Cotonwood/Wilberg Coal Mine

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

Ammendment to Update the Cottonwood/Wilberg MRP for the Phase III Bond Release of the Miller Canyon Portals, Cottonwood Fan Portal and Cottonwood/Wilberg Waste Rock Site, PacifiCorp, Cottonwood/Wilberg Mine, C015/0019, Emery County, Utah

File in:
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See: Incoming For additional

C/015/0019 Incoming

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P.O. Box 310
15 North Main Street
Huntington, Utah 84528

November 15, 2010

Utah Coal Program
Utah Division of Oil, Gas, and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Subj: Amendment to Update the Cottonwood/Wilberg MRP for the Phase III Bond Release of the Miller Canyon Portals, Cottonwood Fan Portal, and Cottonwood/Wilberg Waste Rock Site, PacifiCorp, Cottonwood/Wilberg Mine, C015/0019, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company "Energy West" as mine operator, hereby submits an amendment to update the Cottonwood/Wilberg Mines mining and reclamation plan. This update is in response to the Phase III bond release of the Miller Canyon Portal area, the Cottonwood Fan Portal area, and the "old" Cottonwood/Wilberg waste rock site area.

Energy West has thoroughly reviewed the MRP and removed information referencing these bond release areas. Chapters have been revised accordingly. Actual changes in the MRP include the following:

❖ Volume 1:	Replace Induction
❖ Volume 1:	Replace Table of Contents (note: actual replacement will occur to the clean copy submittal.
❖ Volume 1, Part 2:	Remove Archeological Survey Information (a copy of this information exists in the Confidential and Private Information Volume
❖ Volume 1, Part 2:	Replace Text Section
❖ Volume 2, Part 3:	Replace Text Section
❖ Volume 2, Part 4:	Replace Text Section
❖ Volume 2, Part 4, Appendix C:	Replace Bond Summary and Remove Pages 74-76 of 88

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❖	Volume 3:	Replace Plates 1-1 thru 1-3
❖	Volume 6:	Add Plate 3-16a
❖	Volume 6:	Replace Plate 4-4 and 4-5
❖	Volume 7, Appendix III:	Replace 3-16a
❖	Volume 7, Appendix IV:	Remove Earthwork Quantities Report
❖	Volume 7, Appendix VII, XIX, XXII:	Remove These Appendices
❖	Volume 11:	Remove Complete Volume
❖	Legal and Financial Volume, Appendix G:	Replace Cottonwood/Wilberg Permit Boundary Description

Five (5) complete copies of this amendment are submitted for Division review. A C1 and C2 form is also included for organization of placement into the Cottonwood/Wilberg MRP. If you have any questions concerning this amendment, please contact myself at 435-687-4712 or Dennis Oakley at 435-687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Geology and Environmental Affairs Manager

Cc: file

APPLICATION FOR COAL PERMIT PROCESSING

COPY

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: PacifiCorp

Mine: Cottonwood/Wilberg Mine **Permit Number:** C/015/0019

Title: Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas

Description, Include reason for application and timing required to implement:

Update MRP in regards to Phase III Bond Release.

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☒ Yes ☐ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☒ Yes ☐ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☐ Yes ☒ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes ☒ No 15. Does the application require or include soil removal, storage or placement?
☐ Yes ☒ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes ☒ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☐ Yes ☒ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☐ Yes ☒ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Kenneth Fleck — Kenneth S. Fleck — Manager of Environmental Affairs 11/15/10
Print Name — Sign Name, Position, Date

Subscribed and sworn to before me this 15th day of November, 20 10

Luz Adriana Duran
Notary Public

My commission Expires: Dec, 21, 20 10

Attest: State of UT } ss:
County of Emery

NOTARY PUBLIC
LUZ ADRIANA DURAN
1075 E. Main
Price, Utah 84501
My Commission Expires
December 21, 2010
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
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Form DOGM- C1 (Revised March 12, 2002)

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

COPY

Permittee: PacifiCorp
Mine: Cottonwood/Wilberg Mine **Permit Number:** C/015/0019
Title: Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Volume 1, Introduction, Replace entire section
☐ Add	☒ Replace	☐ Remove	Volume 1, Table of contents, Replace entire section
☐ Add	☒ Replace	☒ Remove	Volume 1, Archeological Report, replace with reference page
☐ Add	☒ Replace	☐ Remove	Volume 1, Part 2, Replace entire text section.
☐ Add	☒ Replace	☐ Remove	Volume 2, Part 3, Operation Plan, Replace entire text section, Retain slope stability review, Retain Simplified Bishop Method of Slices
☐ Add	☐ Replace	☒ Remove	Volume 2, Part 3, Operation Plan, Remove Cottonwood Fan Portal Slope Stablilty Certification, Remove Roberts & Shaffer Letter – Excerpts from Roberts & Shaefer Contract Specification
☐ Add	☒ Replace	☐ Remove	Volume 2, Part 4, Reclamation Plan, Replace Entire text section
☐ Add	☒ Replace	☐ Remove	Volume 2, Part 4, Reclamation Plan, Appendix C, Bond Calculation, replace bond summary
☐ Add	☐ Replace	☒ Remove	Volume 2, Part 4, Reclamation Plan, Appendix C, Bond Calculation, remove pg 74, 75, 76 of 88
☐ Add	☒ Replace	☐ Remove	Volume 3, Map 1-1, Revise Permit Boundary
☐ Add	☒ Replace	☐ Remove	Volume 3, Map 1-2, Revise Permit Boundary
☐ Add	☒ Replace	☐ Remove	Volume 3, Map 1-3, Revise Permit Boundary and ASCA Areas
☒ Add	☐ Replace	☐ Remove	Volume 6, Add Map 3-16a, Cottonwood Canyon Surface Facilities
☐ Add	☒ Replace	☐ Remove	Volume 6, Map 4-4, Revise Permit Boundary
☐ Add	☒ Replace	☐ Remove	Volume 6, Map 4-5, Revise Permit Boundary
☐ Add	☒ Replace	☐ Remove	Volume 7, Appendix III, Plate 3-16a, Cottonwood Canyon Surface Facilities
☐ Add	☐ Replace	☒ Remove	Volume 7, Appendix IV, Remove Earthwork Quantities Report
☐ Add	☐ Replace	☒ Remove	Volume 7, Appendix VII, Entire Appendix
☐ Add	☐ Replace	☒ Remove	Volume 7, Appendix XIX, Entire Appendix
☐ Add	☐ Replace	☒ Remove	Volume 7, Appendix XXII, Entire Appendix
☐ Add	☐ Replace	☒ Remove	Volume 11, Remove Complete Volume
☐ Add	☒ Replace	☐ Remove	Legal and Financial Volume, Appendix G, Replace Cottonwood/Wilberg Permit Boundary Description
☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining RECEIVED NOV 16 2010 DIV. OF OIL, GAS & MINING

Form DOGM - C2 (Revised March 12, 2002)

COPY

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 1, Introduction

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Introduction

PacifiCorp owns and leases certain fee coal lands, together with assigned federal coal leases, and controls approximately 22,500 acres of contiguous minable property located in Emery County, Utah. Geography, the area is known as East Mountain, a large, relatively flat plateau, containing three minable coal seams.

Coal was mined through three separate mines: Deer Creek Mine, Cottonwood/Wilberg Mine, and the Des Bee Dove Mine. The Deer Creek Mine is the only mine that is presently in production. The Cottonwood/Wilberg Mine has been nearly mined out and is currently being used as an underground coal haulage facility. The mine transfers coal from the Deer Creek and Trail Mountain mines to the coal loadout facility in left fork of the Grimes Wash. At this point, coal is transported, via triple trailer coal trucks, to the Hunter Power Plant. The Des Bee Dove Mine has been mined out, sealed, and surface facilities removed.

Several federal coal leases are coincidental to both the Cottonwood/Wilberg and Deer Creek mines as the mines are superimposed. The description of the permit areas for both mines are listed in their respective permits. Both mines are owned and operated by PacifiCorp.

Three coal seams exist in the Cottonwood/Wilberg mine area; Blind Canyon seam (upper), Cottonwood seam (middle), and Hiawatha seam (lower). The Deer Creek Mine is producing coal from the Blind Canyon Seam and will mine in the North Hiawatha seam in the future. The Cottonwood seam contains excessive in-seam temperature gradients and has been determined as unmineable. The majority of coal produced from Cottonwood Mine was from the Hiawatha seam. The coal haulage system (beltline) of the Cottonwood/Wilberg Mine is located in this seam.

The permit boundary and approximate locations of faults that have affected the Cottonwood/Wilberg Mine plan are illustrated in Figure 1. Faults that have influenced mining are the Pleasant Valley Fault, Deer Creek Fault, and the Roan's Canyon Fault.

In the Cottonwood/Wilberg Mine, the Hiawatha seam is bounded on the north by the thinning of the seam below five feet in thickness. On the east, the seam is bounded by the Deer Creek Fault and the Pleasant Valley Fault. On the south and west, the seam is bounded by the coal outcrop and lease border, respectively.

The Blind Canyon seam within the Cottonwood/Wilberg Mine lies approximately 100 feet above the Hiawatha seam. This seam is bounded on the north by the Deer Creek Mine workings. The east, south and west is bounded by the thinning seam of less than five feet in thickness.

Since part of the Cottonwood/Wilberg Mine was overlain by areas of the Deer Creek Mine, the upper seam was mined prior to mining the lower seam. In addition, mining plans were designed with a system of barriers to protect a 345KV power line.

Wilberg Mine

The Wilberg Mine was acquired by Peabody Coal company in 1958. In March 1977, Utah Power and Light (UP&L) acquired the mine from Peabody Coal and was officially listed as the lessee on September 1, 1977. In 1982, UP&L successively bid the South Lease (U-47978) federal coal tract.

On July 1, 1985, the Wilberg Mine and the South Lease area were separated into two distinct mines; the Wilberg Mine (MSHA ID No. 42-00080) and Cottonwood Mine (MSHA ID No. 42-01944). Each mine operated independently of the other utilizing separate equipment and ventilation systems. The Wilberg portals are located on the north coal outcrop in Grimes Wash on the southern end of East Mountain. Mine personnel and coal transfer facilities are located at the Wilberg portal.

The Cottonwood portals are located on the south coal outcrop of the Grimes Wash. These portals provide for men and equipment access, underground conveyor belt coal haulage system, and mine ventilation. Although they are separate underground operations, the two mines share common surface facilities, thus forming the Cottonwood/Wilberg complex.

On May 6, 1996, the Cottonwood/Wilberg Mine and its attached facilities were reassigned an MSHA identification number. The new identification number that was given to the mine was the Trail Mountain identification number (MSHA ID No. 42-01211). This number was assigned to the Cottonwood/Wilberg mine since all Trail Mountain coal is transported through this mine.

Cottonwood/Wilberg Mine

The Cottonwood/Wilberg Mine surface facilities occupy approximately twenty acres of disturbed land at the confluence of the Left and Right forks of the Grimes Wash. The surface facilities include coal handling, electrical substation, equipment maintenance, material storage, parking areas and drainage and sediment control structures. Office, bathhouse and warehouse facilities are located underground.

Cottonwood/Wilberg, Des Bee Dove, and Trail Mountain Waste Rock Sites

Bureau of Land Management Right-of-Way UTU-37642: Located 1.5 miles south of the Cottonwood/Wilberg Mine, the original 48.62 acre site was designed as an open storage and truck loadout for the mine. The Right of Way (ROW) grant, UTU-37642 (east side of State Highway 57), was issued by the Bureau of Land Management (BLM) in 1977, but the development of a concrete storage silo for coal on site changed the need for the loadout. A modification was submitted to use this land for underground development waste storage in connection with underground development ongoing in the Cottonwood/Wilberg Mine. The ROW has been modified to accommodate coal bed methane degasification conducted by Texaco Inc.

The modification includes:

1) 1997 relinquishment of 1.08 acres (access to Texaco well 35-14).
2) 1999 relinquishment of 12.98 acres (Texaco well 34-80).

Total relinquishment of this ROW is 14.06 acres. Of the original 48.62 acre site, only 34.56 acres remain with ~~15.62~~ 1.81 acres of it disturbed. ~~A portion (13.81 acres) of this disturbance has been reclaimed and received Phase I bond release on July 22, 1999~~. Historically, the

Cottonwood/Wilberg Waste Rock Site was located in the southern portion of this ROW. Phase III Bond Release was granted in July 22, 2009.

Bureau of Land Management Right-of-Way UTU-65027: Located 1.7 miles south of the Cottonwood/Wilberg Mine is BLM ROW UTU-65027 (west side of State Highway 57). This 25.85 acre site is currently used for underground waste storage in connection with underground development ongoing in the Trail Mountain Mine. This site replaced ROW UTU-37642 as the primary waste rock storage facility as the old ROW reached design capacity.

Further discussion of the Cottonwood/Wilberg mining operation and facilities can be found in Part 3, Operations Section, beginning on page 3-1. This application and related information are intended to address the Cottonwood/Wilberg Mine complex and its affect on the surrounding area. However, several of the environmental resource studies such as vegetation, soils, and wildlife, apply to the applicant's total contiguous area and can be better evaluated as a whole as they refer not only to the specific mine but to the adjacent areas.

Organization of the Mining Permit Application

The following volumes contain PacifiCorp's permit application for underground coal minng operations at the Cottonwood/Wilberg Coal Mine. The application is organized into a set of eleven (11) volumes as follows:

Volume 1

DOGM Permit
Introduction
Table of Contents
Part 1 - Legal , Financial, Compliance Information
Part 1 Appendices
Part 2 - Environmental Resources

Volume 2

Part 3 - Mining Operation Plan
Part 4 - Reclamation Plan
Part 4 Appendices

Volume 3

Maps and Drawings

Volume 4

Empty

Volume 5

Maps and Drawings

Volume 6

Maps and Drawings

Volume 7

Appendices

Volume 8

Geology Section (~~ACT~~/015/0017, ~~ACT~~/015/0018, ~~ACT~~/015/0019)

Volume 9

Hydrologic Section (~~ACT~~/015/0017, ~~ACT~~/015/0018, ~~ACT~~/015/0019)

Volume 10

Cottonwood Mine Waste Rock Site (Bureau of Land Management R/W UTU-65027)

Volume 11

~~Proposed Cottonwood Fan Portal (Reclamation Plan)~~ Deleted and archived at DOGM in Salt Lake City

~~**Appendices**~~

~~Part1 and Part 2~~

Certification

State of Utah)
: ss.
County of Salt Lake)

Except a otherwise indicated thereon, all maps, plans, and cross-sections submitted with this application have been prepared under the supervision of John Christensen, a registered Professional Engineer of the State of Utah, who, to the best of his knowledge, hereby certifies to the correctness thereof.

Note: This page, as well as maps, will be certified when final approval is granted by the Division of Oil, Gas, and Mining.

John Christensen, P.E.
Professional Engineer
No. 165651

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 1, Table of Contents

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~~R645-301-112.400: Identification Names, Numbers, and Dates of Issuance:~~
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~~R645-301-116: Permit Term~~
~~R645-301-117.100: Certificates of Liability~~
~~R645-301-117.200: Proof of Publication~~
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VOLUME 4

Empty

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4-5	East Mountain Spring & Subsidence Location Map	CM-10742-WB
~~4-6~~	~~(Deleted) See Plate 5-3, Vol. 11~~	
~~4-7~~	~~(8 Sheets) (Deleted) See Plate 5-3, Vol. 11~~	
~~4-8~~	~~Proposed Cottonwood Fan Portal Diversion Ditch Plan & Prof.~~	~~CM-10828-CP~~
~~(Revised) See Vol. 11~~		
~~4-9~~	~~Proposed Cottonwood Fan Portal Diversion Ditch Cross Sec.~~	~~CM-10827-CP~~
~~(Revised) See Vol. 11~~		

VOLUME 8 Geology Section (C/015/017, C/015/018, C/015/0019)

VOLUME 9 Hydrologic Section (C/015/017, C/015/018, C/0015/019)

VOLUME 10 Cottonwood Mine Waste Rock Site (BLM UTU-65027)

~~VOLUME 11 Proposed Cottonwood Fan Portal (Reclamation Plan)~~

APPENDICES

I Coal Lithologic Logs

a. Drill Hole EM-23C

b. Drill Hole EM-12C

c. Drill Hole A-25

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II Field Data For the Vegetation Reference Areas

III Cottonwood/Trail Mountain Overland Tube Conveyor Reclamation Cross-Sections, Vegetation and Soils of the Cottonwood/Trail Mountain Portal Area and Culvert Size Calculations

IV Cottonwood/Wilberg Facility Final Reclamation ~~Earthwork Quantities, Cross-Sections and~~ Stability Analysis

V Report of Engineering Geology Study (Dames & Moore)

VI Overburden Analysis

VII ~~Underground Development Waste Plan~~ (DELETED)

VIII Drainage Systems

Dwgs. 7704-C70A, C71A, C81A, C89A and C90A

IX Road Plans and Cross-Sections

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X Road Construction Variance

XI Geotechnical Study - Stacking Tube

XII Blasting Plan

XIII Hydrologic Analysis of Disturbed Area Runoff Control Cottonwood/Wilberg Mine Portal Site and Hydrologic Analysis of Undisturbed and Disturbed Area Runoff Control Proposed Cottonwood Canyon Fan Portal Site. (Hansen, Allen & Luce, Inc.)

XIV Photographs of Existing Structures

XV Hydrologic Procedures and Calculations with Drainage Map CM-10379-EM Final Reclamation

XVI Subsidence Monitoring Plan

XVII Safety Factor Calculations of Road and Impoundment Embankments

XVIII Stability Report - Proposed Cottonwood Fan Portal

XIX ~~Hydrological Calculations - Proposed Cottonwood Fan Portal~~ (DELETED)

XX UP&L Mining Division, Mine Permit Hydrologic Section (See Volume 9)

XXI Waste Rock Site BLM UTU-65027 (See Volume 10)

XXII ~~Miller Canyon Reclamation~~ (DELETED)

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 1, Part 2, Environmental Resource Information –

Remove - Archeological Sample Survey and Cultureal Resource Evaluation of the East Mountain Locality in Emery County, Utah
Replace with Attached Reference Sheet

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

The Report…

Archeological Sample Survey
and
Cultural Resource Evaluations
of the
East Mountain Locality
in
Emery County, Utah

…can be found in the Confidential and Private Information Volume behind the East Mountain, General Tab

Note: This information is CONFIDENTIAL

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 1, Part 2, Environmental Resource Information

After Removing Archeological Report, Replace Remaining Text Section with Attached. Note that section has been reorganized to more closely follow the Utah Coal Regulations

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 1, Part 2, Environmental Resource Information

After Removing Archeological Report, Replace Remaining Text Section with Attached. Note that section has been reorganized to more closely follow the Utah Coal Regulations

SOILS INFORMATION ~~(783.21)~~

Construction of the Wilberg Mine was begun and completed during the year 1978. Approvals for the facilities were granted in early 1978 by the U.S. Geological Survey under 30 CFR 211 which required approximately the same soil conservation practices as SMACRA's interim regulations effective December 13, 1977.

Soil classifications (horizons) as delineated in the interim regulations were non-existent or so shallow as to preclude attempts of salvage and storage.

To meet initial or interim revegetation requirements and provide soil mapping for permanent regulatory permit application, a consultant was engaged to classify and test the existing soil (after construction for acceptance as a plant growth medium.

Company's consultant is Dr. A.R. Southard, soil scientist, Utah State University, who under contract, performed the field work and prepared the following report and soil maps. (Information was updated in 1989 by Dr. Southard). Southard reported three major conclusions:

1. Basically, no topsoil (Horizon A) exists in sufficient quantities to warrant stockpiling (based on undisturbed adjacent areas).
2. Existing materials, selectively, are acceptable as a plant growth medium.
3. Final reclamation would be enhanced, especially sedimentation control, by induced grass species.

Further, no soil mapping of the disturbed area is possible (Southard).

The Cottonwood facilities were constructed in 1985.

Overview

Portal and support facility areas for the Cottonwood/Wilberg Mine are cut into steep, nearly perpendicular rock cliffs. The areas are dominated by rock outcrop, rubble land, and shallow soils.

Nowhere in the vicinity is there a source of material which would usually be referred to as 'topsoil'.

Soil tests on the disturbed and undisturbed areas and coal waste show that the materials in the portal areas should support selected vegetative materials. These test results, therefore, preclude the recommendation for procurement of topsoil for reclamation since the exposed materials are suitable growth media if properly managed. The one exception is that if during mining operations toxic substances are concentrated, it will be necessary to sample these areas periodically and take the necessary reclamation measures to dispose of or cover the areas in order to assure success of revegetation attempts. Results of soil analyses are summarized ~~on pages 4-9 and 4-10~~ Part 4, Appendix D.

Additional soil sampling was done in 1989. The results are presented ~~on pages 4-9.1 through 4-9.15~~ in Part 4, appendix D.

SOILS REPORT OF THE WILBERG MINE ~~(783.21)~~

(See Maps 2-17 and 2-18)

C - Cut Areas

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

F-Fill Areas

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

R-Or - Rubble Land - Rock Outcrop, 60-80% Slopes

Rubble land is covered by boulders and stores. The vegetation is limited to areas between stones and boulders and lichens.

Rock outcrop is exposed bedrock, mostly sandstone and shale. In general, the material derived from sandstone is suitable for growth media, especially juniper and grasses. Material derived from shale is, in general, less suitable for plant growth; and efforts should be made to cover the shale with sandstone material to enhance reestablishment of native vegetation.

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

Rock Outcrop is dominantly from sandstone and shale. The boulders in the Rubble Land are from sandstone (75%). Ustorthent soils are shallow and formed in material derived from sandstone. Permeability is moderately rapid in the soil material above the rock (25%).

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

A

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

C

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

[1] Reclassified by Dr. A.R. Southard in May, 1989.

R

14 inches; sandstone.

Included in mapping are areas of material which have sloughed and been deposited by gravity in small areas (less than 100 sq. ft.). The soil materia is deeper than Ustorthent soils, and is characterized in Part 4, Appendix D, General Soil Map of the Permit Area, Table I, samples 1112-1116~~, pages 4-9 and 4-10~~. These areas are of such limited extent that they are of no consequence as a local source of cover material for revegetation.

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Soil Survey of Parts of Carbon and Emery Counties, Utah. April 1979. Vol. I and II.

GENERAL SOIL MAP OF THE PERMIT AREA

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

These soils are mostly loamy-skeletal and lithic with areas of sandstone outcrops. In this map unit, Typic Ustochrepts make up about 50%, lithic Ustorthents about 25%, and Rock Outcrop and Rubble 12nd about 20%; included are small areas of Mollisols on north and east-facing slopes.

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

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

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

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

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

These are dark-colored soils in which the surface soil is more than 50 cm thick.

Included in mapping are Typic Cryoborolls, Moffic Cryoboralfs and Typic Cryochrepts. Pachic Cryoborolls can be generally described as follows: a very dark grayish-brown loamy surface layer 60 cm thick, overlying a grayish-brown loamy subsoil 30 cm thick, and, underlain by a pale brown gravelly sandy loam substratum containing 50% sandstone fragments.

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

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

References

1. Soils maps of Utah Power and Light mine sites: Deer Creek. Deseret, and Wilberg.

2. General soils map of Utah.

3. Soils map of a test area in T14S, R5E through 9E.

4. Soils map of Northwest Carbon, Inc., Rilda Canyon and Trail Creek Mine sites.

~~UTAH POWER & LIGHT COMPANY~~

VEGETATION MONITORING PLAN - COTTONWOOD/WILBERG MINE

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive and final effects of underground mining activities at the Cottonwood/Wilberg mines on vegetation. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas that will be impacted by underground mining. The monitoring shall be an extension of the baseline data as outlined in the ~~Wilberg MRP Volume 1, Section 2-101~~ following report titled "Vegetation Information for the Wilberg Mine". This report follows this section.

Aerial photography taken annually will be used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation.

Infrared photography was taken of impacted surface areas during September, 1987. This will be repeated in 1992 and continue on a five year schedule.

Each vegetation type mapped and monitored will be based on a dominant overstory and a dominant understory species to be consistent with Uinta-Southwestern Coal Region Data Adequacy Standards. The details of monitoring and analyses will be developed in cooperation with the US Forest Service.

The vegetation monitoring information and an evaluation of the impacts of mining on vegetation will be submitted in an annual report following the year in which monitoring is conducted.

Vegetation Information for the Wilberg Mine

Report Prepared for

Utah Power & Light Company

by

Jerry R. Barker, Ph.D.
Range Ecologist
Bio-Resources, Inc.
Logan, Utah

July 1982

Vegetation Information for the Wilberg Mine

This reports the vegetational information for the Wilberg Mining area. The Wilberg Mine was existing at the time of the vegetational sampling. However, no new disturbances are planned within the permit area.

Methodology

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

A reference site to represent the vegetation type disturbed by mining was located as close to the disturbed area as feasible. Differences in species composition, aerial plant cover, slope, aspect, soil and geology were minimized between the disturbed area and reference site. The reference site was marked in the field with metal T-posts and located on the vegetational map (Map 2-16 Pinyon-juniper is the only vegetation type disturbed by mining activities.

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

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

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

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

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

where: Y_i = distance from point to nearest shrub in the ith quarter,

A_j = mean area per sampling point,

N = sample size,

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

U = unit area,

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

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

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

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

where: N_{min} = minimum sample size,

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

s = standard deviation,

d = allowable change in sample mean,

$\bar{x}$ = sample mean.

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

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

$$C = S_i/T$$

$$T = \Sigma S_i$$

where: S_i = total individuals of the ith species,

T = total number of shrubs sampled,

C = shrub composition.

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

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

where: I.S. = similarity index,

A = total species in community A,

B = total species in community B,

C = number of species common to both.

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

$$H' = \Sigma P_i \ln P_i$$

where: H'=species diversity index,

P_i=proportion of the observations found in category i.

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

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

where: H'_{max}=maximum diversity,

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

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

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

where: J=species evenness.

Data for aerial cover, species list by life form, and tree density were collected August 12-15, 1980, and analyzed September 8 and 9, 1980. Shrub density was measured April 16, 1982 with data analyzed April 21, 1982.

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

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Permit Area Vegetation

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

Area Disturbed by Mining

The disturbed area of the Wilberg Mine is about 19.5 acres (Table 3). Elevation varies from 7,400 to 8,000 feet. The general slope varies from 33-36°. Annual precipitation averages about 8 inches. The topography is dominated by a southern exposure. The vegetation type disturbed by mining activities was a pinyon-juniper intermixing with the mixed conifer (Table 4). Pinyon pine and Utah juniper were the dominant trees. However, white fir and Douglas fir were also present. Saskatoon serviceberry, low rabbitbrush and Cutler ephedra, cuneate saltbush and shadscale were important shrubs. Herbaceous plants included saline wildrye, bluebunch wheatgrass, Indian ricegrass, Unita groundsel and corymbed eriogonum. Total aerial plant cover varied around 30-35 percent. Soils were probably Ustorthents*.

Reference Site

A reference site was established to represent the pinyon-juniper type disturbed by mining activities (Table 5).

The reference site 4800 m^2) has a northeastern exposure with an elevation of 7,500 ft. Slope varies around 35°. Common plants include Utah Juniper, pinyon pine, Douglas fir, Saskatoon serviceberry, Cutler ephedra, low rabbitbrush, bluebunch wheatgrass, Indian ricegrass and saline wildrye (Table 6). Total plant cover is 38 percent with trees providing the majority of ground cover (Table 7). Shrub and tree densities are 1,461 and 78 plants per acre, respectively (Tables 8 and 9). Saskatoon serviceberry is the most common shrub while cutler ephedra and big sagebrush are the least common. Pinyon pine is the most common tree while limber pine is the least common. Eighty nine percent of the trees occur in the smallest DBH size class. The species diversity index is 2.77. The soils are loamy-skeletal mixed mesic Lithic Ustorthents*.

Wildlife and Livestock

The mining permit area is located with the Ferron Ranger District of the Manti-LaSal National Forest managed by the United States Forest Service. Both wildlife and livestock utilize the permit area for grazing. However, livestock grazing is limited to the higher elevations.

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

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

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

Endangered or Threatened Plants

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

Sensitive Plants

In 1986, a sensitive plant Hedysarum occidentale var. canone was identified by the Forest Service within the permit area at two different locations. The first location is on the slope north of the parking area in Grimes Wash. The second was in Miller Canyon approximately 1/4 mile east of the Cottonwood Canyon road along the creek.

