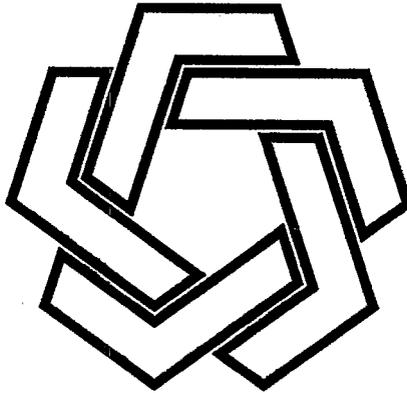


# **STATE DECISION PACKAGE**

**Cottonwood/Wilberg Mine  
Waste Rock Facility  
Utah Power and Light Company**

**PERMIT**



**STATE OF UTAH  
Department of Natural Resources  
Division of Oil, Gas & Mining**

**JUNE 8, 1990**

UTAH DIVISION OF OIL, GAS AND MINING  
STATE DECISION DOCUMENT AND  
TECHNICAL ANALYSIS

COTTONWOOD/WILBERG MINE  
Waste Rock Storage Facility  
ACT/015/019  
Utah Power and Light Company  
Emery County, Utah  
June 8, 1990

CONTENTS

- \* Administrative Overview
- \* Location Map
- \* Permitting Chronology
- \* Mine Plan Information Form
- \* Findings
- \* State Five-Year Renewal Permit
- \* Technical Analysis
- \* Cumulative Hydrologic Impact Assessment (CHIA)
- \* Letters of Concurrence
- \* Affidavits of Publication

AT94/2

**ADMINISTRATIVE OVERVIEW  
COTTONWOOD/WILBERG MINE  
WASTE ROCK STORAGE FACILITY  
ACT/015/019**

**UTAH POWER AND LIGHT COMPANY  
Emery County, Utah  
June 8, 1990**

**Background**

The Cottonwood/Wilberg Mine is located approximately eight miles northwest of Orangeville, Utah on the east side of the Wasatch Plateau Coal Field. The permit area encompasses 11,508 acres, comprised of Federal coal leases and privately-owned holdings.

The existing Waste Rock Site for the Cottonwood/Wilberg Mine will reach its capacity in 1990. Therefore, Utah Power and Light Company (UP&L) submitted a Permit Application Package (PAP) for a new waste rock for the Cottonwood/Wilberg Mine with a 30-year plus life-of-mine storage on August 16, 1989. The area selected for this waste rock storage facility is located on public land managed by the Bureau of Land Management (BLM) and contains an area of 24.42 acres.

The Waste Rock Storage Facility is designed to hold 784,000 cubic yards of material that will be a combination of underground development waste, trommel rejects, and sediments from the sedimentation ponds.

Reclamation will restore the land to its premining land use, wildlife habitat and livestock grazing.

The applicant published notice for four consecutive weeks ending February 27, 1990. No comments were received.

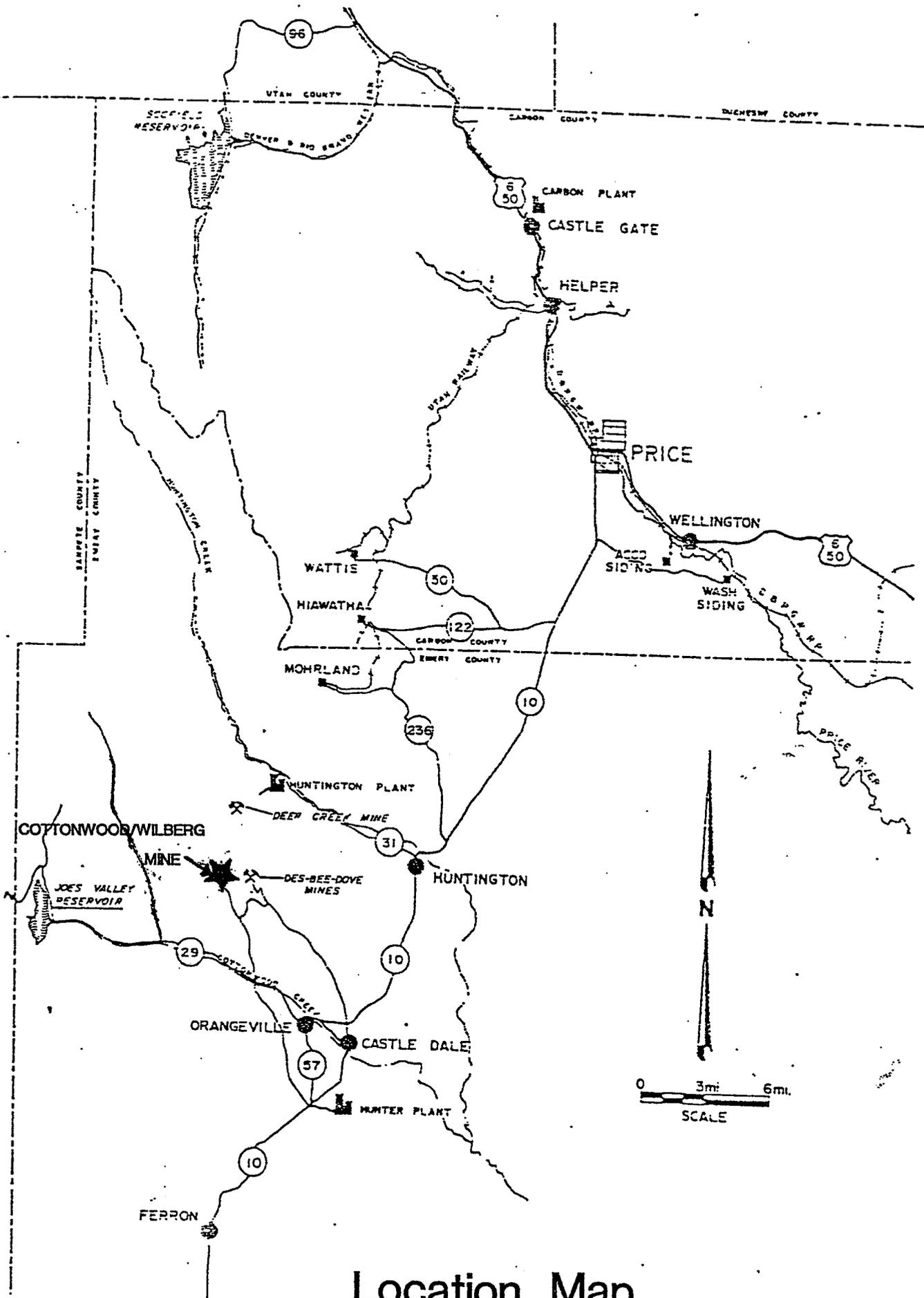
**Coordination With Existing Permit**

Upon approval, a revised permit for the Cottonwood/Wilberg Mine incorporating the new waste rock storage facility will be issued to UP&L. The five-year permit term expiring July 6, 1994 will be in effect.

The permit contains three stipulations for the waste rock storage facility. All of the conditions for the five-year permit renewal (issued July 6, 1989) were met.

**Recommendation for Approval**

Approval of the revised five-year permit is recommended, based on the approved waste rock storage facility application as updated through June 7, 1990.



Location Map  
Cottonwood/ Wilberg Mine

**CHRONOLOGY  
UTAH POWER AND LIGHT COMPANY  
COTTONWOOD/WILBERG MINE  
WASTE ROCK STORAGE FACILITY  
ACT/015/019**

|  |  |
|--|--|
| August 15, 1989                          | Initial Permit Application Package renewed by the Division.  |
| August 16, 1989                          | Division notifies state and federal agencies of this permitting action and transmits copies of the Permit Application Package. |
| August 31, 1989                          | Division completes Initial Completeness Review (ICR) and provides comment on preliminary technical deficiencies.               |
| September 26, 1989<br>& January 16, 1990 | UP&L submits materials addressing the ICR.   |
| February 2, 1990                         | Division issues Determination of Completeness.<br><br>UP&L initiates public notice for four consecutive weeks.                 |
| March 28, 1990                           | Division issues Technical Deficiency comments.   |
| February 19, 1990<br>& May 10, 1990      | UP&L submits materials addressing technical deficiencies.  |
| June 8, 1990                             | Public comment period concludes with no adverse comments received. Division makes necessary findings. Permit issued.           |

## MINE PLAN INFORMATION

Mine Name Cottonwood/Wilberg Waste State ID: ACT/015/019  
Rock Storage Facility

Operator Utah Power and Light Company County: Emery

Controlled By Utah Power and Light Company

Contact Person(s) David Smaldone Position: Director  
Permitting, Compliance & Services

Telephone: (801) 220-4621

New/Existing Existing Mining Method n/a

Fed. Lease No.(s) BLM-ROW# UTU-65027 (see attached description)  
 Legal Description(s) \_\_\_\_\_

Other Leases (Identify) n/a  
 Legal Descriptions \_\_\_\_\_

Ownership Data: For Waste Rock Facility only

| Surface Resources<br>(acres) | Existing<br>Permit Area | Proposed<br>Permit Area | Total Life<br>of Mine Area |
|------------------------------|-------------------------|-------------------------|----------------------------|
| Federal                      | _____                   | --                      | _____                      |
| State                        | _____                   | _____                   | _____                      |
| Private                      | _____                   | 24.42                   | 24.42                      |
| Other                        | _____                   | _____                   | _____                      |
| <b>TOTAL</b>                 | _____                   | 24.42                   | 24.42                      |

**Coal Ownership (Acres)**

|              |       |     |       |
|--------------|-------|-----|-------|
| Federal      | _____ | n/a | _____ |
| State        | _____ | n/a | _____ |
| Private      | _____ | n/a | _____ |
| Other        | _____ | n/a | _____ |
| <b>TOTAL</b> | _____ | n/a | _____ |



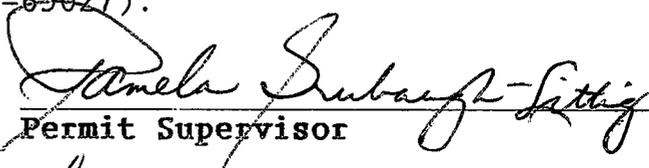
## FINDINGS

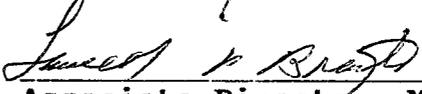
**Utah Power and Light Company  
Cottonwood/Wilberg Mine  
Waste Rock Storage Facility  
ACT/015/019  
Emery County, Utah**

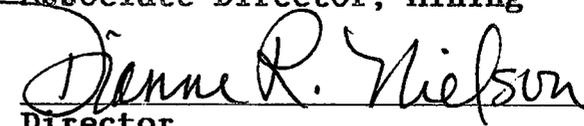
1. All procedures for public participation required by the Act, and the approved Utah State Program have been complied with (R614-300-120).
2. The plan and the permit application are accurate and complete and all requirements of the Surface Mining Control and Reclamation Act (the "Act"), and the approved Utah State Program have been complied with (R614-300-133.100).
3. The proposed lands to be included within the permit area are:
  - a. not included within an area designated unsuitable for underground coal mining operations;
  - b. not within an area under study for designated lands unsuitable for underground coal mining operations;
  - c. not on any lands subject to the prohibitions or limitations of 30 CFR 761.11[a] (national parks, etc.), 761.11[f] (public buildings, etc.) and 761.11[g] (cemeteries);
  - d. within 100 feet of a public road (R614-300-133.220); and
  - e. not within 300 feet of any occupied dwelling (R614-300-133.220).
4. The applicant has satisfied the requirements for alluvial valley floors and prime farmlands (R614-300-134). (See letter from SCS dated February 13, 1990) (See PAP Chapter XI).
5. The assessment of the probable cumulative impacts of all anticipated coal mining and reclamation activities in the general area on the hydrologic balance has been made by the Division. The Operation and Reclamation Plan proposed under the application has been designed to prevent damage to the hydrologic balance in the permit area (R614-300-133.400 and UCA 40-10-11[2][c]). (See East Mountain Cumulative Hydrologic Impact Analysis [CHIA].)
6. The proposed operation will not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats (UMC 786.19[o]) (R614-300-133.500).

## Findings

7. The Division's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800) and (R614-300-133.600). (See attached letter from State Historic Preservation Officer [SHPO] dated August 18, 1989.)
8. The applicant proposes acceptable practices for the reclamation of disturbed lands (PAP Chapter VIII). These practices have been shown to be effective in the short-term; there are no long-term reclamation records utilizing native species in the western United States. Nevertheless, the Division has determined that reclamation, as required by the Act, can be feasibly accomplished under the Permit Application Package (PAP) (R614-300-133.710) (See Technical Analysis R614-301-300).
9. A 510(c) report has been run on the Applicant Violator System (AVS), which shows that: prior violations of applicable laws and regulations have been corrected; Utah Power & Light Company is not delinquent in payment of fees for the Abandoned Mine Reclamation Fund; and the applicant does not control and has not controlled mining operations (Attachment A) with a demonstrated pattern of wilfull violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (UMC 786.19[g], [h] [i] ; {OSMRE Relatedness Report, re-verified June 8, 1990}).
10. A detailed analysis of the proposed bond has been made. The bond estimate for the Waste Rock Storage Facility is \$422,673.00 (the total Cottonwood/Wilberg Mine total bond now equals \$2,008,681.00). The Division has made appropriate adjustments to reflect costs which would be incurred by the state, if it was required to contract the final reclamation activities for the mine site. The original bond was posted on June 15, 1984 (ridered on August 3, 1989 and October 23, 1989 and June 7, 1990) and made payable to OSMRE and the Division of Oil, Gas and Mining (R614-300-134).
11. The applicant has the legal right to enter and complete mining and reclamation activities in the permit area through BLM rights-of-way (BLM-ROW #UTU-65027).

  
Permit Supervisor

  
Associate Director, Mining

  
Director

## ATTACHMENT A

### IDENTIFICATION OF INTERESTS

#### UTAH POWER AND LIGHT COMPANY

According to information supplied by Utah Power and Light Company (UP&L), all assets of UP&L are owned by Pacificorp, Oregon. Pacificorp is the majority shareholder in NERCO, Inc., which includes five coal companies with seven permits. The following lists the permit numbers, companies, and attendant issuing regulatory authority for coal mines controlled by NERCO, Inc.

| <u>PERMIT NUMBER</u> | <u>COMPANY</u>             | <u>REGULATORY AUTHORITY</u>                 |
|----------------------|----------------------------|---|
| 291T2                | Glenrock Coal Company      | Wyoming Department of Environmental Quality |
| TFN24/90             | Antelope Coal Company      | Wyoming Department of Environmental Quality |
| PT33822              | Bridger Coal Company       | Wyoming Department of Environmental Quality |
| P3227                | NERCO Eastern Coal Company | Alabama Surface Mining Commission           |
| P3501                | NERCO Eastern Coal Company | Alabama Surface Mining Commission           |
| MT79012R             | Spring Creek Coal Company  | Montana Department of State Lands           |
| 819P                 | NERCO Eastern Coal Company | Office of Surface Mining, Tennessee         |

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  
(801) 538-5340

This permit, ACT/015/019, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (DOGM) to:

Utah Power and Light Company  
P. O. Box 899  
Salt Lake City, Utah 84110  
(801) 220-4227

for the Cottonwood/Wilberg Mine. Utah Power and Light Company (UP&L) is the lessee of federal coal leases SL-064900, U-1358, SL-070645-U-02292, U-084923, U-084924, U-083066, U-040151, U-044025, U-47978, and the owner/lessee of certain fee-owned parcels. A performance bond is filed with the DOGM in the amount of \$2,008,681.00, payable to the state of Utah, Division of Oil, Gas and Mining and the Office of Surface Mining Reclamation and Enforcement (OSMRE). DOGM must receive a copy of this permit signed and dated by the permittee.

Sec. 1 STATUTES AND REGULATIONS - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act.

