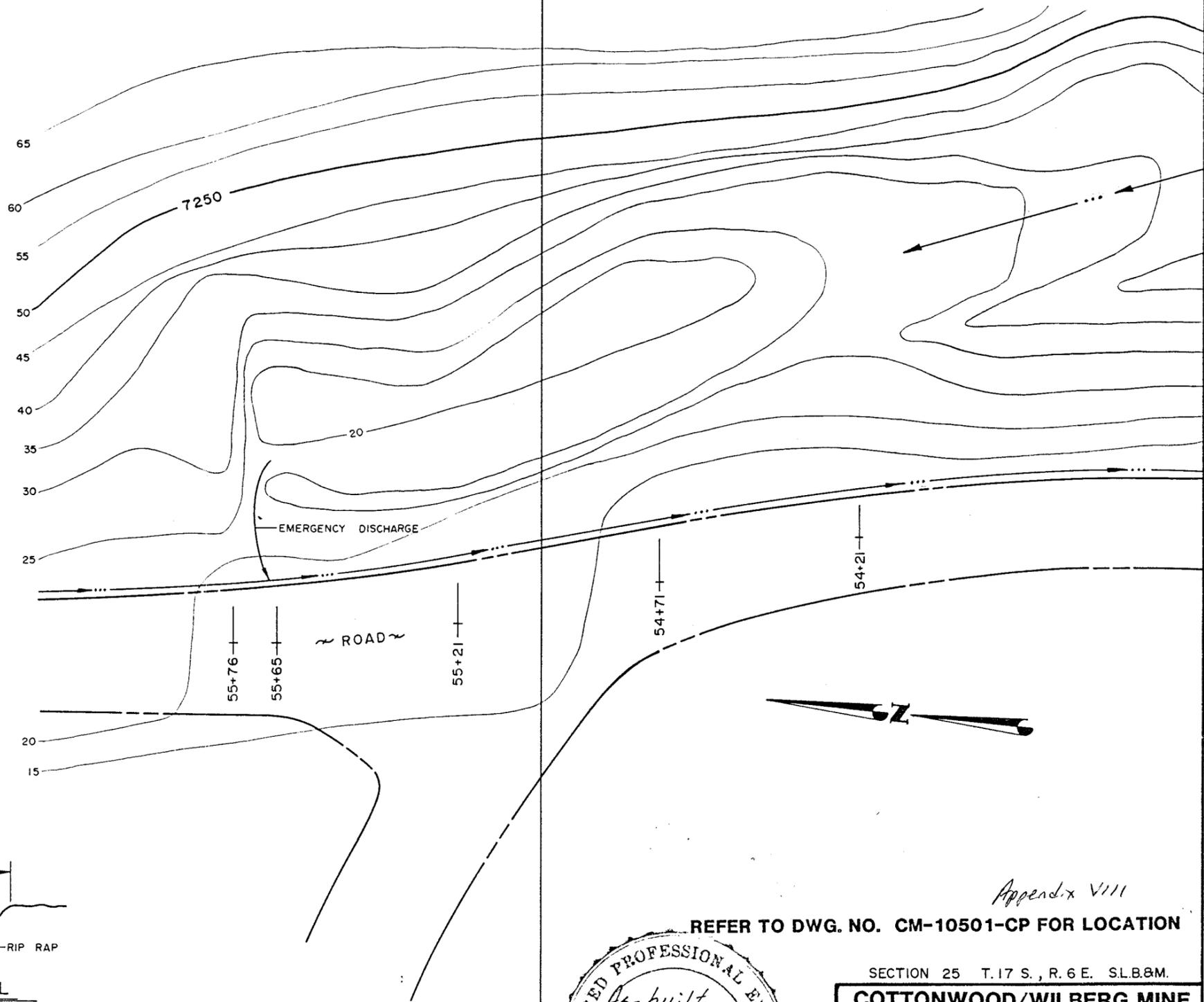
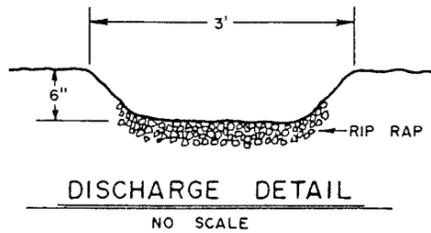
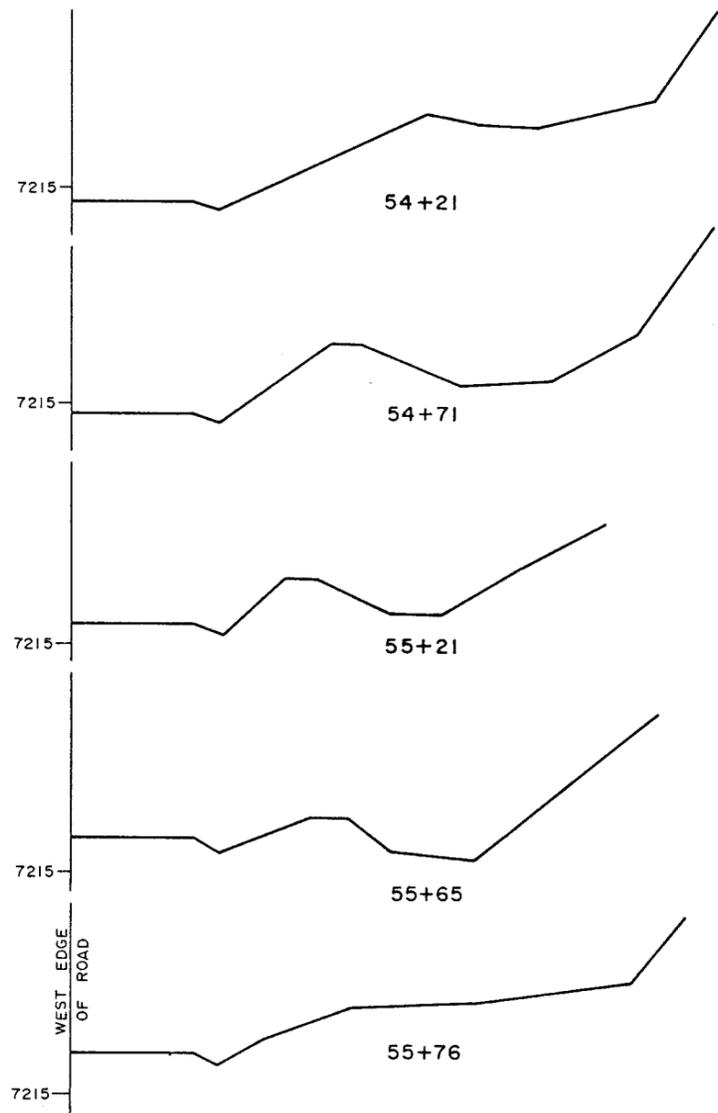
SECTION 25 T.17 S., R.6 E. S.L.B.&M.