Location and mapping of the identified populations was initiated in 1987 and 1988. Also in 1988 the BLM identified Hedysarum distribution on BLM land within the Cottonwood/Wilberg permit area. This information is reflected on Map 2-15A. Mapping of Hedysarum distribution in the permit area will continue through 1989. The majority of identified populations are in locations which will not be impacted by mining operations. However, a monitoring program was formulated in cooperation with the agencies, to assess the population trends.

Two plots (1/100 acre) were located in populations on USFS land within the permit area in 1987. One plot is located in the Right Fork of Grimes Wash and one plot is located in Miller Canyon. The plots were read by Bob Thompson, US Forest Service, Price, in 1987 and 1989. Measurements of growth and age classification (young vs. mature plants) were made on all plants in each 1/100 acre plot. This information will provide the basis for assessing the trend of the monitored population. Monitoring of the two plots will continue on at least three (3) year intervals until the trends are identified.

Additionally, monitoring of the small population in Newberry Canyon, that was impacted by cliff spalling, was begun in 1988. The perimeter of the impacted population (31'x25'x31'x34') was marked with stakes. All plants found within the area were identified as impacted or not impacted. Fourteen (14) plants were impacted by spalled rubble and eighteen (18) plants were not impacted. Also, a separate unaffected population was located near the impacted area. This population was also inventoried in 1988 with twenty-seven (27) plants observed. This monitoring will continue as part of the Cottonwood Mine Escarpment study. The monitoring will also be discussed in the Annual Vegetation Monitoring reports.

Subsequent monitoring of the Newberry Canyon populations will include an inventory of total plants in both populations, growth measurements (height and diameter), and age classification.

Table 1. Sample adequacy for aerial plant cover and density for the pinyon-juniper reference area at the Wilberg Mine.

Reference Site	Parameter	$N_{min.}$ [1]	$\bar{X}$ [2]	S.D.	$N_{obs.}$
Pinyon-juniper	Aerial cover	16	40.0	9.72	24
	Shrub density	28	2.9	1.24	35

[1]Determined after 10 and 20 samples for total cover and shrub density, respectively.
[2]Sample mean of mean area per plant (m^2)

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

Vegetation Type	Total Acres	% of Permit Area
Mixed Conifer	9,037.1	50.2
Pinyon-juniper	4,524.4	25.1
Sagebrush	4,053.0	22.5
Grass	302.5	1.7
Riparian	84.0	0.5
TOTAL	18,000	100
Salt Desert Shrub	281.7	0

[1]The salt desert shrub type is located on adjacent land to the permit area. It is influenced by the Des-Bee-Dove Pond (see vegetational Map 2-11).

Table 3: Vegetation type, number of acres, and percent of vegetation type disturbed by mining at the Cottonwood/Wilberg Mine.

Vegetation Type	Acres Disturbed	% of Vegetation Type
Pinyon-juniper	19.5	0.4

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

Trees	*Abies concolor*	White fir
	Juniperus osteosperma	Utah juniper
	Pinus edulis	Pinyon pine
	Psuedotsuga menziesii	Douglas fir
Shrubs	*Amelanchier alnifolia*	Saskatoon serviceberry
	Artemisia tridentata	Big sagebrush
	Atriplex confertifolia	Shadscale
	Cercocarpus ledifolius	Curlleaf mountain mahogany
	Chrysothamnus nauseosus	Rubber rabbitbrush
	C. viscidiflorus	Low rabbitbrush
	Ephedra cutleri	Cutler ephedra
	Xanthocephalum sarothrae	Broome snakeweed
Forbs	*Cryptantha* sp.	Cryptantha
	Eriogonum corymbosum	Croymbed eriogonum
	Galium sp.	Galium
	Penstemon eatonii	Penstemon
	Senecio multilobatus	Uinta groundsel
Grasses	*Agropyron spiciatum*	Bluebunch wheatgrass
	Elymus salinus	Salina wildrye
	Oryzopsis hymenoides	Indian ricegrass

Table 5. Similarity between the pinyon-juniper reference site and its respective disturbed area at the Wilberg Mine.

Parameter	Reference	Disturbed
Cover, %	37.5	30-35
Density, No./acre		
Shrub	1,461	-
Tree	78	-
Species composition, s[1]	22	20
Aspect	Northeastern	Northeastern Southwestern
Elvation, ft.	7,500	7,400-8,000
Slope, °	33-37	33-36
Soil*	Ustorthent	Ustorthent
Geology	Colluvium	Colluvium
H'	2.77	-
H'_{max}	2.77	-
J	1.0	-
Index of Similarity, %	70.8	

[1]s = total plant species
*Revised by Dr. A.R. Southard in May, 1989

Table 6. Common plant species occurring within the pinyon-juniper reference site at the Wilberg Mine.

	Scientific Name	Common Name
Trees	*Abies concolor*	White fir
	Juniperus osteosperma	Utah juniper
	Pinus edulis	Pinyon pine
	P. flexilis	Limber pine
	Pseudotsuga menziesii	Douglas fir
Shrubs	*Amelanchier alnifolia*	Saskatoon serviceberry
	Artemisia tridentata	Big sagebrush
	Atriplex confortifolia	Shadscale
	A. cuneata	Cuneate saltbush
	Chrysothamnus viscidiflorus	Low rabbitbrush
	Ephedra culteri	Cutler ephedra
	Leptodactylon caespitosa	Mat prickly phlox
	Physocarpus sp.	Ninebark
	Xanthocephalum sarothrae	Broome snakeweed
Forbs	*Eriogonum corymbosium*	Corymbed eriogonum
	Galium sp.	Galium
	Hedysarum boreale	Northern sweetvetch
	Penstemon eatonii	Penstemon
	Senecio multilobatus	Uinta groundsel
Grasses	*Agropyron spicatum*	Bluebunch wheatgrass
	Elymus salinus	Salina wildrye
	Oryzopsis hymenoides	Indian ricegrass

Table 7. Ground cover by species for the pinyon-juniper reference site at the Wilberg Mine.

Item	Percent Cover	
Trees	16.2	
Pinyon pine		9.8
White pine		2.1
Douglas fir		2.0
Utah juniper		1.7
Limber pine		0.6
Shrubs	8.1	
Saskatoon serviceberry		4.6
Cuneate saltbush		1.9
Cutler ephedra		0.6
Snakeweed		0.6
Low rabbitbrush		0.4
Forbs	4.2	
Corymbed eriogonum		2.3
Northern sweetvetch		1.7
Galium		8.2
Grasses	9.0	
Salina wildrye		5.8
Indian ricegrass		1.9
Bluebunch wheatgrass		1.3
Total plant cover	37.5	
Litter	5.0	
Rock	16.7	
Bare ground	40.8	

Table 8. Shrub density and composition for the pinyon-juniper reference area at the Wilberg Mine.

Species	Composition, %	Density, No./Acre[1]
Saskatoon serviceberry	61.0	891
Boome snakeweed	12.9	188
Low rabbitbrush	10.7	156
Mat prickly phlox	5.7	84
Shadscale	5.7	84
Cutler ephedra	2.0	29
Big sagebrush	2.0	29
	100.0	1461

[1]Mean area per plant is $2.77m^2$ based on 35 observations.

Table 9. Tree size class (DBH) and number of trees found within each size class by species for the pinyon-juniper vegetation type reference site at the Wilberg Mine.

	Diameter at Breast Height Inches				
	0 - 4	4 - 10	10 - 20	> 20	% of Total
Species					
Pinyon pine	49	1	0	0	54
Utah juniper	7	6	0	0	14
White fir	7	0	0	0	8
Douglas fir	19	1	0	0	22
Limber pine	0	1	1	0	2
% of Total	89	10	1	0	100

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

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

[1]Total acres
[2]Total acres
[3]Animal unit month
[4]Total animals

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

Total Acres	Land Ownership	AUM
1,959	Private[1]	845
19,328	USFS	1,710

[1]Private land but still managed by the USFS

Productivity Measurements

Productivity measurements for the pinyon-juniper range type on steep slopes is not available. Data collection has been confined to the benches below these slopes because of their value to livestock. Very little, if any, livestock grazing occurs on these steep slopes, most of the forage use is by wildlife.

The current range condition of both the mine and waste rock reference areas is judged as fair when correlated with BLM's assessment of the Grimes Allotments (Land Use Section 783.22). The opportunity for improvement is very limited because of the inherent characteristic of the pinyon-juniper overstory to inhibit understory development. Also, these steep sites are limited by the lack of soil and numerous rock masses.

Pinyon-Juniper Productivity[1]

1. Soil Conservation Service, Soil Survey Carbon-Emery Area 1979
   Kenilworth very stony sandy loam, Lower Grimes Wash
   Wood Hill Range Site, Price, excellent condition
   (understory intact)
   900-1250 lbs./acre (dry weight)

2. U. S. Forest Service, Ferron Ranger District
   John Healy, Range Conservationist
   East Mtn. Allotment, two pinyon-juniper bench sites
   rated in 1982
   fair condition
   300-324 lbs./acre (dry weight)

3. Bureau of Land Management, San Rafael Planning Unit
   East and West Grimes Allotments, fair condition
   current stocking rates 60-100 lbs./acre (dry weight)[2]

4. Bureau of Land Management,
   Letter Dated June 24, 1982. (See Land Use Section)

The productivity for the pinyon-juniper reference site on the steep slopes is estimated at 25-100 lbs./acre (dry weight). This is inferred from the data on the benches and comparisons of the sites.

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[1]Fifty percent of the total forage production is the annual growth of the pinyon and juniper trees.

[2]Based on 800 lbs. forage = 1 AUM.

Appendix

Letters from Governmental Agencies

United States Department of Agriculture
Soil Conservation Service

August 2, 1982

Mr. Jerry Barker
C/O Bio Resources
P. O. Box 3447
Logan, Utah 84321

Dear Mr. Barker:

You have requested site, condition and production on 48.62 acres in Sections 34 and 35 of T 17S and R 7E North and West of Orangeville, Utah. The site is an Upland Stony Loam (Pinyon Juniper) D-34. The ecological condition is fair and the site is producing about 700 pounds of herbage per acre.

George S. Cook
George S. Cook
Range Conservationist

United States Department of the Interior

IN REPLY REFER TO
4190/3400
(U-067)

BUREAU OF LAND MANAGEMENT
Moab District
San Rafael Resource Area
P. O. Drawer AB
Price, Utah 84501

June 24, 1982

Mr. Jerry Barker
c/o Bio Resources
P. O. Box 3447
Logan, Utah 84321

Dear Mr. Barker:

You have requested information concerning Sections 34 and 35 of T. 17 S., R. 7 E.

The two sections are made up of three range sites:

1. Waste - Comprised mainly of cliff and rock outcrop areas.

2. Pinyon-Juniper - Made up of varying amounts of pinyon-juniper, saltbush, bitterbrush, Morman tea, blacksage, mahogany and several grass species. Plant density is between 5-18% and plant vigor is considered weak for most forage species.

3. Desert saltbush - Made up of shadscale, mat saltbush, castle valley clover, Morman tea, blacksage, and seven grass species including curlygrass, sandsage, Indian ricegrass, bull grass, and blue gramma. Plant density is between 0 and 20%.

Range condition could be estimated between fair and good. Vegetative production is low due to range site characteristics. Presently we have no current production or condition figures. There has not been any significant livestock use in the area for the last few years, due to the lack of water.

Our range survey, which was prior to 1966 indicates that Section 34 comprises 640 acres and has a carrying capacity of 9.7 AUM's. Section 35 comprises 640 acres and has a carrying capacity of 18.2 AUM's.

We hope this is the information you need.

Sincerely yours,

Neil A. Simmons

Acting Area Manager

state of utah

DIVISION OF WILDLIFE RESOURCES
DOUGLAS F. DAY
Director
EQUAL OPPORTUNITY EMPLOYER
1596 West North Temple/Salt Lake City, Utah 84116/801-533-9333

July 19, 1982

Reply To SOUTHEASTERN REGIONAL OFFICE
455 West Railroad Avenue, Box 840, Price, Utah 84501
(801) 637-3310

Mr. Jerry Barker
Bio-Resources, Inc.
P.O. Box 3447
Logan, Utah 84321

RE: UP & L Wilberg Mine--Waste Rock Disposal Area

Dear Jerry:

In response to your request for wildlife information concerning the waste rock disposal area for Utah Power and Light Company near the Wilberg Mine, the site represents high-priority valued winter range for mule deer. The assessment of wildlife and recommended mitigation planning provided by the Division to Chris Shingleton (UPandL) on March 2, 1981 should be considered satisfactory for this site. It is anticipated that UPandL will develop an acceptable mitigation plan for their activities as they relate to the rock disposal area.

If the Division can be of further service, please coordinate with Larry Dalton (telephone 637-3310) as appropriate.

Sincerely,

John Livesay, Supervisor
Southeastern Region

JL:LBD:gp

cc: Darrell Nish
Chris Shingleton
Utah Division of Oil, Gas and Mining

FISH AND WILDLIFE RESOURCES INFORMATION ~~(783.20)~~

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

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

Mine Plan Area

The ~~UP&L~~ PacifiCorp lease area covers the south half of East Mountain in the Wasatch Plateau. Life zones range from Upper Sonoran below the mines to Canadian on top. The three mines are located in steep rocky canyons on the south and east slopes of the mountain. ~~The proposed Cottonwood fan portal (deleted) is located adjacent to Cottonwood Creek at the base of a steep rock southwest facing slope of East Mountain.~~

~~Methods~~

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

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

Wildlife Habitats

The habitats within the mine plan are rated as 1 and 2 by Bob Scott and others for coal lands of Utah (Scott, 1977). Around the mines the cliffs are considered raptor nesting habitat with the slopes below and the flat lands above the cliffs as raptor feeding areas. The lower slopes and alluvial fans below the mines are rated as deer winter range. ~~This also includes the proposed Cottonwood fan portal site (deleted).~~ All elk range is shown on Figure 1 in Map Packet 2-20.

The habitats at the ~~proposed Cottonwood fan portal (deleted)~~ portals in Cottonwood Canyon, Cottonwood/Wilberg Mine and Des-Bee-Dove Mines are designated as pinyon-juniper with many open rock and cliff areas. At the Deer Creek Mine some riparian habitat exists along Deer Creek below the mine. The south facing slopes of this steepcanyon are covered with pinyon-juniper -and the north facing slopes are covered with a mixed conifer stand.

The habitat designations are listed below:

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

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

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

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

d. Riparian - The streams are small and flow through steep narrow canyons.

Consequently the riparian zone is very narrow often less than 30 yards wide. The vegetative composition varies from the broad-leafed trees and shrub plant community normally depicted as characteristic of riparian areas to many areas were--e there is only an increased density of conifers and/or aspen.

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

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

~~Wildlife List (See Table 1)~~

Species of Special Significance

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

Table 1: Species List of the Wasatch Plateau

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

Threatened and Endangered

A letter from U. S. Fish and Wildlife Service dated November 6, 1980. "To the best of our knowledge, no endangered or threatened plant species or critical habitat for threatened, or endangered wildlife species occur in the disturbed areas of the subject mining operations.

Effects of Mining Operations on Fish and Wildlife

The effects of mining on wildlife are being evaluated through various studies being conducted by the Mining Division. A major study is presently being implemented at the Cottonwood Mine. The Cottonwood Mine Escarpment Study, developed by the Mining Division, in cooperation with the BLM, USFS, and DOGM. The objects of the study are to develop a geotechnical model for predicting escarpment failure, identify impacts to resources and develop effective mitigation

measures for identified impacts. Results of the study will be reported annually as the study progresses. The primary habitat losses have been raptor nesting sites and deer winter range.

The lower open slopes are used by raptors on the escarpment face for hunting activities where an abundance of rodents and small birds provide a prey base. Wintering migrants also utilize these same habitats for hunting. The vehicle traffic and human presence appears not to have disrupted the natural hunting patterns. Data from the period prior to mining lacked to evaluate the present situation.

The traffic on the Mine access roads kills approximately eight (8) deer each year. This is not considered significant by DWR (personal communication with Larry Dalton). Mining impacts on golden eagles have been studied since 1986 in Newberry Canyon. No significant impacts have been identified to date. Nesting and production of young has continued uninterrupted (see Annual Monitoring Reports and Assessment of Mining Related Impacts in Newberry Canyon).

~~The construction of the proposed Cottonwood fan portal (deleted) will disturb about two acres of pinyon-juniper habitat on a steep rocky southwest facing slope. Some species of migratory birds of high federal interest could nest at this site. The most likely would be the western bluebird. This southwest facing slope also has the potential for snake dens. Below is listed a summary of certain reptile and amphibian species referred to in Utah Division of oil, Gas and Mining letter to Utah Power and Light dated December 5, 1980.~~

a. Utah Mountain Kingsnake - These snakes are widely distributed throughout the mountains of Utah in specific localized drainages. The habitat requirements are drainages with wet meadows, brushy riparian areas and perennial streams. They use rocky south facing slopes adjacent to riparian habitat for denning. The drainages around East Mountain lace these components for a preferred environment because many of the streams are eroded and lack meadows. ~~Thus it is doubtful these snakes inhabit any of the disturbed areas other than below the proposed Cottonwood Fan Portal (deleted).~~

b. Utah Milksnake - This snake could occur in the riparian areas and in the mixed conifer habitat. Most likely place would be in that portion of the

drainages with mixed conifer vegetation.

c. Tiger Salamander - These salamanders prefer quiet pools, ponds, or springholes. Most of these water types occur on top of East Mountain.

An assessment of deer use on the BLM portion of the permit area was initiated by the BLM in 1989. This investigation will be continued as part of the Cottonwood Mine Escarpment study. Data collection and analysis will be done in accordance with Interagency (BLM, USES, DWR) Guidelines.

Fish and Wildlife ~~(Proposed Cottonwood Fan Portal Deleted)~~ at the Portals in Cottonwood Canyon

The ~~proposed Cottonwood portal (deleted)~~ portal area in the Cottonwood Canyon is in pinyon-juniper habitat. A number of important vertebrate species are typical of this habitat within the region. The sparse vegetation and steep, dry conditions present at the portal are less suitable for wildlife than are densely vegetated portions of pinyon-juniper habitat on gently slopizig terrain south and east of the mine property.

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

Typical birds in pinyon-juniper habitat include the mourning dove, pinyon jay, western bluebird, western kingbird, American kestrel, and chipping sparrow (Brown et al, 1958). Chukar partridge inhabit the rocky escarpment areas near the Cottonwood/Wilberg portal area.

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

Open stands of spruce-fir-Douglas fir forest with Douglas fir as a dominant species occur on sheltered north facing slopes at higher elevations within the mine property. Spruce-fir-Douglas fir and pinyon-juniper habitats intermingle in canyon bottoms and at intermediate elevations to form a transition zone between the two vegetation types. Aspen groves in the spruce-fir-Douglas fir communities offer excellent calving areas for elk (U.S. Forest Service, 1976). Mule deer, snowshoe hare, and blue grouse are important game species in forested areas. Non-game mammals which inhabit forest areas include bobcat, beaver, porcupine, red fox, coyote, mountain vole, deer mouse, hoary bat, and silver-haired bat.

Many bird species frequent the forested portions of the mine property. Conspicuous breeding birds include band-tailed pigeon, plain titmouse, Clark's nutcracker, raven, turkey vulture, great horned owl, red-tailed hawk, and golden eagle.

Amphibian species such as the chorus frog and western toad inhabit mesic areas of the site. Reptiles are probably not abundant, but the short-horned lizard, sagebrush lizard, gopher snake, and western terrestrial garter snake inhabit sagebrush and forests-sagebrush ecotones in the site region.

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

Fishery

Cottonwood Creek within Cottonwood Canyon is considered a non-fishery until its junction with Straight Canyon four miles downstream from the project site where it is joined with waters from Joe's Valley Reservoir and is planted with fingerling trout.

Refer to Final Environmental Statement Emery Units 3 and 4.

Game Species

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

Elk (Cervus canadensis) - Elk inhabit the sagebrush, and forest areas at the upper elevations on East Mountain, but do not ordinarily range into pinyon-juniper habitat. The seven year average of elk censured on East Mountain (1970-1976) was 76 antlerless and two antlered individuals seen per year (Dalton, 1977). This census included larger groups only and does not reflect a total population estimate (Dalton, 1977).

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

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

Mountain Cottontail (Sylvilagus nuttalli) – Mountain cottontails inhabit brushy areas and forests, particularly on rocky slopes throughout the mine region (USDI Bureau of Land Management, 1976).

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

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

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

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

Special Status Species

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

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

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

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

STATUS QUESTIONED: Insufficient data area available to permit a reliable assessment of the status of the species. Special status species in Utah that might be found near the mine property are:

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

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

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

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

LAND USE INFORMATION ~~(783.22)~~

Historically, man's first sustained use of the land was grazing by early settlers. Due to the inaccessible reaches of the coal seam in the Grimes Wash area, it is expected that coal mining of a serious nature occurred after the turn of the century in the form of a wagon mine for local consumption. Wilberg derives its name from an early mine owner of federal record, Cyrus Wilberg, who mined this area briefly (1944).

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

is today.

Grimes is a small canyon enclosed by steep barren cliffs with no access to the upper reaches of East Mountain. Two drainages are junctional at the mine site. The left and right forks compose what is known as Grimes Wash which flows across approximately five miles of Mancos Shale prior to its juncture with Cottonwood Creek.

Currently on the BLM lands in the permit area, the livestock use is spring grazing with cattle on the benches (April 1 - June 10). The East Grimes and West Grimes allotments are stocked at 19.4 acres/AUM and 16 acres/AUM for a total of 317 and 263 AUM's respectively. These allotments are judged in fair condition with a downward trend (BLM letter 6/24/82).

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

The grazing of the USES lands is confined to East Mountain under an approved rest rotation system (USES, 1979). Nine permits graze 486 cattle from June 21 to September 10 for a total of 1,296 AUM'S. The range condition is judged "good" with a static to upward trend. The stocking rate is 11 acres/AUM.

Elk use East Mountain for summer range but winter on the western slopes in the Cottonwood Creek drainage. Mule deer also summer on the mountain and winter on the benches and slopes of the southern and eastern portion of East Mountain from the mouth of Cottonwood Creek around to Rilda Canyon in the Huntington Creek drainage. These ranges are rated as high priority winter range by Utah Division of wildlife Resources. Current herd management levels are one deer/20 acres of inter-range (UDWR, 1982).

The total forage productivity of the pinyon-juniper range on the benches is 100-324 lbs/acre, dry weight. The pinyon-juniper range on the rock land soils of the steep slopes is lower, estimated 25-100 lbs/acre, dry weight. See Vegetation Section for productivity details.

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

The Land Use Plans for the Wasatch Plateau designate dispersed recreation and limited commercial timber on East Mountain in addition to big game range and protection of watersheds. The south end of the mountain is not in a known oil or gas field and the reserve potential is judged as low.

There are several oil and gas leases in the area; however, there are no know oil or gas wells within the permit area.

Six gas-producing wells have been developed in Cottonwood Canyon just west of the mine permit area. The wells are within the East Mountain Unit operated by Meridian Oil Co. The East Mountain Unit overlaps the mine permit area; therefore, future development by Meridian Oil Co. may take place within the mine permit area.

The East Mountain Unit and the associated wells will be addressed in mine planning and development in this area of the permit.

Prior mining consisted of a small wagon mine (Wilberg) 1944 through 1958. Coal was extracted from the Hiawatha Seam by conventional methods. Activities were confined to Lease SL-064900. An estimated 107,000 tons were removed.

Pre-mining use of the land was for livestock grazing and wildlife habitat with some occasional timber cutting on top of East Mountain (see Land Use Map 2-19).

REFERENCES

Bureau of Land Management August 1988, San Rafael Draft Resource Management Plan. Moab District, Utah.

Emery County, Zoning Plat Books, Castle Dale, Utah

U.S. Forest Service 1986, Land and Resource Management Plan. Manti-LaSal National Forest, Price, Utah.

Utah Division of Wildlife Resources, May 1982, Utah Big Game Investigation and Management Recommendations 1981-1982, Publication #82-3.

Emery County Zoning

A-1	Agricultural Zone, contains the primary farming areas of the county.
RA-1	Residential-Agricultural Zone, this is the area with the communities and the adjacent or intermixed agricultural lands.
M&G-1	Mining and Grazing Zone, all of the county lands outside of the communities, farming areas and forest service boundary.
I-1	Industrial Zone, specific areas near communities and highways reserved for industrial development.
Ce-1	Critical Environmental Zone, general designation for all private lands within the forest boundary.
Ce-2	Critical Environmental Zone, specific designation for certain land parcels especially those adjacent to recreation site in the forest.

Land Use ~~(Proposed Cottonwood Fan Portal Deleted)~~ of the Portals in Cottonwood Canyon

The ~~proposed~~ portal area ~~(deleted)~~ in Cottonwood Canyon has been the site of an earlier coal mining operation, the Johnson Mine. This earlier mine was opened in 1945 and mining methods were conventional for that period. The Hiawatha coal seam was mined until 1955. The extent of the coal removed was not documented (personal communication, Neldon Sitterud, August 1979).

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

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

Land in the vicinity of the ~~proposed Cottonwood portal (deleted)~~ portals in Cottonwood Canyon is used primarily for spring and winter range forage, wildlife habitat and mineral mining. Historically, the area has been used for wildlife habitat.

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

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

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

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

> Permeability is moderate to rapid, and natural fertility is moderate to low. The susceptibility to sheet erosion is moderate; some gullies have formed. The soils retain about four inches of water but are dry most of the time.
>
> These soils are used for range and are suited to that purpose. Reseeding of grasses and clearing of brush or other mechanical practices that would improve the range are not feasible.
>
> There is Douglas Fir and White Fir on the ~~proposed~~ portal site ~~(deleted)~~. The timber value of the trees in this area is minimal and classified non-commercial due to inaccessibility, size - class distribution and marketing conditions that limit the economic feasibility of commercial operation.

PRIME FARMLAND INVESTIGATION ~~(783.27)~~

After investigating all the lands within the permit boundaries of the Wilberg Coal Mine it is

determined that these lands do not qualify as "prime farmlands" for the following reasons:

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

In keeping with the regulations, applicant requests the Division to make a negative determination. Applicant has contacted the Soil Conservation Service (Mr. Beardall) in Price, Utah. They are aware of the mining company's need for negative determinations for permitting. No soil mapping is published in the area of Utah Power & Light Company coal mines.

It was requested by Mr. Beardall that a map of the three mines, with a request for a soil survey, be submitted for determination. The findings would be forwarded to the Division.

ALLUVIAL VALLEY FLOORS (785.19)

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

~~revegetation please refer to the "Revegetation Plan for the proposed Cottonwood Portal Area."~~

~~The first monitoring session was conducted April 15, 1982. Visual observation was used to assess the degree of plant success after one growing season.~~

~~Basically, the grasses were vigorous and healthy. Western wheatgrass, Indian ricegrass, and Great Basin wildrye were the dominant grass seedlings. Seedlings of green needle grass were not observed. Intermixed among the grasses was an occasional clover seedling. In addition, wheat seedlings, apparently the seed came from straw mulch, were observed in several areas.~~

~~The transplanted woody seedlings were small and not too vigorous. Big sagebrush seedlings were the most vogorous. Live seedlings of low rabbitbrush, shadscale, morman tea, saskatoon serviceberry and pinon pine were scarce. Those seedlings that were alive had started their spring vegetation growth.~~

~~The revegetation of this area was designed to allow the terraced areas on the steep slopees to become stabilized first. Then the vegetation can move into the inter-terraced areas. In addition, encroachment of existing vegetation along the border should occur in the next couple of years.~~

~~Care should be ginven to the irrigation of this area. Water will encourage rapid plant establishment. However, if it is applied at too high rate erosion will occur. Also, frequent irrigation will result in the vegetation becoming adapted to a moist soil condition. Thus, when irrigation ceases, heavy plant mortality may occur.~~

~~If possible, irrigation should be of aduration to allow the water to percolate deep into the soil without causing erosion. This will encourage the roots to grow deep into the soil and help the plants be drought tolerant.~~

~~Some areas may need to be reseeded. This can be accomplished this spring or next fall. Species to reseed with might be:~~

~~Wintergraze grass~~
~~Great Basin wildrye~~
~~Western wheatgrass~~
~~Indian ricegrass~~
~~Clover~~

~~The best method for seeding would be to hand broadcast the seed and then rake it into the soil. For best results Indian ricegrass should be planted at least on inch deep. The others can be planted about one-half inch deep.~~

HYDROLOGY AND GEOLOGY GENERAL REQUIREMENTS ~~(783.13)~~

The Cottonwood/Wilberg Mine area is located in the central portion of the Wasatch Plateau Coal Field in Emery County, Utah (Figure 2-1). Generally, this area is a flat-topped mesa surrounded by heavily vegetated slopes which extend to precipitous cliffs leading to the valley below. The plateau generally has a vertical relief of up to 2,500 feet, rising from Castle Valley below. The following discussion summarizes the structural geology, stratigraphy, hydrology, and economic coal deposits of the region and the Wilberg Mine area.