Sec. 2 PERMIT AREA - The permittee is authorized to conduct underground coal mining activities on the following described lands (as shown on the maps appended as Attachments B and C) within the permit area at the Cottonwood/Wilberg Mine, situated in the state of Utah, Emery County, and located:

Federal

Township 17 South, Range 6 East, SLM

Section 1: SE1/4, E1/2 SW1/4, S1/2 SE1/4 NE1/4,  
SE1/4 SW1/4 NE1/4;  
Section 12: E1/2, E1/2 W1/2;  
Section 13: E1/2, E1/2 W1/2;  
Section 24: E1/2, E1/2 W1/2;  
Section 25: N1/2 NE1/4, E1/2 NW1/4 SE1/4;

Township 17 South, Range 7 East, SLM

Section 6: Lots 9, 10, 11; W1/2 W1/2 SW1/4;  
Section 7: Lots 1, 2, 3, 4; W1/2 NW1/4 NW1/4; SW1/4 NW1/4;  
S1/2;  
Section 8: S1/2 SW1/4, S1/2 NW1/4 SW1/4, SW1/4 NE1/4  
SW1/4, S1/2 S1/2 SE1/4, N1/2 SW1/4 SE1/4;  
Section 9: S1/2 S1/2 SW1/4, SE1/4 SE1/4, S1/2 SW1/4 SE1/4,  
NE1/4 SW1/4 SE1/4, SE1/4 NE1/4 SE1/4;  
Section 10: S1/2 SW1/4, S1/2 N1/2 SW1/4;  
Section 15: N1/2, SW1/4;  
Section 16: All  
Section 17: All  
Section 18: All  
Section 19: All  
Section 20: All  
Section 21: All  
Section 22: NW1/4, S1/2;  
Section 27: NW1/4, N1/2 SW1/4, NE1/4;  
Section 28: All  
Section 29: All  
Section 30: All  
Section 31: Lot 1, E1/2, E1/2 W1/2;  
Section 32: All  
Section 33: N1/2, SW1/4, W1/2 SE1/4;  
Section 34: S1/2 NW1/4, NW1/4 NW1/4, E1/2 SE1/4 NW1/4  
NE1/4, S1/2 SE1/4 NE1/4, E1/2 NW1/4 NE1/4  
SE1/4, NE1/4 NE1/4 SE1/4, N1/2 SE1/4 NE1/4  
SE1/4, E1/2 NE1/4 SE1/4, NW1/4 NE1/4 SE1/4;

Beginning 81.144 ft. South and 1100.278 ft. West of  
the East Quarter Corner of Sec. 34, T.17 S., R. 7E.,  
SLM, Thence; S. 27° 14' 28" W., 515.54 ft.; thence; S.  
46° 59' 05" W., 165.64 ft.; thence; S. 76° 41' 51" W.,  
264.72 ft.; thence; N. 72° 09' 12" W., 670.20 ft.;  
thence; S. 06° 10' 47" W., 105.57 ft.; thence; S. 23°  
08' 12" W., 35.27 ft.; thence; S. 36° 59' 41" W.,  
71.59 ft.; thence; S. 40° 44' 45" W., 144.04 ft.;  
thence; S. 23° 37' 34" W., 93.77 ft.; thence; S. 60°  
40' 32" W., 113.86 ft.; thence; S. 05° 17' 52" E.,  
108.19 ft.; thence; S. 23° 20' 37" E., 105.29 ft.;  
thence; S. 24° 38' 51" W., 61.70 ft.; thence; S. 31°  
19' 19" E., 129.90 ft.; thence; S. 29° 19' 58" E.,  
80.45 ft.; thence; S. 24° 11' 44" E., 104.97 ft.;  
thence; S. 47° 47' 54" E., 168.95 ft.; thence; S. 40°  
17' 54" E., 87.31 ft.; thence; S. 17° 50' 49" W.,  
43.32 ft.; thence; S. 72° 11' 49" E., 213.13ft.;  
thence; S. 78° 08' 28" E., 287.64 ft., thence; N. 11°  
43' 23" E., 86.24 ft.; thence; N. 73° 40' 14" E.,  
120.87 ft.; thence; N. 17° 04' 33" E., 74.31 ft.,

Sec. 34 (Cont'd.)

thence; N. 14° 20' 36" W., 65.70 ft.; thence; N. 17° 05' 06" E., 75.21 ft.; thence; N. 09° 13' 24" W., 65.92 ft.; thence; N. 12° 54' 35" W., 99.73 ft.; thence; N. 02° 44' 30" W., 82.47 ft.; thence; N. 08° 32' 17" W., 85.51 ft.; thence; N. 01° 39' 36" W., 104.82 ft.; thence; N. 17° 50' 48" E., 218.03 ft.; thence; N. 76° 41' 51" E., 218.52 ft.; thence; N. 48° 09' 55" E., 288.01 ft.; thence; N. 27° 14' 28" E., 448.49 ft., thence; N. 39° 55' 41" W., 162.75 ft. to the point of beginning.

Section 35: NW1/4 SW1/4 SW1/4, W1/2 NE1/4 SW1/4 SW1/4, SW1/4 NW1/4 SW1/4, W1/2 NW1/4 NW1/4 SW1/4;

Township 18 South, Range 7 East, SLM

Section 4: NW1/4 NE1/4, N1/2 NW1/4;  
Section 5: N1/2 NE1/4, NW1/4;

Fee

Township 17 South, Range 6 East, SLM

Section 25: NE1/4 SE1/4, SE1/4 NE1/4, E1/2 SW1/4 NE1/4;

Township 17 South, Range 7 East, SLM

Section 10: SW1/4 SE1/4, S1/2 SE1/4 SE1/4;  
Section 11: S1/2 SW1/4 SW1/4;  
Section 14: W1/2 W1/2 NW1/4, W1/2 E1/2 W1/2 NW1/4, W1/2 W1/2 W1/2 SW1/4;  
Section 15: SE1/4;  
Section 22: NE1/4;

Beginning at the SE corner of NE1/4 SE1/4 Section 25, Township 17 South, Range 6 East, SLM, thence North 160 rods, West 116 rods to center line of Cottonwood Creek; thence Southerly along center line of said creek to a point 84 rods West of the beginning; thence East 84 rods to the beginning.

This legal description is for the permit area (as shown on Attachment B) of the Cottonwood/Wilberg Mine and Waste Rock Disposal Area and new Waste Rock Storage Facility. The permittee is authorized to conduct underground coal mining activities and related surface activities on the foregoing described property subject to the conditions of the leases, the approved mining plan, including all conditions and all other applicable conditions, laws and regulations.

- Sec. 3 PERMIT TERM - This revised permit becomes effective on June 8, 1990 and expires on July 6, 1994.
- Sec. 4 ASSIGNMENT OF PERMIT RIGHTS - The permit rights may not be transferred, assigned or sold without the approval of the Director, DOGM. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13(e) and R614-303.
- Sec. 5 RIGHT OF ENTRY - The permittee shall allow the authorized representative of the DOGM, including but not limited to inspectors, and representatives of OSMRE, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:
- A. have the rights of entry provided for in 30 CFR 840.12, R614-400-110, 30 CFR 842.13 and R614-400-220; and
  - B. be accompanied by private persons for the purpose of conducting an inspection in accordance with R614-400-210 and 30 CFR 842, when the inspection is in response to an alleged violation reported by the private person.
- Sec. 6 SCOPE OF OPERATIONS - The permittee shall conduct underground coal mining activities only on those lands specifically designated as within the permit area on the maps submitted in the mining and reclamation plan and permit application and approved for the term of the permit and which are subject to the performance bond.
- Sec. 7 ENVIRONMENTAL IMPACTS - The permittee shall minimize any adverse impact to the environment or public health and safety through but not limited to:
- A. accelerated monitoring to determine the nature and extent of noncompliance and the results of the noncompliance;
  - B. immediate implementation of measures necessary to comply; and
  - C. warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

- Sec. 8 DISPOSAL OF POLLUTANTS - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable state or federal law.
- Sec. 9 CONDUCT OF OPERATIONS - The permittee shall conduct its operations:
- A. in accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and
  - B. utilizing methods specified as conditions of the permit by DOGM in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program and the Federal Lands Program.
- Sec. 10 AUTHORIZED AGENT - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.
- Sec. 11 COMPLIANCE WITH OTHER LAWS - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.
- Sec. 12 PERMIT RENEWAL - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit in accordance with the Act, the approved Utah State Program and the Federal Lands Program.
- Sec. 13 CULTURAL RESOURCES - If during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is not disturbed and shall notify DOGM. DOGM, after coordination with OSMRE, shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by DOGM within the time frame specified by DOGM.
- Sec. 14 APPEALS - The permittee shall have the right to appeal as provided for under R614-300.

Sec. 15 SPECIAL CONDITIONS - In addition to the general obligations and/or requirements set out in the leases, the federal mining plan approval, and this permit, the permittee shall comply with the special conditions appended hereto as Attachment A.

The above conditions (Secs. 1-15) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them. These conditions may be revised or amended, in writing, by the mutual consent of DOGM and the permittee at any time to adjust to changed conditions or to correct an oversight. DOGM may amend these conditions at any time without the consent of the permittee in order to make them consistent with any new federal or state statutes and any new regulations.

THE STATE OF UTAH

By: Dennis P. Nelson

Date: June 8, 1990

I certify that I have read, understand and accept the requirements of this permit and any special conditions attached.

Bret Jensen  
Authorized Representative of  
the Permittee

Date: June 18, 1990 *BJ*

APPROVED AS TO FORM:

By: Alan J. Buchma

Assistant Attorney General

Date: June 8, 1990

AT94/65-70

**ATTACHMENT A  
STIPULATIONS  
COTTONWOOD/WILBERG MINE WASTE ROCK  
STORAGE FACILITY ADDITION  
ACT/015/019**

**Utah Power and Light Company  
Emery County, Utah  
June 8, 1990**

**R6 14-301-231.300 General Requirements-(HS)**

Within 30 days of the completion of the initial phase of construction, the operator must submit as-built surveys of the completed subsoil and topsoil stockpiles. Surveys must include the following information: volume of material, maximum and minimum elevations and slopes, cross sections, and all other pertinent dimensions.

Additionally, the operator must amend the topsoil and subsoil mass balance table (Plate 7-2) in accordance with the results of the above stockpile surveys.

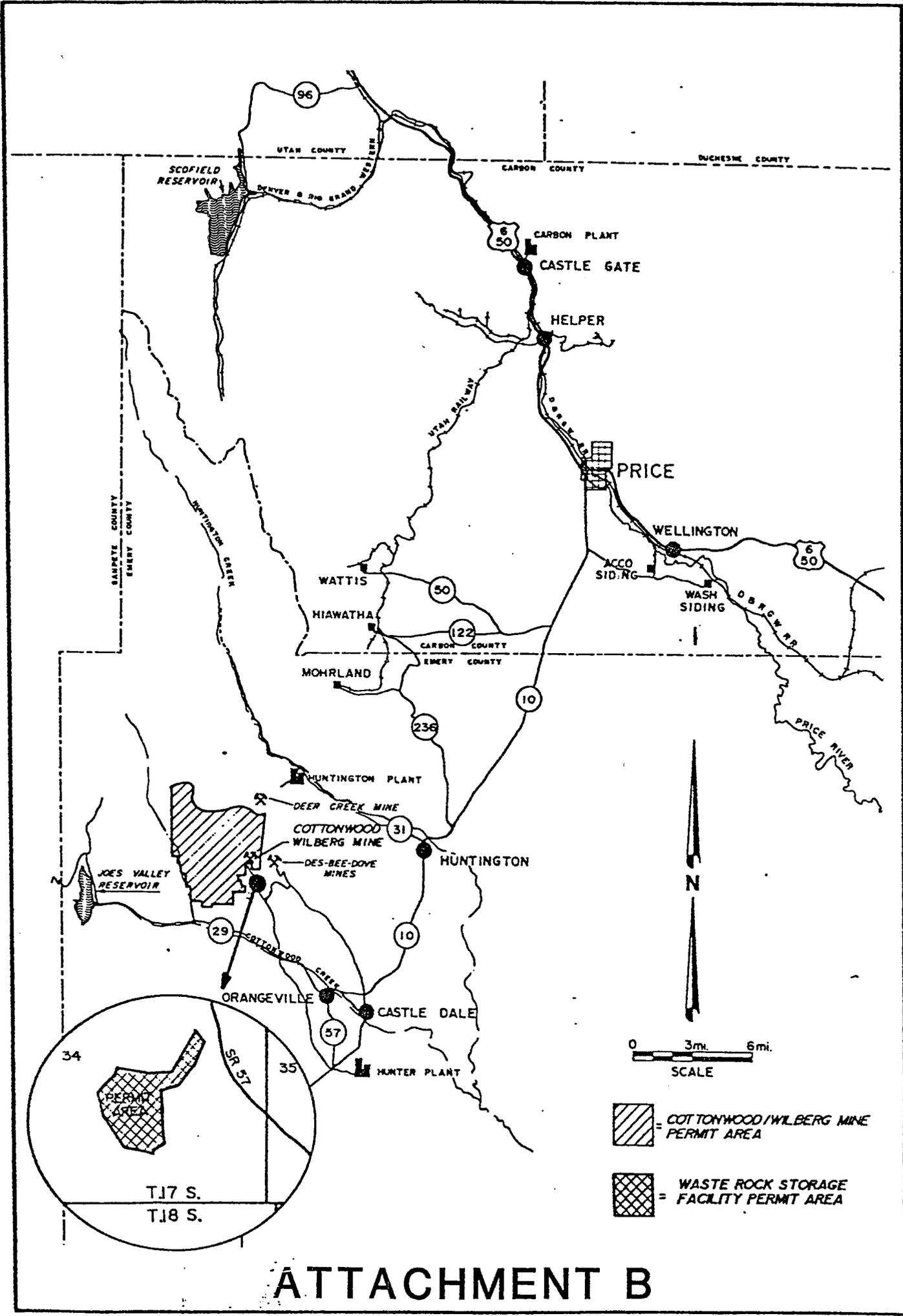
**R6 14-301-233 Topsoil Substitutes and Supplements-(HS)**

In the event that the mass balance indicates a topsoil/subsoil deficiency, the operator must commit to fulfilling the requirements of this section.