**COTTONWOOD/WILBERG MINE
COTTONWOOD FAN PORTAL**

**SOUTH SEDIMENT BASIN
DETAILS & CROSS SECTIONS**

UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION

SCALE: 1" = 30'	DRAWN BY: S. M. C.	DRAWING NUMBER
DATE: NOV. 19, 1980	CHECKED BY:	CM-10351-CP



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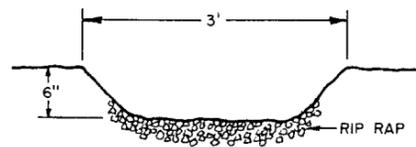
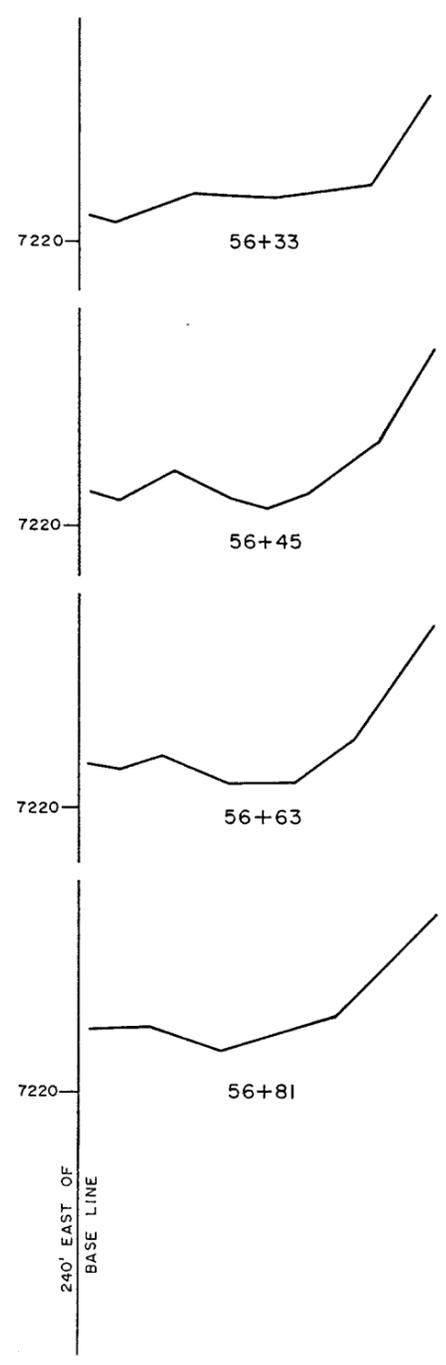
SECTION 25 T.17 S., R.6 E. SLB&M.

**COTTONWOOD/WILBERG MINE
COTTONWOOD FAN PORTAL
SOUTH SEDIMENT BASIN
DETAILS & CROSS SECTIONS**

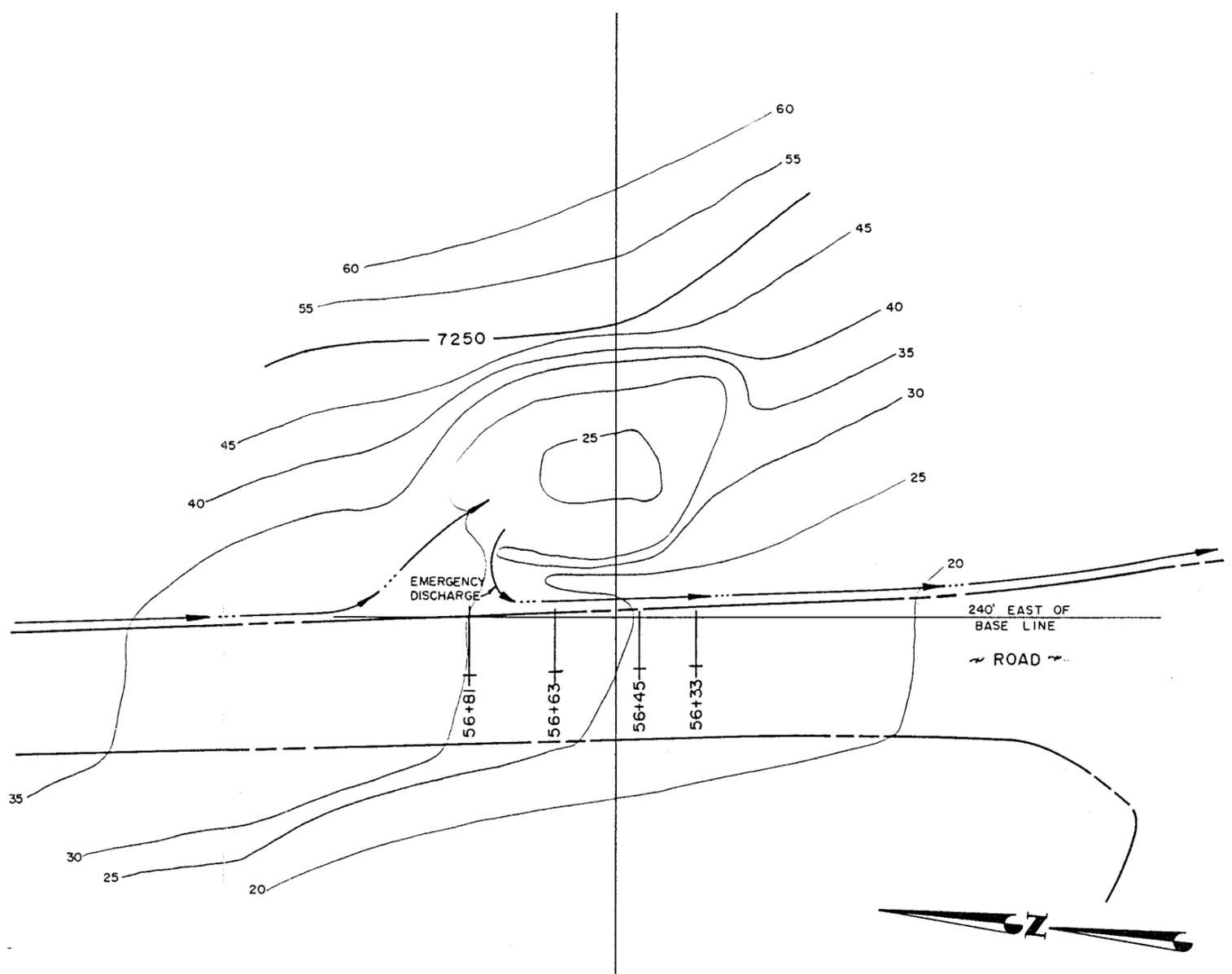
UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION

SCALE: 1" = 30'	DRAWN BY: S. M. C.	DRAWING NUMBER
DATE: NOV 19, 1980	CHECKED BY:	CM-10351-CP

Appendix VIII



DISCHARGE DETAIL
NO. SCALE



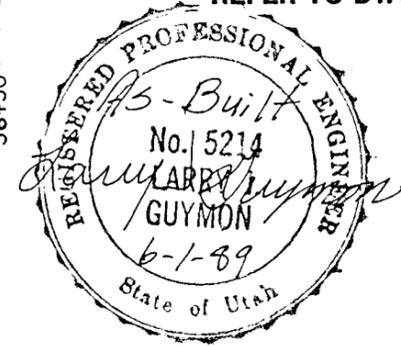
REFER TO DWG. NO. CM-10501-CP FOR LOCATION

Appendix VIII

SECTION 25 T.17 S., R.6 E. S.L.B&M.

**COTTONWOOD/WILBERG MINE
COTTONWOOD FAN PORTAL
NORTH SEDIMENT BASIN
DETAILS & CROSS SECTIONS**

UTAH POWER & LIGHT COMPANY
DEPARTMENT OF MINING & EXPLORATION



SCALE: 1" = 30'	DRAWN BY: S. M. C.	DRAWING NUMBER
DATE: NOV. 20, 1980	CHECKED BY:	CM-10353-CP

Within sixty (60) days of permit approval all issues stated in the April 28, 1989 letter from George Morris to Lowell Braxton will be resolved by Utah Power and Light if the Forest Service is not satisfied.

period. The Hiawatha coal seam was mined until 1955. The extent of the coal removed was not documented (personal communication, Neldon Sitterud, August 1979).

The area across the canyon is an active coal mine, Trail Mountain Mine. Presently mining, stockpiling, and shipping coal occur on that site.

The land use preceding mining was range forage and wildlife habitat. The vegetation reestablished after mining is representative of the Pinyon-Juniper sites with good reestablishment of local forage species.

Land in the vicinity of the Cottonwood portal is used primarily for spring and winter range forage, wildlife habitat and mineral mining. Historically, the area has been used for range forage and wildlife habitat.

The present land use of domestic grazing and wildlife habitat utilizes the surface lands at their highest capability in the Cottonwood Canyon area. Factors which support this conclusion are shallow, coarse textured soils, large amounts of rock outcrop, steep terrain (70-80%), low soil water-holding capacity and low amounts of total annual precipitation.

Vegetation sites on the lower canyon area vary from the semi-desert alkali flat (Greasewood - Soil pH 9.2) with a land classification of capability unit VII's - SX, to the semi-desert stoney loam (pinyon-juniper) range site also with the range site capability unit of VII's - SX.

A site specific investigation, conducted with the Soil Conservation Service Range Specialist in July 1979, indicated that the condition of the range and vegetation in the lower Cottonwood Canyon is fair. The capability level of this area varies. The area at the portal is covered under vegetation sites 1 and 2 and has the estimated capability of producing 1,000 pounds/acre with a present estimated production level of 1,000 pounds/acre of forage.

The Carbon - Emery Soil Survey (USDA, SCS, 1979), expresses the capability unit VII's - SX the following way:

Permeability is moderate to rapid, and natural fertility is moderate to low. The susceptibility to sheet erosion is moderate; some gullies have formed. The soils retain about four inches of water but are dry most of the time.

These soils are used for range and are suited to that purpose. Reseeding of grasses and clearing of brush or other mechanical practices that would improve the range are not feasible.

There are Douglas Fir and White Fir on the portal site. The timber value of the trees in this area is minimal and classified non-commercial due to inaccessability, size - class distribution and marketing conditions that limit the economic feasibility of commercial operation.

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cobbly clay loam to a depth of 5 feet. Other characteristics are the soil is calcareous through. It contains more than 35% rock fragments.

Permeability is rapid. Available water capacity is moderately low. Organic matter content in the surface layer is moderate. Effective rooting depth is about 60 inches. Surface runoff is rapid and erosion hazard is moderate under potential native vegetation and very high if vegetation is removed and the soil is left bare. Erodibility is high. This soil is used for wildlife habitat and recreation.

Typifying Pedon: (Colors are for dry soil unless otherwise noted). The location is between sealed up mine portals of Old Johnson Mine on the upper road. Section 25, T17S, R6E.

All Horizon is 0 to 4 inches, brown (10YR 5/3), very stony sandy loam, very dark grayish-brown (10YR 3/2); weak thick platy structure that breaks to moderate fine granular; soft dry; very friable moist, slightly sticky and slightly plastic wet; common very fine roots; stones and boulders are about 35%; strongly calcareous, lime is disseminated; moderately alkaline (pH 8.0); clear smooth boundary. Note: stones range in diameter from 1 foot to 3 feet. A boulder is a rock fragment more than 3 feet in diameter.

Bb (abG) - Very Stony Sandy Loams - The Bb soil is shallow and excessively drained. It occurs on very steep (70-80%) hillside slopes at elevations of 7,200 to 7,800 feet. This soil formed in colluvium and residuum derived mainly from sandstone and shale.