Data Collection

Utah Power & Light Company has been collecting data regarding the Wilberg Mine area and adjacent properties since 1971. As a result, 118 exploration drill holes have been completed from the surface wherein data were collected regarding the coal seams and enclosing strata (see Map 2-1). Nine of these holes were core drilled through the coal zone and all were geophysically logged. Generally, these surface holes are located on about 1/2 to 3/4 mile centers. In addition to these holes, approximately 475 holes have been drilled from within the mines which provide valuable data on as close as 500 foot centers.

The coal seams exposed on outcrop and within the mine workings have been mapped in detail providing data which is valuable in understanding the coal geology.

The interpretations made herein are based on data collected from all of the above sources in addition

to the published regional data. All of these data allow the construction of a geologic and hydrologic model which represents the conditions present in the area of the Cottonwood/Wilberg Mine and surrounding areas.

The applicant has made a practice of submitting to the BLM, each year, copies of both lithologic and geophysical logs of all drill holes, surface and underground, which are drilled within federal leases or on fee land. At the time the mine permit was completed, copies of all logs had been submitted to the BLM. This practice will continue throughout the lifetime of the Cottonwood/Wilberg Mine.

Structure

The geologic structure of the Cottonwood/Wilberg Mine area is fairly simple. The strata are gently down-folded in the area of the Straight Canyon syncline which is present in the northwest portion of the Cottonwood/Wilberg Mine area (see Map 2-2). Dips in the syncline range from two to six degrees with the north limb dipping the steepest.

The Hiawatha Seam generally strikes N60 E and dips one to three degrees in a northwest direction throughout the area of the current Cottonwood/Wilberg Mine workings. However, to the northwest of the Straight Canyon syncline both the Hiawatha and Blind Canyon Seam dip in a southeast direction at three to five degrees. The dip and strike of the coal seams can be better visualized on Map 2-2 which is included herein.

The strata within the property have been offset by a series of north-south trending fault zones. Generally, these faults are nearly vertical and do not have significant amounts of fault gouge or drag associated with them. One of the major faults present in the region, the Pleasant Valley Fault, has been intersected in the Wilberg Mine (refer to Map 2-2).

The Pleasant Valley Fault consists of two parallel fractures which are about 150 feet apart (see Map 2-2 and cross sections 2-3). Its total displacement, where it was intersected in the Deer Creek Mine to the north is 150 feet with its downthrown side on the east. The displacement diminishes to less than one foot where it was intersected in the Wilberg Mine.

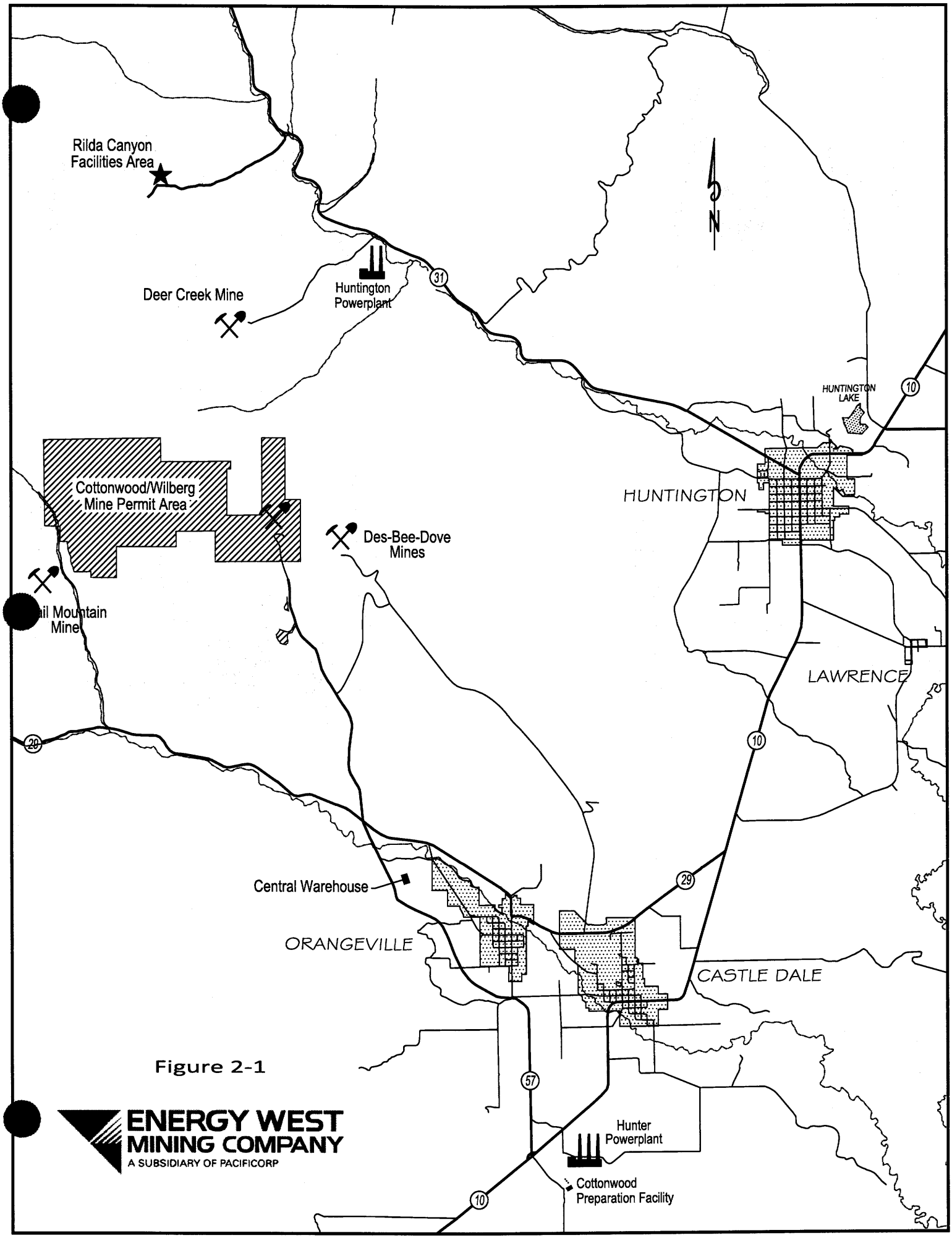

Rilda Canyon
Facilities Area
Deer Creek Mine
Huntington
Powerplant
31
N
HUNTINGTON
LAKE
10
Cottonwood/Wilberg
Mine Permit Area
HUNTINGTON
Des-Bee-Dove
Mines
il Mountain
Mine
LAWRENCE
29
10
Central Warehouse
29
ORANGEVILLE
CASTLE DALE
57
Hunter
Powerplant
Cottonwood
Preparation Facility
10
ENERGY WEST
MINING COMPANY
A SUBSIDIARY OF PACIFICORP

Figure 2-1

Another north-south trending fault is present to the east of the Pleasant Valley Fault. This fault, the Deer Creek Fault, limits the eastward development of the Wilberg Mine. The displacement of the Deer Creek Fault ranges from100 to 170 feet with the east block being downthrown.

A fault system has been identified within the Wilberg Mine area which trends in a northeast-southwest direction along the Straight Canyon synclinal axis (see Map 2-2). In the northeast corner of federal lease U-084923, this structure called the Roans Canyon Fault graben, consists of up to six normal faults with displacements up to sixty-five feet.

Stratigraphy

The rock formations exposed in the Cottonwood/Wilberg Mine area range from Upper Cretaceous to Tertiary in age (see Figure 2-2). These formations in ascending order are the Masuk shale member of the Mancos Shale, Starpoint Sandstone, Blackhawk, Castlegate Sandstone, Price River, North Horn, and Flagstaf Formations. The coal deposits are restricted to the lower portions of the Blackhawk Formation.

The Masuk Shale is the upper member of the Mancos Shale. It consists of light to medium gray marine mudstones. Usually this formation weathers readily forming slopes which are often covered by debris. This formation is generally devoid of water.

Starpoint Sandstone

Overlying and intertonguing with the Masuk Shale is the Starpoint Sandstone. In this area the Starpoint consists of three or more cliff-forming massive sandstones totaling about 400 feet in thickness. Generally, they are fine to medium-grained and moderately well-sorted. The upper contact of the Starpoint is usually quite abrupt and readily identifiable on the outcrop. Locally, the Starpoint Sandstone exhibits aquifer characteristics.

Blackhawk Formation

The Blackhawk Formation consists of alternating mudstones, siltstones, sandstones and coal. Although coal is generally found throughout the Blackhawk Formation, the economic seams are

Figure 2-2

Stratigraphy of East Mountain
(Doelling, 1972)

System	Series	Stratigraphic Unit		Thickness (feet)	Description
TERTIARY	Eocene	Green River Formation		-	Chiefly greenish lacustrine shale and siltstone.
		Wasatch Group	Colton Formation	300 -1,500	Varicolored Shale with Sandstone and limestone lenses, thickness to the north.
	Paleocene		Flagstaff Limestone	200 - 1,500	Dark yellow-gray to cream limestone, evenly bedded with minor amounts of sandstone, shale, and volcanic ash, ledge former.
CRETACEOUS	?		North Horn Formation (Lower Wasatch)	500 - 2,500	Varigated shales with subondinate sandstone, conglomerate and freshwater limestone, thickens to north, slope former.
	Maestrichthian	Mesaverde Group	Price River Formation	600 - 1,000	Gray to white gritty sanstone interbedded with subordinate shale and conglomerate, ledge and slope former.
	Campanian		Castlegate Sandstone	150 - 500	White to gray, coarse-grained often conglomeratic sanstone, cliff former, weathers to shades of brown.
			Blackhawk Formation ***MAJOR COAL SEAMS***	700 - 1,000	Yellow to gray, fine- to medium-grained sandstone, interbedded with subordinate gray and carbonaceous shale, several thick *coal* seams.
			Star Point Sandstone	90 - 1,000	Yellow-gray masive cliff-forming sandstone, often in several tongues separated by Masuk Shale, thickens westward.
	Santonian	Mancos Shale	Masuk Shale	300 - 1,300	Yellow to blue-gray sandy shale, slope former, thick in north and central platear area, thins southward.
			Emery Sandstone ***COAL (?)***	50 - 800	Yellow-gray friable sandstone tongue or tongues, cliff former, may contain coal (?) in south part of platear if mapping is correct, thickens to west and south. *Coal* may be present in subsurface to west.
	Coniacian		Blue Gate Member	1,500 - 2,400	Pale blue-gray, nodular and irregularly bedded marine mudstone and siltstone with several arenaceous beds, weathers into low rolling hill and badlands, thickens northerly.
	Turonian		Ferron Sandstone Member ***MAJOR COAL SEAMS***	50 - 950	Alternating yellow-gray sandstone, sandy shale and gray shale with important *coal* beds of Emery coal field, resistant cliff former, thickens to south.
	Cenomanian		Tununk Shale Member	400 - 650	Blue-gray to black sandy marine slope forming mudstone.
	Albian	Dakota Sandstone *MINOR COAL*		0 - 60	Variable assemblages of yellow-gray sandstone, conglomerate shale and *coal*. Beds lenticular and discontinuous.

Generalized section of rock formations, Wasatch Plateau coal field.

restricted to the lower 150 feet of the formation. The sandstones contained within the Blackhawk Formation are fluvial and increase in number in the upper portions of the formation. Many of these tabular sandstone channels form local perched water tables. The total thickness of the Blackhawk Formation in the Cottonwood/Wilberg Mine area is about 750 feet.

Castlegate Sandstone

The Castlegate Sandstone generally caps the escarpment which surrounds the mine portal area. The Castlegate consists of about 250 feet of coarse-grained, light-gray, fluvial sandstones, pebble conglomerates, and subordinate zones of mudstones. Although this sandstone is very permeable, it lacks water because of insufficient recharge.

Price River Formation

The Price River Formation overlies the Castlegate Sandstone. The formation is about 500 feet thick and forms slopes which extend upward from the Castlegate escarpment. Fine-grained, poorly sorted, sandstones dominate the Price River Formation but some mudstones are present. The Price River Formation generally lacks water.

North Horn Formation

The North Horn Formation is about 850 to 900 feet thick in the Cottonwood/Wilberg Mine area. Mudstones dominate the rock types present. These mudstones are generally grey to light brown in color. Localized, lenticular sandstone channels are present in this formation throughout. These sandstone beds are more common near the upper and lower contacts of the formation and many times host localized perched water tables.

Flagstaff Formation

The youngest formation exposed in the area is the Flagstaff Formation. It consists of white to light-gray, lacustrine limestone. An erosional remnant of 100 to 150 feet of this formation remains forming a cap on the highest plateaus of the area. The formation is fairly well fractured allowing surface water to percolate down to lower strata.

Economic Coal Occurrences

Three economic coal seams are present on the property which hosts the Cottonwood/Wilberg Mine: the Hiawatha, Cottonwood, and the Blind Canyon Seams. The current workings of the mine are located in the basal or Hiawatha Seam.

Hiawatha Seam

The Hiawatha Seam is of minable thickness in both the southern and extreme northern portions of the East Mountain property (see Map 2-4). This seam which rests directly on the Starpoint Sandstone ranges in thickness from 16 feet to less than 5 feet. The Hiawatha Seam is not present throughout a major portion of the property. This lack of coal is due to a major distributary river channel which flowed through the coal swamp in an easterly direction.

Blind Canyon Seam

The second major minable seam on the Cottonwood/Wilberg Mine property is the Blind Canyon Seam. This seam is located from 14 to 140 feet above the Hiawatha Seam (see Map 2-5). The average separation between these seams is 70 to 80 feet but does increase up to 140 feet in the southern portion of the property. The Blind Canyon Seam is of minable thickness through most of the permit area and in part is mined through the Deer Creek Mine (see Map 2-6). This seam ranges in thickness from 16 feet to less than 5 feet. The thickness of the seam thins to less than 5 feet in the southwest portion of the property.

Cottonwood Seam

The Cottonwood Seam is located stratigraphically between the Hiawatha and Blind Canyon Seams. This seam is located generally about 70 to 90 feet above the Hiawatha Seam (see Map 2-7) but is found in minable thickness only in the south half of lease U-47978.
feet in the southern limit of minable Blind Canyon Seam.

~~Because the interburden between the two seams is less than 30 feet (see Map 2-9), the Blind Canyon Seam will not be mined in the same area as the Cottonwood Seam.~~

~~Figure 2-3 illustrates where the Blind Canyon coal reserves are dedicated to the Wilberg Mine and the area of minable Cottonwood Seam.~~

Overburden

The coal reserves in the Wilberg Mine area within the Hiawatha Seam are covered by up to 2,300 feet of overburden. Because the topography of these lands displays much relief, the thickness of the overburden is highly variable (see Maps 2-10, 2-11 and cross sections 2-3). The overburden is the greatest in the western and northern portions of the property where the plateau is capped with the Flagstaff Limestone. In these areas the overburden ranges from 2,200 - 2,300 feet. However, the overburden above most of the coal is less than 1,800 feet.

Chemical Composition

In the development of the Cottonwood/Wilberg Mines and associated surface facilities, some of the strata and alluvium covering the coal seam was excavated to accommodate the facilities. In order to better understand the chemical and physical characteristics of the rock material that was excavated, over 130 samples from both outcrop and core from drill holes were analyzed.

Four drill holes were selected as data points in which core samples were analyzed for their chemical and physical properties (see Figure 2-4). These core drill holes were selected to give the best representation of the same rock sequence which was excavated at the Cottonwood/Wilberg Mine portals and that which will be excavated during the mines life. Two of the holes were drilled from the surface of East Mountain (EM-12C and EM-23C), and two of the holes were drilled from within the Deer Creek and Wilberg Mines (A-25 and B-124).

Samples of rock core were collected from each lithologic unit that was penetrated within the selected drill holes. These samples consisted of a representative section of core averaging 0.3' in length usually taken from the center of each lithologic unit. Samples of rocks which were immediately overlain by minable coal seams were collected at the coal seam contact. The rock zones sampled and the sample numbers are shown on the core logs for each drill hole (see core logs in Appendix VI.)

In light of the recommendation made by the Office of Surface Mining (OSM) each sample was analyzed for the following:

pH	% Iron
EC (electrical conductivity)	% Zinc
% Calcium	% Sulfate
% Sodium	% Moylbdenum
% Magnesium	% Boron
SAR (Sodium Absorption Ratio)	Alkalinity (Equivalent $CACO_3$)

All of the samples of carbonaceous mudstone that were collected were also analyzed for their percent pyrite/marcasite content. The samples collected from immediately below a minable coal seam were analyzed for their clay content. In addition to these analyses, four or five representative samples of each of the rock types present, sandstone, siltstone, mudstone, interbeds (thinly laminated siltstone and mudstone), carbonaceous mudstone, and coal were tested for their physical properties. These samples were crushed to a size of -1/4" mesh and the product was screened for its percent sand, silt and clay content.

Front Range Labs, Inc., of Fort Collins, Colorado, was selected to do the analytical work because of their expertise in testing the chemical and physical properties of coal overburden and their ability to perform all of the required analytical work.

~~Utah Power & Light~~ PacifiCorp had previously established an excellent data base regarding the coal quality within the East Mountain property. Since 1979, samples have been collected from within the Deer Creek and Cottonwood/Wilberg Mines on a daily basis. These samples were analyzed by Standard Laboratories, Inc., in Huntington, Utah prior to1987 and by CT&E, in Huntington, Utah since that time. Some of the data reported herein have been gleaned from this work.

The findings of these analyses are separated by formation, rock type and coal seam in Table A and

TABLE A (Revised)

Overburden Analysis

Lithology	Number of Samples: Chemical Tests	Number of Samples: Physical Tests	Chemical Test: Ca (Mg/L)	Mg (Mg/L)	Na (Mg/L)	SAR1	Fe (ppm)	Zn (ppm)	SO-S_4 (ppm)	Mo (ppm)	B (ppm)	pH (paste)	E.C.[2] amhos/cm	Sat. %	Physical Test: Pyrite[3] FeS2	Sand %	Silt %	Clay %	Crushed Rock Texture
Blackhawk Formation																			
Sandstone:	26	2																	
Mean			4.37	8.18	2.13	1.05	8874	11.47	409.6	0.1	0.06	8	1.55	21.7	-	84.5	11	4.5	Sandy Loam
S.D.			3.91	5.13	1.08	0.69	6672	9.7	353.1	0	0.06	0.96	0.89	3.36	-	0.71	1.41	2.12	
Siltstone:	24	5																	
Mean			3.06	6.24	2.3	1.69	14512.88	38.26	464.41	0.1	0.18	7.88	1.41	20.81	2.3	71.6	17.8	10.6	Sandy Loam
S.D.			2.63	7.23	2.78	3.72	8782.4	21.29	1222.63	0	0.16	1.08	1.72	1.82	0	23.5	16.57	7.7	
Mudstone:	24	4																	
Mean			3.12	3.13	4.7	4.28	11074.13	70.13	233.96	0.1	0.28	8	1.1	23.99	-	71.5	20.5	8	Sandy Loam
S.D.			2.36	2.89	12.76	12.58	5350.17	79.99	275.1	0	0.23	0.31	1.12	4.88	-	13.77	15.2	3.56	
Interbeds:	15	3																	
Mean			4.34	7.98	2.79	1.3	10982.13	21.58	346.95	0.1	0.12	8.05	1.58	20.56	-	75.33	17	7.67	Loamy Sand
S.D.			3.13	6.37	1.85	1.36	6584.59	9.97	359.46	0	0.11	0.23	0.92	1.33	-	7.64	9.54	3.06	
Carb-		3																	
Mudstone:	25																		
Mean			6.19	6.51	3.7	2.4	9933.76	58.04	438.86	0.1	0.42	7.53	1.54	34.76	2.3	73.33	18	5.67	Loamy Sand
S.D.			4.85	8.42	4.85	3.98	6112.12	38.94	378.81	0	0.34	0.85	1.14	9.94	3.29	20.6	16.82	1.53	
															Sulfer %				
Coal (Blind Canyon)	8	0																	
Mean			1.55	1.81	1.68	1.63	2089.38	10.19	103.88	0.1	0.06	8	0.36	60.66	0.44				
S.D.			0.59	2.88	1.35	1.27	2557.56	8.82	66.88	0	0.05	0.25	0.05	18.59	0.06				
Coal (Hiawatha)	2	0																	
Mean			1.52	2.85	1.41	1.58	2532.41	10.82	97.32	0.1	0.12	7.95	0.34	60.24	0.51				
S.D.			0.66	3.64	0.95	1.18	2718.02	8.41	72.14	0	0.21	0.24	0.07	16.84	0.06				
Coal Cottonwood:	1	0																	
Mean			2.5	3.3	0.47	2.21	465	55	321	0.96	0.43	7.4	1.4	21.86	0.49				
S.D.															0.07				
Starpoint Sandstone																**Sand %**	**Silt %**	**Clay %**	
Sandstone:	11	4																	
Mean			5.14	8.58	3.42	3.57	3798	9.47	1457	0.1	0.11	6.76	2.49	30.46	-	90.75	4.75	4.5	Sandy Loam
S.D.			3.89	4.69	2.97	5.18	2695	6.98	2578	0	0.24	1.54	1.2	4.8	-	4.8	3.5	1.91	

[1] SAR = Sodium Absorption Ratio
[2] EC = Electrical Conductivity
[3] = Including Marcasite

Note: See Volume 7, Appendix VI for raw data.

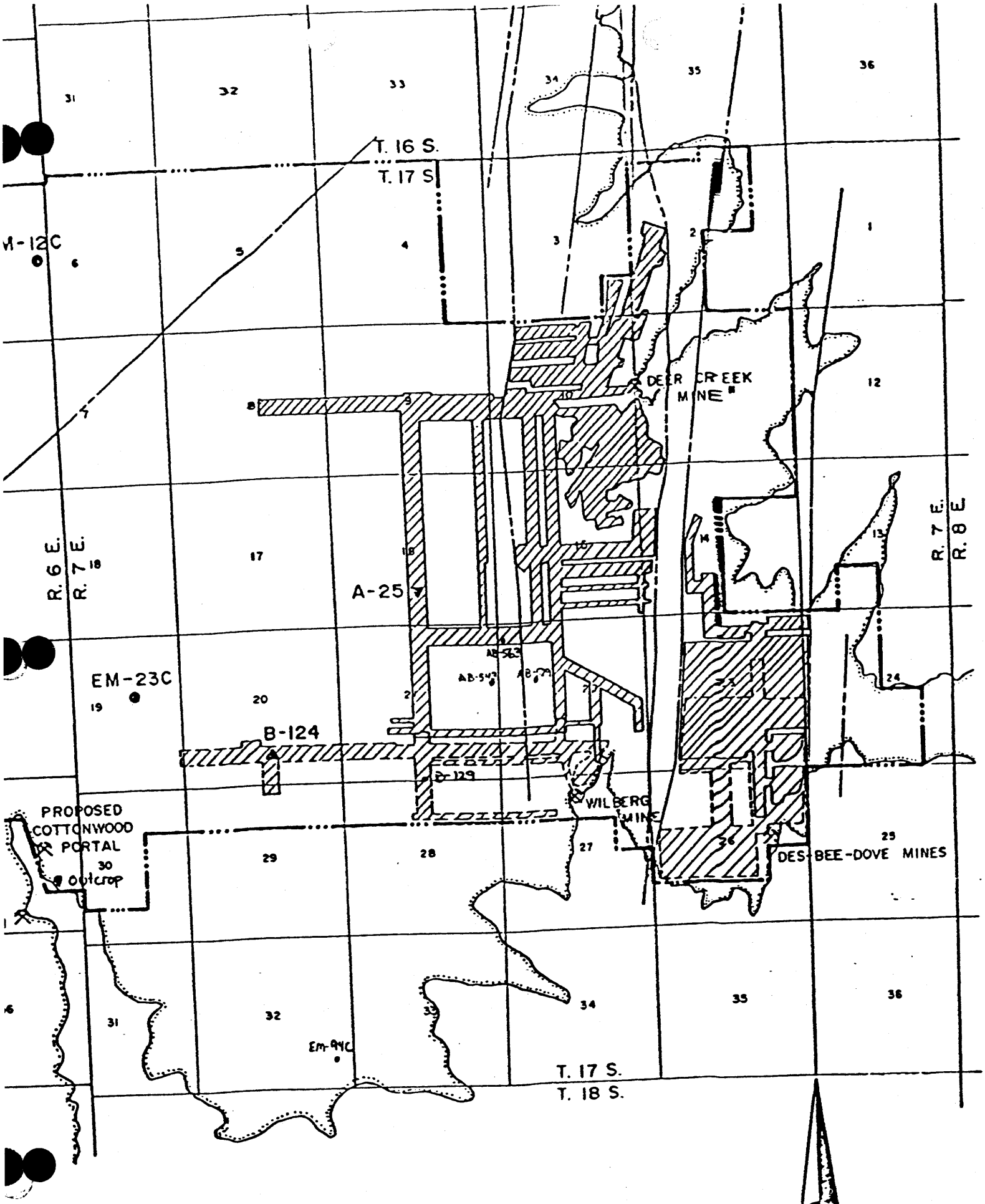


FIGURE · 2.4
DATA LOCATION MAP

the individual analysis are found in Appendix VI. For each rock type the mean and standard deviations have been calculated for each of the various chemical and physical parameters. In general, the chemical content within a rock type is moderately consistent as shown by the sandstones and siltstones are variable due to sulfate enrichment by groundwater in some of these rock types and not others.

The sulfur content of the Hiawatha, Cottonwood, and Blind Canyon Seams averages 0.52%, and generally ranges from 0.49% to 0.59%. Of this sulfur content, 79% is in the form of organic sulfur and 16 % is in the form of pyritic including marcasite. The remainder is in the form of sulfate.

Generally, the physical tests which were completed on these samples indicate that all rock types present have the tendency to resist reduction of grain size when excavated and reclaimed and only a minimum of clay-sized particles will be liberated. As may be expected, the coarser-grained rocks, sandstones and siltstones produced much less clay-sized particles when crushed. Generally, the dominant rock type in the area of the Cottonwood/Wilberg Mine is sandstone; therefore, any interpretations made should recognize this fact.

In addition to the aforementioned analyses that were made of the general overburden, the strata immediately above and below the coal seam were analyzed for their potential alkalinity and pyrite/marcasite content and the strata immediately below the coal was analyzed for clay content as well. The results of these tests are as follows:
(NOTE: See Appendix VI for Raw Data.)

Zone Sampled	# Samples	pH	% FeS Pyrite/Marcasite	% Clay	Potential Alkalinity Equivalent (mg/L CaCO3)
Hiawatha Seam Roof	3	7.8	3.3	-	281,400
Hiawatha Seam Floor	3	7.5	1.3	5.5	127,300
Cottonwood Seam Roof	2	7.8	0.5	5.2	222,200
Cottonwood Seam Floor	1	8.7	0.4	10.5	70,200
Blind Canyon Seam Roof	2	8.1	0.5	-	252,600
Blind Canyon Seam Floor	3	8.3	1.3	9.0	3,500

The analyses of the overburden samples tested clearly show that no toxic or hazardous materials are present. The material excavated near the portal site is slightly alkaline. Generally, the soils in this region which are derived from the strata tested are alkaline as well. The overburden material which has been excavated will not degrade the quality of the soils in the area or of the groundwater percolating through this material.