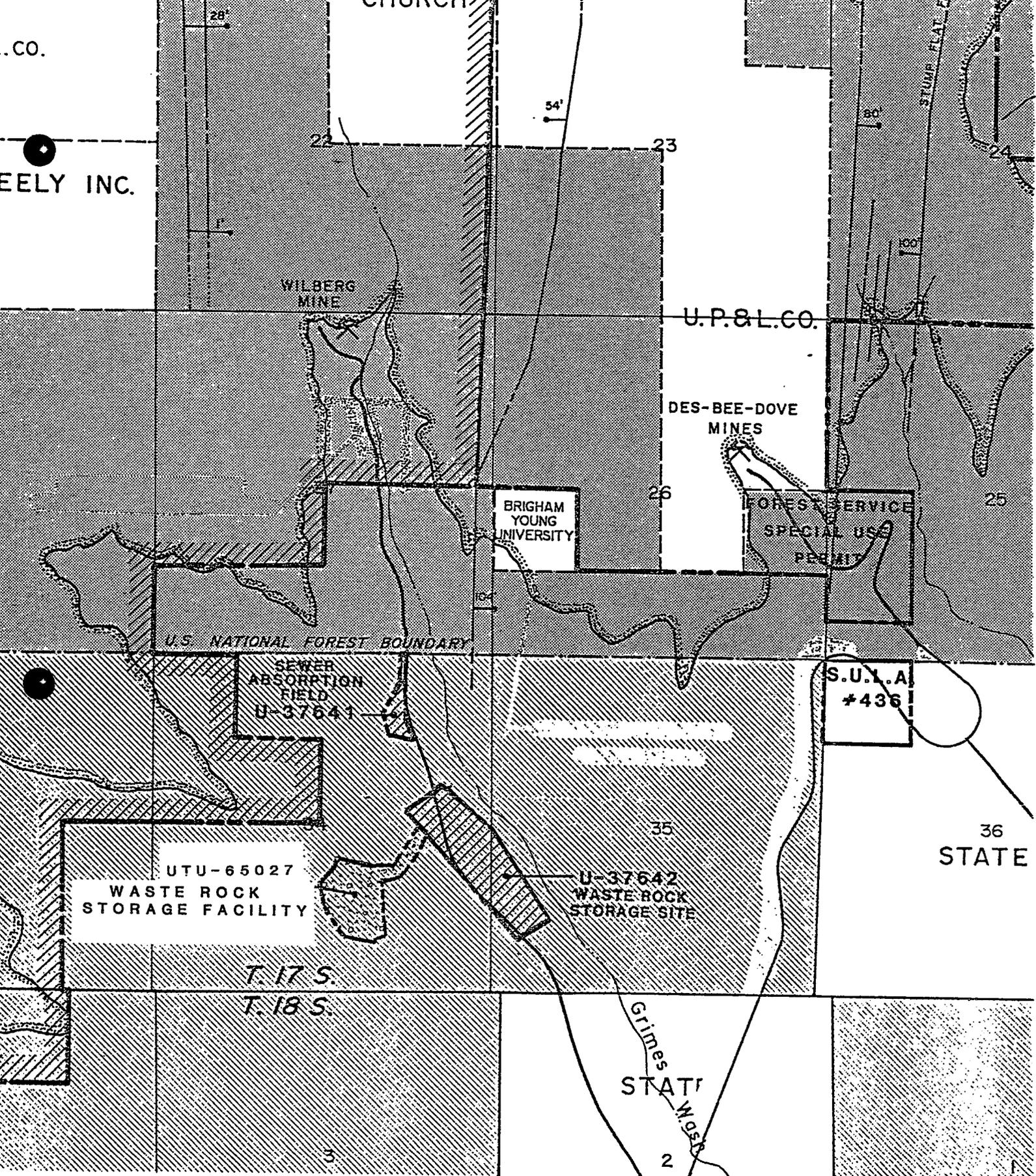
**R6 14-301-342 Fish and Wildlife-(SMW)**

Within 30 days of permit approval the applicant must revise the DWR high priority Mule Deer winter range designation in the text (pages 9-1 and 10-7) and Map 9-1 to critical Mule Deer winter range. The applicant must update (pages 9-4 to 9-7) and outline the wildlife mitigation procedures to include an area of at least 33 acres.

djh  
AT94/78



# ATTACHMENT B



**LOCATION OF COTTONWOOD/WILBERG  
WASTE ROCK STORAGE FACILITY**

**ATTACHMENT C**

**TECHNICAL ANALYSIS  
COTTONWOOD/WILBERG MINE WASTE ROCK  
STORAGE FACILITY ADDITION  
ACT/015/019**

**Utah Power and Light Company  
Emery County, Utah  
June 8, 1990**

**R614-301-200 Soils-(HS)**

**210. Introduction**

The applicant has proposed the construction and operation of a life of mine disposal facility for waste rock and excess spoil (page 1-1). Discarded waste rock and excess soil from the Cottonwood/Wilberg and Des-Bee-Dove Mines will be composed of the following: underground development waste (i.e., low-grade coal, roof and floor and mid-seam materials, etc.); trommel screen reject, sediment from pond, and drainage coarse cleanout (page 2-9.0 to 2-9.1). The applicant's plan for removal, storage and redistribution of topsoil and subsoil material may be located in the PAP as follows: page 2-7, 2-8, 2-10 through 2-10.1; Map 4-4; Plate 7-2, pages 3-1 through 3-10.1, and 4-31.44. Waste rock analysis to determine coal/rock ratio and identify potential acid- and/or toxic-forming or alkalinity-producing materials and mitigation of revegetation problems attendant to the waste rock storage facility may be located in the PAP on pages 2-9 through 2-14.

The applicant is in compliance with this section.

**220. Environmental Description**

The soils of the Cottonwood/Wilberg Mine Waste Rock Storage Facility (Chapter VIII) are primarily colluvium, alluvium, and glacial outwash derived primarily from sandstone and shale. The soils tend to be very gravelly, stony and bouldery throughout the profile.

An aridic bordering on ustic and a torric bordering on ustic moisture regime with a hyperthermic to mesic temperature regime prevails.

Average annual precipitation is between 8-14 inches, with the mean annual soil temperature higher than 8°C, but lower than 15°C. In some instances, mean annual soil temperature may be greater than 22° C. The topography of the area is gently sloping to steep ranging from 0 to 80 percent slope. The aspect is generally southeast. The soil capability classification ranges from VII-S to VIII-S-3 non-irrigated.

Under native vegetation erosion hazards associated with these soils is moderate. The erosion hazard for disturbed soils is primarily severe. These soils are generally well-drained and range in texture from loamy sand to clay loam. The pH of the surface horizon ranges from 7.8 to 8.4. The electrical conductivity ranges from 0.2 to 10.6 mmhos/cm at 25°C. The depths of reported A horizon range from 1 to 6 inches. However, it is necessary to note that the soil (lithic ustic torriorthents) characterized exists at the limit of soil and not-soil.

The Cottonwood/Wilberg Waste Rock Storage Facility soil resource is surveyed at the Order 1 Scale. Correlation of site map units with currently recognized soil series or map units are as follows: Backland-Rubbleland-Rock Outcrop complex; Strych very stony loam, dry, 3 to 30 percent slopes. The soils along the haul road and subsoil stockpile area consist primarily of loamy-skeletal, mixed, mesic ustollic calciorthids. The soils within the waste rock cell and the vegetation reference area consist primarily of fine-silty, mixed, mesic (calcereous) lithic ustic torriorthents. Soil profile depths generally range from 25 to 60 inches.

The major limiting factors for the soils along the haul road and within the subsoil stockpile area is that more than 50 percent of the soil volume is occupied by rock. Thus, the available water is cut in half and the volume of topsoil/subsoil available for stockpiling must be discounted by half.

The major limiting factors for the soil within the waste rock cell are high salts and high sodium absorption ratio. Hence, soils in portions of Zone D (Plate 7-2) will not be salvaged for revegetation purposes.

The applicant is in compliance with this section.

**221. Prime Farmland Investigation.** A pre-application investigation was conducted to determine if prime farmland could be impacted within the disturbed area. Ferris P. Allgood, State Soils Scientist for the U.S. Soil Conservation Service gave a negative determination for prime farmland (page 10-10.3) within the disturbed area.

On the basis of soil survey and field review of the lands within the permit area, there are no soil map units that have been designated as prime farmland by the Soil Conservation Service.

The applicant is in compliance with this section.

### **230. Operations Plan**

The disturbance associated with the Cottonwood/Wilberg Waste Rock Storage Facility will be approximately 16.9 acres. Topsoil and subsoil will be salvaged from approximately 13.4 acres of disturbance. Approximately 2.5 acres in the disturbed area will not be stripped of topsoil or subsoil (refer to R614-301.220).

Approximately 20,020 cubic yards of topsoil and 37,200 cubic yards of subsoil will be salvaged as plant growth medium (Plate 7-2). Estimates of salvagable soil quantities (volume) may vary because of the high percentage of rocks and areas of excess salt accumulation. This may result in a topsoil/subsoil deficit. Overstory vegetation (i.e., Pinyon-Juniper) will be removed from the areas to be disturbed. Understory shrubs, grasses and forbs will be salvaged and mixed with the topsoil material (page 2-8).

Topsoil salvaged from the haul road will be temporarily stockpiled until it can be redistributed on the embankments of the constructed road (page 2-8). Silt fences will be installed along the toe of the embankment to provide erosion protection until the interim vegetation (interim seed mixture, pages 3-6 and 3-7) is established.

Topsoil and subsoil salvaged from the waste rock cell, subsoil and topsoil stockpile areas will be separately stockpiled as depicted on Plate 4-5. Silt fences will be installed along the base of the stockpiles to provide erosion protection until the interim vegetation is established. As the outslopes of the waste rock cell is reclaimed, topsoil and subsoil will be incrementally borrowed from each respective stockpile. The resulting excavation cut bank will be graded and protected from erosion utilizing erosion control chemicals, vegetation and/or erosion control matting.

Construction of the waste rock storage facility will incorporate a plan to allow for contemporaneous reclamation of the outslopes of the pile. Waste material will be used to construct a berm, approximately 10 feet high, to contain the waste material to be deposited (page 3-2). To identify the acid and/or toxic-forming or alkalinity producing material potential of the material disposed, the following sampling program will be implemented.

1. Bi-annually, the upper two feet of the levelled waste rock will be sampled at the rate of two samples per acre;
2. During construction of the operational berm, the outer two feet (outslope) of the final grade will be sampled at the rate of one sample per 200 linear feet of berm. Physiochemical analysis will include the constituents located on pages 2-12 and 2-12.1.
3. If initial sampling indicates acid- and/or toxic-forming material, additional sampling will be conducted to define the extent of the poor quality material.

The quantity (volume) of salvagable topsoil and subsoil may vary substantially from the projected salvagable quantity (Plate 7-2). Rockiness, excessive salt accumulations, and poor physical soil conditions (i.e., unweathered shale, clay lenses, dispersed soils) will be encountered during removal operations.

The applicant will be in compliance when the following stipulations are met.

**Stipulations R614-301-230-(1, 2)-(HS)**

**R614-301-231.300 General Requirements**

Within 30 days of the completion of the initial phase of construction, the operator must submit as-built surveys of the completed subsoil and topsoil stockpiles. Surveys must include the following information: volume of material, maximum and minimum elevations and slopes, cross sections, and all other pertinent dimensions.

Additionally, the operator must amend the topsoil and subsoil mass balance table (Plate 7-2) in accordance with the results of the above stockpile surveys.

**R614-301-233 Topsoil Substitutes and Supplements**

In the event that the mass balance indicates a topsoil/subsoil deficiency, the operator must commit to fulfilling the requirements of this section.

**240. Reclamation Plan**

The Waste Rock Storage Facility will be constructed to incorporate a regular, phased reclamation of the outslopes (final grade) of the waste rock. Subsequent to the construction of an operational berm, waste rock sampling will be conducted to determine the presence and/or extent of acid- and/or toxic-forming or alkalinity-producing materials near the surface of the outslopes. If the material is found to be acid- and/or toxic-forming or alkalinity-producing, it will be removed from the berm and placed behind the operational berm and buried with at least four feet of non-toxic, non-acid forming material (page 2-9).

When it is determined that the waste material near the surface of the berm outslope is of good quality, the waste material will be roughened (i.e., scarified, if necessary) to a depth of 18 inches and covered with 18 inches of subsoil and 6 inches of topsoil (page 3-4). Six inches of topsoil will be redistributed on the haul road and the subsoil and topsoil stockpile areas. All topsoil surfaces will be in a roughened condition (page 3-10).

Fertilizer application types and rates will be determined from soil analysis (page 3-10). Following seeding on slopes, erosion control matting or hay mulch (2 tons/acre) and netting will be applied. In areas where drill seeding is employed, two tons of alfalfa hay mulch will be crimped into the soil surface. One ton of wood fiber mulch will be applied in areas which are hydroseeded (page 3-10.1).

As the waste pile elevation rises, new operational berms will be constructed, sampled and reclaimed. At the completion of the construction of the waste pile, the top surface will be analyzed (page 2-12.1) to identify acid- and/or toxic-forming or alkalinity producing material. All acid- or toxic-forming or alkalinity producing material will be covered with four feet of non-toxic and non-acid and non-alkalinity producing materials (page 2-10.1). When these standards are met and the top surface of the completed waste rock storage facility is completed, 18 inches of subsoil and 6 inches of topsoil will be redistributed on the surface and reclaimed as stated above.

The applicant is in compliance with this section.

### **R614-301-250 Performance Standards**

The applicant's proposal to contemporaneously reclaim the outslope of the waste rock storage facility, conduct regular analysis of waste rock material for its acid- and/or toxic-forming potential and salvage, and store and redistribute topsoil/subsoil is sufficient to fulfill the requirements of this section.

### **R614-301-300 Biology-(SMW)**

#### **310. Introduction and 320. Environmental Description**

The facility will disturb approximately 17 acres of land within the Upper Sonoran Transition Life Zone. Vegetative communities on this site which will be disturbed are Pinyon-Juniper (10 acres), Black Sagebrush (4 acres), and Gardner Saltbush (11 acres). The three vegetative communities and representative reference areas were sampled for cover and woody species density (pages 8-8 through 8-10). The U.S. Soil Conservation Service provided range production data (page 7-19) for the Pinyon-Juniper (400 lbs./acre), Black Sagebrush (300 lbs./acre), and Saltbush (125 lbs./acre) reference area. Vegetation types and reference areas are delineated on Map 8-1.

The applicant references the wildlife studies and information from the Cottonwood/Wilberg Coal Mine Permit Application Package (C/W PAP) for much of the wildlife information (C/W PAP, Volume 2, page 4-55). Additional wildlife information for the site was through communication with the Bureau of Land Management (BLM) and the Division of Wildlife Resources (DWR). No additional studies were conducted.

The disturbed areas were rated as critical (DWR) and crucial (BLM) Mule deer winter range (Map 9-1). The area is of "substantial - value yearlong habitat for the Desert cottontail" (page 9-1). The site is within the territories of golden eagles, but not within the buffer zone (page 9-2). A negative find was reported by the BLM for the listed sensitive Canyon sweetvetch (Hedysarum occidentale var. canone, page 9-4). No aquatic or riparian communities are located within the proposed permit area (pages 9-2 through 9-3). Mitigation

for disturbing the site will be done on an adjacent Pinyon-Juniper community to increase forage production for wildlife and livestock use (pages 9-4 through 9-7). The site is included in a raptor monitoring program associated with the Cottonwood/Wilberg Mine.

The applicant will be in compliance with this section when the following stipulation is met.

<sup>320-(1)-(SMW)</sup>  
**Stipulation R614-301-322-220-(SMW)**

#### **R614-301-322.220 High Value Habitat**

Within 30 days of permit approval, the applicant must change the DWR high priority Mule deer winter range designation in the text (pages 9-1 and 10-7) and Map 9-1 to critical Mule deer winter range.

#### **330. Operation Plan**

The facility will be constructed and operated to minimize disruption of normal wildlife activities. Interim and final revegetation will occur concurrently. The applicant has committed to interim revegetation on the road cut and fill slopes, ditches, and other associated disturbances (pages 3-6 through 3-8). The interim seed mixture was developed to enhance the vegetation's nutritive value for wildlife habitat. Sediment control measures such as straw bales, silt fences and drainage structures will be used during construction and interim revegetation to reduce impact to the surrounding undisturbed site (pages 3-5 to 3-6). An area adjacent to the storage facility will be enhanced for wildlife as mitigation for the disturbance by selective clearing of Pinyon-Juniper and seeding to establish browse species.

The applicant is in compliance with this section.

#### **340. Reclamation Plan**

All disturbed areas will be revegetated (pages 3-8 through 3-10.1). Site grading and topsoil placement will be done in September (page 3-15.1). Seeding will occur in October immediately after topsoil spreading. October is the normally accepted time for seeding in the area. If the topsoil is crusted, it will be prepared by hand or tilling prior to seeding. The final revegetation seed mix (page 3-9) will be hand broadcast or hydroseeded on slopes and broadcast or drilled on the flatter areas. Fertilizer will be applied to the reseeded area (page 3-10). Areas which have been broadcast seeded and fertilized will be hand or mechanically raked to cover the seed. Mulching techniques such as netting with two tons per acre of hay, one ton per acre hydromulch, or crimped two tons per acre hay, will be used according to the various slopes.

The reseeded area will be quantitatively monitored for shrub establishment during the second year. If monitoring indicates, supplemental containerized shrubs will be planted (page 3-13) to achieve the desired woody plant density.

Postmining land use is designated as wildlife habitat and livestock grazing. Plant species have been chosen primarily for nutritional value since cover is not a limiting factor to wildlife. If adequate shrub density is not obtained through seeding, containerized shrubs will be planted in clumps to maximize cover.

The applicant will be in compliance when the following stipulation is met.

**Stipulation R614-301-342.100-(SMW)**

**R614-301-342.100 Enhancement Measures-(SMW)**

The applicant must update (pages 9-4 to 9-7) the wildlife mitigation procedures to include an area of at least 33 acres.

**350. Performance Standards**

The applicant has committed to contemporaneous reclamation. Interim revegetation will be done on the soil stockpiles, the road cut and fills, and the sediment pond banks (pages 3-6 to 3-8). The rock storage pile will be reclaimed in lifts. As each lift is completed (approximately 2 to 5 years), the slope will be seeded with the final revegetation seed mix, fertilized and mulched. This successive seeding will allow the applicant to update and fine tune the permanent seed mixture and mulching techniques.