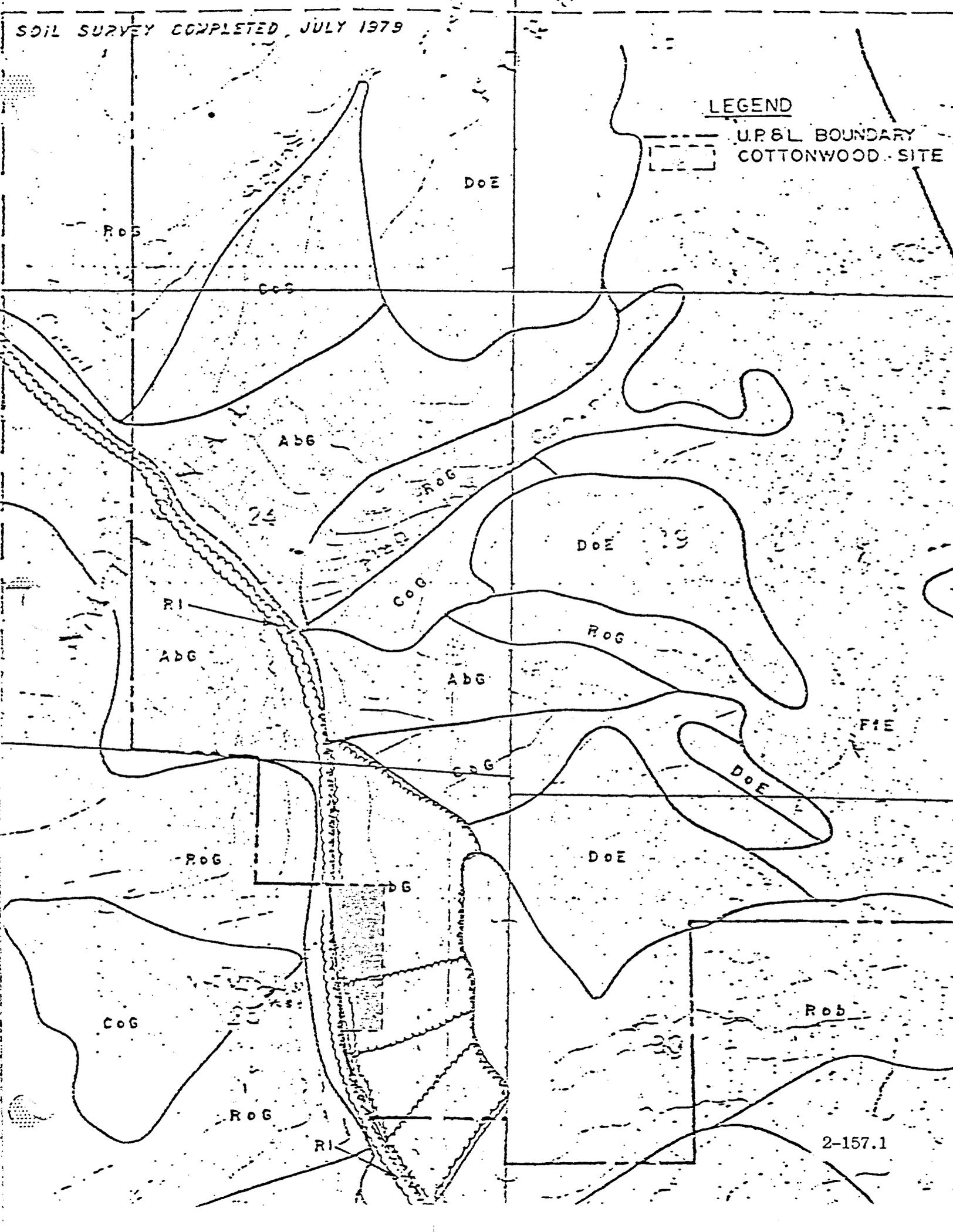
The average annual precipitation is 12 to 15 inches. Mean annual air temperature is 44 to 47° F and the average frost-free season is 80 to 90 days. This soil occurs on hillside slopes in the mine area and on ridges and points in other parts of the survey area. Slopes are 70 to 80 percent and are west and east facing. They are medium in length and convex in shape. Vegetation is dominantly bullgrass, rabbitbrush, serviceberry and pinyon. Included in mapping are small areas of Cc stony sandy loam, 50 to 70 percent slopes. Associated soils are Cc, Dd and De soils.

In a typical profile the surface layer is brown, very stony sandy loam about four inches thick. The underlying layer is pale brown, very cobby silt loam about 10 inches thick. Other characteristics include the soil is less than 20 inches deep over sandstone bedrock. It is strongly calcareous. Reaction is moderately alkaline. Permeability is moderately rapid. Available water capacity is very low. Organic matter content in the surface layer is moderate. Effective rooting depth is about 14 inches. Surface runoff is medium and erosion hazard is medium under potential native vegetation and very high if vegetation is removed and the

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LEGEND

- U.P & L BOUNDARY
- COTTONWOOD SITE



soil is left bare. Erodibility is high. This soil is used for wildlife habitat, recreation and woodland.

Typifying Pedon: (Colors are for dry soil unless otherwise noted.) The location is directly above second walled up opening on upper road (at old Johnson Mine). Section 25, T17S, R6E. The horizon is A1 with 0 to 4 inches; brown (10YR 5/3) very stony sandy loam, dark grayish brown (10YR 4/2) moist; moderate very fine granular structure; soft clay, firm, moist, slightly sticky and slightly plastic wet; few very fine, few fine roots; stones and boulders cover 25% of the surface; strongly calcareous, lime is disseminate; moderately alkaline (pH 8.0); clear, smooth boundary. Note: Stones range in diameter from 1 foot to 3 feet. A boulder is a rock fragment more than 3 feet in diameter.

Vegetation Information for
the Cottonwood Portal Area

Report Prepared for
Utah Power & Light Company

by

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July 1982

Vegetation Information for the Cottonwood Portal Area

This reports the vegetational information for the Cottonwood Portal Area. The Cottonwood Portal Area disturbance was existing at the time of vegetational sampling. However, no new disturbances are planned within the permit area.

Methodology

Six vegetational types were identified within the permit area and adjacent areas and mapped (scale 1:24,000). Aerial photography (scale 1:24,000) and field reconnaissance were utilized to construct the vegetation map. Aerial photography (taken in 1962) and the vegetation of adjacent canyons and areas were used to infer what species composition and aerial plant cover were before the present disturbance occurred at the Wilberg Mine (see Map 2-15).

A reference site to represent the vegetation type disturbed by mining was located as close to the disturbed area as feasible. Differences in species composition, aerial plant cover, slope, aspect, soil and geology were minimized between the disturbed area and reference site. The reference site was marked in the field with metal T-posts and located on the vegetational map (Fig. 1 in Fan Portal Reclamation). Pinyon-juniper is the only vegetation type disturbed by mining activities.