The operator commits to sample roof, floor and mid-seam material in active sections annually. A representative sample will be taken in areas mined within a given year. The locations where the samples are taken will be sufficient to include the various lithologies encountered during mining. These locations will be plotted on a map for future reference. The samples will be analyzed for acid- and/or toxic-forming potential in accordance with the Divisions Guidelines for the Management of Topsoil and overburden. The sample location map and laboratory analyses, including raw data, will be submitted to the Division annually.

~~Pages 2-69 through 2-99, Revised 3/1/89, have been deleted. The information found in this section is now in Appendix III, "Hydrology Information". Page 2-100, Revised 11/21/83, is also deleted. Figure 2-9 following page 2-100 should be deleted.~~

~~The information on page 2-151 has been deleted.~~

~~Cottonwood/Wilberg and Des-Bee-Dove Waste Rock Site~~

~~The proposed waste rock storage site is an area of low relief paralleling the Wilberg Mine road with a gently sloping topography. The elevation of the site varies from 6,890 feet in the northwest 'corner down to 6,700 feet in the southeast. Grimes Wash, an intermittent stream passes near the site cutting a steep-sided channel along a portion of the NE boundary. Along these steeply cut banks, good exposures of the strata are found.~~

~~The site is situated upon colluvium ranging in thickness from approximately 50 feet in the northwest corner to 35 feet in the southeast and lying unconformable upon the Mancos Shale. Depths of~~

~~colluvium are projected from outcrop in Grimes Wash nearby. The colluvium is conglomeratic consisting primarily of cobble sized sandstone material ranging down to pebble and cemented with a friable sandy mud. Boulders in excess of eight feet in diameter are randomly interspersed within the colluvium. The fabric and cementing material of the colluvium render it moderately permeable.~~

~~The colluvium weathers to a loose sandy soil, light brown in color with sand particles ranging from fine to medium grained. The soil tends to be low in compactability and of moderate permeability. The loose soil can be eroded during major precipitation events but the permeability of the soil counteracts this by allowing for the infiltration of runoff. Soils at the proposed site were sampled on the north and south ends. Results of these analyses are shown in Table 1.~~

~~TABLE 1~~

~~Waste Rock Disposal Site~~

	~~North End~~	~~South End~~
~~pH~~	~~7.9~~	~~8.25~~
~~EC (mmhos/cm)~~	~~0.9~~	~~0.85~~
~~SAR~~	~~1.85~~	~~1.76~~
~~Sand~~	~~20%~~	~~20%~~
~~Silt~~	~~60%~~	~~65%~~
~~Clay~~	~~20%~~	~~15%~~
~~Sodium~~	~~110~~	~~95~~
~~Calcium~~	~~210~~	~~150~~
~~Magnesium~~	~~34~~	~~42~~

~~Soil: A young shallow alluvial derived soil, calcerous with a definite hardpan. Impervious layer influences plant growth so large rooted species predominate in the vegetation composition.~~

~~Soil Description:~~

~~A~~	~~0-3'~~	~~Brown (10YR 5/3, moist) silt loam; gravelly with scattered rocks; granular, soft,loose, slightly sticky, slightly plastic; moderately calcerous, pH 8.2; few small and medium roots; boundary gradual.~~
~~A_2~~	~~3-18"~~	~~Pale brown (10YR 6/3, moist) loam, gravelly with scattered rocks; small angular blocky, friable, slightly sticky, slightly plastic; moderately calcerous; common small and medium roots, some large relic roots; some clay buildup at 14", cobble bed at 18-20".~~
~~C_{ca}~~	~~20'~~	~~Light brownish gray (10YR 6/2, moist) caliche, rocky; massive, very hard, strongly calcerous; few medium roots; a cemented caliche layer.~~
~~C~~		~~Depth varies but consists mainly of bedded cobbles and rocks.~~

~~The hydrology of the site is limited to surface water. The natural drainages in the area trend NW/SE terminating into Grimes Wash. Rainfall projections for this area predict a 3.0 inch rainfall for the 100 year / 24 hour precipitation event.~~

~~Geologic studies of the area (Hintze) identify the Ferron Sandstone as the first possible water bearing member of the Mancos Shale Formation. Oil and gas wells drilled in the area report no water when drilling through the Mancos Shale Formation. One well drilled on the proposed site encountered no water down to 4,900 feet from the surface. Another well drilled three miles south of the site encountered no water drilling through the Mancos Shale down to 11,500 feet from the surface (GR elev. 6,023'). These wells are the nearest to the proposed site on record. Records are on file at the Division of Oil, Gas and Mining.~~

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 2, Part 3, Operation Plan

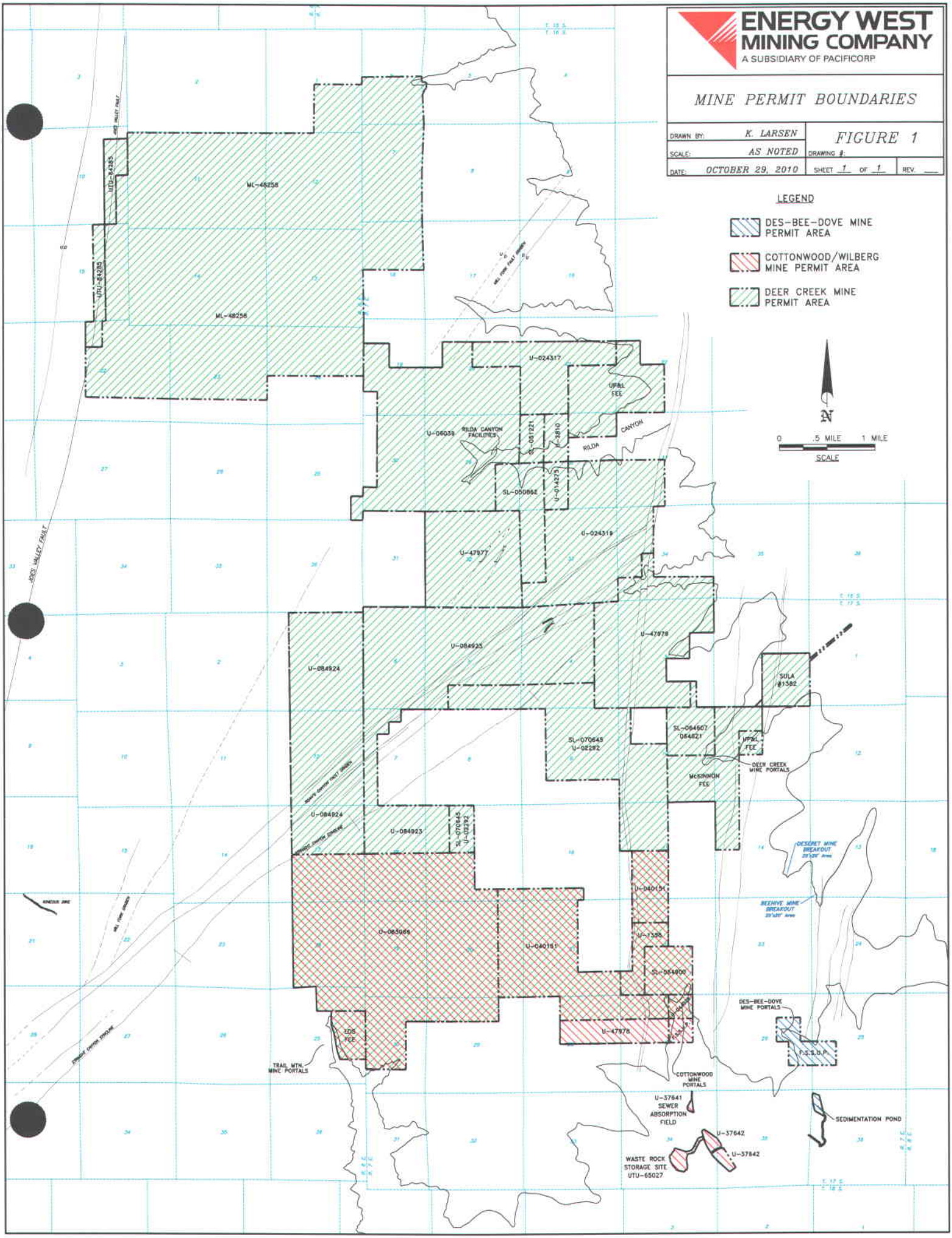
Replace Entire Text Section
Retain Roberts & Shaefer Letter – Slope Stability Review
Remove Cottonwood Fan Portal Slope Stablilty Certification
Remove Roberts & Shaffer Letter – Excerpts from Roberts & Shaefer Contract Specification
Retain Simplified Bishop Method of Slices

COTTONWOOD MINE OPERATION

In 1958 the Wilberg Mine was acquired by Peabody Coal Company. In March 1977, Utah Power and Light Company acquired the Wilberg Mine from Peabody Coal and was officially listed as lessee on September 1, 1977. In 1982, Utah Power and Light successively bid the South Lease federal coal tract. Following necessary permit and construction approvals, the Cottonwood Mine began production in the South Lease. The two mines, Wilberg and Cottonwood, form the Cottonwood/Wilberg coal mining operation. The Cottonwood/Wilberg Mine is operated by Energy West Mining Company. The Cottonwood/Wilberg operation was officially authorized as a production mine on January 23, 1978 under 30 CFR 211 (USGS).

Three coal seams exist in the Cottonwood/Wilberg Mine area. Blind Canyon (upper) Seam is being mined in part from Deer Creek in Huntington Canyon. Cottonwood (middle) Seam contains excessive in-seam temperature gradients and has been determined by Utah Power and Light and the Bureau of Land Management as unmineable. Hiawatha (lower) Seam is being mined in part from the Cottonwood/Wilberg Mine. Both Cottonwood/Wilberg and Deer Creek Mines are owned by PacifiCorp and operated by Energy West Mining Company. Relative locations of these two mines are shown on Figure 1.

The Wilberg portals are located on the north coal outcrop in Grimes Wash on the southern end of East Mountain in Emery County, Utah. Mine personnel and coal transfer facilitiesare located at the Wilberg Portal. The Cottonwood portals are located on the south coal outcrop of Grimes Wash. These portals provide for Cottonwood men and equipment access, underground conveyor belt access and mine portal sites are the Cottonwood/Wilberg surface coal handling substation, material storage, and parking facilities. Approximately 2011 acres of mineable coal are accessible in the Hiawatha coal seam from the Cottonwood/Wilberg Mine.


ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
MINE PERMIT BOUNDARIES
DRAWN BY: K. LARSEN
SCALE: AS NOTED
DATE: OCTOBER 29, 2010
FIGURE 1
DRAWING #:
SHEET 1 OF 1
REV.
LEGEND
DES-BEE-DOVE MINE PERMIT AREA
COTTONWOOD/WILBERG MINE PERMIT AREA
DEER CREEK MINE PERMIT AREA
N
0 .5 MILE 1 MILE
SCALE
ROCK VALLEY FAULT
ML-48258
UTU-84285
U-024317
UP&L FEE
U-06039
WILDA CANYON FACILITIES
U-061221
U-2810
WILDA CANYON
SL-050665
U-014275
U-024319
U-47977
U-084925
U-47978
U-084924
SULA 81582
SL-064607
064621
UP&L FEE
SL-070645
U-02292
McKINNON FEE
DEER CREEK MINE PORTALS
DESERET MINE BREAKOUT
BEEHIVE MINE BREAKOUT
U-040151
U-085069
U-1338
SL-064608
DES-BEE-DOVE MINE PORTALS
P.C.S.D.P.
EDS FEE
TRAIL MTN. MINE PORTALS
COTTONWOOD MINE PORTALS
U-37641 SEWER ABSORPTION FIELD
SEDIMENTATION POND
U-37642
U-37842
WASTE ROCK STORAGE SITE UTU-65027

Prior to temporary cessation in 2001, a total of 40.3 million tons have been produced from the Cottonwood/Wilberg mines. The remaining reserves are estimated 2.05 million at tons. This is anticipated upon resumption of mining, production will be obtained by utilizing one or two continuous mining units and one longwall mining system.

The Cottonwood mining plan has progressively changed with the introduction of more efficient mining methods. The Cottonwood Mine is developed with mains and submains which support a series of longwall mining panels. This system is very effective in extracting and maximizing coal recovery. Approximately 70% of the Cottonwood mineable coal reserve will be extracted by longwall mining systems, 30% will be extracted by continuous miner development and limited pillar extraction. The extracted coal is sized in the Cottonwood coal facility and trucked to the PacifiCorp Hunter Power Plant, approximately 13 miles.

MINING PLAN

The Cottonwood mining plan is based on the geologic information outlined in Geology Description. Good knowledge of the entire property is available from the outcrop and drilling. Detailed knowledge of a smaller part of the property is known from mining operations.

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

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

Permit boundary and approximate locations of faults affecting the Cottonwood Mine plan are illustrated in Figure 1. Faults influencing the mining plan are the Pleasant Valley Fault, Deer Creek Fault and Roan's Canyon Fault.

In the Cottonwood Mine, the Hiawatha Seam is bounded on the north by the thinning of the seam below 5' in thickness. On the east, the seam is bounded on the Deer Creek Fault and Pleasant Valley Fault, and on the south and west by coal outcrop, thinning of the seam below 5', and lease boundaries. Mining will commence in interburden thickness of 30 feet or greater when extracting both seams.

The Blind Canyon Seam within the Cottonwood Mine lies approximately 100 feet above the Hiawatha Seam. This seam is bounded on the north by the Deer Creek Mine workings and on the east, south and west by the thinning of the seam below 5 feet in thickness.

Since part of the area of the Cottonwood Mine is overlain by areas of the Deer Creek Mine, detailed mine scheduling has been undertaken to ensure that the upper seam is mined prior to the mining of the lower seam while still following good mining practices in generating the mine layout. In addition, the mining plans are designed with a system of barriers for protection of the 345 KV line and perennial stream drainage.

The mine layout, as illustrated in Map 3-1 thru 3-2 is an arrangement of longwall panels and development sections interconnected by systems of main and sub-main entries. This arrangement is predicated on geographical dedication of reserves, available coal quality and geologic information. Better knowledge of the geology and quality parameters of the coal reserve through additional drilling, mine development work, and continued operating experience at Hunter Power Plant will influence future mining techniques and mine plans.

The planned mine development sequence accommodates longwall panels as the primary means of efficiently extracting the reserves. Longwall mining systems are far superior to other mining methods in terms of overall coal recovery, safety, consistent coal quality, and operational efficiency. In areas of the mine where overburden, coal quality, or ground conditions are a concern, only longwall systems will be employed to extract the reserves. This will ensure the best possible means

of maximizing reserve recovery while maintaining consistent coal quality and ground control. The sequence of mining at Cottonwood is shown on Maps 3-1 thru 3-2.

The Cottonwood mine plans projected mining areas which normally could not be mined due to coal quality restrictions and high in-seam ash levels. Establishment of a partial-wash coal preparation facility for the Hunter Power Plant allowed usage of these previously unmineable high-ash reserves as power plant fuel. Therefore, all high-ash mineable reserves located in PacifiCorp's mining leases have been dedicated to the Cottonwood coal preparation facilities.

During normal operations high-ash transfers from the Deer Creek Mine to the Cottonwood operation will be achieved through Blind Canyon to Hiawatha Seam conveyor systems. Established coal transfer facilities and conveyor systems are planned to be utilized throughout the life of the Cottonwood Mine operation for movement of coal to the Hunter Power Plant.

Plans for roof control, ventilation system, and methane and dust control have been submitted to MSHA and are filed in the MSHA district office; Mine Safety and Health Administration, PO Box 25367, Denver, Colorado 80225.

MINING METHOD

Continuous Mining Units

The principle purpose for continuous mining units in Cottonwood Mine is development; i.e., driving main entries, opening headgates, tailgates, bleeder and setup entries for the longwall panels.

Figure 2 illustrates the basic configuration of the main entries. A six-entry system exists for the main headings with openings driven 20 feet wide on 100 foot centers. The pillars created measure 80 feet by 80 feet, a size which, in the past, has proven sufficient to support the overlying strata.

Development work for the longwall panels is illustrated in Figure 3. Bleeder entries are driven on 100 foot by 100 foot centers. With retreating longwall mining systems, all development of room-and-pillar sections at Cottonwood Mine, three entries will be opened on advance with two or more

developed on retreat in conjunction with pillar extraction. Openings are 20 feet wide on 100 foot by 100 foot centers. The sequence of pillar recovery is shown in Figure 4 (near the end of advance and beginning of retreat and pillaring). However, the predominant mining method will be the longwall mining system which achieves much higher recovery percentages.

LONGWALL MINING SYSTEMS

Longwall coal mining, as it is practiced in PacifiCorp's mines, presents the safest and most efficient mining method that is available. The longwall method used is the retreating type. After development entries are driven to the extent of the panel length on both sides of the longwall face, setup entries are driven to connect the development entries. A face 500 to 1000 feet wide (depending on circumstances) is developed, and the longwall equipment is set up. Mining proceeds back towards the main entries. A barrier of approximately 400 to 500 feet is left between the mined out longwall panel and the main entries.

Panels are designed with two or three-entry development systems on 50 foot by 100 foot centers. Entries are developed on 100 foot centers for two pillars before they are decreased to the 50 foot by 100 foot centers. The 50 foot by 100 foot centers on the development entries are designed on the yielding pillar principle. This means they will gradually crush out as the second panel mines by them. The purpose of this feature is to prevent the buildup of unrelieved stresses in the pillar which, in the past, has resulted in sudden and violent failure of pillars with its accompanying danger to personnel and property.

The longwall panels are designed to be as long as possible within the property boundaries. Geologic features are the principal limiting factors.

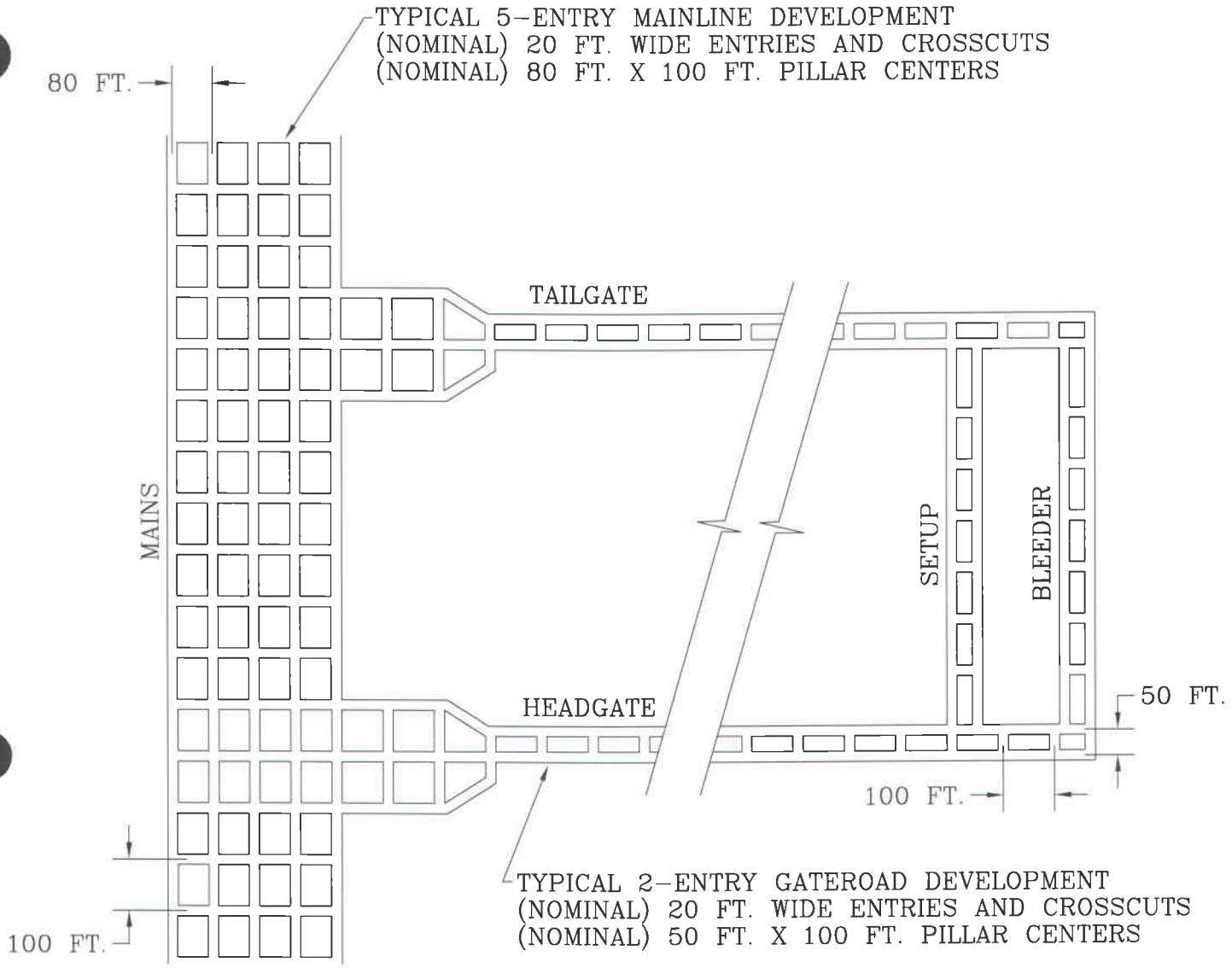


FIGURE 2
TYPICAL MAIN ENTRY AND PANEL DEVELOPMENT
AT THE COTTONWOOD MINE

CAD FILE NAME/DISK#: FIGURE 2.DWG

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD MINE
TYPICAL MAIN ENTRY
AND PANEL DEVELOPMENT

DRAWN BY:	K. LARSEN	FIGURE 2	
SCALE:	NONE	DRAWING #:	
DATE:	JULY 31, 2001	SHEET 1 OF 1	REV.

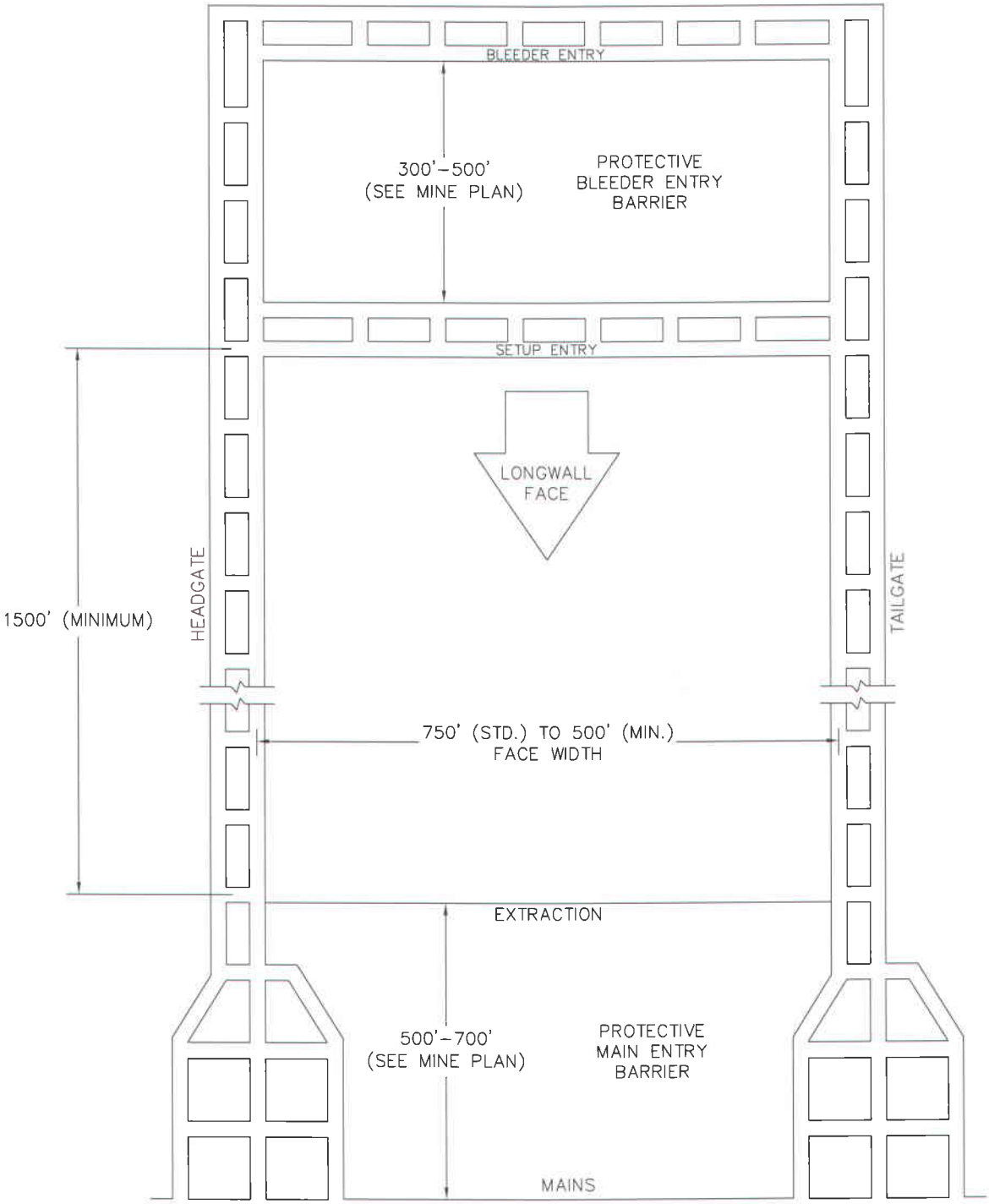


FIGURE 3
TYPICAL LONGWALL PANEL RETREAT AS USED
AT THE COTTONWOOD MINE

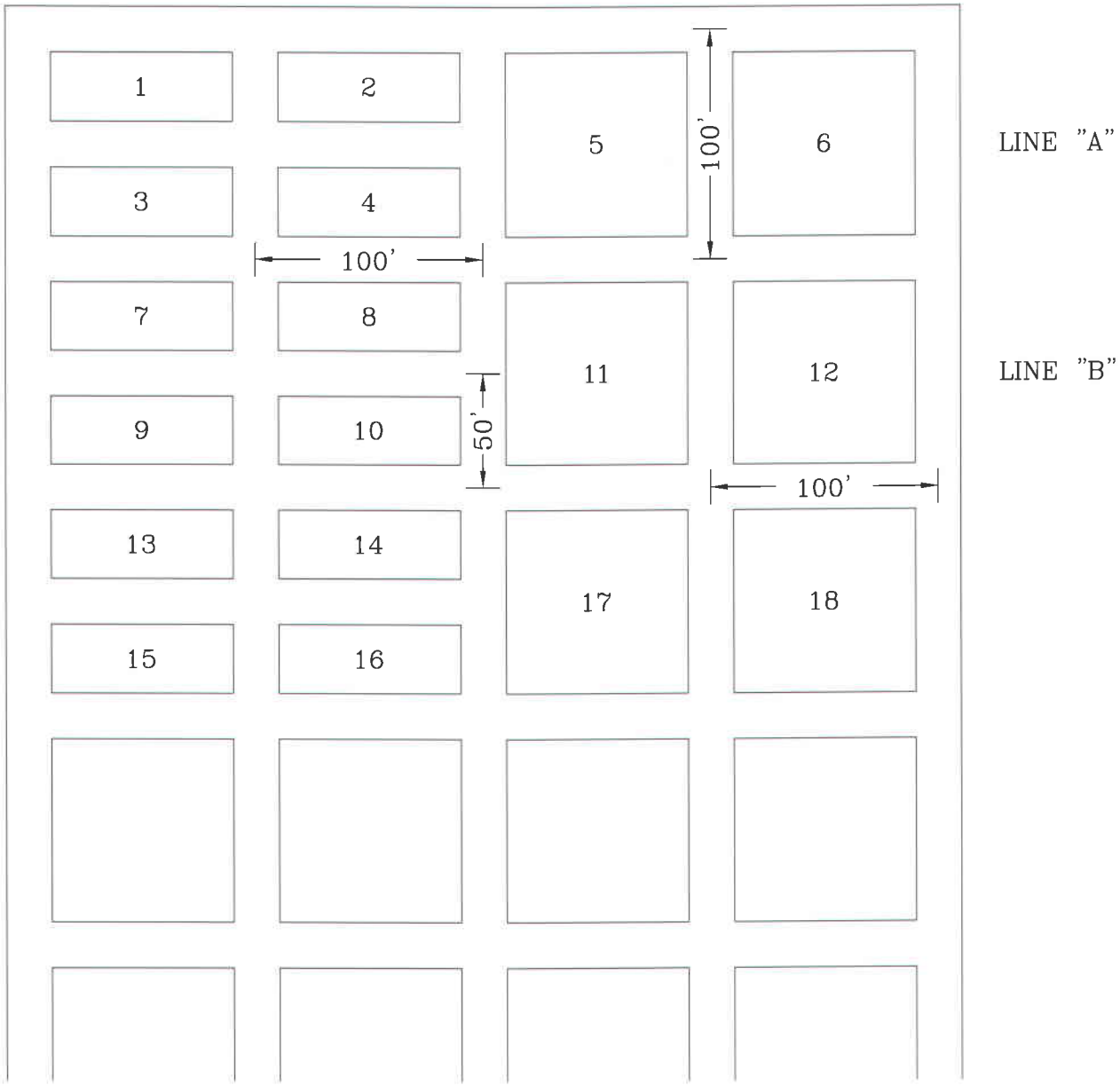
CAD FILE NAME/DISK#: FIGURE 3.DWG

ENERGY WEST
MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD MINE
TYPICAL LONGWALL
PANEL RETREAT

DRAWN BY:	K. LARSEN	FIGURE 3	
SCALE:	NONE	DRAWING #:	
DATE:	JULY 31, 2001	SHEET 1 OF 1	REV. ___

END OF ROOM & PILLAR SECTIONS



Pillars in Line "A" will be recovered first, starting at pillar #1 going to #6. Then the pillars in Line "B" will be recovered.