The applicant has committed to establish a diverse, effective and permanent vegetative cover on all disturbed areas. Monitoring revegetated areas and comparing to reference areas and success standards will ensure recovery to premining productivity levels. The proposed seed mix should provide a vegetative cover which is capable of self-regeneration and plant succession. Many of the species in the seed mixture are also found on the site.

Yellow sweetclover (*Melilotus officinalis*) and Alfalfa (*Medicago sativa*) are proposed for use in the interim and final (page 3-14) revegetation seed mix. These two forbs are introduced species. They are included in the seed mixture because of their nitrogen fixing capability, deep tap roots, and forage quality. The species are not known to be persistent and aggressive in this area.

The postmining land use is wildlife habitat and livestock grazing (page 3-1). The revegetation success standard will be based on cover, production, and woody plant density. The revegetation success standard of production and cover will be based on comparing the various slopes and soil factors (pages 3-14 and 3-14.1) of the reclaim to the reference areas. A shrub density standard of 2,500 woody plants per acre has been established. This density standard has been approved by the BLM and DWR (personal communication May 30, 1990).

The extended responsibility period will continue for not less than 10 full years after final seeding. The site will be monitored annually and quantitative measurements will be taken in years 2, 3, 5, 9 and 10 (page 3-15).

No power lines or other transmission facilities will be constructed. Fences will be designed to allow uninhibited big game passage. The sediment pond will not contain hazardous or toxic materials. No persistent pesticides will be used unless approved (9-3 to 9-3.1).

The applicant is in compliance with this section.

### **R614-301-400 Land Use and Air Quality-(SMW)**

#### **R614-301-410 Land Use**

The BLM administers the public land on which the Cottonwood/Wilberg Waste Rock Facility is proposed. The applicant has applied for a BLM right-of-way (page 1-10). The BLM describes the area according to ecological sites as a semi-desert shallow loam and semi-desert stony loam (page 10-6). Vegetation production is less than 700 pounds per acre and slopes vary from 15 to 50 percent on these ecological sites. The area is listed as Class IV in BLM Visual Resource Management classification systems. This class attempts to minimize the visual impact of disturbances (page 10-8). The site is located on critical Mule deer winter habitat (page 10-7). The site is within the West Grimes livestock grazing allotment and the Cottonwood Watershed (pages 10-7 and 10-8).

An intensive archaeological evaluation was conducted of the site and no cultural resource sites or isolated cultural material was observed (page 10-3). The State of Utah Division of State History concurs with this evaluation that no historic properties will be impacted (letter dated August 18, 1989). No previous mining has occurred on the permit area.

The post mining land use based on the BLM Land Resource Management Plan and Emery County zoning regulations will be wildlife habitat and livestock grazing (page 10-10). The final reclamation seed species are intended to increase the nutritive value of the available food for wildlife and livestock. Productivity of the waste rock site will meet reference area standard and pre-disturbance levels prior to bond release.

The applicant is in compliance with this section.

## **R614.301-420 Air Quality-(JK)**

The applicant committed to conduct all operations in compliance with the requirements of the Clean Air Act (42 U.S.C., Sec. 7401 et seq.) and any other applicable state or federal statutes and regulations concerning air quality. The applicant has also provided a description of coordination and compliance efforts undertaken with the Utah Bureau of Air Quality (page 10-10).

## **R614-301-500 Engineering-(JK)**

### **510. Introduction and 511. General Requirements**

The PAP contains the required descriptions, maps, cross sections and plans of the proposed operation and its attendant reclamation plan.

### **512. Certification**

All cross sections, maps, plans, engineering designs, geologic cross sections and maps, waste disposal plans, impoundment plans and road plans in the Permit Application Package (PAP) have been examined and certified by a qualified, registered professional engineer (page 4-5).

### **513. Compliance with MSHA Regulations and MSHA Approval**

Nothing in the PAP necessitates compliance with the MSHA regulations cited in this section, therefore this section does not apply.

### **514. Inspections**

A professional engineer will inspect the waste rock pile, the road, and the sedimentation pond during construction, operation, and reclamation. The inspecting engineer will, within two weeks of each inspection, submit to the Division a certified report stating whether or not the waste rock pile, the road, or the sedimentation pond, has been constructed and maintained as designed and in accordance with the approved plan (pages 2-15, 2-19).

### **515. Reporting and Emergency Procedures**

If operations cease temporarily, the facility will be maintained as if it were in operation. As soon as it is known that temporary cessation of operations will exceed 30 days, a Notice of Intent to Cease or Abandon Operations will be sent to the Division. The notice will contain: (1) the measured area of the permit area; (2) the extent and kind of reclamation already accomplished; and (3) a description of backfilling, regrading, revegetation, environmental monitoring, and water treatment that will continue during temporary cessation (pages 2-19 and 2-20).

The applicant commits to notify the Division, by the quickest possible means, of any slide or imminent impoundment hazard (page 2-19).

## 520. Operation Plan

### 521. General

The PAP contains an operation plan with maps, cross sections, narrative, descriptions, and calculations which show how the relevant requirements will be met (Chapter II).

521.100 Cross Sections and Maps The PAP contains maps which show existing surface facilities and features, landowners, rights-of-entry, public interests, permit areas, land surface configuration, proposed features for the permit area, and transportation facilities. All maps have been prepared by or under the supervision of a qualified, registered, professional engineer, and have been thus certified, in accordance with R614-301-512 (page 4-5).

521.200 Signs and Markers Specifications A facility permit identification sign will be placed at each point of access. Each sign will measure 40 inches by 18 inches. Each sign will state the facility's name, the owner/operator, address and telephone number, the Utah Reclamation Permit number, the MSHA ID number, and the UPDES permit number.

The applicant commits to post, maintain and remove appropriate signs and markers. All signs and markers will be made of a durable material such as thin sheet metal. Perimeter and topsoil markers will measure 10 inches by 14 inches, be post mounted, and read "Perimeter - Do Not Disturb", or "Topsoil", as the case may be (pages 2-18, 2-21 and 2-22).

### 524. Blasting and Explosives

Warning and all-clear signals will be given before and after blasting. Access to the blasting area will be restricted so as not to jeopardize the safety of the public or of those involved in construction of the waste rock storage facility.

Complete records of all blasts will be compiled and kept on file at the Utah Power and Light Mining Division office in Huntington, Utah.

All blasting will be conducted by persons who have been trained, examined, and certified as provided by 30 CFR 850 and the applicable regulations of the Utah State Industrial Commission. No pre-blasting surveys are necessary since there are no dwellings or structures within one-half mile of the permit area. All blasting will be conducted between sunrise and sunset (pages 2-15, 2-16 and 2-17).

### **527. Transportation Facilities**

The only transportation facility within the permit area is the primary access road which will carry waste rock from Utah State Road 57 to the actual storage facility. The road will be located so as to disturb the natural topography as little as possible.

The road will consist of 10 inches of compacted road base gravel overlain by a six-inch thick surface of crushed stone. During construction and use of the road, water will be used to control fugitive dust as well as aid in compaction of the grade material (pages 2-1, 2-8, 2-9, 4-1, 4-2, 4-16 and 4-17).

### **528. Handling and Disposal of Coal, Overburden, Excess Spoil and Coal Mine Waste**

In order to facilitate contemporaneous reclamation, the waste rock storage facility will be constructed in phases. First, a berm of waste rock approximately 10 feet high will be constructed around the outer edge of the waste rock pile. Then, waste material will be placed and compacted inside the berm until the entire area is filled. Then, another berm will be constructed around the edge of the area thus created, and the entire process will be repeated.

Reclamation of the outslope of the waste rock pile will thus proceed berm by berm, the outslope of each berm being reclaimed as its inner area is being filled and compacted. The entire cycle of berm construction, filling and compaction, and contemporaneous outslope reclamation will be repeated until the waste rock pile is completed (pages 2-10, 2-10.1 and 2-10.2).

The applicant is in compliance with this section.

### **530. Operational Design Criteria and Plans**

#### **532. Sediment Control**

Two ditches, designated "DA" and "DB", encircle the entire waste rock pile. These ditches will receive runoff from the waste rock pile, from one side of each of the two topsoil storage piles, and from the area above the waste rock pile, and will transport the runoff to the sedimentation pond at the lower end of the permit area.

The runoff from the outside slopes of the topsoil storage piles and from the outslope of the road will not go to the sedimentation pond. Instead, it will be treated with straw bales or silt fences or a combination of the two (pages 2-1 through 2-8, 4-7 through 4-14 and 4-14.1).

### 533. Impoundments

The only impoundment in the permit area will be the sedimentation pond. It will have a capacity of less than 20 acre-feet and will measure less than 20 feet from toe to crest and need not, therefore, meet the requirements of MSHA, 30CFR77.216.

The operator has found the static, steady-state seepage safety factor and the seismic safety factor for the sedimentation pond to be 1.9 and 1.3, respectively. These values are well above the respective required values of 1.5 and 1.2 (pages 2-19, 4-15.1, 4-15.2, 4-15.3 and Map 4-5).

### 534. Roads

There will be one primary access road in the permit area (see Section 527-Transportation Facilities). It will be located on a stable part of the permit area in such a way as to create as little disturbance of the natural topography as possible. Both its surface and its subgrade will consist of crushed gravel. Its outsoles, which have a grade of 1v:1.5h, will have a safety factor of 1.5. It will be watered to control dust and aid compaction and will be bladed and otherwise maintained as necessary (pages 2-1, 2-4, 2-4.1, 2-5 through 2-9, 4-1, 4-16 and 4-17).

### 535. Spoil

535.100 Disposal of Excess Spoil Excess spoil will be disposed of in the waste rock pile along with other waste rock material. The outsoles of the waste rock pile will have a slope of 1v:2h, which will result in a static safety factor for the pile of at least 1.5. A geotechnical investigation of the entire area was done by a private consulting firm (pages 2-9, 2-10, 2-10.1, 2-10.2, 2-11, 2-12, 2-12.1, 2-12.2, 2-13, 2-14 and 4-3).

### 536. Coal Mine Waste

Coal mine waste will be placed in the waste rock pile along with spoil and development waste. Coal mine waste will be mixed with other waste, as necessary, in order to maintain a ratio of coal to non-combustible waste material of 50 percent or less. Any acid- or toxic-forming material, as determined by semi-annual sampling of the top of the waste rock pile, will be covered with at least four feet of inert material (pages 2-9, 2-10, 2-10.1, 2-10.2, 2-11, 2-12, 2-12.1, 2-12.2, 2-13, 2-14 and 4-3).

### **537. Regraded Slopes**

The operator will restore the site of the access road to its original contour. The waste rock pile, of course, will constitute a major alteration of the original contour. This is allowed because (1) the pile will not be detrimental to the environment, to public health or safety, or to the approved postmining land use; (2) the stability of the pile is assured by sound design and by a thorough geotechnical investigation; and (3) the surface of the pile will be revegetated and surface runoff controlled (pages 2-3, 2-4, 3-3, 3-4 and 3-4.1).

The applicant is in compliance with this section.

### **540. Reclamation Plan**

#### **542. Narratives, Maps and Plans**

The PAP includes a reclamation timetable (see pages 3-15 and 3-15.1), final configuration (Maps 4-6 and 4-7), maps and cross sections, and final road reclamation plans and cross sections. A detailed estimate of reclamation costs is also included in the PAP (pages 3-16 to 3-24).

The applicant is in compliance with this section.

### **550. Reclamation Design Criteria and Plans**

#### **553. Backfilling and Grading-(JK/TM)**

The applicant is committed to grade and backfill all disturbed areas, except the waste rock pile itself, so as to (1) achieve the approximate original contour; (2) achieve a postmining slope with a long term static safety factor of at least 1.3 and prevent slides; (3) minimize erosion and water pollution; and (4) support the approved postmining land use (pages 3-3, 3-4 and 3-4.1).

The applicant is in compliance with this section.

## **R614-301-700 Hydrology-(TM)**

### **710. Introduction**

The existing hydrologic resources for groundwater and surface water are described in Chapter VI, pages 6-1 through 6-12 of the PAP. The operations plan is described in Chapter II, pages 2-1 through 2-22. The reclamation plan is described in Chapter III, pages 3-1 through 3-24. Monitoring and inspection of the impoundments will be on a regular basis as stated on pages 2-7 and 2-19 of the PAP.

The applicant is in compliance with this section.

## 720. Environmental Description

722.100. The location and extent of subsurface water is described on page 6-74 of the PAP. Limited ground water is present above the waste rock site which rests upon a basically impermeable member of the Masuk Shale. Because of the lack of established aquifers within the proposed site, contour maps and cross sections of existing aquifers are not applicable.

722.300. Elevations and locations of monitoring stations used to gather baseline data are found on Map 4-3, Drill Hole Locations, and Map 4-4 and 4-6, Surface Water Sampling Locations.

722.400. Location and depth of monitoring wells is found on page 6.1-1 of the PAP and Map 4-3.

724.100. Depth to ground water is given on page 6.1-1 of the PAP.

724.200. All surface water within the permit area is ephemeral in nature.

725.100. All the necessary hydrologic and geologic information for the cumulative impact area has been provided.

728.100. The probable hydrologic consequences are discussed on pages 6-3 and 6-4 of the PAP. No impacts to surface or ground water are anticipated, based on the lack of ground water and the use of adequate sediment controls during construction operations and reclamation.

The applicant is in compliance with this section.

## 730. Operations Plan

The operations plan is described in Chapter II, pages 2-1 through 2-22 of the PAP. The plan encompasses all the measures necessary to be undertaken during coal mining and reclamation operations through bond release to minimize disturbance to the hydrologic balance within the permit area and adjacent areas. The operator is using the Best Technology Currently Available (BTCA) to prevent additional contributions of suspended solids to streamflow and minimize erosion to the extent possible.

All other ditches associated with the waste pile are sized to handle the 100-year, 6-hour storm and will be in place for the life of the facility. Interim revegetation and alternative sediment controls will be used to prevent sedimentation of areas (.9 acres) not draining to the pond (Map 4-2 of the PAP).

Runoff from 15.3 acres of undisturbed land and 16.0 acres of disturbed land will be diverted into a sediment pond.

The drainage system for the road will consist of roadside ditches and cross culverts. Ditches and culverts for the access road are sized to handle the 10-year, 6-hour storm (refer to Chapter IV, Engineering Design - Road Section and Plan View). All culverts and ditches will be protected with riprap to prevent excessive erosion and maintained as described on pages 2-5 and 2-6 of the PAP.

The applicant is in compliance with this section.

#### 731.200 Water Monitoring

731.210. Ground water monitoring will occur as described in Chapter VI, page 6-2 using parameters shown on page 6.2-1 of the PAP. This meets Division requirements for both baseline, operational and post mine monitoring.

731.213. The applicant has shown that the water-bearing stratum in the proposed permit and adjacent area is not one that serves as an aquifer which significantly insures the hydrologic balance within the CIA. The applicant proposes to monitor ground water in the area though it is of very marginal quality and quantity, and will not be impacted by the waste rock site due to its occurrence. The occurrence of ground water is discussed on pages 6-3 and 6-4 of the PAP.

#### 731.220 Surface Water Monitoring

731.221. The surface water monitoring plan is described on page 6-1.2 and 6-2. This monitoring meets the requirements of the operator's UPDES permit and Division monitoring guidelines.

731.224. Surface water monitoring will proceed through mining and continue during reclamation as described on pages 6-1.2, 6-2 and according to the parameters found on page 6-2.2 of the PAP.

#### 731.300 Acid- and Toxic-Forming Material

All materials which are acid- or toxic-forming will be properly identified, handled or buried so as to prevent any degradation of water quality as referenced on pages 2-10 through 2-12 of the PAP.

#### 731.400 Transfer of Well

Before final release of bond, the monitoring well, Drill Hole #4 as shown on Map 4-3, will be sealed in a safe and environmentally sound manner as described on page 6-2 of the PAP.

### 731.600 Stream Buffer Zones

The operation is not occurring within 100 feet of a perennial stream or an intermittent stream. All surface drainage at the site is ephemeral in nature as described on page 6-1 of the PAP.