Vegetational analyses of the reference site consisted of developing a list of species by the life form, measuring aerial plant cover, determining shrub density and composition. Also, tree density by size class was determined.

Aerial cover was measured by the step-point method. Plant species, litter, rock or bare ground was determined every third pace along a 20 point transect. The starting point and direction of each transect was randomly selected.

The point-center quarter method was used to measure shrub density. At each sampling point two perpendicular lines were inscribed to delineate four quarters centered over the sampling point. The distance from the nearest shrub in each quarter to the sampling point was measured and then the shrub was identified (data sheets are in Appendix). Shrub density was determined by the following equations:

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$$A_j = (Y_1 + Y_2 + Y_3 + Y_4/4)^2$$

$$D = U/\Sigma A_j/n$$

where:

Y_i = distance from point to nearest shrub
in the i th quarter,

A_j = mean area per sampling point,

N = sample size,

D = density, the number of shrubs per unit area,

U = unit area,

Five sampling points were placed 15 paces apart along a transect. The starting point and direction of each transect was randomly located.

Tree density was obtained by a complete enumeration by species within the reference site. Tree size class was determined by measuring diameter at breast height (DBH) for all tree species except pinyon pine and Utah juniper which were measured at the base.

Statistical adequacy for sample size for aerial plant cover and shrub density was determined by the following formula:

$$N_{\min} = t^2 s^2 / (d\bar{x})^2$$

where:

N_{\min} = minimum sample size,

t = t -value for a 2-tailed test,

s = standard deviation,

d = allowable change in sample mean,

\bar{x} = sample mean.

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Sample size for aerial cover was tested at the 90 percent confidence level ($t_{0.10, \infty} = 1.645$) with a 10 percent error of the mean ($d=0.10$). Shrub density sample size was tested at the 80 percent confidence level ($t_{0.20, \infty} = 1.282$) with 10 percent error of the mean ($d=0.10$). Adequacy for aerial cover and shrub density was calculated after 10 and 20 samples, respectively. Sample size for density was determined using mean area per plant. Table 1 gives the minimum sample size and observed sample size for the reference area. Data presented hereafter will be based on the observed sample number.

Shrub composition based on density was determined by the following formula:

$$C = S_i/T$$

$$T = \sum S_i$$

where:

S_i = total individuals of the i th species,

T = total number of shrubs sampled,

C = shrub composition.

Jaccard's Community Coefficient was used to quantify the similarity in plant species between the reference and disturbed area. The equation is:

$$I.S. = (C/A+B-C)100\%$$

where:

I.S. = similarity index,

A = total species in community A,

B = total species in community B,

C = number of species common to both.

The Shannon Index was used to calculate species diversity for the reference areas. The index is:

$$H' = -\sum P_i \ln P_i$$

where:

H' = species diversity index,

P_i = proportion of the observations found in category i .

Diversity calculations based on ground cover by species. The maximum possible diversity for a reference area is:

$$H'_{\max} = \ln K$$

where:

$$H'_{\max} = \text{maximum diversity,}$$

K = the number of categories, i.e., species.

The ratio between H' and H'_{\max} is referred to as species evenness. This is calculated as:

$$J = H' / H'_{\max}$$

where:

J = species evenness.

Data for aerial cover, species list by life form, and tree density were collected August 12-15, 1980, and analyzed September 8 and 9, 1980. Shrub density was measured April 14, 1982 with data analyzed April 22, 1982.

United States Forest Service and Utah Division of Wildlife Resources personnel located in Price, Utah were consulted on August 15 and 16, 1980 with regards to livestock and big game vegetational use within the permit area.

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Permit Area Vegetation

The mine property permit area is 18,000 acres (Table 2). Six major vegetation types were identified within the permit area and adjacent land (see 2-15, Vegetation Map). Mixed conifer, pinyon-juniper, sagebrush, grass, riparian and salt desert shrub are the six vegetation types (Table 2). The mixed conifer type occurs primarily at the higher elevations (above 9,000 ft.) or at lower elevations with a northern exposure. The pinyon-juniper vegetation type is found on the steep, rocky slopes with a southern exposure and the relatively flat ground at lower elevations (7,000 ft.). At the higher elevations and on north-facing slopes, it is common for the pinyon-juniper community to intermix with the mixed conifer community. Elevation for the pinyon-juniper vegetation type varies from 7,000 to 9,000 feet. The sagebrush and grass vegetation types also occur at the high elevations, but are restricted to the drier sites than the mixed conifer. The riparian vegetation type is located along Deer Creek, Cottonwood and Grimes Wash. This vegetation type is better developed along Deer Creek below the mine, then along Cottonwood and Grimes Wash. The salt desert shrub vegetation type is not found within the permit area, but is located on adjacent land. It has a southwestern exposure and elevation varies from 6,600 to 7,600 feet.

Disturbed Area

The disturbed area of the Cottonwood Canyon portal site totals five acres (Table 3). Elevation is approximately 7,200 ft. with a west and southwest exposure. The general slope varies from about 25 to 35°. The native plant community before disturbance was a pinyon-juniper (Table 4). Utah juniper and pinyon pine were the common trees. Common grasses were Indian rice grass, western wheatgrass and salina wildrye. Common shrubs included *Cutler* ephedra, mountain mahogany and saskatoon serviceberry. Aerial plant cover varied from 40-43 percent.

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Reference Area

A reference area was established to represent the disturbed pinyon-juniper vegetation type (Table 5).

The reference site (3,000m²) has a southern exposure with an elevation of 7,500 ft. Slope varies around 37°. Common plants include Utah juniper, pinyon pine, saskatoon serviceberry, cutler ephedra, galium, corymbed eriogonum, western wheatgrass and salina wildrye (Table 6).

Total plant cover is 42 percent with grasses and woody plants providing the majority of cover (Table 7). Tree and shrub densities are 37 and 660 plants per acre, respectively (Table 8 and 9). Low rabbitbrush and cutler ephedra are the dominant shrubs. The dominant trees are pinyon and Utah juniper. The species diversity index is 2.41. The soil* is a Typic Ustorthent-Lithic Ustorthent-Rocky outcrop association.

Wildlife and Livestock

The mining permit area is located within the Ferron Ranger District of the Manti-LaSal National Forest managed by the United States Forest Service. Both wildlife and livestock utilize the permit area for grazing. However, wildlife and livestock grazing is limited to the higher elevations. Very little wildlife and livestock grazing occurs on the steep slopes where the mine is located.