FIGURE 4
SEQUENCE OF PILLAR RECOVERY
AT THE COTTONWOOD MINE

CAD FILE NAME/DISK#: FIGURE 4.DWG

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD MINE
SEQUENCE OF PILLAR RECOVERY

DRAWN BY: K. LARSEN	FIGURE 4	
SCALE: NONE	DRAWING #:	
DATE: JULY 31, 2001	SHEET 1 OF 1	REV.

COAL RECOVERY

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

One hundred (100) foot wide barrier pillars are left between room-and-pillar panels to prevent abutment pressures from adjacent sections from carrying over to the active section. These barrier pillars also act as fire isolation barriers, should a combustible incident arise in any particular panel.

Barriers either 300 feet or 400 feet wide are left between major room-and-pillar panels. Barriers from 400 to 500 feet are left between longwall extracting panels and the main entries in the mine. These major pillars protect the intake/return airways and transportation systems, while mining in the particular area of the mine that these entries serve.

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

As is the case with both our standard systems of mining for the Cottonwood Mine, it is our intention to maximize the amount of coal recovered from lease areas, subject only to feasible economic constraints, coal quality and mine safety considerations. Mining in the South Lease (Federal Coal Lease No. U-47978) was conducted in accordance with the stipulation agreed to by the BLM, USFS, UDOGM and UP&L Co. on May 10, 1988.

It is anticipated that occasions will arise when resource recovery cannot be fully accomplished, as outlined by the mine plan, due to difficult mining conditions, unforeseen geologic conditions, or degradation of the mineable coal quality. However, before any modification is made, it will first be discussed with the appropriate Bureau of Land Management officials for approval. Table 1 list the list the remaining reserves by lease:

TABLE 1
COTTONWOOD MINE
COAL RESERVES (Hiawatha Seam)

LEASE AREA	RECOVERABLE TONS (Millions)
Federal Lease U-083066	0.29
Federal Lease U-040151	1.6
Federal Lease U-1358	0.17
TOTAL REMAINING TONS	2.05

TEMPORARY CESSATION OF OPERATIONS

As stated in the regulations:

> *515.320. Before temporary cessation of coal mining and reclamation operations for a period of 30 days or more, or as soon as it is known that a temporary cessation will*

extend beyond 30 days, each person who conducts coal mining and reclamation operations will submit to the Division a notice of intention to cease or abandon operations. This notice will include:

515.321. For the purposes of UNDERGROUND COAL MINING AND RECLAMATION ACTIVITIES, a statement of the exact number of surface acres and the horizontal and vertical extent of subsurface strata which have been in the permit area prior to cessation or abandonment, the extent and kind of reclamation of surface area which will have been accomplished, and identification of the backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

PacifiCorp notified the Division of temporary cessation of coal mining operations at the Cottonwood/Wilberg Mine effective May 29, 2001. Coal mining at the Cottonwood/Wilberg Mine ceased as of March 15, 2001. All portal were sealed according MSHA specifications on May 28, 2001.

The following data is provided to comply with the listed regulations:

Cottonwood/Wilberg Mine:

- Exact number of surface acres (disturbed) 101.74 acres
  Conditionally Approved 61.76 acres

- Horizontal and Vertical Extent of Subsurface Which Have Been in the Permit Area: 10,600 acres

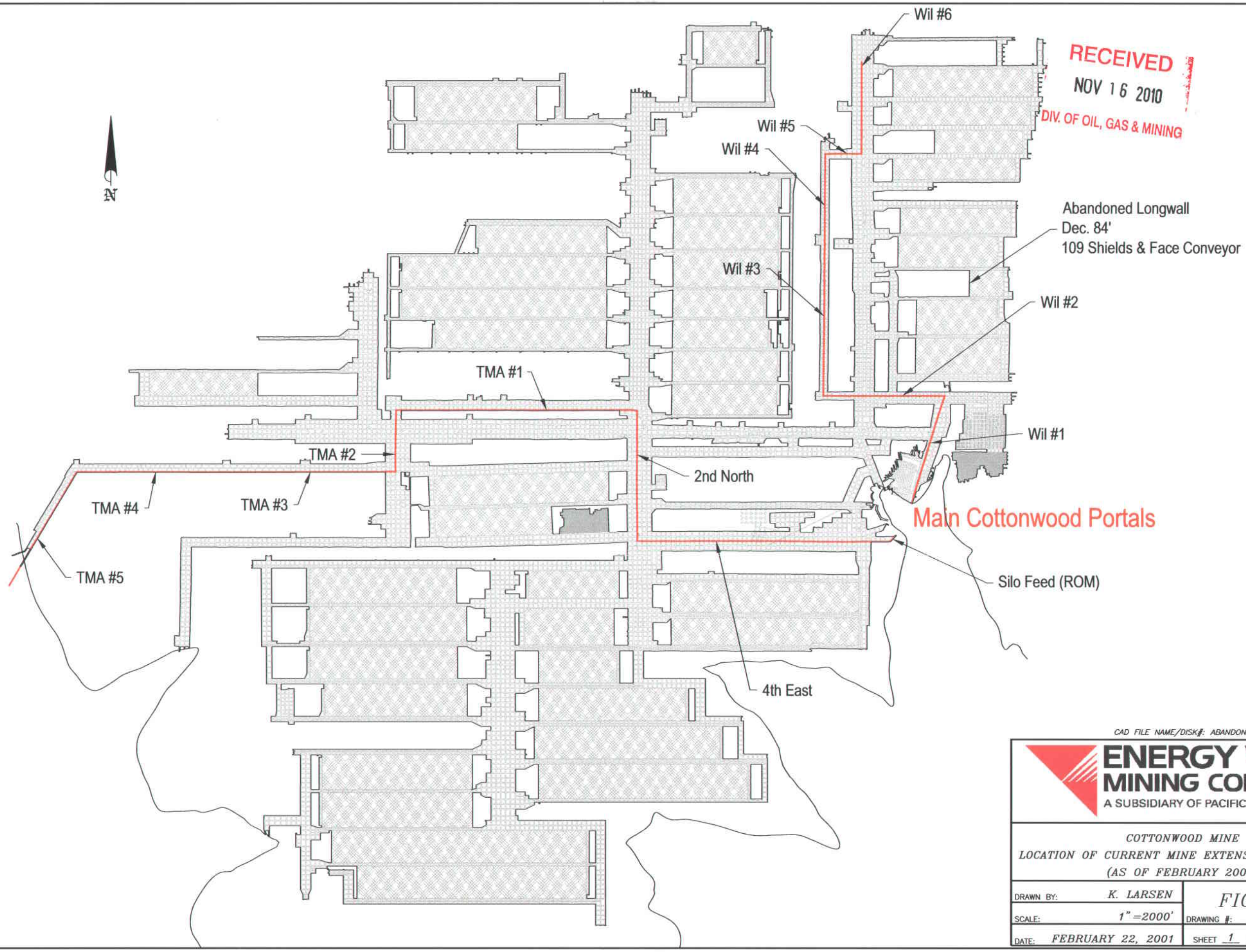
- Reclamation of the surface facilities is not currently planned.

- Environmental Monitoring including; subsidence, hydrologic, vegetative and compliance will continue as stated in the approved MRP, unless approved by the Division.

- Mine Closures: All portal openings were sealed as specified in 30CFRPart 75.335 or as specified in the approved ventilation plan.

- Water Treatment Activities: All hydrologic conveyance structures will be maintained and monitored as specified in the MRP.

In preparation of temporary cessation, documentation of mining equipment and mine extension material to be abandoned in place and removed from the mine was submitted to Bureau of Land Management and Division of Oil, Gas & Mining. Verification of equipment removal was conducted on May 4, 2001 with Division of Oil, Gas and Mining (Pete Hess) participating in the review (Bureau of Land Management (Steve Falk) was invited but was unable to attend). Table 2 is a list of the material abandoned during temporary cessation (refer to Figure 5):



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CAD FILE NAME/DISK#: ABANDONED-EQUIPMENT.DWG

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COTTONWOOD MINE
LOCATION OF CURRENT MINE EXTENSION EQUIPMENT
(AS OF FEBRUARY 2001)

DRAWN BY: K. LARSEN	FIGURE 5	
SCALE: 1" =2000'	DRAWING #:	
DATE: FEBRUARY 22, 2001	SHEET 1 OF 1	REV. ___

TABLE 2 COTTONWOOD/WILBERG MINES SUMMARY OF NON-RECOVERED EXTENSION MATERIAL			
ITEM	**LOCATION**	**QUANTITY**	**TOTAL**
Belt	Wilberg Mine #1 (48")	830 feet	
	Wilberg Mine #2 (48")	620 feet	
	Wilberg Mine #3 (48")	1,980 feet	3,430 feet
Belt Structure	Wilberg Mine #5 (48")	765 feet	
	Wilberg Mine #6 (48")	1,635 feet	2,400 feet
	Cottonwood Mine 4th East (60")	5,280 feet	
	Cottonwood Mine 2nd North (60")	2,765 feet	
	Cottonwood Mine TMA #1 (60")	5,068 feet	
	Cottonwood Mine TMA #2 (60")	1,300 feet	
	Cottonwood Mine TMA #3 (60")	3,095 feet	
	Cottonwood Mine TMA #5 (60")	2,162 feet	
	Cottonwood Mine 1st West #1 (60")	1,740 feet	
	Cottonwood Mine 1st West #2 (60")	650 feet	22,060 feet
Steel Pipe	Wilberg Mine (4")	12,435 feet	
	Cottonwood Mine (6")	24,286 feet	36,721 feet
PVC Pipe	Wilberg Mine (6")	12,435 feet	
	Cottonwood Mine (12")	23,909 feet	36,344 feet

A plan to construct permanent seals was submitted to and approved by Mine Safety Health Administration. Sealing of the mine portals was completed on May 28, 2001.

Abandonment of Machinery: To comply with Section 10 of the Federal Coal Lease Stipulations, PacifiCorp will request approval prior to abandonment of machinery within the mine. Table 3 list machinery abandoned in the Cottonwood/Wilberg mines (refer to Figure 5).

TABLE 3 WILBERG MINE			
LEASE #	**LOCATION**	**TYPE OF EQUIPMENT**	**BUREAU OF LAND MANAGEMENT APPROVAL DATE**
Fee	5TH Right	109 Longwall Shields and Face Conveyor	Private Property Equipment abandoned due to Wilberg Mine Fire.

Abandonment of this machinery is insignificant compared to the other steel materials that must be left underground. Ferrous materials include steel roofbolts, steel wire ceiling mesh and steel covered longwall support cans. These materials are not removed due to safety concerns in all underground coal mines.

Although the shields contained emulsified oil which could eventually enter the hydrologic system, it will not have a significant impact on the hydrologic balance in the area based on the following criteria:

- It will be a period of many years prior to the sediments being saturated to reach potential areas of discharge.
- The combination of water chemistry, temperature, and lack of oxygen will impede the rate of oxidation of the metal.
- The combination of specific gravity and dip of the geology will potentially carry any migration away from the surface waters.
- The total volume of the potential contaminants is so minute it will be diluted within a short distance. Initial mixture is 95% water and 5% emulsified oil.
- No municipal or domestic water uses exist within 5 miles of the sites.

All portals associated with the Cottonwood/Wilberg Mine were sealed as specified in 30CFR Part 75.335 (except one (1) opening which was inaccessible. This opening was completely backfilled with non-combustible fill from the surface).

MINE ABANDONMENT

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

Since the Cottonwood Mine began operation, ground water has flowed into the mine workings. The amount of water flowing into the mine has increased in recent years due to the increase in the area which has been developed with mine entries. In general, it has also been observed that areas which at one time produced abundant water have since become dry, indicating that the mining activities have dewatered the strata which enclosed the coal seam. Because the current data is insufficient to calculate whether or not the mine workings will become flooded after mining, the applicant will design the post mining portal seals to contend with water flooding the mine workings. No hydrological seals are planned during reclamation. During temporary cessation, Trail Mountain Access intake portal was designed as a drain. PacifiCorp applied to the Division of Water Quality to relocate UPDES 0022896 outfall 001 from Grimes Wash to Cottonwood Canyon. Approval was granted July 30, 2001.

MINING AREA

Within the area of the Wasatch Plateau, coal seams are known to be present in two formations, the Blackhawk and the Ferron Sandstone member of the Mancos Shale. Coal seams within the Ferron Sandstone outcrop to the southeast are of economic importance in that region (Emery Coal Field). However, the presence of these seams at depths below East Mountain can only be speculated because no data is available to prove their existence. If coal seams do exist in the Ferron Sandstone they would be at unmineable depths of 4,000 to 4,500 feet below the Cottonwood/Wilberg Mine workings. The future recovery of these speculative coal reserves will, in no way, be influenced by the present or proposed workings of the Cottonwood/Wilberg Mines. Areas affected during the operation of the Cottonwood/Wilberg mines are shown on Maps 3-1 and 3-2.

MINE PRODUCTION

Future operations at Cottonwood Mine will employ a maximum of approximately 175 people to conduct its underground mining activities. Underground mining consist of longwall retreat mining and continuous miner development. Remaining reserves is estimated at approximately 2.05 million tons.

MINE EQUIPMENT

During normal coal production, many pieces of major underground equipment are utilized at Cottonwood Mine to promote safe and efficient operation of the longwall mining systems and continuous mining units.

Cottonwood Mine utilizes diesel equipment. Men ride to the working face in diesel pickup trucks, and materials are delivered with diesel trailers. All principal in-mine haulage of coal is by belt conveyor. In the main entry system, one entry is dedicated specifically to the belt conveyor, and at least one entry is reserved for material and supply haulage.

Table 4 lists the major ancillary equipment used in Cottonwood Mine.

TABLE 4
COTTONWOOD MINE - MAJOR UNDERGROUND ANCILLARY EQUIPMENT

Continuous Mining Units	Longwall Mining System	General Mine
Continuous Miners	Face Conveyor	Utility Tractors
Shuttle Cars	Double Ended Shearer	Transformers
Scoops	Compressors	Conveyors
Roof Bolters	Shield Type Supports	Conveyor Drives
Rock Dusters	Stageloader	Welders
Power Centers	Lump Breakers	Battery Chargers
Feeder Breakers	Scoops/Forklift	Man Carriers
	Transformer	Material and Equipment Trailers
	Petito Mule	Diesel Scoops
	Shield Trailers	Diesel Pickup
		Ambulance

ENGINEERING PRINCIPLES AND TECHNIQUES

A variety of engineering principles and techniques are applied in the Cottonwood Mine operation. Principles of engineering employed are those associated with standard prudent mine engineering practices. Employment of knowledgeable, experienced personnel makes application of such principles possible. Engineering design techniques for Cottonwood Mine include computer

simulation of coal extraction, ventilation, and pumping systems, along with research and testing in rock mechanics and subsidence.

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

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

SIGNS AND MARKERS

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

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

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

A mine permit identification sign will be placed at each point of access from public roads to areas of surface operations and facilities within the permit area. The sign will state the facility's name,

owner/operator address and phone number, Utah Reclamation Permit No., MSHA ID NO., and NPDES Permit No. The sign size will be approximately 40" wide by 18" high. Upon cessation of operations or bond release, signs and markers will be removed as appropriate.

MINE FACILITIES

Introduction

The Cottonwood Mine facility is located on a 20 acre site at the head of the Grimes Wash. The site is characterized by sparse vegetation and rugged, dry, steep terrain. Surface facilities include the following: sediment basins, embankment fills, coal storage silo, breaker station, crusher station, truck loadout, facility conveyors, roads, upper and lower parking lots, elevator, trash chute, materials storage area, mine ventilation fans, mine control building, diesel shop, drainage systems, and power substation. Some mine support facilities are underground, they include: office, bathhouse, small parts warehouse, and water treatment plant.

Specific locations of mine facilities are shown on drawings 3-15 and 3-16. All facility plans are on file at Energy West Mining Main Office, 30 North Main Street, Huntington, Utah. They are available for public inspection.

With the exception of roads and conveyors, a narrative follows explaining the construction, use, maintenance, and removal of the forenamed facilities. All temporary structures (i.e. buildings, roads, basins, ditches, culverts, etc.) will be removed during final reclamation.

DAMS, EMBANKMENTS AND OTHER IMPOUNDMENTS

Sediment Ponds - Two MSHA ponds provide sediment control for the twenty acre disturbance associated with Cottonwood/Wilberg Mine; North Pond and South Pond. The South Pond includes the UPDES discharge point. ~~Two small sediment basins are used for sediment and water quality control at the reclaimed proposed Cottonwood Fan Portal. All structures have UPDES permits (see Existing Structures).~~

The original Cottonwood/Wilberg/Des Bee Dove Waste Rock Disposal Site (Cells 1 through 7) requires no separate sedimentation pond as it is an earthen containment structure itself. Phase I Bond Release was granted on July 22, 1999. Phase III Bond Release was granted July 22, 2009. An approved sedimentation pond was constructed at the current Waste Rock Disposal Site (operation startup 1990). The pond is covered under UPDES Permit No. UT0022896-005.

MSHA ponds are inspected monthly. All other structures are inspected quarterly by a qualified person and at least yearly by a registered professional engineer. A certified engineering report will be submitted to the regulatory authority annually. See Appendix XI for sediment pond safety factor calculations.

Construction of the ponds and waste rock site is according to the design discussed in Existing Structures. These designs were prepared under the direction of registered professional engineers. Basic construction of the mine site ponds includes: (1) excavation of pond area concurrently with dam construction, (2) emplacement of large boulders in dam for riprap, (3) installation of outlet works, (4) installation of 3 foot thick clay seal in each pond, and (5) establishment of vegetation to control embankment erosion. Specifics of Subchapter K compliance criteria are presented in Existing Structures.

The MSHA ponds are connected in series such that the overflow from the first pond enters the second pond. Overflow from the second pond is discharged into a 90-inch bypass culvert. The outlet works of each pond consist of an overflow riser and outlet orifice. The orifice functions to slowly drain the sedimentation ponds while the sediment is being settled out. Each pond also is equipped with a staff gauge to indicate water surface depth.

Maintenance of the ponds includes quarterly inspections (monthly for MSHA ponds) by a qualified person and an annual inspection and certified report by a registered professional engineer. The level of accumulated sediment is checked quarterly. When accumulated sediment reaches 60% of the maximum volume for sediment, the ponds will be cleaned.

To help reduce the cleaning frequency of the MSHA ponds, two sediment traps are located in the tipple area (see Facilities Map WS449E, Packet 3-16). Flow into the sediment traps is via surface ditches. Discharge from the traps enters the existing disturbed drainage culvert system and ultimately reports to the sediment pond. The traps are designed to facilitate easy cleaning on a periodic basis. These sediment traps are identical to those installed at the Deer Creek Mine (see Drawing DS1159C, Deer Creek PAP).

Embankments - Three embankment fill structures have been constructed at Cottonwood/Wilberg Portal. These fills support the service road, upper parking lot, and upper storage area. Design and construction of the fills was performed and certified by Roberts & Schaefer Company engineers. Geotechnical analyses and recommendations for fill materials in the area were made by Dames & Moore. A copy of the geotechnical studies is included in the appendix with a statement that the structures were build according to recommendations of the geotechnical study. Construction materials were taken from the Grimes Wash area, mainly the right fork drainage excavation for the lower parking lot. Specifics on Subchapter K compliance criteria for the fills are discussed in Existing Structures.

Maintenance of the fills is limited to annual inspections by a registered professional engineer and properly maintained drainage. Drainage in and around the fill is adequately maintained to prevent infiltration of excess moisture to the fill. Reclamation of the fills is discussed in detail in the Reclamation Section.

OVERBURDEN AND TOPSOIL HANDLING AND STORAGE

No topsoil exists in the Cottonwood/Wilberg portal area. All earthen structures have been constructed with available subsoils and rock. These subsoils and rock will be used in the final reclamation of the Cottonwood/Wilberg portal area. There are no structures constructed specifically for storage of overburden or topsoil at Cottonwood/Wilberg portal. A 1.81 acre site exists below the mine site along the county road that is used for storage of rock rip-rap and soils.

COAL HANDLING AND PROCESSING FACILITIES

The Cottonwood Mine coal handling system has been in operation since 1978. Prior to construction of the facility, plans for the Wilberg Mine facilities were reviewed and approved by the regulatory agencies. Those agencies participating in the review include: USFS, BLM, EPA, USGS and Utah State Department of Social Services. Construction was completed according to reviewed and approved plans.

Coal Handling Facilities Summary - The Cottonwood Mine existing coal handling facilities are common to both Cottonwood and Wilberg Mines. Respective mine conveyors deliver coal to a single coal storage silo.

Cottonwood Mine's conveyor consists of a 12 foot diameter closed steel tube connecting the portal to the concrete silo. Wilberg Mine delivers its coal by using the old Main West conveyor (original conveyor) which is open.

Raw coal is delivered to the Coal Handling Circuit by mine belt conveyor. The coal is transferred to the Silo Feed Conveyor which deposits the raw coal in an 8,500 ton capacity storage silo of concrete construction. Provisions have been made for additional emergency ground storage beside the silo of 30,000 ton capacity.

The raw coal is recovered from the storage silo and the emergency ground storage by means of three reciprocating plate feeders which discharge onto the breaker feed conveyor which feeds the breaker station.

At the breaker station, the raw coal is passed over an 8' x 20' vibrating screen which separates all materials over 1-5/8" from the stream of coal and passes them to the rotary breaker. The minus 1-5/8" material which passes through the screen is deposited directly on the collecting conveyor. The +1-5/8" material is broken by means of repeated lifting and dropping until the material is either broken to minus 1-5/8" or rejected. The minus 1-5/8" product passes through the breaker drum and

is deposited on the collecting conveyor. Materials which will not break to final product size in the rotary breaker are discharged onto the recirculating conveyor for further processing, described later.

The product on the collecting conveyor is delivered to the truck loadout bin (800 ton capacity) by way of the truck loadout conveyor. Automatic sampling equipment is provided at the transfer point to provide a representative sample of the product coal. The product is loaded from the bin into trucks and weighed on a platform scale at the loadout bin. The trucks are then dispatched directly to the power plant. The plant has provisions for the future installation of an overland belt conveyor to handle the total plant throughput in lieu of truck haulage, but is not being considered at this time.

The rotary breaker rejects, containing coal and trash, are discharged onto the recirculating belt conveyor, past an inspection and picking station, for delivery to a single-deck vibrating screen for removal of the oversize debris. The screen undersize (minus 6 inches) is fed to a secondary roll crusher making a minus 1-5/8" x 0 product that discharges onto the breaker feed belt thus rejoining the main plant feed stream. The screen oversize trash and the materials from the inspection and picking station are collected in a trash and rejects bin. Tramp iron magnets are installed at appropriate conveyor transfer points to protect equipment and provide for an iron and steel free final plant product.

Dust collection facilities also are provided at appropriate locations throughout the plant, such as at conveyor transfers, vibrating screens, crusher, and bins. Dust from the collectors is returned to the plant product stream.

Facility Conveyors - Coal is carried between each processing unit in the facility by 48" covered conveyors. A narrative discussing the construction, use, maintenance, and removal of these conveyors is found in Transportation Facilities.

Storage Silo and Emergency Surge Pile - The concrete coal storage silo was constructed in 1978. It has a capacity of 8,500 tons. When the storage silo capacity is exceeded, and emergency surge pile is utilized. At the discharge of the silo feed conveyor, a flop gate activated on signal provides for

emergency bypass of the silo through a chute/conveyor to the 30,000 ton emergency surge pile. Reclaim of raw coal from the silo is by two reciprocating plate feeders, each having a capacity of 1,200/300 tph adjustable feed rate. Either or both feeders may be operating at any given time. Reclaim from the emergency surge pile is by a single reciprocating plate feeder, identical to the two under the silo. A front-end loader or a dozer is required to move coal in the surge pile in order to draw the total pile into the feed system.

The three feeders are installed in a concrete reclaim tunnel and they discharge onto a common belt conveyor, the breaker feed belt. Normal reclaim rate to feed the preparation plant is 1,200 tph, maximum feed rate will not exceed 1,500 tph.

An emergency exit is installed at the rear of the reclaim tunnel, accessible by a short ladder (8' 8") built into the wall of the tunnel. This exit is lined with a 36-inch diameter 10 ga. galvanized steel corrugated metal pipe. It extends to a 48-inch diameter tee on the surface. One branch of the tee is fitted with a hinged door for exiting the tunnel. The other branch of the tee serves as a housing for a flange-mounted tube axial exhaust fan that provides ventilation for the reclaim tunnel. The fan delivers 10,000 cfm and is direct-driven by a 2 hp, 1,150 rpm, totally enclosed motor. The plate feeders are adjusted and the motors aligned and greased periodically to provide consistent feed rates. Periodically, the reclaim tunnel is washed down. The reclaim ventilation fan will be maintained to be functional at all times.

At the end of facility life, the silo will be demolished. Concrete from the silo structure will be used for backfill in the reclamation of the mine site. Steel parts and machinery will be salvaged or sold for scrap.

Breaker Station - Raw coal (16" x 0") from the breaker feed belt falls into the feed box of an 8' x 20' single-deck inclined vibrating screen. The screen separates the product at minus 1-5/8 inches. Oversize feeds directly into a 14' diameter x 28' long rotary breaker which breaks the coal into a finished 1-5/8" x 0" product, and yields a reject nominally +6". The reject product is subject to further treatment, discussed later. The finished product from the breaker and the screen undersize

drop onto a 54-inch wide inclined collecting conveyor. At this point, the coal is a nominal 1-5/8" x 0" and is the final product of the plant. Maintenance of the breaker station is by standard machinery service procedures. Bearings and moving parts on the crushers and screens are greased periodically. Parts, such as chutes, screens, and liner plates, will be replaced as they wear out.

In conjunction with reclamation, the breaker station will be dismantled. Components will be sold for scrap or salvaged. The concrete foundation will be removed to below the anticipated final reclamation surface. Any concrete extracted will be used for fill in the mine site reclamation.

Secondary Crushing Station - Rotary breaker rejects, a nominal +6" material consisting of coal and trash, are directed from the breaker to the recirculating belt conveyor for delivery to the secondary crushing station. A self-cleaning magnet is installed at the discharge of the conveyor for tramp iron removal as the rejects are fed onto a 4' x 8' single-deck vibrating screen. Undersize from the screen is crushed in 36-SSM Gundlach double-roll crusher to minus 1-5/8" and fed onto the breaker feed conveyor. Screen oversize is rejected into a concrete rejects bin. Maintenance of the secondary crushing station is similar to the breaker station maintenance.
The secondary crushing station will be dismantled in conjunction with reclamation. The components will be salvaged or sold for scrap. The foundation will be removed to below the anticipated final reclamation surface. Any extracted concrete will be used for fill.