### 731.700 Cross Sections and Maps

All maps and cross sections have been prepared and certified by a registered professional engineer, complying with the requirements of this section.

731.730. The location and elevation of each station to be used for water monitoring is found on Maps 4-3 and 4-4.

731.740. Map 4-5 shows the location the proposed sediment pond is located in after final construction of the waste rock facility.

731.750. Cross sections for the proposed sediment pond as certified by a professional registered engineer are shown on Plate 4-13.

732.410. All culverted ephemeral drainages along the access road are designed according to the 10-year, 6-hour storm as shown in Table 4-3. The drainage area for each culvert is marked on Map 4-2. Refer to Exhibit XIX for culvert outlet protection and trash racks. Page 4-14.2 documents the fact that the Division of Water Rights waived the application to alter a natural stream channel for all road crossings.

The applicant is in compliance with this section.

### 740. Design Criteria and Plans

#### 742. Sediment Control Measures

All sediment control measures have been designed to prevent to the extent possible, additional contributions of sediment to streamflow, meet the effluent limits, and minimize erosion to the extent possible.

742.200. The discharge structure (i.e., spillway) associated with the sediment pond is designed according to standard engineering practices (page 4-10 and Plate 4-13, PAP).

### 742.220 Sediment Ponds

One sediment pond has been designed and is shown in cross section on Plate 4-13. All technical designs are included on pages 4-6 through 4-10 of the PAP. Exhibit XX shows the Stage-Discharge Curve for the structure and the Stage-Capacity Curve. The pond design includes a non-clogging, dewatering pipe and a non-erodible open channel spillway. The pond will contain the 10-year, 24-hour storm volume and the open channel spillway is capable of passing 25-year, 6-hour precipitation, even with adequate freeboard as shown on pages 4-6 through 4-10 and Exhibit XX.

### 742.330 Diversions of Miscellaneous Flows

742.423.1. All diversions and culverts associated with the access road have been designed to handle 10-year, 6-hour storm events as shown in Table 4-3 (Access Road Culvert Sizing), page 4-15 of the PAP.

742.423.2-3. Exhibit XIX shows the designs for trash racks and culvert outlet protection on the two major culverts associated with the access road.

742.423.4. All natural stream crossings are photographically documented on pages 4-14.3 and 4-14.4. A statement in the plan states that where a reclaimed road corridor crosses a natural drainage channel, a channel will be built across the reclaimed corridor. The design and sizing will be the same as the natural channel that existed prior to disturbance, both as shown in cross section (Plate 4-9) and photographically documented prior to disturbance.

745.222. and 745.330. All diversion channels associated with the waste rock fill area are diverted into stabilized diversion channels designed to handle the 100-year, 6-hour event, as discussed on pages 2-6, 2-7 and 4-11 through 4-14.1. The reclaimed diversions will also meet this specification as discussed on pages 3-5 and 3-6. Map 4-5 shows the location during operations phase, and Map 4-7 shows the final configuration following reclamation.

746.120. The overall plan has been designed to prevent the adverse effects of leachate and surface water from the fill on surface and ground water. The Mancos Shale geology allows very little percolation of leachate and is basically devoid of ground water. During the operations phase as described in Chapter II, all surface water runoff is diverted or controlled in an appropriate manner. A monitoring well will be left in place down gradient from the refuse pile. Surface water runoff is ephemeral in nature and will be monitored as described in Chapter VI.

746.212. (See comments for 745.222 and 745.330.)

746.221. Riprap sizing for Ditch DA is found on page 4-14. Both Ditch DA and DB will be monitored throughout the life of the facility for erosion and formation of gullies over nine inches deep. If erosion does occur, the applicant has committed to repair gullies and install velocity controls as discussed on page 4-14 of the PAP. Contemporaneous reclamation of all areas reclaimed is proposed.

#### 750. Performance Standards-(TM)

The applicant has provided necessary information on designs, permits, monitoring, and prevention and control plans to minimize disturbance to the hydrologic balance within the permit and adjacent areas. The plan has been designed to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit as defined in previous sections of the technical analysis.

The applicant has received NPDES/UPDES permit #UT 0022896-005 for the Waste Rock Sedimentation Pond site. The terms and conditions of the permit are spelled out in the permit.

The applicant is in compliance with this section.

#### 760. Reclamation Plan

762.100. Roads As described in the reclamation plan, the sediment pond will be removed and the diversion ditches extended. This drainage pattern will meet the requirements of restoring the natural drainage pattern in a stable manner similar to pre-existing conditions. All road drainage crossings will be created as shown on pages 4-14.3 and 4-14.4.

The applicant is in compliance with this section.

#### R614-302-320 Alluvial Valley Floors-(DD)

The operator states in Chapter 5, on page 5-2, that no alluvial valley floors exist within the waste rock site. The north and east sides of the waste rock site are covered by a Quarternary terrace gravel deposit. The gravels are five to twenty-five feet in thickness, and cover a gentle slope of the Mancos Shale. The gravels are moderately permeable and most of the rainfall percolates through these deposits and flows down dip towards Grimes Wash and Cottonwood Creek.

The applicant has supplied information to show that an alluvial valley floor does not exist at the Cottonwood/Wilberg site. The unconsolidated materials at the site do not support an aquifer available for subirrigation. Test borings indicate that ground water sources are not sufficient to provide a hydrologic head within the alluvium. Precipitation rapidly penetrates the soils and comes in contact with the lower portion of the Masuk Member and the topography of the consolidated surface direct ground waters to lower-lying areas. The natural vegetation of Gardner Saltbrush and Junipers reflects the capability of subirrigation from ground water sources.

An alluvial valley floor does not exist within the proposed waste rock area.

The applicant is in compliance with this section.

djh  
AT68/25-43



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Norman H. Bangertter  
Governor

Dee C. Hansen  
Executive Director

Dianne R. Nielson, Ph.D.  
Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340

April 24, 1991

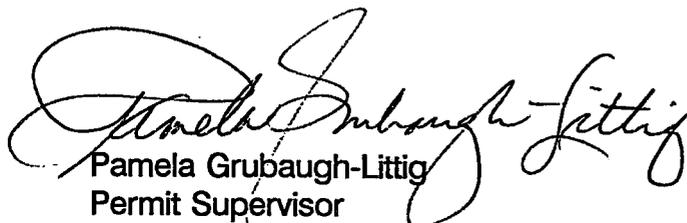
Mr. Blake Webster  
PacifiCorp Electric Operations  
Fuel Resources  
P.O. Box 26128  
Salt Lake City, Utah 84126-0128

Dear Mr. Webster:

Re: Approval of Stipulation Response R614-301-231.300 (HS) and R614-301-233 (HS), Cottonwood/Wilberg Waste Rock Storage Facility Addition, PacifiCorp Electric Operations, Cottonwood/Wilberg Mine, ACT/015/019, Folder #3, Emery County, Utah

The above-noted stipulation responses for the Cottonwood/Wilberg Waste Rock Storage Facility have been approved effective April 22, 1991.

Sincerely,

  
Pamela Grubaugh-Littig  
Permit Supervisor

jbe

cc: Henry Sauer  
AT015019.2



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Norman H. Bangert  
Governor

Dee C. Hansen  
Executive Director

Dianne R. Nielson, Ph.D.  
Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340

July 31, 1990

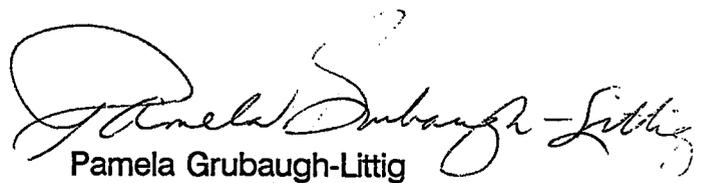
Mr. David R. Smaldone, Director  
Permitting, Compliance and Services  
Utah Power and Light Company  
Mining Division  
P. O. Box 26128  
Salt Lake City, Utah 84126-0128

Dear Mr. Smaldone:

Re: Approval of Stipulation R614-301-342, Waste Rock Storage Facility, Utah Power and Light Company, Cottonwood/Wilberg Mine, ACT/015/019, Folder #3, Emery County, Utah

This letter will inform you that the above-referenced stipulation is approved.

Sincerely,

  
Pamela Grubaugh-Littig  
Permit Supervisor

djh  
cc: V. Payne, UP&L  
AT



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Norman H. Bangertter  
Governor

Dee C. Hansen  
Executive Director

Dianne R. Nielson, Ph.D.  
Division Director

355 West North Temple  
3 Triad Center, Suite 350  
Salt Lake City, Utah 84180-1203  
801-538-5340

June 8, 1990

TO: Pamela Grubaugh-Littig

FROM: Joseph C. Helfrich, Regulatory Program Coordinator 

RE: 510 C Compliance Check, Utah Power and Light Company, Cottonwood/-  
Wilberg Mine, ACT/015/019, Folder #3, Emery County, Utah

As of the writing of this letter, there are no NOV's or CO's which are not corrected or in the process of being corrected. Any NOV's or CO's that are outstanding are in the process of administrative or judicial review. There are no finalized civil penalties which are outstanding and overdue in the name of Utah Power and Light Company, or NERCO, Incorporated and associated mining entities.

Finally, they do not have a demonstrated pattern of willful violations, nor has either been subject to any bond forfeitures for any operation in the state of Utah.

jb  
WMN10/6

/read all

Message 594-2043

SUBJECT: AVSCH RECOMMENDATION: UT

TO: Joe Helfrich, AVS Representative, UT

FROM: Frank Frideczky, AVS Clearinghouse

SUBJECT: Utah Power & Light Co, Application Numbers  
ACT015017, ACT015018 and ACT015019

DATE: July 20, 1989

Utah Power & Light Co Applications ACT015017, ACT015018 and  
ACT015019 have been researched, and the AVS Clearinghouse  
recommendation is ISSUE.

During the research, documents were uncovered linking NERCO INC,  
parent company of Utah Power & Light to two CMIS violations in  
Alabama, NSO-2-17-23 and NSO-2-17-24, issued to Sand Mountain  
Mineral Co. Because of the circumstances involved in these  
violations, it is requested that you contact NERCO INC and  
request that they contact Frank A. Frideczky on the AVS hotline  
to resolve the status of these violations in order to avoid  
future complications with NERCO INC related applications.

[PG ID 20:DOI370025:57969]

152E for 152G22 10:09 MDT 20-Jul-89 Message 594-2043 [1]

\* RECEIPT notice pending \*

Receipt of Message 594-2043 acknowledged to 152E on 11:05 MDT 25-Jul-89

Action?:

[ Done ]

/bye

Off at 11:06 MDT 25-Jul-89

Host Name: BYE

bcRO

# AFFIDAVIT OF PUBLICATION

STATE OF UTAH  
 County of Emery, ss.

I, Dan Stockburger, on oath, say that I am the General Manager of the The Emery County Progress, a weekly newspaper of general circulation, published at Castle Dale, State and County aforesaid, and that a certain notice, a true

copy of which is hereto attached, was published in the full issue of such newspaper for Four (4) consecutive issues, and that the first publication was on the 6th day of February, 1990

and that the last publication of such notice was in the issue of such newspaper dated the 27th day of February, 1990

*[Signature]*

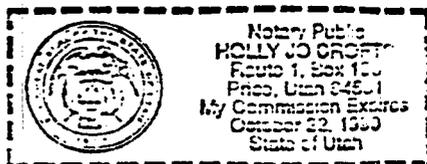
Subscribed and sworn to before me this

27th day of February, 1990

*Holly Jo Crofts*  
 Notary Public.

My Commission expires October 22, 1990  
 Residing at Price, Utah

Publication fee, \$ 220.80



## NOTICE

Utah Power & Light Company, 1407 West North Temple, Salt Lake City, Utah 84110, hereby announces its intent to file an application for a Waste Rock Storage Facility Permit for the Cottonwood/Wilberg Coal Mine with the Division of Oil, Gas and Mining under the laws of the State of Utah and the Office of Surface Mining.

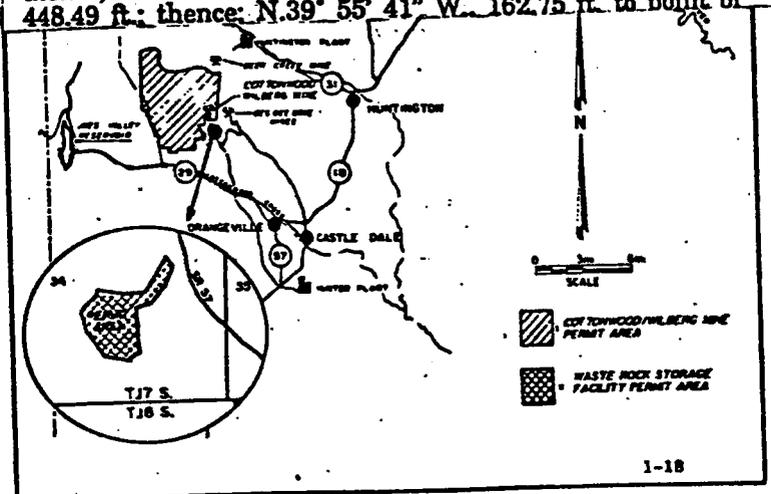
A copy of the complete application is available for public inspection at the Emery County Recorder's Office, Emery County Courthouse, Castle Dale, Utah 84513.

Written comments on the application should be submitted to the State of Utah, Division of Oil, Gas and Mining, 355 W. North Temple, 3 Triad Center, Suite 350, Salt Lake City, Utah 84180-1203. Said comments must be submitted within thirty (30) days from February 27, 1989, the date of last publication of this notice.

The Waste Rock Storage Facility area is contained on the U.S.G.S. 7.5-minute "Red Point" quadrangle map. A map depicting the general area of the Cottonwood/Wilberg Waste Rock Storage Facility is published herewith.

The land contained in the permit area is described as follows:

Beginning 81.144 ft. South and 1100.278 ft. West of the East Quarter Corner of Sec 34, T.17 S., R. 7E., SLM, Thence; S. 27° 14' 28" W., 515.54 ft.; thence; S. 46° 59' 05" W., 165.64 ft.; thence; S. 76° 41' 51" W., 264.72 ft.; thence; N. 72° 09' 12" W., 670.20 ft.; thence; S. 06° 10' 47" W., 105.57 ft.; thence; S. 23° 08' 12" W., 35.27 ft.; thence; S. 36° 59' 41" W., 71.59 ft.; thence; S. 40° 44' 45" W., 144.04 ft.; thence; S. 23° 37' 34" W., 93.77 ft.; thence; S. 60° 40' 32" W., 113.86 ft.; thence; S. 05° 17' 52" E., 108.19 ft.; thence; S. 23° 20' 37" E., 105.29 ft.; thence; S. 24° 38' 51" W., 61.70 ft.; thence; S. 31° 19' 19" E., 129.90 ft.; thence; S. 29° 19' 58" E., 80.45 ft.; thence; S. 24° 11' 44" E., 104.97 ft.; thence; S. 47° 47' 54" E., 168.95 ft.; thence; S. 40° 17' 54" E., 87.31 ft.; thence; S. 17° 50' 49" W., 43.32 ft.; thence; S. 72° 11' 49" E., 213.13 ft.; thence; S. 78° 08' 28" E., 287.64 ft.; thence; N. 11° 43' 23" E., 86.24 ft.; thence; N. 73° 40' 14" E., 120.87 ft.; thence; N. 17° 04' 33" E., 74.31 ft.; thence; N. 14° 20' 36" W., 65.70 ft.; thence; N. 17° 05' 06" E., 75.21 ft.; thence; N. 09° 13' 24" W., 65.92 ft.; thence; N. 12° 54' 35" W., 99.73 ft.; thence; N. 02° 44' 30" W., 82.47 ft.; thence; N. 08° 32' 17" W., 85.51 ft.; thence; N. 01° 39' 36" W., 104.82 ft.; thence; N. 17° 50' 48" E., 218.03 ft.; thence; N. 76° 41' 51" E., 218.52 ft.; thence; N. 48° 09' 55" E., 288.01 ft.; thence; N. 27° 14' 28" E., 448.49 ft.; thence; N. 39° 55' 41" W., 162.75 ft. to point of



Published in the Emery County Progress February 6, 13, 20 and 27, 1990.