Deer, elk and moose utilize the area for grazing (Table 10). Deer have a greater impact on the vegetation than elk or moose because of their high numbers.

Besides wildlife use, the area provides summer grazing for cattle (Table 11). Cattle grazing occurs on the East Mountain allotment of the Ferron Ranger District. For the past several years, there has been a 10 percent non-use of the available AUM's. During 1980 all AUM's were utilized. Overall range condition is fair.

Endangered or Threatened Plants

During the vegetation sampling, no endangered or threatened plant species were identified.

(*Reclassified by Dr. A.R. Southard in May, 1989)

Table 1. Sample adequacy for aerial plant cover and shrub density for the pinyon-juniper reference area at the Cottonwood Portal Area.

<u>Reference Area</u>	<u>Parameter</u>	<u>N_{min}</u> ¹	<u>\bar{X}</u> ²	<u>S.D.</u>	<u>N_{obs}</u>
Pinyon-juniper	Aerial cover	17	42.0	10.59	18
	Shrub density	38	7.52	3.60	40

¹Determined after 10 and 20 samples for total cover and shrub density, respectively.

²Sample mean of mean area per plant (m²).

Table 2. Vegetation types and size of each that are found within the permit area per plant and adjacent land.

<u>Vegetation Type</u>	<u>Total Acres</u>	<u>% of Permit Area</u>
Mixed conifer	9,037.1	50.2
Pinyon-juniper	4,524.4	25.1
Sagebrush	4,053.0	22.5
Grass	302.5	1.7
Riparian	<u>84.0</u>	<u>0.5</u>
TOTAL	18,000.0	100.0
Salt Desert Shrub ¹	281.7	0

¹The salt desert shrub type is located on adjacent land to the permit area. It is influenced by the Des-Bee-Dove Pond.

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Table 3: Vegetation type, number of acres, and percent of vegetation type disturbed by mining activities at the Cottonwood Portal Area.

<u>Vegetation Type</u>	<u>Acres Disturbed</u>	<u>% of Vegetation Type</u>
Pinyon-juniper	6.4	0.1

Table 4: Plant species that were inferred to have existed within the disturbed portion of the pinyon-juniper vegetation type at the Cottonwood Portal Area.

Trees	Rocky Mountain juniper	<u>J. scopulorum</u>
	Utah juniper	<u>Juniperous osteosperma</u>
	Pinyon pine	<u>Pinus edulis</u>
	Limber pine	<u>P. flexilis</u>
	Douglas fir	<u>Pseudotsuga manziesii</u>
Shrubs	Saskatoon serviceberry	<u>Amelanchier alifolia</u>
	Creeping barberry	<u>Berberis repens</u>
	Curleaf mountain mahogany	<u>Cercocarpus ledifolius</u>
	Mountain mahogany	<u>C. montanus</u>
	Low Rabbitbrush	<u>Chrysothamnus visidiflorus</u>
	Cutler ephedra	<u>Ephedra cutleri</u>
	Wood's rose	<u>Rosa woodsii</u>
Grasses	Western wheatgrass	<u>Agropyron smithii</u>
	Salina wildrye	<u>Elymus salina</u>
	Indian rice grass	<u>Oryzopsis hymenoides</u>
Forbs	Aster	<u>Aster spp.</u>
	Corymbed eriogonum	<u>Eriogonum corymbosum</u>
	Galium	<u>Galium spp.</u>
	Flax	<u>Lolium kingii</u>

Table 5. Similarity between the pinyon-juniper reference site and its respective disturbed area at the Cottonwood Portal Area,

<u>Parameter</u>	<u>Reference</u>	<u>Disturbed</u>
Cover, %	41.9	40-43
Denisty, No./Acre		
Shrub	660	-
Tree	37	-
Species composition, s ¹	20	19
Aspect	S to SW	S to SW
Elevation, ft.	7,300	7,200
Slope, °	25-35	25-35
Soil*	Ustorthent	Ustorthent
Geology	Colluvium	Colluvium
H'	2.41	-
H' _{max}	2.89	-
J	0.83	-
Index of similarity, %		90.0

¹s - total plant species.

*Revised by Dr. A.R. Southard in May, 1989.

Table 7. Ground cover by species for the pinyon-juniper reference site at the Cottonwood Portal Area.

<u>Item</u>	<u>Percent Cover</u>
Trees	12.8
Pinyon pine	5.0
Utah juniper	3.6
Douglas fir	1.9
Rocky Mountain juniper	1.7
Limber pine	0.6
Shrubs	12.5
Saskatoon serviceberry	5.6
Cutler ephedra	2.5
Creeping barberry	1.9
Low rabbitbrush	1.4
Wood's rose	0.5
Mountain mahogany	0.3
Cuneate saltbush	0.3
Forbs	1.7
Galium	1.1
Alypsanth	0.3
Forb	0.3
Grasses	14.7
Bluebunch wheatgrass	5.3
Salina wildrye	5.0
Indian ricegrass	4.4
Total plant cover	41.9
Litter	7.2
Rock	12.3
Bare ground	38.6

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Table 8. Shrub density and composition for the reference site at the Cottonwood Portal Area.

<u>Species</u>	<u>Composition</u>	<u>Density, No/Acre</u>
Low rabbitbrush	33	217
Cutler ephedra	30	198
Creeping barberry	19	125
Saskatoon serviceberry	13	84
Shadscale	2	13
Wood's rose	2	13
Snakeweed	<1	<6
Curlleaf mountain mahogany	<1	<6
	<u>100</u>	<u>660</u>

¹Based on 40 observations, mean area per plant was 6.3 m²

Table 9. Tree size class (DBH), density and composition for the reference site at the Cottonwood Portal Area.

<u>Species</u>	<u>0-10</u>	<u>11-25</u>	<u>26-50</u>	<u>>50</u>	<u>% of Total</u>
Pinyon pine	4	10	10	5	58
Utah juniper	5	7	1	0	26
Douglas fir	3	0	1	2	12
Limber pine	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>4</u>
% of Total	28	34	24	14	100

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Table 10. Deer, elk and moose utilization on the Ferron Ranger District of the Manti-LaSal National Forest.