Truck Loading Station - The final product, 1-5/8" x 0" coal prepared at the breaker station is conveyed to the truck loadout. Material is handled on the truck loadout conveyor at the maximum rate of 1,500 tph. The conveyor discharges into a twin hopper bin having total capacity of 800 tons. A self-cleaning magnet is suspended in the discharge chute of the conveyor for tramp iron removal. The truck loadout bin hoppers are equipped with air cylinder operated clam shell gates. Operation of the gates is from a control room located between the loadout bin hoppers.

A 100-ton capacity truck scale with 140' x 12' platform is installed beneath one of the two bin hoppers for weighing trucks empty and loaded. The truck scale pit has a drainage system. The pit floor is in five sections with each section sloped to drain into 2-inch diameter drains that discharge

into a 4-inch cast iron header pipe. The header discharges into a sandbox approximately 60 feet from the scale pit. Truck scales at the loadout require service periodically to ensure accurate operation. The bin liner is expected to wear enough to require repair during the facility life. The clam shell gates on the hoppers are greased to ensure smooth operation.

The truck loadout will be dismantled in conjunction with mine site reclamation. Steel parts and machinery will be sold for scrap or salvaged. The foundation and concrete scale pit will be removed below the anticipated final reclamation surface. Any excavated concrete will be used for backfill.

Dust Collection System - Four baghouse type (dry) dust collectors are located strategically throughout the plant, providing pickup points at dust generating locations such as conveyor transfers, feeder draws and discharges, vibrating screens, breaker, crusher and applicable ancillary equipment. The collectors are provided with automatic, pneumatic cleaning systems and associated components as required for complete operational units. Each collector includes a centrifugal type exhaust fan suitable for the installation, complete with drive components. Where applicable, the collectors are equipped with enclosed-type screw conveyors to convey dust from hoppers of the respective baghouses and return it to the system through a powered rotary valve seal. Units installed on top of bins discharge directly into the bin.

Locations and collectors sizes are as follows:

- Mine surge silo - 4,000 CFM
- Breaker station (includes sampling equipment) - 32,000 CFM
- Secondary crushing (includes reclaim feeders from mine surge silo and emergency stockpile) - 15,000 CFM
- Truck loadout station - 4,000 CFM
- Specific locations of dust collection points are shown in drawing 3-19 thru 3-26.

Maintenance of the dust collection system includes lubrication, bag cleaning, and motor replacement. All moving parts are lubricated to prevent excess wear and corrosion during operation. Periodically,

the collection bags are mechanically cleaned of dust. The collected dust is returned to the plant product system.

Removal of dust collection systems will take place in conjunction with removal of the facility stations in which they are incorporated. Parts will be sold for scrap or salvaged.

NON-COAL AND MINE DEVELOPMENT WASTE DISPOSAL

In the north end of the upper storage yard, a trash chute and collection boxes have been provided for disposal of non-coal waste material from the mine. Material that accumulates in the collection box is loaded into trucks by front-end loader. Trash is then transported to a state and federal approved dump site. The concrete trash chute and collection box will be demolished during reclamation and used for backfill.

Used oil accumulated at the mine site is reclaimed in compliance with the Utah Oil Refinement Act and CFR Title 40, Part 266, Subpart E. Used oil is collected at the mine site by a Division approved collector/hauler and reclaimed through a Division, and EPA approved reclaimer.

Underground development waste is temporarily stored adjacent to the non-coal waste pile and then transported to an approved waste rock disposal site. Temporary storage will not exceed thirty (30) days. A modification to the underground development waste disposal plan is included in Appendix VII.

OTHER MINE FACILITIES

Office - Bathhouse - Warehouse - The mine office at Cottonwood/Wilberg is located underground off the portal road on the same level as the Hiawatha Seam. It is part of an underground facility containing a small parts warehouse and bathhouse. The floor plan comprises 2,300 square feet, housing mine administration, first aid, safety, dust control, and clerical personnel. Included in the office is a conference room and restroom facilities. The structure is concrete block walls and concrete floors. The roof is supported by solid steel sheet roof bolted to the rock strata above and further supported with steel I-beams.

The Wilberg bathhouse is the largest of the underground personnel facilities taking 3,000 sq. ft. It houses change rooms, showers, bathrooms, and a lamp room. The bathhouse structure is identical to the offices, having concrete block walls, concrete floors, and roof bolted steel plate ceilings reinforced with steel I-beams.

The underground small parts warehouse comprises 3,000 sq. ft. of concrete floor space. The walls are concrete block and the ceiling is roof-bolted steel plate. This warehouse is strictly for small machine parts and mine supplies requiring cover and security.

Little maintenance will be required on this underground facility. The portal entrances will receive periodic painting to preserve their appearance. The building interiors require standard building maintenance.

An additional Coal Storage Facility is located adjacent to the Coal Storage Silo. The storage capacity is approximately 30,000 tons. A transfer conveyor will be used to transport coal from the silo to the storage pile. A multiplate tunnel approximately 200 feet in length will house the reclaim conveyor.

Cottonwood portal facilities includes three breakouts, (1) a man and material entry portal, (2) a ROM belt entry, and (3) a fan portal. All are accessed by an underground road system which has four separate openings.

The portals used in this facility will be sealed at the end of mine life. The steel liners in the entrances will be removed and sold for salvage.

Mine Control Building - The mine control building is a 10' x 15' concrete block structure located on the portal road overlooking the mine surface facilities. This structure houses controls for the silo feed conveyor, rock dust silo, and coal site dust collector.

The mine control building will require painting periodically to maintain its appearance. At the end of its useful life the controls will be removed and salvaged. The building will be demolished and the concrete block used for backfill.

Elevator - The elevator is installed in a rock shaft lined with shotcrete. The man car has a capacity of 25 men. Access to the elevator is through two rock tunnels driven from the upper and lower parking lots. The elevator lifts men to the portal road where the office, bathhouse, and warehouse are located. The elevator will require standard periodic mechanical maintenance. The hoist building will be painted periodically to maintain its appearance.

During reclamation, the elevator and hoist building will be removed. Mechanical and structural parts will be sold for salvage. The elevator shaft will be backfilled and the rock tunnels will be sealed.

Personnel Parking Lots - Two personnel parking lots occupy approximately three acres combined. Each are identified by location as the upper parking lot and the lower parking lot. Both lots are accessible from the service road.

The 1.4 acre upper parking lot has a 3-inch asphalt surface over a 6-inch gravel base course. The lot is sloped to drain into concrete catch basins, drop drains, and rolled asphalt ditches. The 1.6 acre lower parking lot is gravel surfaced only with a 6-inch base course and is slopes to drain to catch basins at the entrance. Runoff from the parking lots is conveyed, through culverts, to the sedimentation basins. The parking lots will be cleared of snow and debris and resurfaced as needed. Drains will be cleaned to maintain proper drainage.

The asphalt surfacing will be removed and disposed of at an approved facility. The parking areas will then be graded and revegetated as outlined in the reclamation plan.

Upper Materials Storage Area - The 0.7 acre upper storage yard is gravel surfaced with a 6-inch base course. This yard is used for storage of belt materials, crib blocks, roof bolts, beams, belts, etc. The trash chute is located on the north side of the storage yard. Fueling facilities with underground

storage tanks were installed on the west side of the materials storage area. The Diesel tanks held 2,000 gallons and the gasoline held 2000 gallons. The hydraulic oil tank held 2000 gallons. The underground storage tanks were removed and a closure notice issued by the State on September 18, 1988. Mine materials are transported by diesel equipment from the storage yard to the mine.

Diesel Maintenance Building - The two story diesel maintenance building is located on the west side of the upper materials storage area. This building houses both a maintenance shop (lower level) and offices/training rooms (upper level). Above-ground fuel and hydraulic storage tanks are located in a concrete containment attached to the west side of this facility. Diesel and gasoline storage tanks hold 2000 gallons each and the hydraulic storage tank holds 4000 gallons.

Silo Storage Pad

During construction of the Cottonwood Mine portal facilities it became necessary to construct a sizable crane pad located adjacent and west of the concrete silo. Erection weights and heights associated with the conveyor tube and bent structure necessitated use of a very large crane; hence, the crane pad. As the pad, or structure, was temporary, the requested permit was temporary. Since its construction, it has found a worth that of being a material storage area and crane maintenance structure for work on the conveyor tube. The structure was included as a permanent facility of the Cottonwood mining and reclamation permit.

Location: Directly west of the concrete silo.

Size: 60 feet wide by 110 feet long and 25 feet high (see map in packet 3-16).

Materials: Structural wide flange I-beams measuring 12" x 10" x 35' buried vertically on 10' 0" centers and interlocked with steel anchors. Walls are formed by interlocking 10" x 10" x 10' 0" square timbers between the I-beams which forms a two-sided bin wall. Approximately 1300 cubic yards of material excavated from the bent structure platform was used to fill the structure.

Drainage: Approximately 100 feet of chain link fence was removed to accommodate the new structure. The fence served as protection of the undisturbed drainage ditch. To separate the undisturbed and disturbed drainages at the structure a ditch commensurate in size with the existing ditch will be constructed along the contour of the contact of the fill and natural hill slope. This ditch 2' x 2' will be sloped down canyon to channel the undisturbed runoff waters down canyon to a point where the binwall ends and the flow can be moved by culvert to the existing ditch. Drainage off the disturbed portion of the pad will flow northward where existing ditches and culverts will convey the water to the sedimentation basins. No modification of the sedimentation basins is necessary to accommodate the fractional increase of the disturbed area. Basins operate on detention time between inflow and outflow controls. Removal costs have been added to the final reclamation costs (see Volume II, Part 4).

The Upper Storage Yard- Upper Storage Yard is maintained in a manner similar to the upper and lower parking lots. Snow and debris are removed as needed. Regrading and resurfacing will be performed when required. The rock dust, fuel, and trash chute installations will be removed during reclamation. The material storage area will be regraded and revegetated as proposed in the reclamation plan.

Power Supply- The power source for the entire Cottonwood/Wilberg Mine is supplied from the main substation which transforms the 69 KV utility service down to 7,560 volts by means of two (2) 6,000 KVA transformers. Power at this level (7,560 V) is then transferred to the promontory substation switchgear by aerial cable and then distributed from that point to the various secondary unit substations where it is further broken down to 480 volt, 3-phase, 60 HZ (the utilization level for the surface facility). Additional distribution from the promontory switchgear supplies the mine with four (4) 7,560 V, 3-phase, 60 HZ feeders and also the mine ventilation fan with 4,160 V, 3-phase, 60 HZ

power from the 3,000 KVA fan transformer located at the promontory substation adjacent to the switchgear.

Power is supplied to the substation via a 69 KV transmission line roughly paralleling the Cottonwood haul road to the lower parking lot. Also, a 69 KV line serves the Trail Mountain Mine. The power supply system will be maintained by Utah Power & Light Company - Southern Division.

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

Mine Fans-With the division of the original Wilberg Mine into the Cottonwood/Wilberg mining complex there are some changes made in the ventilation systems.

After the Wilberg fire the northern portion of the mine was sealed and the fan removed. Recovery and rehabilitation of Wilberg Mine uses a small 150 HP exhaust fan located immediately north of the original 1000 HP fan which existed at the time of the fire.

Cottonwood Mine fan (not to be confused with the proposed Cottonwood Canyon fan portal located in Cottonwood Canyon) is situated as shown on the facilities map (packet 3-16). Under normal operation, the fan is driven by a 1,000 HP electric motor as the prime mover. Through a clutch arrangement, a diesel engine is installed to provide backup for the electric motor. The electric motor and the diesel engine are installed in a motor house, separated from the mine ventilation fan and duct by a long shaft-type coupling.

Fuel for the diesel engine is stored in a 500 gallon capacity horizontal fuel tank, located on a small earthen embankment approximately 14 feet above the fan house road. A 2-inch fill line permits filling the tank from the fan road. A buried 3/4 inch line supplies fuel to the engine.

The mine fan is inspected daily and greased as needed. The fan motor house and evase' will be painted periodically to maintain their appearance.

At the end of mine life all fan installations will be dismantled and salvaged. The fan portals will be sealed. ~~The proposed Cottonwood Canyon fan portal plans have been deleted and final reclamation of the area was completed in 1998.~~

Water Pollution Control Facilities

Drainage System - Two separate drainage systems are provided at the Cottonwood Mine site and are classified as "undisturbed" and "disturbed" collection systems. These systems are illustrated on Drawing MAP 1 "Disturbed Area Runoff Control Facilities". Details of these systems are in Appendix XIII. The "undisturbed" system collects uncontaminated water above the portal site and from side slopes adjacent to the site and conveys it past the disturbed area into the natural channel of Grimes Wash.

Undisturbed runoff is collected by concrete inlet boxes in both the right and left forks of Grimes Wash and conveyed by 72-inch pipes to a junction box in the plant yard area. From the junction box, a 90-inch culvert carries the runoff back into the natural channel. The system is designed to adequately pass the 50 year/24 hour precipitation event.

The "disturbed" collection system collects runoff from the roads, parking lots, storage areas and portal area and conveys it to sedimentation basins located within the truck turn-around loop. This system consists of concrete catch basins, small-diameter CSP culvert and open ditches designed to adequately collect and pass peak flow from a 100 year/6 hour precipitation event.

Drainage south of the sedimentation basins is controlled by asphalt paving and concrete curb and gutter. The drainage from the road area and the guard station area is directed through riprap channels. See Drawing Map 1 for details.

The fill slopes for the security guard station were prepared and seeded according to the approved interim reclamation plan and silt fences were installed at the toe of the fill slope to provide sediment control until revegetation is successful.

Maintenance on the above drainage system consists of annual inspection and cleaning of all culverts, inlets and ditches. Trash and debris is removed and the system is checked for damage which might require repair to insure proper operation of the system.

Mine Water and Washdown System - Mine waste water is collected in an underground sump and skimmed of oil. Approximately 15,000 gallons per day of this water is prepared in the underground water treatment plant for use as potable water. Some mine water is used for washdown in the silo reclaim tunnel.

A pipeline is installed in the service yard to carry washdown water from the underground sump to the silo reclaim tunnel. Two washdown stations and hose reels are provided in the tunnel. A sump pump discharges the washdown water to a catch basin in the "disturbed" drainage system.

Water is treated underground at a maximum rate of 20 gpm and stored in an 8,000 gallon capacity fresh water storage tank. The treatment plant and process are approved by the Utah State Department of Social Services - Division of Health - Bureau of Water Quality.

After the 1984 Wilberg fire it became prudent to provide an external fire protection system. The outside physical facilities include a round water storage tank whose dimensions are 30' x 23' containing 100,000 gallons live storage and a 24' x 33' pump house. This system integrates the mines' live water systems to provide a spare capacity of 100,000 extended water in case of emergencies.

The excess mine water is discharged through a 6-inch steel pipe into the concrete inlet box at the left fork of Grimes Wash diversion. Discharge of mine water into Grimes Wash is approved by EPA under permit number UT-0022896-001. PacifiCorp notified the Division of temporary cessation of coal mining operations at the Cottonwood/Wilberg Mine effective May 29, 2001. Coal mining at the Cottonwood/Wilberg Mine ceased as of March 15, 2001. All portals were sealed according MSHA specifications on May 28, 2001. During temporary cessation, Trail Mountain Access intake portal

was designed as a drain. PacifiCorp applied to the Division of Water Quality to relocate UPDES 0022896 outfall 001 from Grimes Wash to Cottonwood Canyon. Approval was granted on July 30, 2001.

Sewage System - Sewage from the office and change room is collected in six 2,500 gallon precast concrete septic tanks located underground at the portal level. The septic tanks are connected in series and each has an individual cleanout manhole. Effluent from these tanks is carried by a 6-inch diameter pipeline to an absorption field located at the mouth of Grimes Wash Canyon. The piping is polyvinyl chloride (PVC), meeting the requirements of ASTM D3033 or D3034. The pipeline is routed down the left fork of Grimes Wash and through the plant area. It parallels the haul road for approximately 4,370 feet in a southerly direction, then diverges to the south and west for approximately 715 feet to the main absorption field (see Drawing 3-17 and 3-18).

The absorption field is designed for a percolation rate of 2 minutes/inch, with 5,220 feet of pipe laterals provided. The sewer treatment provided fulfills local, state and county health codes as stated by Utah State Department of Social Services.

To accommodate the sewage handling needs of the Trail Mountain Mine, a 4" sewer line is connected to the existing Cottonwood Sewage System. The line is buried under the Cottonwood Canyon Road and enters the Cottonwood Mine Belt Entry. It follows underground workings through the Cottonwood Tube Conveyor down the coal silo, connecting to the Cottonwood System (See 3-16 and 3-16A Facilities Map). The Trail Mountain Connection was approved on March 17, 1995 by the Division of Water Quality.

Alternative Sediment Control Areas - Disturbed areas which cannot be reasonably treated by a siltation structure (i.e., sediment pond) due to remote geographic locations and small areas not justifying a sediment pond which cannot meet effluent limitations without treatment are considered Alternative Sediment Control Areas (ASCA). These areas are treated by the best control technology available which includes, but is not limited to: silt fences, berms, catch basins, strawbales, gravel

filter dikes, check dams, sediment traps and mulches. A list of the ASCA's within the permit area is found in Table 5, (see Plate 3-27 for typical silt fence installation).

TABLE 5			
COTTONWOOD/WILBERG MINE ALTERNATIVE SEDIMENT CONTROL AREAS (ASCA)			
SITE LOCATION	***SEDIMENT CONTROL***	***ACERAGE***	***DRAWING***
~~Miller Canyon~~ ~~Final Reclamation Completed June 1999~~	~~Surface Roughening/Deep Pocking~~	~~0.02~~	~~Map 1-3: CM-10370-WB~~ ~~Refer to Appendix XXII~~
Sewer Absorption Field	Silt Fence	1.25	Map 1-3: CM-10370-WB
~~Proposed Cottonwood Canyon Fan Portal~~ ~~Final Reclamation Completed November 1998~~	~~Surface Roughening/Deep Pocking~~ ~~Strawbales, Silt Fence, Sediment Basins. Berms, Rock Gabions~~	~~8.4~~	~~Volume 11~~ ~~Map 3-13: CM-10501-CP~~
~~Waste Rock Site - Outslope~~ ~~UTU-37642~~ ~~Final Reclamation Completed 1983-1993~~	~~Strawbales/Silt Fences~~	~~0.93~~	~~Appendix VII~~ ~~CM-10361-WB~~
Guard Station	Silt Fence	0.18	Map 3-16: WS449D
Conveyor Bent Pad	Strawbales	0.04	Map 3-16: WS449D
Tube Conveyor Access Road	Silt Fence/Strawbales, Berm	0.24	Map 3-16: WS449D
Wilberg Fan	Sediment Trap, Berm	0.67	Map 3-16: WS449D
Deer Creek Mine 9th East Breakouts Final Reclamation Completed November 1999	Surface Roughening/Deep Pocking	0.60	Map 3-16: WS449D
Waste Rock Site:UTU- 65027	Silt Fence	3.28	Volume 10 Map 4-2: CM-10821-WB
TOTAL ACREAGE		~~15.61~~ **6.26**	

DIVERSIONS

Wilberg Mine operation will not require further diversion of any stream channel in the permit area until reclamation. Specific procedures for diversion during reclamation are described in the Reclamation Section. Existing runoff and stream channel diversion are described in Operation Plan.

TRANSPORTATION FACILITIES (R645-301-527)

The Cottonwood/Wilberg Mine operation utilizes roads and conveyors in association with facilities described in Operation Plan. All portal facilities are shown on Drawing 3-16. A description of the construction, maintenance, and removal of each transportation facility at the Cottonwood/Wilberg area follows.

~~The proposed Cottonwood Canyon fan portal facilities (plans abandoned) associated with the Cottonwood/Wilberg Mine will utilize the Old Johnson Mine access road. The proposed Cottonwood Canyon Fan Portal area was reclaimed in 1998 (refer to Volume 11 for complete details related to the Proposed Cottonwood Canyon Fan Portal).~~

Cottonwood/Wilberg facility plans were reviewed and approved prior to construction by the regulatory agencies. Agencies participating were the USFS, EPA, BLM, DOGM, and Utah State Department of Social Services.

Roads

There are five facility roads at the Cottonwood/Wilberg portal, identified as follows:

a. Haul Road
b. Truck Turn-Around
c. Service Road
d. Portal Road
e. Fan Access Road

All of the mine site roads are classified as primary roads according to R645-301-527.120. Safety factor calculations are found in Appendix XI.

All of the roads, except the fan access road, are asphalt surfaced. Surfaced roads are crowned, with the surfaced portion sloping at 2% to each side from the center line. Unsurfaced shoulders slope at 4%. Safety guardrails are installed at critical locations throughout the road system.

The haul road is a continuation of Utah State Road No. 57. It is 28 feet wide for two-way traffic, with a grade of 8% and 12%. Construction consists of a 6-inch thick gravel base course on a prepared subgrade, topped with a 6-inch thickness of asphalt. Superelevations on curves are designed for speeds of 40 to 55 mph. The haul road was designed and constructed by the UDOT. The truck turn-around is included in the Roberts & Schaefer Facilities Design and Certification.

The truck turn-around is also 28 feet wide. The road is level from the point of exit from the haul road through the platform scale at the truck loadout bin and around the 180° turn heading back to the haul road. A vertical curve in the road provides the transition to a 12% slope matching the slope of the haul road at the junction of the two roads. Construction of the truck turn-around is the same as the haul road. Superelevations on curves are designed for speeds of 5 to 30 mph.

The service road starts with a 150-foot long transition section at the junction of the haul road and truck turn-around. It terminates at the upper storage area. The service road is 20-feet wide for two-way traffic, with a nominal grade of 12%. Construction consists of a 6-inch thick gravel base course on a prepared subgrade, topped with a 6-inch thickness of asphalt. Superelevations on curves are designed for speeds of 5 to 20 mph. Turn-outs are provided from the service road to the coal silo area, the lower material yard, parking lot and the upper storage area.

The portal road starts at the upper storage area and extends at a 6% grade to the elevation of the facility portals where it follows the existing grade (approximately 3%) of the coal seam. Construction consists of a 6-inch thick gravel base course on a prepared subgrade, topped with a 6-inch thickness of asphalt. Surfacing of the road terminates near the promontory substation. From this point the road runs into the fan access road.

The Wilberg fan access road is a dirt road of variable width providing access from the mine portal to the mine ventilation fan. The road was constructed along an existing alignment on the Starpoint sandstone and is essentially level.

Road plans and cross-sections are in Appendix IX. Detailed specifications for road widths, gradients, surfaces, cuts and embankments are included in these drawings. Variances were required for gradients in the portal area due to the steep, narrow canyon terrain. The regulatory agencies have granted the variance on the basis that major construction of complying roadways would increase environmental degradation. A copy of the road construction variance is in Appendix X.

Drainages for the portal area are described in Operation Plan. Associated drainage plans including specifications are shown on Maps 1 and 2, Appendix XIII. Protection of inlet ends of ditch relief culverts is provided through grated drains and concrete catch basins. Details of drop drain installation are in the appendices with the drainage system details.

Geotechnical analysis and recommendations for steep cuts and embankment fills at Cottonwood/Wilberg portal area were furnished by Dames & Moore. A copy of their report and recommendations are found in Appendix V.

R645-301-534.130 states that road embankments will have a minimum safety factor of 1.3. Safety factor calculations indicate that all of the roads at the Cottonwood/Wilberg Mine site meet this requirement. See Appendix XI for safety factor information.

Roads will be cleared of snow and debris as needed to maintain proper drainage and utility. Resurfacing of roads will be performed as needed to maintain grade and prevent erosion. If a road is damaged by a catastrophic event, such as a flood or earthquake, the road will be repaired as soon as practical after the damage has occurred.

Specific procedures for reclamation of roads and fills are discussed in the Reclamation Section.

Explosives

The explosive storage and handling facility at the Cottonwood facility is located on the Wilberg fan pad area in accordance with the appropriate State and Federal regulations. (See Map 3-16.) See Appendix XII for the Blasting Plan.

Conveyors

The coal handling circuit includes eight conveyors identified as follows:

- (2) Mine Belt Conveyors
- Silo Feed Conveyor
- Breaker Feed Conveyor
- Recirculating Conveyor
- Collecting Conveyor
- Truck Load-out Conveyor
- Cottonwood Canyon Tube Conveyor

All facility conveyors are 48" wide with the exception of the collecting conveyors, Cottonwood ROM conveyor, and Cottonwood Canyon Tube Conveyor which are 54", 60" and 60" wide respectively. All conveyors are covered to prevent wind erosion of their respective loads.

The Wilberg Mine belt conveyor delivers 16" x 0" coal from the mine to the coal transfer structure at maximum rate of 2,450 tph. The Wilberg Mine silo feed conveyor collects 16" x 0" coal from the coal transfer and delivers up to 2,450 tph to the coal storage silo or emergency silo bypass. This conveyor is inclined at 7° and is 700 feet long. In addition, the Cottonwood ROM belt conveyor delivers 16" x 0" coal to the coal silo at a maximum rate of 3200 tph.

The breaker feed conveyor delivers 16" x 0" coal from the reciprocating feeders under the silo to the breaker station feed box. It delivers on the average of 1,200 tph and may deliver as much as 1,500 tph. The recirculating conveyor delivers rejects from the breaker station to the secondary crushers. Rejects include wood, tramp iron, rock, and coal. The coal in the reject is attached to rock which will not break to the 1-5/8" x 0" product size. This belt carries up to 170 tph of reject material. The collecting conveyor is incorporated in the base of the breaker station. This belt receives the final

product coal at 1-5/8" x 0" from the breaker station and feeds the truck load-out conveyor. A maximum of 1,500 tph may be delivered on this belt.

The final conveyor on the coal handling circuit is the truck load-out conveyor. This conveyor delivers 1-5/8" x 0" coal from the collecting conveyor to the truck load-out at a maximum rate of 1,500 tph.

Standard mechanical maintenance procedures are followed to ensure smooth operation and long life of the facility conveyors. During reclamation, the conveyors will be dismantled and sold for salvage.

RETURN OF COAL PROCESSING WASTES TO UNDERGROUND

Some rock will be generated during entry rehabilitation and underground construction, most of which will be gobbed underground. No plans exist to return coal processing wastes underground at the Cottonwood/Wilberg Mine.

AIR POLLUTION CONTROL PLAN

Presently, the most up-to-date fugitive dust control practices are implemented at Cottonwood Mine. In accordance with regulations, control measures have been applied in facility construction and will be applied throughout the life and subsequent reclamation of the mine site.

All service and haul roads at Cottonwood Mine is asphalt surfaced with the exception of the mine fan service road. Travel on the mine fan service road is minimized to once a day at low speed. The unpaved mine fan service road extends 700 feet beyond the mine portal road.

Vehicular traffic in the Cottonwood portal area is controlled to minimize contribution of fugitive dust. Vehicle speeds are restricted to 20 mph; speed limit signs are posted. The steep natural terrain prevents unauthorized travel on other than established roads.

Revegetation procedures have been implemented on all non-use areas in the portal yard. Where erosion or incomplete germination occurs, filling and reseeding will be repeated until adequate vegetation is established.

Fugitive dust controls are implemented throughout the coal handling process. All belt conveyors and interprocess conveyors are covered and equipped with belt scrapers to prevent coal dust generation. Transfer points are enclosed and chute inlets and outlets are rubber curtained to minimize open areas. A dust collection system with baghouses has been provided for the storage silo, crushing and cleaning facility, and the truck load-out. Collection points at the storage site include the silo inlet and reclaim feeders. The crushing and cleaning facility collection points include the breaker feed chute, reject discharge chute, breaker screen enclosure, and conveyor skirtboards. Collection points at the truck load-out include the conveyor head chute and the hopper. Descriptions of dust collection systems are included in the buildings and facilities paragraph under Operation Plan: General Requirements.

The high moisture content of the coal at Cottonwood/Wilberg Mine provides fugitive dust control throughout the handling and hauling process. Analysis of samples taken during processing show an average 10.54% inherent and surface moisture content in 616 samples. Table 5 is a copy of the sample analysis data. Coal dust generation is reduced throughout the handling process of dampening effect of this moisture.