# AFFIDAVIT OF PUBLICATION

STATE OF UTAH )  
 County of Emery, ) ss.

I, Dan Stockburger, on oath, say that I am the General  
 Manager of the The Emery County Progress, a weekly  
 newspaper of general circulation, published at Castle Dale,  
 State and County aforesaid, and that a certain notice, a true

copy of which is hereto attached, was published in the full issue  
 of such newspaper for..... Four (4).....con-

secutive issues, and that the first publication was on the  
 ..... 6th ..... day of ..... February, 19. 90.....

and that the last publication of such notice was in the issue of  
 such newspaper dated the

..... 27th ..... day of ..... February, 19. 90.....

*Dan Stockburger*

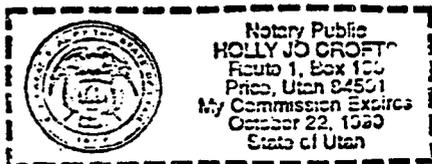
Subscribed and sworn to before me this

..... 27th ..... day of ..... February, 19. 90.....

*Holly Jo Crofts*  
 Notary Public.

My Commission expires October 22, 1990  
 Residing at Price, Utah

Publication fee, \$ 220.80.....



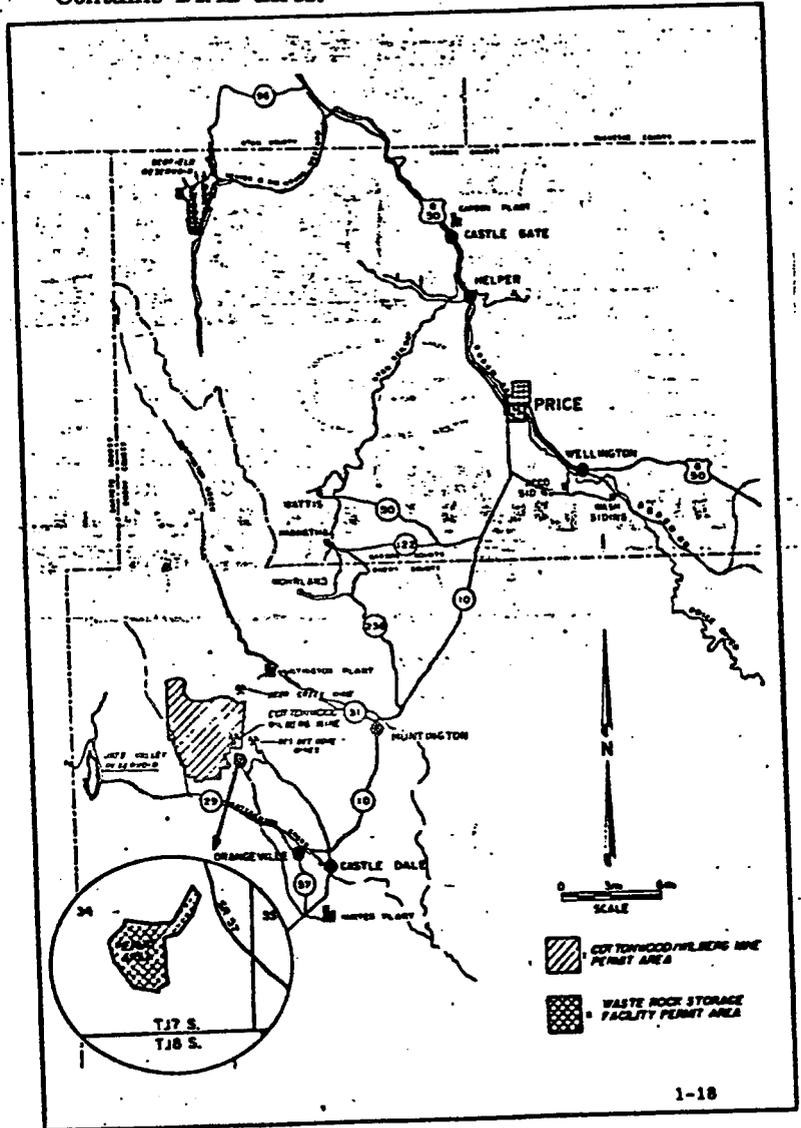
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The Waste Rock Storage Facility area is contained on the U.S.G.S. 7.5-minute "Red Point" quadrangle map. A map beginning.....  
 Contains 24.42 acres.



Published in the Emery County Progress February 6, 13, 20 and 27, 1990.

**EAST MOUNTAIN  
CUMULATIVE HYDROLOGIC IMPACT  
ASSESSMENT**

**Cottonwood/Wilberg Mine, ACT/015/019**

**Deer Creek Mine, ACT/015/018**

**Des-Bee-Dove Mines, ACT/015/017**

**Huntington #4 Mine, ACT/015/004**

**Crandall Canyon Mine, ACT/015/032**

**Emery County, Utah**

**July 1989**

**Revised June 1990\***

**\* Cottonwood/Wilberg Waste Rock Storage Facility**

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## I. INTRODUCTION

The purpose of this report is to provide a Cumulative Hydrologic Impact Assessment (CHIA) for East Mountain, located in Emery County, Utah. This assessment encompasses the probable cumulative impacts of all anticipated coal mining in the general area on the hydrologic balance and whether the operations proposed under the application have been designed to prevent damage to the hydrologic balance outside the proposed mine plan area. This report complies with legislation passed under Utah Code Annotated 40-10-1 et seq. and the attendant State Program rules under UMC 786.19(c).

East Mountain occurs within the Wasatch Plateau Coal Field, approximately 20 miles southwest of Price, Utah (Figure 1). The eastern margin of the Wasatch Plateau forms a rugged escarpment that overlooks Castle Valley and the San Rafael Swell to the east. Elevations along the eastern escarpment of the Wasatch Plateau range from approximately 6,500 to over 9,000 feet.

Precipitation varies from 40 inches at higher elevations to less than 10 inches at lower elevations. The area encompassed by the Wasatch Plateau may be classified as semiarid to subhumid.

## GEOLOGY

Outcropping rocks of the Wasatch Plateau Coal Field range from Upper Cretaceous to Quarternary in age. The rock record reflects an overall regressive sequence from marine (Mancos Shale) through littoral (Star Point Sandstone) and lagoonal (Blackhawk Formation) to fluvial (Castlegate Sandstone, Price River Formation and North Horn Formation) and lacustrine (Flagstaff Limestone) depositional environments. Oscillating depositional environments within the overall regressive trend are represented by lithologies within the Blackhawk Formation. The major coal-bearing unit within the Wasatch Plateau Coal Field is the Blackhawk Formation.

## VEGETATION

Vegetation of the Wasatch Plateau area is classified within the Colorado Plateau floristic division (Cronquist et al., 1972). The area occupies parts of both the Utah Plateaus and the Canyon Lands floristic sections. Vegetation communities of the area include desert shrub (shadscale) at the lowest elevations through sagebrush, sagebrush-grassland, pinyon-juniper, mountain brush, Douglas fir-white fir-blue spruce, and Engleman spruce-subalpine fir.

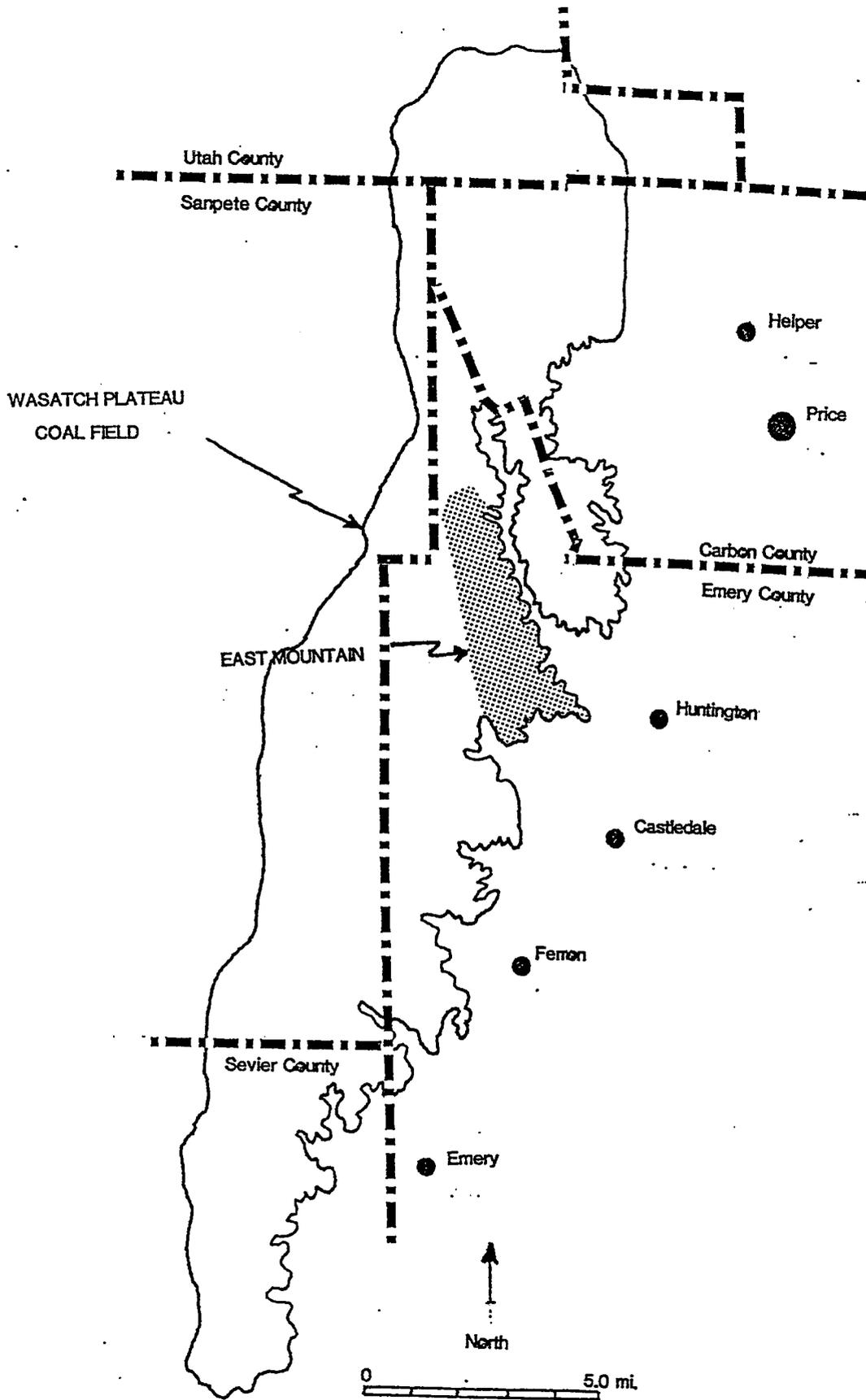


Figure 1. Wasatch Plateau Coal Field.

Desert shrub communities are sparsely vegetated shrublands that, depending on elevation and soils, may be dominated by shadscale (Atriplex confertifolia), fourwing saltbush (A. canescens), Castle Valley clover (A. cuneata) or mat saltbush (A. corrugata) and may include winterfat (Ceratoides lanata), Mormon tea (Ephedra spp.), budsage (Artemisia spinescens), miscellaneous buckwheats (Eriogonum spp.), Indian ricegrass (Oryzopsis hymenoides), galleta grass (Hilaria jamesii), grama grass (Bouteloua spp.), needle and thread grass (Stipa comata), sand dropseed (Sporobolus cryptandrus) and squirreltail (Sitanian hystrix). Greasewood (Sarcobatus vermiculatus) - saltgrass (Distichlis stricta) may dominate bottomlands.

Many sagebrush communities of the area are relatively dense shrub stands of (Artemisia tridentata) with very little understory growth. In relatively undisturbed sagebrush communities, rabbitbrush (Chrysothamnus nauseosus or C. viscidiflorus), Mormon tea, and several perennial grasses may be common, including thickspike and western wheatgrass (Agropyron dasystachyum and A. smithii), basin wildrye (Elymus cinereus), Indian ricegrass and dropseed species.

In the sagebrush-grassland type, the typical big sage may give way to Artemisia tridentata var. vaseyana (mountain big sage) with a co-dominant perennial grass understory. Salina wildrye (Elymus salinus) may be co-dominant in these communities and may dominate an herbaceous grassland type. Black sage (A. nova) with Salina wildrye or western wheatgrass understory is also common.

Pinyon-juniper woodlands occupy drier sites often with stoney to very rocky soils. Pinus edulis and Juniperus osteosperma are co-dominant in the overstory. Understory vegetation ranges from sparse to moderate ground cover on range sites in poor to excellent condition. Understory species include sagebrush, mountain mahogany (Cercocarpus montanus), snowberry (Symphoricarpus oreophilus), and several perennial grasses including slender wheatgrass (Agropyron trachycaulum), Salina wildrye, junegrass (Koeleria cristata) and Indian ricegrass.

Dominant shrubs of the mountain brush communities will vary depending on elevation and aspect. The drier south and west-facing slopes may support dense stands of Gambel oak (Quercus gambellii). Other dominants of this community may include serviceberry (Amelanchier utahensis), mountain mahogany (Cercocarpus montanus or C. ledifolius), bitterbrush (Purshia tridentata) and snowberry.

The range of the Douglas fir-white fir-blue spruce community is about 8,000 to 10,000 feet. Douglas fir (Pseudotsuga mensiesii) is usually the dominant tree with white fir (Abies concolor) and blue spruce (Picea pungens) usually limited to the most mesic sites, often along streams. With dense canopies, understory vegetation may be sparse. Common shrubs include serviceberry (Amelanchier spp.), Oregon grape (Berberis repens), chokecherry (Prunus virginiana), Rocky Mountain maple (Acer glabrum), mountain lover (Pachistima myrsinites) and snowberry. Bluebunch wheatgrass (Agropyron spicatum), mountain brome (Bromus carinatus), and Kentucky bluegrass (Poa pratensis) are common grasses. Aspen stands (Populus tremuloides) can be found throughout the zone, particularly in mesic sites and as successful communities.

Engelman spruce (Picea engelmannii) and subalpine fir (Abies lasiocarpa) dominate the spruce-fir zone at the highest elevations of the hydrologic impact area. While receiving about the same precipitation as the Douglas fir communities, lower evapo-transpiration with cooler temperatures can permit a more lush vegetation in the spruce-fir zone. Limber pine (Pinus flexilis) often occupies steep or rocky, drier sites of this zone.

Small riparian communities are found at all elevations within the impact assessment area. With greater water availability and cooler temperatures, the riparian zone often includes more mesic species, (e.g., those from a higher vegetation zone). Shrub species from the mountain shrub type may be found at most elevations.

Additional riparian zone shrubs include Narrowleaf cottonwood (Populus angustifolia), red osier dogwood (Cornus stolonifera), skunkbush (Rhus trilobata), river birch (Betula occidentalis) and various willows (Salix spp.). Grass species from the mesic zones may be represented (mountain shrub and higher zones) along with fescues (Festuca spp.) and miscellaneous sedges (Carex spp.). Small wet areas around springs and seeps will often support a dense growth of grasses, sedges and willows.

## HYDROLOGY

Surface runoff from the Wasatch Plateau area flows either to the Price River Basin or the San Rafael River Basin. The Price River Basin, which includes about 1,800 square miles in six counties, is located primarily in Carbon and Emery Counties in East-Central Utah. The San Rafael River Basin, which includes about 2,300 square miles in three counties, is located mainly in Emery County to the south of the Price River Basin. The Price River drainage originates in the Wasatch Plateau about 12 miles west and south of Scofield

Reservoir. Downstream from the reservoir the river flows in a generally southeasterly direction. The drainage is bounded by the Book Cliffs on the northeast, the Wasatch Plateau on the west and the San Rafael Swell on the south. The San Rafael River Basin occupies part of two physiographic sections of the Colorado Plateau - The High Plateaus to the north and west and Canyonlands to the south and east (Fenneman, 1946). Principal streams in the basin are Huntington and Cottonwood creeks, which merge to form the San Rafael River, and Ferron Creek, which joins the San Rafael River within a mile of that confluence. The San Rafael River also flows in a southeasterly direction to eventually join the Green River, after traveling from its headwaters in the Wasatch Plateau.