<u>Wildlife</u>	<u>Unit</u>	<u>High Priority¹ Summer Range</u>	<u>Winter² Range</u>	<u>AUM³</u>	<u>No.⁴</u>
Deer	34 N	6,500		274	289
	35 S	5,450		282	297
			3,055	73	65
Elk	Manti Range	12,685		365	126
			2,320	27	8
			Critical 1,040	120	35
Moose	Entire Allotment (Year Long)		15,005	130	13

¹Total acres

²Total acres

³Animal unit month

⁴Total animals

Table 11. Cattle utilization on the East Mountain allotment of the Ferron Ranger District, Manti-LaSal National Forest.

<u>Total Acres</u>	<u>Land Ownership</u>	<u>AUM</u>
1,959	Private ¹	845
19,328	USFS	1,710

¹Private land but still managed by the USFS

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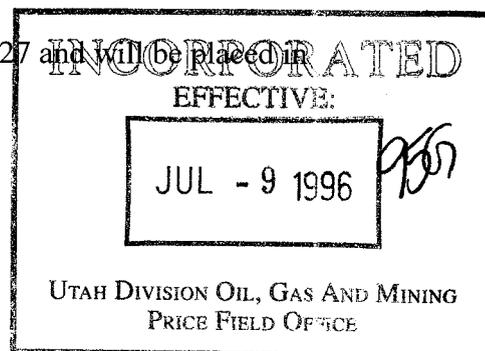
TABLE A

<u>DRAWINGS</u>	<u>PLATE NO.</u>
7704-C121, 7704-C122, KS1496D, CM-10552-WB	3-29
7704-C123	3-30
7704-C124	3-31
7704-C125	3-32
7704-C126	3-33
7704-C127	3-34
7704-C128	3-35
7704-C117	3-36
7704-C118	3-37
7704-C119	3-38

Table B indicates revised drawings and plate numbers that supercede the current ones.

TABLE B

KS1496D	Supercedes 7704-C121, 7704-C122, and previous KS1496D and will be placed in Plate 3-29, Volume 6.
KS1578D KS1579D	Supercede CM-10552-WB and will be placed in Plate 3-30, Volume 6.
KS1577D	Supercedes 7704-C123, 7704-C124 and 7704-C128 and will be placed in Plate 3-31, Volume 6.
KS1576D	Supercedes 7704-C125, 7704-C126 and 7704-C127 and will be placed in Plate 3-32, Volume 6.



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3-29 Sedimentation Ponds-Plan View and Profile KS1496D

**3-30 North and South Pond X-Sections KS1578D
KS1579D**

3-31 Sediment Ponds, Specifications and Details KS1577D

3-32 Sediment Ponds, Outlet Structures and Details KS1576D

(Plates 3-33 thru 3-35 Deleted 6/19/96)

3-36 Pond # 2 - 10 Year Storm (R&S) 7704-C117

3-37 Pond # 1 - 10 Year Storm (R&S) 7704-C118

3-38 Pond # 2 - 50 Year Storm (R&S) 7704-C119

Reclamation

4-1 Final Reclamation Map - Stage I CM-10500-WB

**4-2 Final Reclamation Map - Stage II (2 Sheets) CM-10378-WB
Final Reclamation - 90" Culvert Plan (R&S) 7704-C45**

4-3 Disturbed Mine Plan Area Cross Sections CM-10484 WB

**4-4 Subsidence Monitoring Overlay (3 Sheets) CM-10581-WB
1980 Primary Control Diagram CM-10582-WB**

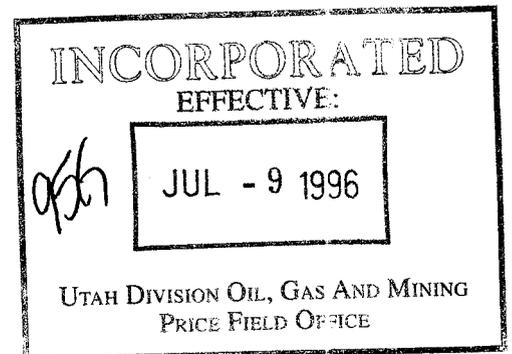
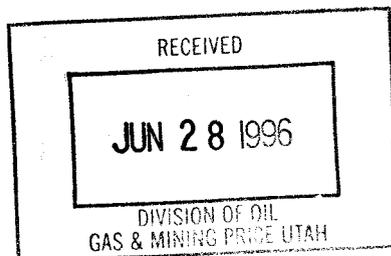
4-5 East Mountain Spring & Subsidence Location Map CM-10742WB

4-6 Cottonwood Fan Portal Topography Cross-Section CM-10406-CP

**4-7 Cottonwood Fan Portal Reclamation Cross-Section CM-10813-CP
(8 Sheets)**

4-8 Cottonwood Fan Portal Diversion Ditch-Plan & Prof. CM-10828-CP

4-9 Cottonwood Fan Portal Diversion Ditch-Cross-Sec. CM-10827-CP



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to 1.5 h. Cut sections will be built on a 1 v to 1.5 h in unconsolidated areas. A locked gate will be located at the entrance to the waste rock storage facility.

2. Cottonwood/Wilberg Waste Rock Storage Facility

A. Introduction

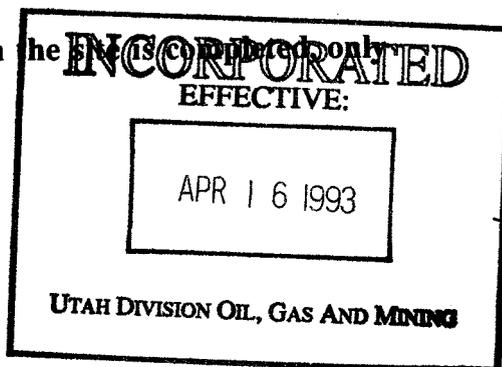
The original Cottonwood/Wilberg Waste Rock Storage Area is approaching its capacity thus making it necessary to construct a new facility to handle the disposal needs of the mine. Calculations have been made, based on past history, of waste rock generated during mining operations, these quantities have been used to formulate the design of the new facility. (Refer to Chapter IV Engineering Designs.)

B. Location

The area selected for the waste rock storage facility is located on public land managed by the US Department of Interior, Bureau of Land Management. The area is located in the southeast quarter of Section 34, Township 17 South, Range 7E, west of the coal haul road used for the Cottonwood/Wilberg Coal Mine Facility. The area was selected because it is close to the mine facilities and has the required capacity to contain all the waste rock generated from the Cottonwood/Wilberg, Des Bee Dove and Trail Mountain mines for the anticipated life of each mine.