Conditions do not exist at Cottonwood/Wilberg Mine that promotes spontaneous combustion. No facilities are available or planned for long-term stockpiling of coal. No coal products are stored, excepting active ROM storage (silo) at the Cottonwood/Wilberg Mine.

EXPERIMENTAL PRACTICES

No experimental underground mine practices are being conducted at Cottonwood Mine.

PERMITTED OFF-SITE SUPPORT FACILITIES

As discussed in the facilities description of the Operation Plan, a sewer leach field exists off-site adjacent to Wilberg haul road. The leach field location, construction, maintenance, and removal are incorporated in the Operation Plan section.

~~*Miller Canyon Intake Portals*~~

~~The Miller Canyon intake portals were developed in October of 1981. This facility consists of three (3) portals (8 ft. x 20 ft.) on 100 ft. centers. The portals were used for intake purposes until the Wilberg Mine fire in December 1984. At that time they were temporarily sealed. The portals were subsequently sealed permanently in 1987.~~

~~The seal in the east portal is provided with a water monitoring pipe. Intermittent small quantity discharges occur at this point. The discharges are monitored in accordance with stipulations of UPDES UT-0022896-004.~~

~~*Channel Canyon Intake Portals*~~

~~The Channel Canyon ventilation breakouts consisted of two separate portals which occurred on a steep escarpment located in an un-named canyon on the western wide of East Mountain. The first set of seals were constructed in 1990, 25 feet inby the portal openings. An additional set of seals were constructed at the outcrop to conform with the near vertical slope. Final reclamation of these portals occurred in the summer of 1997. Final bond release was received by DOGM on February 23, 1998.~~

Cottonwood Canyon Diesel and Tube Conveyor Portals

The Cottonwood Canyon diesel and tube conveyor portals were developed in 1994-1995. The portals are used for underground travel and conveyance of coal from the Trail Mountain Mine to the Cottonwood Mine surface facilities. (See Appendix III for reclamation cross-sections, soil, vegetation reports and culvert size calculations.) Reclamation of this area will use the same seed mixture listed in Part 4 of this plan.

All surface drainage will be directed and treated through a silt fence before entering an eighteen inch (18") corrugated metal pipe (cmp) that will be placed under the concrete pad to allow surface flow from the existing road ditch to continue. The conveyor pad will be constructed of dirt and gravel with a dirt berm. All surface drainage will be directed and treated through a silt fence before entering a six inch (6") corrugated metal pipe (cmp) which will direct the flow down the slope from the pad and into an existing thirty-six inch (36") undisturbed inlet.

~~*Cottonwood Fan Portal Area (For complete details on the Cottonwood Fan Portal Area refer to Volume 11)*~~

~~The original development plans for the Wilberg Mine centered on extending the main entries westward to intersect the coal outcrop located in Cottonwood Canyon four miles west of the portals.~~

~~It was anticipated the ventilation exhaust fan would be needed in early 1983. However, with the breakout or air intakes constructed in the Miller Canyon and the shift in mining emphasis to the South (Cottonwood) lease, the fan portal installation was postponed.~~

~~This portal site initially was disturbed under an exploration permit issued by the State of Utah for determining subsoil engineering design data for a major portal facility which since has been reduced to only a fan portal. This five acre site includes two small soil stockpiles, and a disturbed drainage collection system with two small sedimentation basins. Approximately half or 2.5 acres of this disturbed area has been revegetated. This planting occurred in late 1981. Following updated plans and mining needs, the once proposed fan portal is no longer required. Final reclamation of the disturbed area was completed in the fall of 1999.~~

~~There exists within the area of previously planned development, an old abandoned coal mine (Johnson Mine). Remnants include an old wagon road and two sealed portals. The roadway was upgraded and utilized during construction phases for facing off the proposed fan area. The roadway was reclaimed to some degree in 1981. Final reclamation of this area occurred in the fall of 1999.~~

BLM Right-of-Way UTU-37642 – This area once contained a 15.62 acre waste rock site. The site was reclaimed in the 1980's and Phase III bond release was granted in July of 2009. A 1.81 acre rock and soil storage area now only exists at this site. The area is completely enclosed by a net and barbed wire fence. Access into this site is from state highway 57.

Cottonwood/Wilberg Waste Rock Disposal Sites

~~***BLM Right-of-Way UTU-37642 (Old Waste Rock Site):***~~

~~Old Waste Site (refer to Appendix Volume, Appendix VII): Located 1.5 miles south of the Cottonwood/Wilberg Mine, this 48.62 acre site was originally designed as an open storage and truck loadout for the Cottonwood/Wilberg Mine. The Right-of-Way grant was issued by the Bureau of Land Management (BLM) in 1977 but subsequent developments, specifically a concrete storage silo for coal storage constructed at the mine site, changed the need for this site. A modification was submitted to use this land for underground development waste storage in connection with underground development ongoing in the Cottonwood/Wilberg Mine. The Right-of-Way UTU-37642 has been modified to accommodate coal bed methane degasification conducted by Texaco Inc. Listed below is a list the acreage descriptions of the Right-of-Way including original grant, modifications, and disturbance associated with the facility:~~

~~**BLM Right-of-Way UTU-37642**~~

~~Original Grant~~	~~48.62 acres~~
~~1997 Relinquishment (Texaco Well 35-14)~~	~~1.08 acres~~
~~1999 Relinquishment (Texaco Well 34-80)~~	~~12.98 acres~~
~~TOTAL RIGHT-OF-WAY UTU-37642~~	~~34.56 acres~~
~~Disturbed Area~~	~~15.62 acres~~
~~Reclaimed Area (Phase I Released)~~	~~13.81 acres~~

~~Approximately 13.81 acres of the old waste rock site has been reclaimed. Material to cover the waste rock was taken from the perimeter berms. Phase 1 bond release was approved on July 22, 1999. The area relinquished in 1999, (12.98 acres approved by the BLM on November 2, 1999) was undisturbed acreage located mainly on the west side of State Highway 57 (refer to Appendix VII: CM-10361). Texaco is utilizing this area as a utility corridor for well 34-80.~~

BLM Right-of-Way UTU-65027 (New Waste Rock Site):

New Waste Site (refer to Volume 10): Located 1.7 miles south of the Cottonwood/Wilberg Mine on the west side of State Highway 57 is BLM Right-of-Way UTU-65027. This 27.27 acre site was permitted to replace the "Old Waste Rock Site: UTU-37642" which reached designed capacity. The Right-of-Way grant was issued by the BLM in 1990. The Right-of-Way UTU-65027 has been modified to accommodate coal bed methane degasification conducted by Texaco Inc and to reflect as-built conditions. Listed below is a list the acrerage descriptions of the Right-of-Way including original grant, modifications and disturbance associated with the facility:

BLM Right-of-Way UTU-65027

Original Grant: 6/28/90	25.49 acres
Amendment: 8/15/90 (Staging Area)	1.78 acres
Subtotal	27.27 acres
1999 Relinquishment (Texaco Well 34-80)	
Staging Area	1.78 acres
As-Built Addition (1999)	0.36 acres
TOTAL RIGHT-OF-WAY UTU-65027	25.85 acres
Disturbed Area (Total Project Life)	17.44 acres

During the Texaco well assessment, PacifiCorp re-surveyed the disturbed and permit boudaries associated the R/W UTU-65027. Two small areas of disturbance were located outside the original metes and bounds permit boundary description. To rectify this situation, PacifiCorp has revised the R/W description to include all areas of disturbance associated with the waste rock facility (refer to Volume 10). The 1999 relinquished area referred to as the "staging area", was previously disturbed by oil & gas drilling activities in 1956. PacifiCorp will retain access to State Highway 57 and has installed permit and disturbed boundary signs as indicated on map 4-1 (CM-10826). Texaco will re-disturb the staging area with development of well 34-80 and will assume reclamation liabilities.

IN-SITU PROCESSING

There are no-situ processing activities or plans for such activities associated with the Cottonwood/Wilberg Mine.

OPERATION PLAN EXISTING STRUCTURES

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

Existing Structures

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

For the sake of organization and simplicity, we have decided to list the various structures by groupings of associated structures. Group I (Underground Facilities), this group association will list those facilities such as underground diversions and surface drainage systems. Group II shall list and incorporate all surface facilities, buildings, conveyors, power lines, storage tanks, etc., and all facilities related with operations as they pertain to coal processing. Group III lists only earthen structures, i.e., fills, embankments, roads, earthen berms, and sedimentation basins.

Group I (Underground)

1. Two 6' diversions located in both the left and right forks of the Grimes Wash drainage. One 7.5' diversion connected to the two 6' tributary diversions. Diversions are shown on drawing titled "Undisturbed Surface Water Diversion" Map 3-27. Diversions consist of corrugated metal pipe and were installed early in 1978. Capacity sizes were calculated to accommodate 50-year precipitation events. Hydrological calculations are included in Appendix XIII (R & S Report).
2. Surface drainage collection system, as shown on Map 3-28, depicts how a series of concrete catch basins interconnected by an underground collection system captures all disturbed area runoff waters within the disturbed area. This system was

constructed in 1978. Design criteria meet the 10 year/24 hour precipitation event. All water collected in channeled to the sedimentation basins. Hydrological computations are included in the Appendix (R & S Report).

Group II (Surface)

Surface facilities, as shown on the Surface Facilities Map (aerial photograph - Map 3-15), indicates each facility location.

By definition (SMCRA-EIS), existing structures includes any man-made component installed or constructed within the mine plan area (portal) which facilitates mining, processing or the transporting of coal.

It is applicant's belief by interpretation of the regulation "Existing Structures" UMC 784.12 and the testing of these structures by the corresponding Subchapter "K", UMC (810-845) a performance standard is irrelevant. Part 784.12 requires a showing or evidence of the structures competency level measured by a set of standards that are void of normal acceptable engineering design criterion.

We suggest that it was not the intent of the regulatory writers to test buildings, conveyors and other such structures by the performance standards of Subchapter K, but rather, earthen structures such as foundations, fills, embankments and containment ponds (Hardaway 1980).

Nevertheless, we have included pictures of each surface facility and further state that each was designed by professional engineers to standards that meet both state and federal building codes (see Appendix XIV).

No surface structures contained in the following list are planned for modification (see Table 6). Construction plans for each structure are on file in the applicant's office at 30 North Main, Huntington, Utah, for review by the regulatory authority.

TABLE 6 COTTONWOOD/WILBERG MINE EXISTING STRUCTURES APPLICABLE EXHIBITS AND CONSTRUCTION DATES	
Structures	**Construction Dates (Begin/End)**
Coal Handling Facility	
Coal Pass	June 1978/December 1978
Storage Silo	June 1978/December 1978
Breaker Station	June 1978/December 1978
Secondary Crusher	June 1978/December 1978
Truck Load-Out	June 1978/December 1978
Conveyors	June 1978/December 1978
Dust Collection System	June 1978/December 1978
Power Supply	June 1978/October 1978
Grimes Wash Diversion	June 1978/August 1978
Disturbed Surface Drainage	June 1978/December 1978
Mine Water Disposal	June 1978/August 1978
Sewer Treatment	June 1978/December 1978
Personnel Parking Lots	June 1978/December 1978
Elevator	November 1979/August 1980
Materials Storage	June 1978/December 1978
Trash Chutes	October 1978/December 1978
Railway	June 1978/December 1978
Roads	June 1978/December 1978
Mine Fans	June 1978/October 1978

Group III (Earthen Structures)

Locations of the major earthen structures are shown on the Surface Facilities Map 3-16 (topography map). Only areas of significant size have been selected as existing structures for reasons of future monitoring. The following are earthen structures.

Haul Road
Sediment basins
Lower Service Area
Lower Parking Lot
Upper Parking Lot
Upper Storage Yard
Service Road

Of the five major fill embankments, two consist of deep fill material which quality for future monitoring. Both are located in the left fork of Grimes drainage, the upper parking lot and the material storage yard. Also, per ~~UMC 817.49~~ R645-301-514.300 all sedimentation basins are monitored. Quarterly inspections of physical stability and quarterly discharge reports are filed with the appropriate agencies for UPDES permits. The remaining structures are either small fill areas or mostly cut embankments and are considered stable by their nature.

Wilberg Mine was constructed during the year 1978. Standard acceptable construction practices were used during the excavation and grading phases of work. Hydrological considerations include underground diversions and surface collection systems as previously described in the operating plans.

Roads - General

Horizontal alignment was limited by natural topography, a narrow and steep canyon. Vertical grades average approximately 12% overall and were submitted to the Division for variance of non-compliance structures.

Approval was given by the DOGM on May 25, 1978. Construction of roads utilized acceptable practices for material selection and compaction methods. Culverts for surface drainage were calculated to meet storm events for a 10 year/6 hour storm which are included in the hydrological calculations. Side slopes were determined by soil classifications to meet the slope limitations of ~~Subchapter K (817.162)~~ R645-301-527 and 534. All roads are hard surfaced with the exception of the fan portal access road which is constructed on a massive sandstone formation serving as a base member of the Hiawatha coal seam, a proven foundation.

We have determined by inspection and slope stability analysis that the existing earthen structures that compose the Cottonwood Mine meet the minimum performance standards of ~~Subchapter K~~ R645-301-527 and 534 and will not require modification.

The following is a general description of these structures.

Sediment Basin Area

Sedimentation basins constructed in 1979 utilize two small basins taking advantage of the restricted width and the canyon gradient to optimize storage capacity requirements. Both basins are located between the load-out loop road, as shown on the layout maps. Physical dimensions and detail drawings are included. Design parameters are based on a 10 year/24 hour event. Basins are in series with each other allowing for a 24 hour detention time. Each basin is fitted with a steel stand pipe with a 3" siphon pipe for decanting purposes. The stand pipes are open topped and sized to accommodate a 25 year storm event. No emergency spillways, other than the stand pipes, will be required to meet the performance standards of 30 CFR Subpart "~~K~~ C " 77.216. Hydrological computations for the design with flow through hydrographs are included in this submittal, Appendix XIII.

Calculations for the sediment basin embankments indicate that the basins meet the safety factor requirements established by R645-301-533.100. See Appendix XI for this information.

Monitoring of the basins for structural deterioration, settling or water seepage will be visually inspected quarterly. Sediment and water levels will be recorded and cleaned as necessary to maintain the 60 percent sediment storage levels. An annual inspection report of each basin's physical condition with recorded water and sediment levels shall be submitted to the Division are required.

Wilberg Mine has been issued an UPDES permit whose identification number is UT-0022896. There are five outfalls associated with this permit. They are:

001 Cottonwood Mine Water Discharge in Cottonwood Canyon,

003 Wilberg Portal Sedimentation Pond Discharge,

~~002 Cottonwood Portal Sedimentation Basin Discharge,~~

~~004 Miller Canyon Ventilation Portal Discharge,~~

005 New Waste Rock Site Sedimentation Pond Discharge.

Approval of the sedimentation ponds by the appropriate state and federal agencies has been given for the Wilberg portal and Waste Rock Site ponds. ~~Sedimentation basins associated with the Cottonwood exploration work has received DOGM approval. Company states that the basins meet the performance standards of Subchapter "K" and require no modification.~~

Lower Service Area

This area is at the confluence of Grimes Wash and a tributary (right fork) that enters from the northeast. Three terraced areas have been constructed for disposition of coal which is received from the mine entries. The silo area, at 7,428' elevation, lies astride the gulch, 300' north-south and 100' east-west, with a storage yard at the north end. The crusher-breaker area is on the west side of the gulch at an elevation of 7,396' running 420' north-south and averaging 70' wide. The load-out area is at 7,387' elevation and occupies about 300' diagonally across the gulch including the haul road and irregularly shaped storage areas.

Lower Parking Lot

The lower parking lot is situated in the right fork drainage at an elevation of 7,471' and 300' long and 200' wide. It is constructed of rock and earth material removed from the northern slope. The surface of the lot is drained through a series of open ditches and concrete catch basins as shown on surface drainage map. The haul road right-of-way continues up Grimes Wash (left fork), but from this point is designated as the service road. The fill where the service road begins at the lower parking lot is about 40' high. This fill slopes was analyzed for slope stability and found to have a safety factor greater than 1.5 (see Slope Stability section).

Upper Parking Lot

The upper lot is located astride Grimes Wash (left fork) about 520' along the service road from the lower parking lot at an elevation of 7,530'. It is a filled area 200' wide (across the channel) and 300' long. Drainage is diverted around the northern side of the lot by an open ditch and into the culvert system that feeds the sedimentation basins. The northern edge of the lot abuts a near vertical, barren rock slope. The southern edge lies against the natural slope of the canyon wall which was cut out to form the service road. The western edge of the lot is formed in the canyon by the toes of the fill that

reaches down from the upper storage area. The service road grade forms the eastern edge of the lot. The outer edge of the road slopes at 1V:1.5H down to the lower service area - silo level.

Fill at the center line of the lot vertically above the drainage channel is about 35' deep at the western edge and is about 85' deep at a corresponding point on the eastern edge. This slope was analyzed for stability and found to have a safety factor greater than 1.5 (see Slope Stability).

Upper Storage Yard

The upper storage area is an earth filled structure in the drainage channel used for storage of mine materials and supplies. it is located about 70' vertically above the upper parking lot and is roughly rectangular, 200' wide by 300' long. Fill material was mostly obtained from the lower parking lot area. Some fill was added as excavated material from the service road below the coal seam.

The nominal elevation of this area varies from 7,611' to 7,605' and it extends across the drainage channel to abut a natural rock slope on the north. The south edge adjoins the service road. The southwestern end of the area lies within a 180° curve of the service run where it reverses direction across the drainage channel. The area at this point has a useful width of about 60'. The northern end is formed by the shoulder of the fill that lies at its angle of repose (1V:1.5H) overlooking the upper parking lot. It is 200' wide along the crest. The face of this fill appears to be stable and unaffected by the runoff upon it. The depth of fill at the shoulder is about 70' at a point directly above the channel. Area drainage is provided by 7 drop inlets to a culvert system running to the sedimentation basins in the lower service area. This fill was analyzed for stability and found to have a safety factor greater than 1.5 (see Slope Stability).

Service Road

The service road is deemed to originate at the lower parking lot, then traverses up Grimes Wash (left fork), past the upper parking lot, and up a steep grade on the west side where it has been blasted from the sandstone wall of the canyon. It passes the upper service level 650' from the upper parking lot at 7,620' elevation. It intersects the coal seam at about 7,640' elevation where the sandstone at the base of the coal seam forms the road bed. The sandstone continues as a ledge running southeasterly into

which the mine entries are driven. Offices, warehouse, and change rooms have been constructed underground in old workings near the cropline. About 750' along the ledge from the crossing of Grimes Wash, the road turns 90° northeast to parallel the drainage of the right fork. Service traffic is terminated at this point, but the road continues about 600' for access to ventilation fans and then along the coal bed for another 800' to intersect a breakout of the Deer Creek Mine workings (reclaimed in late 1999).

Structural Stability

The surface facilities including the existing fill slopes were constructed in 1978. Roberts & Schaefer was contracted to design and construct these facilities.

As part of their design process Roberts & Schaefer contracted with Dames & Moore for several geotechnical studies. One of which is included in the mine plan. Based on the recommendations of Dames & Moore, design specifications were put together for construction of the facilities, more particularly the earthen fill structures. Roberts & Schaefer specifications for construction are included for review.

Based on the Dames & Moore geotechnical report and Roberts & Schaefer's construction specifications, stability analyses have been done on the three major fills specifically: upper storage yard, upper parking lot and lower parking lot. Based on verbal conversations with Dames & Moore and Roberts & Schaefer personnel the following soil parameters have been estimated:

$\gamma = 120$ pcf
$C = 0$
$\emptyset = 38^\circ - 40^\circ$

These parameters have been confirmed in writing (see attached letter). The simplified Bishop method of slices was used to determine the safety factors. Method of procedure is included.

Upper Storage Yard:

Height of Fill (H) = 80'
Cohesion (C) = 0
Unit Weight (γ) = 120 pcf
Slope = 1.5H:1V
$\emptyset = 38°$ SF = 1.5
$\emptyset = 40°$ SF = 1.6

Upper Parking Lot:

Height of Fill (H) = 100'
Cohesion (C) = 0
Unit Weight (γ) = 120 pcf
Slope = 1.5H:1V
$\emptyset = 38°$ SF = 1.5
$\emptyset = 40°$ SF = 1.6

Lower Parking Lot:

Height of Fill (H) = 40'
Cohesion (C) = 0
Unit Weight (γ) = 120 pcf
Slope = 1.5H:1V
$\emptyset = 38°$ SF = 1.5
$\emptyset = 40°$ SF = 1.6

~~Slope stability analysis was also performed on the proposed Cottonwood fan portal pad. The soil parameters were taken from the tests and study done by Rollins, Brown and Gunnell which are included in Appendix XVIII.~~

~~Cottonwood Fan Pad:~~

~~Height of Fill (H) = 90'~~
~~Cohesion (C) = 1872 psf~~
~~Unit Weight (γ) = 100 pcf~~
~~Slope = 1.4H:1V (36°)~~
~~$\emptyset = 27.3°$ SF = 1.5~~

Based on the results of stability analysis, the construction specifications, and the as-built condition, the Wilberg facilities are well within the regulations.

At any time a slide occurs which may have a potential adverse effect on health, safety or the environment, the applicant will notify the Division as soon as possible. Remedial measures agreed upon by PacifiCorp and the Division will be used.

ROBERTS & SCHAEFER LETTER

SLOPE STABILITY REVIEW

~~COTTONWOOD FAN PORTAL~~

~~SLOPE STABILITY CERTIFICATION~~

ROBERTS & SCHAEFER LETTER

Excerpts From Roberts & Schaefer Contract Specifications

pages 10 - 15 (including Table 4.5.1)

SIMPLIFIED BISHOP METHOD OF SLICES

(Lamb & Whitman 1969, p. 365)

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 2, Part 4, Reclamation Plan

Replace Entire Text Section

RECLAMATION PLAN

Structure Removal

Once mining has ceased, the surface facilities will be dismantled and removed from the permit area. Starting at the mine portals, all belt lines, crushing and screening systems, electrical systems, truck loadouts, surface buildings and fan installations will be torn down and hauled from the permit area.

The concrete silo will be torn down, broken up and buried against the east highway cut in the lower parking lot. All other concrete foundations that would be above final grade will be removed and buried with the silo material. Refer to Items 1-A thru 3-A in Appendix C for demolition of the structures at the Cottonwood/Wilberg Mine.

Portal Sealing

Final stages of mining (second mining), as pillars are extracted near the portal entrances inside, office and warehouse facilities will be dismantled and portal sealing will begin. Wilberg's portal entries are all up-dip of the extracted seam and require no drains or special hydrological containment seals (see Protection of the Hydrological Balance section). Seals are proposed as shown on Figure 1 (refer to Part 4 - Figures).

~~Because of their remote and inaccessible location from the surface, the following portals and breakouts will have to be completed from inside the mine: Channel Canyon , 7th West "Miller Canyon", Cottonwood Canyon diesel and tube conveyor portals. The Channel Canyon portals were reclaimed in August of 1997 and Phase III Bond Release for the area was approved by the Division on March 26, 1998. The Miller Canyon portals were sealed from inside the mine in 1987 and final reclamation was completed in June 1999 (refer to appendix volume: Appendix XXII). The Cottonwood Canyon diesel and tube conveyor portals are presently utilized and will also be sealed sometime in the future.~~

The ~~remaining~~ Cottonwood/Wilberg portals and breakouts will be sealed before backfilling and grading is started.

The total portals or breakouts to be sealed is 23 (refer to Part 4: Appendix A - High Wall Survey).

Cottonwood/Wilberg Mines List of Portals (refer to Highwall Survey: Part 4 Appendix A)*		
Location (Number of Portals)	**Development Date**	**Status**
Grimes Wash		
Wilberg Mine Fan (1)	Prior to 1973	Active Mine Fan
Wilberg Fan Portal (1)	1978	Sealed with cement plug in 1985
Wilberg Belt Portal (1)	Prior to 1973	Active
Wilberg Intake Portal (1)	Prior to 1973	Active
Underground Offices (4)	1975-1976	Active
Shop Portals (1)	Prior to1973	Active
Old Portals behind water tank (2)	Prior to 1973	Active
Wilberg Intake Portals (3)	May 1977	Sealed with cement plug in 1985
Mine Access to Cottonwood (2)	1982	Active
Cottonwood Intake Portals (2)	1985	Active
Cottonwood Fan Access Tunnel (2)	1982	Active
Cottonwood Fan Portal (1)	1984	Active
Cottonwood Belt Portal (1)	1984	Active
Cottonwood Canyon		
Cottonwood Diesel Roadway (1)	1995	Active
Cottonwood Belt Portal (1)	1995	Active
Miller Canyon (3)	1981	Reclaimed in 1999 Phase III Bond Release Accepted on October 4, 2010
Channnel Canyon Intakes (2)	1989	Reclaimed in 1997 Phase III Bond Release Accepted March 1998

* Refer to Item 2-A in Appendix C.

Asphalt Removal

The asphalt and gravel road base from the service road, truck turn around, upper parking lot, portal bench, south Wilberg portals, and south Wilberg storage pad will be removed and disposed of off-site. Refer to Appendix C, Item 3-A for quantities removed.

Channel Restoration

On completion of mining and beginning reclamation, buried diversion piping in the right and left forks of Grimes Wash to just below the confluence, will be excavated and removed.

Reclamation concept for hydrological concerns will involve a two-stage approach. Stage One will see reclamation remove all the surface facilities, buried diversion, backfill and grading and near total restoration of the drainage stream beds. During Stage One of the two sedimentation basins will remain with diversion of undisturbed surface waters. Ponds will function as they have during mining.

Upon acceptance by the authority of revegetation of the reclaimed area following the extended bonding period, the two sedimentation ponds and buried diversion piping will be removed and final backfilling and grading, channel restoration, duel culverting under the access road, and revegetation of this area will be completed.

Original engineering drawings show present buried diversions were placed generally along the existing stream bed. Both left and right forks will be excavated to the original bedrock channel insuring original grade and location.

Restoration concept will be to duplicate stream bed gradient, meandering location, together with drops, riffles and pools reducing excessive velocities during heavy runoffs. Channel design is based on passing safely a 100 year/24 hour storm event with 3.5 inches of precipitation.

The drainage pattern consists of the main branch of Grimes Wash (left fork) and the Right Fork. Both drainages are extremely steep and have scoured the channel to bedrock. At their confluence the grade flattens rapidly allowing channels to be regraded to a moderate slope.

A rip-rapped channel design to carry the peak flows calculated for both east and west watersheds will be emplaced as shown on Map 4-1. Watershed characteristics are depicted in Table 1 (refer to Part 4 - Tables). The curve number derivation is shown in Table 2 (refer to Part 4 - Tables), and height, flow and velocity are summarized for various channel slopes in Appendix XV. Hydrological

procedures and calculations are described in the Appendix. Watersheds and subdrainages are depicted on the drainage map in Appendix XV.

Channel reconstruction will of a trapezoidal design using bedrock as a base with both filter and rip-rap sides whose slope shall not be steeper than 50 percent (2H:1V), refer to Part 4: Figure 2.

Filter and rip-rap gradation shall consist of aggregate materials with weight and size approximating the following ratios:

d_{15} Filter	d_{15} Rip-rap
d_{85} Base	d_{85} Filter

Granular size gravel smaller than 3" and larger than #4 sieve. Sand smaller than #4 and larger than #200.

Rip-rap shall be composed of graded mixtures down to the one inch size particle such that 50 percent of the mixture by weight shall be larger than the D_{50} size. This mixture shall contain sufficient gradation to fill the void when placed. The diameter of the largest stone shall be 1.25 x D_{50} and the rip-rap thickness shall not be less than 1.5 times the largest stone diameter. Rip-rap D_{50} maximum shall not exceed one-third the bottom width of the channel bottom.