The water quality of both the Price River and the San Rafael Rivers is good in the mountainous headwater tributaries, but deteriorates rapidly as flow traverses the Mancos Shale. The shale lithology typically has low permeability, is easily eroded and contains large quantities of soluble salts that are major contributors to poor water quality. Depending upon the duration of contact, water quality degrades downstream to where Total Dissolved Solids (TDS) levels of 4,000 milligrams per liter (mg/l) are not uncommon. The predominant ion leached from the Mancos Shale is sulfate ( $SO_4$ ) with values over 1,000 mg/l common in the lower reaches of the Price River.

Ground water is present in all lithostratigraphic units within the Wasatch Plateau Coal Field. Ground water occurs under localized conditions that often form a system of "perched" aquifers and associated springs and/or seeps. Significant localized ground-water resources are associated with the North Horn Formation and Price River Formation. The U.S. Geological Survey has identified and formally designated the Star Point-Blackhawk aquifer as the only regional ground-water resource occurring in the Wasatch Plateau Coal Field (Danielson, et al., 1981 and Lines, 1984).

## II. CUMULATIVE IMPACT AREA (CIA)

Figure 2 delineates the CIA for current and projected mining in the East Mountain area. The CIA encompasses approximately 68 square miles and includes East Mountain. The western and eastern CIA boundaries are designated by Huntington Creek and Cottonwood Creek, whereas the southern extent is bounded by sections 8, 9 and 10, T18S, R7E, and the northern boundary is defined by a drainage divide.

## II. CUMULATIVE IMPACT AREA (CIA)

### III. SCOPE OF MINING

#### COTTONWOOD/WILBERG, DEER CREEK, AND DES-BEE-DOVE MINES (Utah Power and Light Company)

The Cottonwood/Wilberg, Deer Creek, and Des-Bee-Dove Mines represent three adjacent and overlapping permit areas encompassing about 29,000 acres.

The federal coal leases that are designated in the East Mountain "Logical Mining Units" are as follows:

##### Cottonwood/Wilberg

SL-064900, U-1358, U-083066, U-040151, U-044025, U-47978, and portions of SL-070645-U-02292, U-084923, and U-084924.

##### Deer Creek

SL-064607-064621, SL-064900, U-1358, SL-070645, U-02292, U-084923, U-084924, U-083066, U-040151, U-044025, U-014275, U-024319, and U-47979. Future coal leases (not yet in permit area) are U-06039, U-024317, and SL-051221.

##### Des-Bee-Dove

U-02664, SL-050133, and SL-066116.

#### COTTONWOOD/WILBERG MINE

Coal mining operations have been in existence since the 1890's in the Wilberg area. Utah Power and Light Company (UP&L) acquired the Wilberg Mine in September 1977 from the Peabody Coal Company, which had acquired the lease in 1958. Mining had previously been conducted under the original owner, Cyrus Wilberg, beginning in 1945. With the UP&L acquisition, the Wilberg Mine was redesigned.

A tragic fire occurred in December of 1984. On July 1, 1985, it was decided to divide the Wilberg Coal Mine into two separate and independent coal mines; the Cottonwood and the Wilberg Coal Mines, each with a separate MSHA identification number. The mining and reclamation permit, however, was designated as ACT/015/019 for the Cottonwood/Wilberg Mine because the surface facilities were shared by each mine.

Longwall mining and limited room and pillar mining produces about 2.5 million tons from the Hiawatha and Blind Canyon seams. Mining is scheduled to cease around the year 2022.

There are two permitted waste rock storage facilities for the Cottonwood/Wilberg Mine and the Des-Bee-Dove Mine. One of facilities (BLM-ROW U-37642 [16 acres]) will reach its capacity in 1990. The other waste rock storage facility (BLM-ROW UTU-65027 [24 acres]) was permitted in June, 1990 and will be the disposal facility for underground development waste, trommel reject, and sediment from sedimentation ponds.

#### DEER CREEK MINE

UP&L purchased the Deer Creek Mine in 1977 from Peabody Coal Company, which had acquired leases on the Deer Creek property and began operations in 1969. Coal mining operations had taken place on fee land in Deer Creek Canyon prior to 1946 when the first federal coal lease was issued in this area. Operations of the Deer Creek Mine overlap those of the Wilberg Mine, predominantly in the Blind Canyon Seam. The Deer Creek Mine surface facilities are located on a 25-acre site at the junction of Deer Creek Canyon and Elk Canyon.

The majority of the Deer Creek Mine utilizes the longwall mining method and produces about 2.5 million tons per year from the Hiawatha and Blind Canyon seams. All underground operations are scheduled to cease around the year 2032.

#### DES-BEE-DOVE MINE

The Des-Bee-Dove Mine complex (the Deseret, Beehive and Little Dove Mines) was acquired by UP&L in 1972 from the Deseret Coal Company, a Mormon Church enterprise. The Mormon Church and the Castle Valley Fuel Company mined the property from 1938 to 1947. From 1936 to 1938 the mine workings were operated by two men, Edwards and Broderick. Mining began in the canyon in 1898 as the Griffith Mine.

The Des-Bee-Dove Mine permit area contains two mineable coal seams - the Hiawatha and Blind Canyon. The mining plan consists of a series of room and pillar continuous mine sections.

The Des-Bee-Dove Mine ceased operations on February 6, 1987. UP&L is currently maintaining the site in an indefinite "temporary cessation" phase because if the coal market improves, this mine may be re-activated. Before UP&L temporarily ceased operations, the Des-Bee-Dove Mine produced 725,000 tons per year and projected that mining would end in the year 1998.

#### HUNTINGTON CANYON #4 (Beaver Creek Coal Company)

The Huntington Canyon #4 Mine permit area contains 1,320 acres. The underground operations utilized room and pillar mining methods in the Blind Canyon and Hiawatha coal seams in Federal Lease No. U-33454 and SL-064903. All underground mine operations ceased November 1, 1984.

Beaver Creek Coal Company reclaimed the site during the period of August 15, 1985 through September 30, 1985. Three portals and one opening were sealed, regrading and backfilling of the pad and road areas was completed, soil replaced, and reseeding done. The reclaimed site has been maintained since that time.

#### CRANDALL CANYON MINE (Genwal Coal Company)

Historically, mining had been conducted in Crandall Canyon from November of 1939 to September of 1955. Mining in Tract 1 by Genwal Coal Company began in 1983.

The permit area for the Crandall Canyon Mine contains approximately 158 acres in Huntington Canyon in Emery County, Utah. The current method of room and pillar mining for Federal Lease SL-062648 will be continued throughout Lease U-54762. Pillars will be removed upon abandonment of sections. Overall, an advance-retreat mining system is projected for the mine.

The reserves within the permit area are proposed for mining through 1994.

#### IV. STUDY AREA

##### GEOLOGY

The East Mountain CIA is characterized by cliffs, narrow canyons and high plateaus. Stratigraphic units outcropping within the area include, from oldest to youngest, the Mancos Shale, Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation, Flagstaff Limestone and Quaternary deposits. Lithologic descriptions and unit thickness are given in Figure 3.

Rocks in the study area strike northeast and dip from one to three degrees to the southeast. The four major structural features occurring on East Mountain are: (1) Deer Creek Fault; (2) Roans Canyon Fault Graben; (3) Pleasant Valley Fault; and (4) Straight Canyon Syncline. The Deer Creek Fault and Pleasant Valley Fault trend north - south, whereas Roan's Canyon Fault Graben and Straight Canyon Syncline trend northeast - southwest. Fault displacements range from several feet to approximately 170 feet.



## HYDROLOGIC RESOURCES

### GROUND WATER

The ground-water regime within the CIA is dependent upon climatic and geologic parameters that establish systems of recharge, movement and discharge.

Snowmelt at higher elevations provides most of the ground-water recharge, particularly where permeable lithologies such as fractured or solution limestone are exposed at the surface. Vertical migration of ground water occurs through permeable rock units and/or along zones of faulting and fracturing. Lateral migration initiates when ground water encounters impermeable rocks and continues until either the land surface is intersected (and spring discharge occurs) or other permeable lithologies or zones are encountered that allow further vertical flow.

The Star Point Sandstone and lower portion of the Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation, Flagstaff Limestone, and Quarternary deposits are potential reservoirs or conduits for ground water in the CIA. Reservoir lithologies are predominantly sandstone and limestone. Sandstone reservoirs occur as channel and overbank, lenticular and tabular deposits, whereas limestone reservoirs have developed through solution processes and fracturing. Shale, siltstone and cemented sandstone beds act as aquacludes to impede ground-water movement. The Mancos Shale is considered a regional aquaclude that delimits downward flow within the CIA. Localized aquacludes include relatively thin, impermeable lithologies occurring within the stratigraphic section above the Star Point Sandstone.

The Star Point-Blackhawk aquifer is present and represents the only identified regional ground-water resource in the study area (Danielson, et al., 1981). Ground water associated with the Price River Formation and North Horn Formation may be characterized as occurring within an extensive "perched" aquifer zone and represents a significant hydrologic resource.

Faults and fractures act as effective conduits for ground water and allow unsaturated downward flow. Springs having significant discharges (10 gpm or greater) are most commonly located in proximity to north-south and northeast-southwest trending fault or fracture zones (Figure 4). In particular, the Roans Canyon Fault Graben appears to act as a significant conduit for ground water. Drilling from the Deer Creek Mine identified two major hydrogeologic units associated with the graben. Aquifer testing indicated the horizontal flow component within the graben is towards the east and suggests discharge occurs into the Huntington Creek drainages basin.

The Straight Canyon Syncline is also thought to direct ground-water movement towards the southwest into the Cottonwood Creek drainage basin.

Data from seven boreholes located within the Cottonwood/Wilberg Mine suggest that locally ground-water, in the Star Point Sandstone, is moving towards the northeast. Other, more regional data indicate ground water moves from north to south.

Approximately 160 seeps and springs occur within the CIA. Total spring discharge exceeds 1700 gpm. Spring discharge is distributed as follows:

| <u>Lithologic Unit</u>                                      | <u>Number of Springs</u> | <u>Total Discharge</u> |
|---|--------------------------|------------------------|
| Flagstaff Limestone   | 5                        | 20 gpm                 |
| Undifferentiated Flagstaff Limestone/North Horn Formation   | 5                        | 60 gpm                 |
| North Horn Formation  | 42                       | 1045 gpm               |
| Undifferentiated North Horn Formation/Price River Formation | 6                        | 65 gpm                 |
| Price River Formation                                       | 28                       | 140 gpm                |
| Castlegate Sandstone  | 11                       | 35 gpm                 |
| Blackhawk Formation   | 49                       | 95 gpm                 |
| Star Point Sandstone  | 16                       | 260 gpm                |

Analysis from spring samples indicate water quality progressively decreases from the Flagstaff Limestone to the Star Point Sandstone.

Mine inflow is estimated to total 1500 gpm for the Deer Creek Mine and Cottonwood/Wilberg Mine and 100 gpm in the Crandall Canyon Mine. Mine water is discharged to the Left Fork of Grimes Wash and Miller Canyon at the Cottonwood/Wilberg Mine and to the Huntington Power Plant at the Deer Creek Mine. Mine water is not discharged at the Crandall Canyon Mine or Des-Bee-Dove Mine. No discharge occurs at the reclaimed Huntington #4 Mine.

Mine water within the CIA represents ground-water depletion from storage in the Blackhawk Formation and Star Point Sandstone and interception of flow along faults/fractures.

## SURFACE WATER

The CIA has been divided into six major drainage basins representing ten sub-drainage areas. The CIA encompasses drainage to Huntington Creek and Cottonwood Creek, both draining to the San Raphael River Basin (see Figure 5).

### Crandall Canyon (1)

Crandall Canyon drainage (1) includes the disturbed area associated with the Crandall Canyon Mine. The mine exists in the lower reaches of the drainage which encompasses 3741.62 acres. The average gradient of Crandall Creek is 16 percent. Crandall Creek is perennial and flows east into Huntington Creek.

Mining is centered in the lower reaches of the drainage area and involves approximately 162 acres, of which 9.7 acres is surface disturbance. All surface disturbance is treated by maintained sediment controls.

### Little Bear Canyon and Mill Fork Canyon (2 and 3)

Approximately 4319 acres drain from Little Bear Canyon and Mill Fork Canyon combined. The Huntington #4 Mine encompasses approximately 1320 acres with these two canyons. Reclaimed surface disturbance involves 12.5 acres in Mill Fork Canyon. Little Bear Creek is considered ephemeral and Mill Creek is considered perennial in its lower reaches. The average gradient of Little Bear Creek is 30 percent and the average gradient for Mill Creek is 13 percent.

Huntington #4 Mine has been reclaimed for several years and will have maintained sediment controls in place through the bonding period.

UP & L's permit area encompasses 390 acres in Mill Fork Canyon.

### Rilda Creek (4)

Approximately 4586.8 acres drain Rilda Canyon. Rilda Creek is perennial due to several large springs found in the middle reaches of the creek. The average gradient of Rilda Creek is 11 percent.

The permit area of Utah Power and Light Company mines encompasses areas of Rilda Canyon. Previous surface disturbance was associated with the Helco Mine and North Emery Water Users have several developed springs adjacent to the Helco Mine. Reclamation of the abandoned Helco Mine is planned for the near future. U.P. & L.'s permit area encompasses 2417 acres of Rilda Canyon drainage.

### Meetinghouse Canyon and Deer Creek Canyon (5 and 6)

Approximately 4955 acres drain Meetinghouse Canyon and 3593 acres drain Deer Creek Canyon. Meetinghouse Creek is considered ephemeral and Deer Creek is considered perennial. The average gradient of Meetinghouse Creek is 12 percent and the average gradient of Deer Creek is 13 percent. Approximately 56 acres of surface disturbance associated with the Deer Creek Mine is found in the middle of Deer Creek Canyon. The surface facilities are treated by sediment controls and all coal produced at the mine is conveyed to the Huntington Power Plant found adjacent to Huntington Creek near the bottom of Deer Creek Canyon.

Meetinghouse Canyon contains 4535 acres and Deer Creek Canyon contains 3,347 acres of U.P. & L.'s permit area.

### Maple Gulch and Danish Bench (7 and 8)

Approximately 6790 acres is associated with the drainage area of Maple Gulch and approximately 5960 acres is associated with the drainage area of Danish Bench. Both areas are primarily Mancos Shale flats draining away from the southern end of East Mountain and lack the confined canyons of some of the other drainages found in the CIA. Danish Bench drains to Cottonwood Creek and has an average gradient of 12.5 percent. Maple Gulch drains to Huntington Creek and has an average gradient of 17 percent. Permit areas of the U.P. & L. mines encompasses 837 acres of Maple Gulch and 250 acres of Danish Bench. Neither area contains any surface disturbance associated with mining.

### Grimes Wash (9)

Approximately 8412 acres is associated with Grimes Wash drainage. The Cottonwood/Wilberg Mine is situated within Grimes Wash and represents 31 acres of surface disturbance which is treated by sediment controls. The average gradient of Grimes Wash is 14 percent. U.P. & L.'s permit area encompasses 4120 acres of the Grimes Wash drainage.

### Cottonwood Creek (10)

This drainage encompasses 10,373 acres and includes all drainage to Cottonwood Creek along the western half of the CIA area. It has many small canyons and contains 12 acres of surface disturbance associated with the Cottonwood Fan Portal area of the Cottonwood/Wilberg Mine. This area is treated by sediment controls and is partially reclaimed. The portion of U.P. & L.'s permit area contained in this drainage is 5120 acres. There is also a portal in Miller Canyon which drains to Cottonwood Creek and discharges periodically due to gravity drainage from the mine.

## V. POTENTIAL IMPACTS

### GROUND WATER

Dewatering and subsidence related to mining have the greatest potential for impacting ground-water resources in the CIA. The impact of changes in vegetation on ground-water recharge should be minimal since mining will disturb less than 150 acres of the 44,000 acre CIA. Disturbance of phreatophytic vegetation (primarily cottonwood and some willow) is negligible.

The Cottonwood/Wilberg Mine Waste Rock Storage area is located below the coal resource on Quaternary sediment gravel that directly overlies the Masuk member of the Mancos Shale. Inasmuch as the Mancos Shale is considered a regional aquiclude, the storage facility presents a low risk for impacting ground-water resources.