C. Design

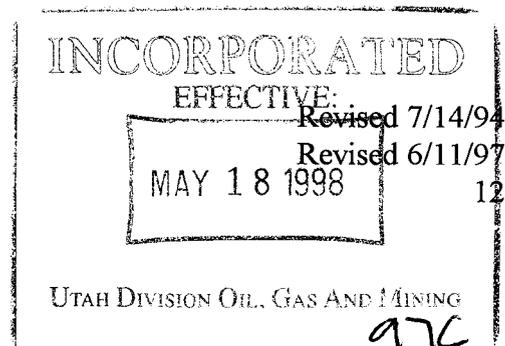
The facility is designed to fit into the existing topography of the area with as little disturbance as is possible to the existing drainage system. Only on ephemeral drainage channel will require a permanent diversion for the construction and operation at the facility. When the



*Superseded
5/13/97*

APPENDICES

- I Coal Lithologic Logs
 - a. Drill Hole EM-23C
 - b. Drill Hole EM-12C
 - c. Drill Hole A-25
 - d. Drill Hole B-124
- II Field Data For the Vegetation Reference Areas
- III Cottonwood/Trail Mountain Overland Tube Conveyor Reclamation Cross-Sections, Vegetation and Soils of the Cottonwood/Trail Mountain Portal Area and Culvert Size Calculations
- IV Cottonwood/Wilberg Facility Final Reclamation Earthwork Quantities, Cross-Sections and Stability Analysis
- V Report of Engineering Geology Study (Dames & Moore)
- VI Overburden Analysis
- VII Underground Development Waste Plan
- VIII Drainage Systems
 - Dwgs. 7704-C70A, C71A, C81A, C89A and C90A
- IX Road Plans and Cross-Sections
 - Dwgs. 7704-C50 thru C64
- X Road Construction Variance
- XI Geotechnical Study - Stacking Tube
- XII Blasting Plan
- XIII Hydrologic Analysis of Disturbed Area Runoff Control Cottonwood/Wilberg Mine Portal Site and
 - Hydrologic Analysis of Undisturbed and Disturbed Area Runoff Control Proposed Cottonwood Canyon Fan Portal Site.
 - (Hansen, Allen & Luce, Inc.)
- XIV Photographs of Existing Structures
- XV Hydrologic Procedures and Calculations with Drainage Map CM-10379-EM Final Reclamation
- XVI Subsidence Monitoring Plan
- XVII Safety Factor Calculations of Road and Impoundment Embankments
- XVIII Stability Report - Proposed Cottonwood Fan Portal
- XIX Hydrological Calculations - Proposed Cottonwood Fan Portal
- XX UP&L Mining Division, Mine Permit Hydrologic Section (See Volume 9)
- XXI Waste Rock Storage Facility (See Volume 10)



2-16	Mine Plan Area Vegetation Map	CE-10486-WB
2-17	General Soils Map-Cottonwood/Wilberg Permit Area	CE-10497-WB
2-18	Mine Plan Area Soils Map	CM-10346-WB
2-19	Land Use Map	CM-10597-WB
2-19A	Raptor Nesting Location & Habitat Map	CM-10587-WB
2-20	Mule Deer Habitat Elk Habitat	CM-10542-WB
		Figure 1

OPERATION PLAN

3-1	Life of Mine Plan in Five-Year Increments - Hiawatha Seam	CM-10807-WB
3-2	Life of Mine Plan in Five-Year Increments - Blind Canyon Seam	CM-10808-WB
3-3	Deleted	
3-4	Deleted	
3-5	Deleted	
3-6	Deleted	

COTTONWOOD FAN PORTAL

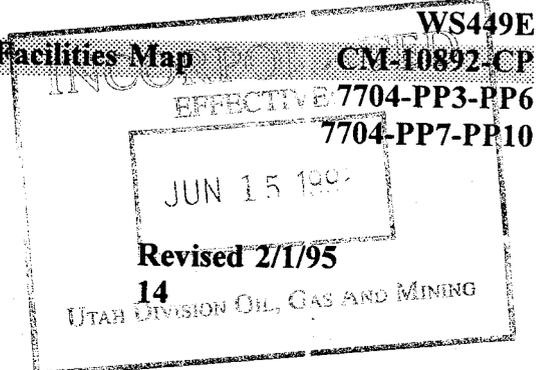
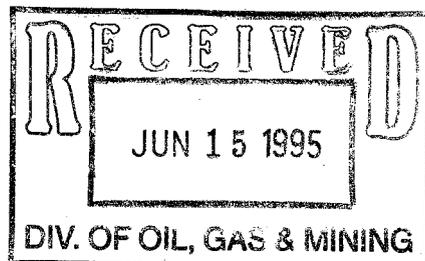
3-7	Access Road Class II	CM-10322-CP
3-8	Access Road Cross-Sections (4 sheets)	CM-10348-CP

VOLUME 6

3-9	Deleted	
3-10	South Sediment Basin Details and Cross-Sections North Sediment Basin Details and Cross-Sections	CM-10351-CP CM-10353-CP
3-11	General Layout Plan (R&S) Access Road & Portal Pad Cross-Sections	8029-L2 CM-10550-CP
3-12	Cottonwood Fan Portal Cross-Sections	CM-10335-CP
3-13	Hydrological Map	CM-10501-CP
3-14	Reclamation Map	Figure 1

COTTONWOOD/WILBERG MINE

3-15	Typical Road Cross-Sections	7704-C50
3-16	Cottonwood/Wilberg Coal Mine Facilities Map	WS449E
3-16A	Cottonwood Mine/Cottonwood Fan Portal Surface Facilities Map	CM-10892-CP
3-17	Sanitation System/Sewer Lines (R&S)	7704-PP3-PP6
3-18	Sanitation System/Sewer Lines (R&S)	7704-PP7-PP10



September 7, 1989

Mr. Rick Smith
Permit Supervisor
State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Re: Completeness Review - Cottonwood/Wilberg Rock Storage
Facility

Dear Mr. Smith:

This is to verify that to the best of my knowledge and belief all of the information contained in the Cottonwood/Wilberg Waste Rock Facility Permit Application package is true and correct. This is given to meet the requirements of UMC 771.27 Verification of Application.

Sincerely,



David Smaldone
Director of Permitting,
Compliance & Services
Mining Division

DS:do

STATE OF UTAH)
): ss.
County of Salt Lake)

Subscribed and sworn to before me this 22nd day of
September, 1989.


Barbara Baldauf, Notary Public
Residing in Salt Lake City, Utah