Dewatering. The volume of water being discharged from mines within the CIA (1,600 gpm) approximates the amount of water that is currently being withdrawn from the ground-water system. The current and projected withdrawal values may be totalled and compared to estimates of ground-water discharge and recharge within the CIA and thereby, allow an assessment of cumulative dewatering impacts.

Approximately 38,400 acres within the CIA overlie the coal resource and represent a potential recharge area (Figure 6). Average annual precipitation is approximately 20 inches over the potential recharge area and hence, the total annual precipitation over the outcropping recharge area is 53,900 acre-feet.

Table 1A gives estimates for the total annual discharge of springs from water-bearing rock units that overlie the coal resource.

Table 1A. Precipitation and Spring Discharge Estimates for Areas Above the Coal Resource, East Mountain CIA.

| <u>Lithologic Unit</u>   | <u>Outcrop Area (acres)</u> | <u>Normal Annual Precipitation on Outcrop (acre-feet)</u> | <u>Total Annual Discharge of Springs (Percent of annual precipitation on outcrop)</u> |
|--|-----------------------------|---|---|
| Undivided Flagstaff Limestone, North Horn Formation, Price River Formation | 26,000                      | 43,300  | 3%  |
| Castlegate Sandstone   | 3,300                       | 5,600   | 1%  |
| Blackhawk Formation, Star Point Sandstone                                  | 9,100                       | 5,000   | 3%  |
| Total  |                             |   |   |

Discharge also occurs directly to perennial streams where channels intersect ground water within the Blackhawk Formation and Star Point Sandstone. The six perennial streams that occur within the CIA are: Crandall Creek, Mill Fork Creek, Rilda Creek, Grimes Wash Creek, Cottonwood Creek, and Huntington Creek. All of these streams intersect the lower Blackhawk Formation and Star Point Sandstone. A study conducted along Miller Creek in the adjacent Gentry Mountain area indicated streamflow substantially increased (from 8 to 115 gpm) as a result of discharge from the Blackhawk Formation and Star Point Sandstone (Cyprus-Plateau Mining Company, Star Point Mine PAP, pages 783-40). The results from the Miller Creek study suggest perennial streams that traverse the regional aquifer sustain similar ground-water discharges (or base flow recharge). Accordingly, total base flow recharge to perennial streams is estimated to be 600 gpm.

Table 1B lists estimated ground-water discharges to perennial streams and from mines.

**Table 1B. Estimated Ground-Water Discharge to Perennial Streams and from Mines, East Mountain CIA.**

|  |                 |
|--|-----------------|
| Discharge to Perennial Streams (6 total) | <u>600</u> gpm  |
| Discharge from Mines (3 total)           | <u>1600</u> gpm |
| Total                                    | <u>2200</u> gpm |

Table 1C approximates the amount of ground water discharged to the atmosphere by mine ventilation systems. Psychrometric formulas were utilized to derive ventilation discharge values and extrapolated to mine elevation. Average relative humidity data from the Central Weather Station in the Manti-LaSal National Forest were also used in the psychrometric calculation.

**Table 1C. Approximate Atmospheric Discharges from Active Mines, East Mountain, CIA.**

| <u>Mine</u>             | <u>Approximate Discharge Rate (gpm)</u> |
|-------------------------|---|
| Cottonwood/Wilberg Mine | 36                                      |
| Deer Creek Mine         | 36                                      |
| Crandall Canyon Mine    | <u>10</u>                               |
| TOTAL                   | 82                                      |

Total ground-water discharge within the CIA (summed from Tables 1A, 1B and 1C) is currently about 3700 gpm, where 41 percent (2100 gpm) of the total represents natural discharge to streams and springs and 59 percent (1600 gpm) results from mining activities.

Lines (1985) investigated the adjacent Trail Mountain area and indicated regional aquifer inflow to mines is derived from aquifer storage (80 percent) and aquifer discharge (20 percent). Extrapolating these percentages to the East Mountain CIA allows depletion, due to present mining activities (5200 acres mined), of regional aquifer storage and discharge to be estimated at 1280 gpm and 320 gpm, respectively. Assuming future mining encompasses 12,000 acres and will continue to encounter steady - state inflow from the regional aquifer, then depletion would increase to 2960 gpm for storage and 740 gpm for discharge.

U.P. & L. has proposed to access coal reserves for the Deer Creek Mine by driving a rock tunnel across the Roans Canyon Fault Graben. A drilling and testing program identified two water-bearing zones within the graben. The operator intends to minimize inflow by pressure grouting the water-bearing zones during development of the rock tunnel. It is not anticipated that the diversion of ground-water flow within the Roans Canyon Fault Graben will exceed a total of 100 gpm.

Future mining-induced dewatering is projected to encompass 2100 gpm and hence, the cumulative dewatering total would be approximately 3700 gpm. Following the cessation of mining, the discharge of ground water to the Left Fork of Grimes Wash, Miller Canyon, Huntington Power Plant and the atmosphere will cease and workings will begin to flood.

The impact associated with the reduction in surface flow is considered temporary. Mine flooding will conceivably recharge regional aquifer storage and re-establish the natural ground-water conduit system that was operational prior to mining. The maximum time span required for complete mine flooding may be derived by assuming the final workings (14,000 acres) will remain open (average 5 foot height) and caving will not occur. Accordingly, for workings that experience inflow (Cottonwood/Wilberg Mine, Deer Creek Mine, Crandall Canyon Mine) an upper limit of 20 years may be derived for complete mine flooding. It should be noted that complete flooding will, undoubtedly, never be achieved because the hydraulic head generated as flooding proceeds will increase until the hydraulic properties of the roof, floor and rib are exceeded and flow within the rocks initiates.

**Subsidence.** Subsidence impacts are largely related to extension and expansion of the existing fracture system and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of ground-water flow. Potential changes include increased flow rates along fractures that have "opened", and diverting flow along new fractures or within permeable lithologies. Subsurface flow diversion may cause the depletion of water in certain localized aquifers and potential loss of flow to springs that will be undermined. Increased flow rates along fractures would reduce ground-water residence time and potentially improve water quality.

Mining will occur beneath approximately 13 springs that have a combined flow in excess of 625 gpm. Overburden thickness averages more than 1000 feet beneath areas where springs are located. Diversion of spring flow is considered to be at overall low risk.

### **SURFACE WATER**

The cumulative impacts associated with mining within the CIA will be summarized by individually discussing impacts associated with the Crandall Canyon Mine, Huntington #4 Mine, Deer Creek Mine, Cottonwood/Wilberg Mine and the Des-Bee-Dove Mine. Creeks and drainage areas which are referenced by (#) or discussed, are shown on Figure 5, Surface Water Drainage Map.

**Cottonwood/Wilberg Mine.** The Cottonwood/Wilberg Mine is located in Grimes Wash. Grimes Wash drainage quality is greatly affected by the influx of the Right Fork. The Right Fork originates in the North Horn Formation (interbedded shales, siltstones, and sandstones), which is abundant with calcareous material. As a result, the Right Fork contributes a relatively high amount of suspended solids to the Grimes Wash drainage. The greatest factor influencing the suspended solids level in the Right Fork drainage during 1988 was the sudden increase in temperature.

As reported in 1985, the TDS level increased slightly at the location below the mine. Two possible factors stated for the rise were Cottonwood/Wilberg Mine Discharge and Mancos Shale seeps. Due to the fact that no water was discharged from the mine during 1985 through 1988 (one exception in August 1986), seeps emanating from the Mancos Shale probably have the greatest influence upon the level. Periodic sampling during 1986 and early 1987 confirmed the seeps' contribution to the TDS level. The average for the four samples collected was 1,188 mg/l, representing a nearly 3.3 fold increase over the historical averages for the Right and Left Forks. (Annual Hydrologic Monitoring Report for 1988, pg. 24).

All surface facilities are treated by sediment controls and as such, there are no potential impacts from sediments generated from disturbed areas.

Waste rock generated from the Des-Bee-Dove and Cottonwood/Wilberg Coal Mines is disposed of in a series of seven interconnected storage cells which constitute the Cottonwood/Wilberg Waste Rock Storage area (Figure 4). The waste rock storage site is located at 6,800 feet elevation; annual precipitation is approximately 14 inches, and the vegetation surrounding the waste rock storage area is the pinyon-juniper community type.

Each complete waste rock containment structure consists of over four feet of shot and crushed coal, sandstone, and mudstone rock. The expected waste rock encountered will be approximately 70 percent sandstone, 20 percent interbedded mudstone and siltstone, and 10 percent boney coal.

Roof and floor materials are sandy loam to loamy sand in nature. Analyses of roof and floor material indicate high Sodium Adsorption Ratios (SAR) (Mean=17.36, Standard Deviation=25.14), and movement of sodic materials is typically associated with hydroscopic rise and leaching processes. High SAR in the waste rock storage area should not be a concern to water quality because drainage from the storage site should be minor.

Analyses from Drill Hole EM-23C, indicates low pH (3.3, 2.9, 3.7) within the mudstones and siltstones directly below the Hiawatha Coal Seam. Additionally, roof and floor analyses indicate high pyritic/marcasite levels (%FeS<sub>2</sub> Mean=8.15, Standard Deviation=10.82). The colluvium and Mancos Shale which underlies the waste rock storage area is calcareous and should be sufficient to neutralize drainage or seepage from areas within the waste rock storage site, which could potentially form acid.

Although most water associated with the Cottonwood/Wilberg Waste Rock Storage Area will evaporate, some water will inevitably percolate through the storage cells and underlying colluvium deposits. Eventually seepage would contact the Mancos Shale and further degradation (increased TDS and EC) of water quality would take place. Accordingly, drainage from the waste rock storage site would have little down-gradient effect.

**Deer Creek Mine.** Referencing Table 1D, it is apparent that the quality of Deer Creek runoff degrades from the upper to lower sampling points. The quality of the lower point is affected by the Mancos Shale and is dominated by chloride, sulfate and sodium.

**Table 1D. Deer Creek Water Quality.**

|       |      | Calcium | Chloride | Conductivity | Magnesium | Sodium | Sulfate | TDS   | TSS     |
|-------|------|---------|----------|--------------|-----------|--------|---------|-------|---------|
| Above | Max  | 82.0    | 176.0    | 1580         | 183.9     | 111.6  | 255.0   | 897   | 3592.0  |
| Mine  | Mean | 49.5    | 19.2     | 581          | 37.5      | 27.5   | 63.8    | 335.0 | 124.9   |
| Below | Max  | 112     | 420.0    | 2300         | 122.8     | 233.8  | 500.0   | 1544  | 20540.0 |
| Mine  | Mean | 73      | 120.4    | 1153         | 67.0      | 114.9  | 215.8   | 684   | 490.9   |

Deer Creek sediment pond discharge has been historically within UPDES limits, but discharges high Total Dissolved Solids degrading downstream water quality.

All surface drainage facilities are designed to safely control water and sediment runoff from all disturbed areas. In addition, all surface water originating from undisturbed lands upstream of the facilities area will be controlled and diverted around the operation. Storm runoff from within the mine facilities area is collected in a system of open ditches, bermed roadways and culverts, and is discharged to Deer Creek below the facilities area.

The sediment pond is designed to detain the 10-year, 24-hour storm event. It should be noted that when the design event is exceeded (i.e. storms larger than the 10-year, 24-hour storm), sediment detention times will be reduced, leading to a slightly higher sediment load in Deer Creek.

Runoff from 25 acres of disturbed land will be temporarily detained in the Deer Creek Mine sediment pond and will be released to Deer Creek within UPDES limitations. The surface-water impact associated with the Deer Creek Mine operations will be minimal.

Reclamation of the drainage at the Deer Creek Mine will consist of removing the temporary drainage system, diversion and sedimentation pond. Permanent channels will be constructed over the fill and into a splash basin. The Utah program regulations currently require all diversions to be routed away from fill. However, the applicant's proposal has been determined to be sound engineering design and acceptable as a state-of-the-art experimental practice under UMC 785.13. All channels are designed to pass the 100-year, 24-hour runoff peak flow. The proposed surface-water reclamation plan will have negligible impact on water quantity or quality of Deer Creek and its tributaries.

**Des-Bee-Dove Mine.** The Des-Bee-Dove Mine complex ceased operations in February 1987 for economic reasons and is in an indefinite "temporary cessation". The mine is a dry mine and all surface drainage is treated by a sediment pond and released to an ephemeral wash. Since all surface water is treated by a maintained sediment pond, the effects of the Des-Bee-Dove Mine operations or the hydrologic balance are negligible.

**Huntington #4 Mine.** The major aquatic habitats within the permit area are Mill Fork and Little Bear Creek. All reclaimed mine lands are within Mill Fork Canyon. Based on benthic macroinvertebrate and aquatic habitat surveys conducted by the operator and on data provided by the Utah Division of Wildlife Resources, neither creek supports game or non-game fish and both lack sufficient flow in most years to provide spawning sites. However, these streams probably contribute some invertebrate food items and a small amount of surface flow to Huntington Creek, an important fishery in the region.

The mine is currently reclaimed and all surface structures have been removed and all disturbed areas reseeded. Sediment controls are in place (i.e. sediment ponds) and there is no anticipated impact to Mill Creek from the Huntington #4 Mine due to the lack of potential sources of impact.

**Crandall Canyon Mine.** Crandall Canyon Mine is located in Crandall Canyon. The U.S. Geological Survey established a gaging station at the mouth of Crandall Canyon Creek in 1978. Flow data collected at the gaging station are not complete for the winter in most years, due presumably to data acquisition problems. However, the limited data indicate that most of the flow of Crandall Canyon Creek occurs in the period of May through July. Assuming an average of 30 acre-feet per month for the period when records were missing, the average annual flow for the six year period of data was 2740 acre-feet.

Surface water quality data collected from Crandall Canyon Creek by Genwal Coal Company for the Tract 1 Lease from 1985 indicate that the dominant ions in Crandall Canyon Creek are calcium and bicarbonate. Total dissolved solids concentrations in the stream have varied from 180 to 286 milligrams per liter, with lower concentrations normally occurring during the high flow season. Total suspended solids concentrations in Crandall Canyon Creek have varied during the period of record from 0.5 to 208.0 milligrams per liter. As expected, the highest suspended solids concentrations generally occur during periods of highest flow.

The main concern in terms of impact to surface water is water quality deterioration downstream from the minesite, primarily in the form of suspended sediments. Typically the suspended sediment concentration in Crandall Canyon Creek since 1983 varied from approximately 205 mg/l to 0.5 mg/l. Low suspended sediment values are associated with natural climactic and geologic process although a proportion may be attributed to surface disturbances from roads and the mine pad area. Sediment controls do exist for the disturbed surface areas. Therefore, the impact associated with mining in Crandall Canyon is minimized by surface controls (i.e., sediment pond, diversions, etc.).

## **VI. SUMMARY**

Mine operations within the CIA currently intercept regional aquifer flow at an approximate rate of 1,600 gpm. Of this total, approximately 1586 gpm are consumptively lost to mine ventilation (86 gpm) and cooling/evaporation at a power plant (1,500 gpm). The remaining 14 gpm are discharged, without interbasin transfer of water to streams. Mine water discharge meet required effluent limitations.

Future mining operations are designed to avoid interception of fault conduit flow and accordingly, inflow from the regional aquifer is estimated to increase from 1,600 gpm to 3700 gpm. Approximately 80 percent of the flow will be derived from storage and 20 percent from discharge. Consumptive use is not anticipated to increase. Mine water discharge (1500 gpm) and ventilation losses (86 gpm) will be discontinued upon cessation of mining. Concommitantly, flooding of abandoned workings will initiate. An upper limit of 20 years has been estimated for complete flooding of workings and re-establishment of the premining ground-water system.

Diversion of spring flow is considered to be at overall low risk.

Sediment control measures have been and will be designed and implemented to reduce and stabilize contamination of surface waters.

Following cessation of mining, waste rock storage areas will be adequately covered with topsoil and all disturbed areas will be stabilized and revegetated to prevent surface water contamination.

The designs proposed for all anticipated mining operations within the CIA are herein determined to be consistent with preventing damage to the hydrologic balance outside the proposed mine plan areas.

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