RIP-RAP GRADATION

	Steep Slopes	Mild Slopes
$\frac{D_{Max}}{D_{50}}$	1.25	2
$\frac{D_{50}}{D_{10\text{-}20}}$	2-3	2-3

Determination of the mean rip-rap diameter (D_{50}) was based on maximum shear stress using the methodology presented by Anderson, et al (1970) as follows:

$$T_{max} = 5D_{50} \qquad (1)$$

$$T_0 = c\ 62.4\ d\ S \qquad (2)$$

where,

T_{max}	=	the maximum shear stress than the rip-rap can sustain in pounds/sq. ft.
T_0 (T 0)	=	the actual shear stress on the channel in pounds/sq. ft.
D_{50}	=	the mean rip-rap diameter in feet
d	=	the flow depth in feet
S	=	the channel slope (ft/ft)
62.4	=	the unit weight of water in pounds/cu.ft.
C	=	the channel shape coefficient (see following table)

Channel shape coefficients for sides of trapezoidal shaped channel with 2:1 side slopes:

Bottom width/depth	C
1.0	1.3
2.2	1.2
4.3	1.1
> 6.3	1.0

Two constraints associated with the use of equations 1 and 2 are:

1. T_{max} should be less than 15 pounds/sq.ft.
2. the maximum rip-rap size, D_{max}, should not exceed approximately 1/3 of the channel width.

Both constraints limit the mean rip-rap diameter to three feet for the channel conditions at the Wilberg site (assuming a 10-foot bottom width for the channel). By combining equations 1 and 2 with the Manning equation and assuming one dimensional flow, the following equation is obtained:

$$D_{50} = 9.8\ C\ (nq)^{0.6}\ S^{0.7} \qquad (3)$$

where the additional variables are:

n = Manning's roughness coefficient

q = discharge per unit width of channel

It can be seen from equation 3 that with the rip-rap diameter fixed and the roughness and flow conditions established, the slope of the channel is the only variable that can be adjusted to meet rip-rap stability requirements.

Therefore, equation 3 was used to establish criteria for maximum slope conditions along the channel reach, assuming a D_{50} of 3 feet. The difference between the actual slope conditions and the maximum allowable slope will be the fall that will have to be incorporated into drop structures along the channel profile. The fall will take place over natural ledges along the channel profile which will be excavated in bedrock during channel restoration.

Channel slope data, channel hydraulic data, and channel profiles for the Left Fork, Right Fork and Main channels are presented on Maps 4-2.

Sidewall construction of the rip-rapped channel shall incorporate a 9-inch granular filter on which a 4.50 foot thick rip-rap protective covering will be placed. Construction and placement of the rock shall, where possible, enhance pooling and energy disposition.

Section Reference

Anderson, A.G., A.S. Paintal, and J. T. Davenport. 1970.
Tentative design procedure for rip-rap lined channels. University of Minnesota, National Cooperative Highway Research Program Report 108. Highway Research Board.

Sedimentation Control

Sediment control is provided in several ways. First, a series of small contour ditches spaced approximately 40 feet apart. Each ditch will contain approximately one cubic foot of water per lineal foot of ditch. This provides not only water retention to lesson runoff and reduced sediment loading but enhances soil moisture for plants adjacent to the ditches. Second, the entire revegetation area is covered with a two inch blanket of mulch and anchored with a vexar netting. And last, two sedimentation ponds connected by a collection system which parallels the major drainage channels.

Contour Ditches

This system of parallel ditches with provisions for excess overflow into collection ditches will provide a major restraint of runoff water during initial revegetation of reclamation. Hydrological, each ditch should retain about 30% of the calculated runoff:

$$40 \times .824 \div 12 = 2.7 \text{ cubic feet/foot}$$

Stability of each ditch will be given by compacting the surface before the ditches are constructed.

BACKFILLING AND GRADING

In general, the backfilling and grading of the disturbed areas will consist of removing the fill pads and backfilling the cut areas. This will occur in two stages. Stage I (refer to Appendix C for quantities cut, regraded and/or moved - Items 3-B thru 3-X) reclamation will recontour the disturbed areas of the Right and Left forks of the Grimes Wash. Approximately 143,879 bank cubic yards (BCY) of material will be backfilled and graded within these areas. Approximately 59,543 BCY will be cut from between stations 5+00 and 11+00. This material will be moved to the remaining stations in the Left and Right forks and used as fill material. The remaining 84,336 BCY of material will be backfilled and graded within the stations to recontour the disturbed areas as illustrated on Plate 4-1, map CM-10500-WB and Plate 4-3, Map CM-10484-WB in Volume 6. An access road will remain in the Right Fork of the Grimes Wash as part of the Stage I reclamation.

During Stage II of final reclamation (refer to Appendix C for quantities cut, regraded and/or moved - Items 3-Y thru 3-JJ), the access road and the north and south sediment ponds will be removed (refer to Plate 4-2, map CM-10378-WB, 1 of ~~2~~ 3 in Volume 6). Approximately 57,368 BCY of material will be backfilled and graded within these remaining areas to complete final reclamation. Approximately 15,721 BCY will be cut from between stations 16+00 and 19+00. This material will be moved to the remaining stations in the Right Fork and the main channel below the confluence of the Right and Left forks. Approximately 41,647 BCY of material will be backfilled and graded within the stations to recontour the remaining disturbed areas as illustrated on Plate 4-2, map CM-10378-WB, 1of 2 and Plate 4-3, map CM-10484-WB in Volume 6. The referenced Plate 4-3 illustrates cross-sections of the area to be reclaimed.

Waste Rock Storage Facilities

Old Waste Site: Located 1.5 miles south of the Cottonwood/Wilberg Mine, this 48.62 acre site was originally designed as an open storage and truck loadout for the Cottonwood/Wilberg Mine. The Right-of-Way grant was issued by the Bureau of Land Management in 1977 but subsequent developments, specifically a concrete storage silo for coal storage constructed at the mine site, changed the need for this site. A modification was submitted to use this land for underground development waste storage in connection with underground development ongoing in the Cottonwood/Wilberg Mine. The Right-of-Way UTU-37642 has been modified to accommodate coal bed methane degasification conducted by Texaco Inc. Listed below is a list the acreage descriptions of the Right-of-Way including original grant, modifications and disturbance associated with the facility:

BLM Right-of-Way UTU-37642

Original Grant	48.62 acres
1997 Relinquishment (Texaco Well 35-14)	1.08 acres
1999 Relinquishment (Texaco Well 34-80)	12.98 acres
TOTAL RIGHT-OF-WAY UTU-37642	34.56 acres
Disturbed Area	~~15.62~~ 0.00 acres
Reclaimed Area (Phase III Released July 2009)	13.81 acres

Approximately 13.81 acres of the old waste rock site has been reclaimed. Material to cover the waste rock was taken from the perimeter berms. Phase 1 bond release was approved on July 22, 1999. **Phase III bond release was approved July 22, 2009.**

New Waste Site: Located 1.7 miles south of the Cottonwood/Wilberg Mine on the west side of State Highway 57. This 27.27 acre site was permitted to replace the "Old Waste Rock Site: UTU-37642" which reached designed capacity. The Right-of-Way grant was issued by the Bureau of Land Management in 1990. The Right-of-Way UTU-65027 has been modified to accommodate coal bed methane degasification conducted by Texaco Inc and to reflect as-built conditions. Listed below is a list the acreage descriptions of the Right-of-Way including original grant, modifications and disturbance associated with the facility:

BLM Right-of-Way UTU-65027

Original Grant: 6/8/90	25.49 acres
Amendment: 8/15/90 (Staging Area)	1.78 acres
Subtotal	27.27 acres
1999 Relinquishment (Texaco Well 34-80)	
Staging Area	1.78 acres
As-Built Addition (1999)	0.36 acres
TOTAL RIGHT-OF-WAY UTU-65027	25.85 acres
Disturbed Area (Total Project Life)	17.44 acres

For complete reclamation details refer to Volume 10. Soil sample analyses of this site are found in Appendix D.

Highwall Elimination

Final reclamation of highwalls at the Cottonwood/Wilberg mines is accomplished in three phases. These phases follow strict requirements set forth by the Utah Coal Rules R645-301-100 through 800. Highwalls at the Cottonwood/Wilberg mines were inventoried by Office of Surface Mining and the Division of Oil, Gas and Mining in 1997. Eighteen (18) areas of concern were identified and are listed in Part 4 Appendix A. Eight (8) of the areas considered highwalls were constructed prior to the ruling (May 3, 1978) of the Surface Mining Control and Reclamation Act (SMCRA). Seven (7) highwall portals were constructed after that date. Three (3) of the sites have no associated highwalls. Sites constructed prior to May 3, 1978 need only to eliminate highwalls to the extent practical using all reasonably available spoil. All post SMCRA sites are required to completely eliminate highwalls. Part 4, Appendix B exhibits the extent of backfill that will be used to eliminate as practical or eliminate completely these highwalls. This is shown in a photo essay of each of these portals. All highwalls at the Cottonwood/Wilberg mines will be eliminated concurrently with final reclamation activities. Detailed scheduling and cost estimations are located in Part 4 Appendix C

Acid and Toxic Material Handling

All acid and toxic forming material will be buried with at least four feet of material during the backfilling and grading cycle. When feasible, this will be accomplished within 30 days after the material is first exposed. Temporary storage of the material, beyond 30 days must be approved by the Division.

Rip-rap Installation and Drainage Structure Removal

During the backfilling and grading cycle, rocks suitable for rip-rap will be sorted from the excavation and placed in the restructured drainage channel. The amount of rip-rap material is approximately 7% of the total. The majority of the material was originally taken from rock cuts; therefore, sufficient material for rip-rap is available.

As the backfilling and grading progresses and the drainage structures are exposed they will be removed and disposed of off the permit area.

Temporary Sedimentation Control Facilities

To aid in erosion control on the large fill slopes, small ridges or contours will be made on 10 foot intervals, sloped at 2% toward the rip-rap channel.

Soil Stabilization of Rills and Gullies

Rills and gullies, which develop ~~to a depth of nine (9) inches or greater~~ in areas that have been regraded and topsoiled, which disrupt the approved postmining land use, or reestablishment of the vegetative cover, or cause or contribute to violation of water quality standards for receiving streams, will be filled, regraded, or otherwise stabilized; topsoil will be replace; and the areas will be reseeded or replanted. Based on our present maintenance program for fill slopes, we estimate 32 hours per year of work will be needed.

Sediment Control Structure Removal

Once the bonding period is complete and revegetation is satisfactory the sediment ponds/basins at Cottonwood/Wilberg will be backfilled and graded. Material in the embankments will be used as backfill.

Final Reclamation Slope Stability

The final contours and slopes will be reconstructed to approximate original contour. No reconstruction slopes are greater than 1.5H: 1V.

Cottonwood/Wilberg Facilities Area

Slope stability ~~and mass balance~~ analyses were performed by Johansen and Tuttle Engineering in 1989 (see Appendix IV). The following is a summary of the results of these.

Maximum Height of Fill (H) = 60'
C = 0
γ = 120 pcf
Slope = 1.5H:1V

$\emptyset = 40^{\circ}$ (min) SF = 1.3

Roberts & Schaefer specifications for Class C fills will be used.

(See information in Part 3 - Structural Stablility .)

Plan for Grading Along the Contour

A final grading, preparation of overburden before replacement of topsoil, and placement of topsoil, shall be done along the contour to minimize subsequent erosion and instability. If such grading, preparation, or placement along the contour is hazardous to equipment operators, then grading, preparation, or placement in a direction other than generally parallel to the contour may be used. In all cases, grading, preparation, or placement shall be conducted in a manner which minimizes erosion and provides a surface for replacement of topsoil which will minimize slippage.

Cessation of Operations-Temporary

PacifiCorp commits that before temporary cessation of mining and reclamation operations for a period of thirty (30) days or more, or as soon as it is known that a temporary cessation will extend beyond thirty (30) days, a Notice of Intention to Cease or Abandon Operations will be submitted to the Division. This notice shall include a statement of the exact number of surface acres and the horizontal and vertical extent of sub-surface strata which have been in the permit area prior to cessation or abandonment, the extent and kind of reclamation of surface area which will have been accomplished, and identification of backfilling, regrading, revegetation, environmental monitoring, underground opening closures and water treatment activities that will continue during the temporary cessation.

REVEGETATION

Interim Stabilization and Vegetation Plan

There are five major fills at the Cottonwood/Wilberg Mine with bare open slopes generally with a south or southeast aspect. With the proposed reclamation plan these fills would provide the soil material for the final contouring and grading. Plate 4-3 (map CM-10484-WB) shows the location of substitute topsoil to be used for final reclamation. Because no topsoil was stockpiled and the native soils on these steep slopes provide very little topsoil material, these materials will need to become the planting medium. An off-site source is impractical. The fill material was tested in 1980, 1983, and again in 2001 for its physical and chemical properties. Refer to Appendix D for the results of the 2001 soil sampling program.

The soil material in the fills was originally derived from sandstone and shale parent materials. The soil material particles are mostly sand with textures from sandy loam to loamy sands (Refer to Part 4 Appendix D: Soil of the Wilberg Mine Site). The water holding capacity is low, typical of sandy soils.

They are calcareous soils as indicated by a pH of 7.5-8.5 and calcium carbonate equivalents above eight percent (Refer to Part 4 Appendix D: Soil of the Wilberg Mine Site). Salt content is too low for any harmful affects on plants. Potassium, phosphates and nitrogen, important plant nutrients, are very low indicating the need for fertilization to insure plant growth. The organic material is principally coal debris; the nitrogen percentage ratio is too low.

PacifiCorp shall restore areas impacted by subsidence caused by surface cracks or other subsidence features such as escarpments (not to include naturally occurring escarpments which are not a result of mining) which are of a size or nature that could, in the Division's determination, either injure or kill grazing livestock. Restoration shall include recontouring of the affected land surface including measures to prevent rilling, and revegetation in accordance with the approved permanent revegetation plan in the PAP. Restoration shall be undertaken after annual subsidence survey data

indicate that the surface has stabilized but in all cases restoration and revegetation shall be completed prior to bond release.

PacifiCorp shall compensate surface owners, except for land owned by PacifiCorp, for lands which cannot be safely grazed due to hazards caused by surface effects of subsidence, with land (in close proximity) of comparable size and grazing capacity to be used for grazing until restoration of the damaged land is achieved.

PacifiCorp shall compensate, at a fair market value, owners of livestock which are injured or killed as a direct result of surface hazards caused by subsidence.

Interim Revegetation (Prior to 1989)

Fill Slopes

The fill slopes at the upper equipment yard, upper parking lot, silo area, sedimentation ponds and roadways require interim stabilization.

The interim revegetation will provide information for developing a final revegetation plan by:

1. Developing the fill material as a substitute for topsoil by establishing a root system in the top layers along with organic material buildup and an environment suitable for micro-organism colonization.
2. Provide a detailed analysis of soil productivity with a series of tests over the life of the mine. This will be the basis for fertilization and soil handling at the final revegetation.

The upper 18" fill layer will become the "topsoil" by nature of its established plant community with micro-organisms, organic deposition, nutrient soil cycles, root zone, etc. At final reclamation this "topsoil" will be removed and stored during the redistribution of fill and grading. Then the temporarily stored "topsoil" will be placed on the newly graded surfaces 6-12 inches deep at random locations. This will increase the variability of the soil surface and serve as a catalyst for the final seedings and plantings.

The following interim seed mix was applied for soil stabilization in November of 1988. The areas (see 1988 Vegetation Monitoring Report) were hydroseeded and hydromulched using the methods and fertilizer application rates described below. Interim revegetation monitoring will be conducted according to Division Guidelines as described on the following pages. The plant species were selected on the basis of their drought tolerance, alkalinity tolerance, vegetative growth form (cover soil surface), root systems (both taproot and spreading) and nitrogen fixation potential. Because the slope's aspects emulate the pinyon-juniper plant community on steep slopes most species selected were native to the reference area.

Common Name	Scientific Name	Lbs/Acre Equivalent PLS*
GRASSES		
Thickspike Wheatgrass	Agropyron dasystachyum	5
Western Wheatgrass	Agropyron smithii	6
Bluebunch Wheatgrass	Agropyron spicatum	3
Indian Ricegrass	Oryzopsis hymenoides	4
Squirreltail	Sitanion hystrix	3
Greatbasin Wildrye	Elymus cinereus	3
FORBS		
Pacific Aster	Aster chilensis	0.2
Northern Sweetvetch	Hedysarum boreale	1
Yellow Sweetclover	Melilotus officinalis	1
Alfalfa	Medicago sativa	1
Palmer Penstemon	Penstemon palmeri	1

Mechanics of Interim Revegetation (Prior to 1989)

Fill Slopes

The fill slopes are relatively small areas and because of the steepness, all of the seeding and planting work was done by hydroseeding. These slopes are severe planting sites and successful establishment of a vegetation cover will require close attention to details, some favorable growing conditions and repeated efforts. The criteria for interim revegetation success will be the establishment of at least 60% ground cover on the majority of the slope. This may require a three to seven year period.

Seeding (November 1988)

1. Slopes were cleaned of debris.
2. The seed mixture (described above) was applied by hydroseeder at the specified rates.
3. The hydromulch/tackifier/fertilizer mixture was applied at the following rates:

Sylva fiber hydromulch	2000 lbs/acre
Organic tackifier	120 lbs/acre
Ammonium nitrate	50 lbs/acre
Triple superphosphate	75 lbs/acre

Maintenance and Monitoring (refer to Part 4: Figure 3)

1. Signs will be placed around the planted slopes.
2. Weed control will not be undertaken unless it is determined necessary due to weed dominance and delayed rate of succession. Studies indicate that competition from weeds, including Salsola kali, is greatly reduced within three (3) years after revegetation. Preliminary on-site studies support published reports on this matter. All noxious weeds will be eradicated if they become established on the site.
3. Rodent damage, on revegetated areas, will be assessed and species specific control measures will be implemented as necessary.
4. A site visit will be scheduled at least once each year to check on fitness of the sites and progress of the plant growth. Observations will be made to assess potential problems including: erosion, animal impacts, unusual conditions (e.g. abnormal plant growth, areas of poor vegetation, etc.). Erosion will be repaired as discussed earlier (refer to Soil Stabilization of Rills and Gullies).
5. Ground cover will be assessed by ocular estimation using meter square quadrants. Interim revegetation will be determined successful when erosion is effectively controlled or ground cover is a least 60%.
6. An annual report that summarizes the year's work will be placed in the Company's files and forwarded to DOGM.
7. The soil materials on the fill slopes will be sampled at five year intervals to record productivity changes. Analysis of these samples will be placed in Part 4, Appendix D. Five samples at 0-6", 6"-12", & 12"-18" depths will be composites for each of the five fill slopes for analysis. Analyses will be performed in accordance with Division Guidelines and will include:
    1. Soil Texture
    2. pH
    3. Electrical Conductivity
    4. Sodium Adsorption Ratio
    5. Organic Carbon/Organic Matter
    6. Saturation Percentage
    7. Available water capacity (1/3 and 14 atmosphere water)
    8. Standard Fertility Test (for P and K analysis)
    9. Field estimate of percent Rock Fragments (by volume)

Additional sampling will be conducted, as needed to delineate any problem areas identified during initial sampling.

Interim Revegetation (1989-Future)

When necessary to effectively control erosion on disturbed areas, seeding and planting will take place as contemporaneously as practicable with the completion of backfilling and grading. The following seed mixture and planting will be applied at the specified rates. The species were recommended by the US Forest Service as being consistent with the management plan for the area. (Please refer to the Final Reclamation Plan, for justification of introduced species.)

Common Name	Scientific Name	Lbs/Acre Equivalent PLS*
GRASSES		
Thickspike wheatgrass	Agropyron dasystachyum	2
Crested wheatgrass	Agropyron cristatum	1
Western wheatgrass	Agropyron smithii	3
Intermediate wheatgrass	Agropyron intermedium	3
Smooth brome grass	Bromus inermis	2
Indian ricegrass	Oryzopsis hymenoides	2
Needle-and-thread grass	Stipa comata	2
FORBS		
Pacific aster	Aster chilensis var. adscendens	0.2
Utah vetch	Hedysarum boreale	1
Yellow sweetclover	Melilotus officinalis	2
Alfalfa	Medicago sativa var. nomad	1.5
Eaton penstemon	Penstemon eatonii	0.4
	TOTAL	20.1

*Application rates result in approximately 80 seeds/ft^2.

SHRUBS		
Serviceberry	Amelanchier alnifolia	100
Fourwing saltbush	Atriplex canescens	50
Snowberry	Symphoricarpos oreophilus	100
Winterfat	Ceratoides lanata	50

Interim Revegetation Methods (1989-Future)

1. Seedbed Preparation

   Seeding will take place as contemporaneously as practicable following soil placement; therefore, the seedbed will be in a condition suitable for seed application. However, if a surface crust has developed it will be broken up by hand or mechanical tilling.

2. Seeding

   The seed mixture will be hand broadcast with "hurricane spreaders" or applied by hydroseeder at the specified rate.

3. Fertilizer Application

   The following fertilizer combination will be applied by hand broadcasting with "hurricane spreaders" or as a separate operation of hydroseeding:

Ammonium Nitrate	40 lbs/acre
Triple Superphosphate	35 lbs/acre

4. Seed Covering
   Following hand broadcasting of the seed mixture and fertilizer, the sites will be hand or mechanically raked to cover the seeds.

5. Mulch Application

   Following hand broadcasting and raking, the seeded areas will be covered with hay mulch (2 tons per acre) and netting or erosion control mulch blanket. The netting or blanket will be mechanically anchored per the manufacturers specifications.

   Following hydroseeding, a hydromulch with tackifier will be applied at the rate of approximately 2000 lbs/acre.

The criteria for interim revegetation success will be the establishment of at least 60% ground cover, on the majority of the slope, which prevents or minimizes erosion. Maintenance and monitoring will be conducted as described earlier, refer to "Mechanics of Interim Revegetation".

Test Plots

Test plots were established on a fill slope at the mine site to test the final revegetation seed mix. The test plots were located in area W2-West (see Map 2-18). Slope and vegetation test plots exposure will be relatively constant throughout the area. Division approval was obtained prior to installation of the test plots. Observations indicate that moisture may be the primary factor affecting vegetation growth at the mine site. Therefore, the test plots were designed to test the final revegetation seed mix and plantings under various moisture conditions and mulch applications.

Because of the limited size of the slopes involved, the test plot sizes were limited. The plot layout and design is illustrated on Figure 4 (refer to Part 4: Figures). The design provides for eight (8) seeding, mulch, and irrigation combinations.

The test plot area will be divided into eight (8) individual plots, each one 20 feet by 20 feet. Each plot will be separated from adjacent plots by a buffer area five (5) feet in width. Each plot will be permanently staked and the entire test area will be fenced. The test plots were installed in the fall of 1989 with seeding being done as late in the season as possible.

Prior to seeding, the test plot area was treated with Round-up herbicide per manufacturers recommendations to remove existing vegetation. The soil surface was roughened using hand tools to prepare the seedbed.

The final revegetation seed mixture (detailed in the Final Vegetation Plan) was applied on all test plots as described in the Final Revegetation Plan. Following seeding, the following fertilizer mixture was applied, per DOGM recommendations:

Ammonium Nitrate	30-50 lbs/acre
Triple Phosphate	30-40 lbs/acre

The plots will then be hand-raked to cover the seed and fertilizer.

Following seed and fertilizer application, the various mulch treatments were applied as indicated on Part 4: Figure 4. During hydromulch application, adjacent plots were covered to prevent contamination due to overspray or wind drift.

During the spring of 1991, containerized plants were planted as described in the Final Revegetation Methods.

Irrigation was applied during the first two (2) years (growing seasons) following seeding. After dicussion with the Division, irrigation was terminated after the second growing season. Irrigation began with the onset of spring and terminated at the first fall frost.

Irrigation was applied once per week unless determined otherwise based on soil moisture and plant vigor appearance. Soil moisture conditions were determined weekly by soil probing to a six (6) inch depth.

Irrigation was supplied from a water truck using a hand-held sprayer attached to a hose. The amount of water applied was quantified. Water was applied to the point of surface saturation or penetration to six (6) inches on the control plot. All irrigated plots were watered equally. Irrigation commenced in the early evening and be completed by sundown.

Maintenance, monitoring and sampling methods and schedules were as specified for Final Reclamation Sampling. A minimum of 15, 1/4 meter quadrants will be evaluated per plot. Success standards will be as specified for the reference area (refer to Part 2: Vegetation Information for the Wilberg Mine).

Final Revegetation Plan

The upper 18" of the slope material will be the planting medium, as explained in the interim plan. Seeding will take place as contemporaneously with soil grading as is practicable in late fall or early spring. If considerable time (i.e. over one month) lapses between soil grading or seedbed preparation and seeding, the soil will be protected with a mulch cover, which will be mechanically or chemically anchored. A cover of hay mulch or hydromulch will be applied at a rate sufficient to provide 50

percent ground cover. The plantings will be randomly spaced and clumped for wildlife enhancement. Grazing will be enhanced by establishment of grasses. Grazing will not be allowed on the land until after bond release. Fencing will be installed if necessary to preclude grazing.

The final revegetation plan may be revised to incorporate the results of the interim revegetation and test plots. Revisions will be approved by the Division prior to implementation.

Topsoil Handling

As has been discussed previously, the upper 18" of fill material will be removed from the fill slopes and used as the planting medium (topsoil). It is estimated this will yield approximately 10,000 cubic yards of "substitute topsoil". Refer to Plate 4-3 (map CM-10484-WB) in Volume 6 for locations of substitute topsoil areas.

During backfilling and grading, all acid and toxic materials will be covered with at least four (4) feet of non-toxic material. When feasible, this will occur within 30 days after the material is first exposed. Temporary storage of the material, beyond 30 days must be approved by the Division.

Following the backfilling and grading, the surface of the backfilled material will be in an uncompacted rough condition. If areas develop where the surface is not in such condition, the material will be ripped and roughened using track-hoes, dozers and/or hand tools to eliminate slippage surfaces and promote root penetration. Topsoil material will be redistributed on the regraded areas using backhoes, excavators and dozers to achieve redistribution.

Following redistribution the topsoil will be sampled and analyzed as described in Divisions Guidelines for Management of Topsoil and Overbuden for Underground and Surface Coal Mines.

Because all surface disturbances occurs on Forest Service land, the USFS has provided the Cottonwood/Wilberg Mine with both interim and final revegetation seed mixes proposed for use. Plant species in both mixes are currently in use by the Manti-LaSal National Forest and commonly occur on the Wasatch Plateau. Both seed mixes will be evaluated in field trials proposed for

initiation in fall 1989. As the mixes include six (6) introduced species, field trials will be conducted to demonstrate whether the introduced species can establish a diverse, effective and permanent cover capable of achieving the postmining land use.

The following information is provided for each of the introduced species as further justification for their use:

Alfalfa and Yellow Sweetclover

These species are included in the interim seed mixture (and yellow sweetclover in the final mixture) because of, (1) their nitrogen fixing ability; (2) deep tap roots; (3) highly rated forage quality; and (4) ability to encourage natural plant succession.

Smooth Brome

The following evidence suggests Smooth Brome is a deep rooting species that is ideally suited for inclusion in the interim seed mix. The maximum reported rooting depth for Smooth Brome given by Wyatt, et al (1980) was 76 cm. Nicholas (1979) reported of 17 grass species she evaluated, Smooth Brome had the highest overall root/shoot ration (0.87). Dayton (1937) reported roots of Smooth Brome commonly penetrate to depths of five (5) feet or more. In addition to its deep rooting system, its sod-forming growth habits are ideally suited to control erosion. These characteristics justify its use for inclusion in the interim revegetation seed mixture.

Small Burnet

Small Burnet is included because of its ability to establish on disturbed sites and promote natural plant succession. According to Plummer, et al (1968), Small Burnet is a preferred plant for wildlife during late winter and early spring. Its relatively short persistence makes it an ideal nurse crop and successional species.

Intermediate Wheatgrass

The outstanding root growth characteristics of Intermediate Wheatgrass make this species ideal for interim and final revegetation in maintaining the viability of the soil biota. In a

greenhouse study, Nicholas (1979) reported this species ranked fourth of seventeen species in overall root/shoot ratio (.75) and second of the seventeen species in root biomass (40.15%). In another greenhouse study, McGinnies and Crofts (1986) found Intermediate Wheatgrass to have higher root/shoot ratios (1.29) in unfertilized treatment than Smooth Brome (0.49) or Slender Wheatgrass (0.19). McGinnies and Nicholas (1982) reported Intermediate Wheatgrass produced the highest root yields of seventeen species tested on raw spoil.

Crested Wheatgrass

Crested Wheatgrass is valued as a long-lived drought-resistant species which is easily established (SCS Bulletin TP-157, 1982). The species is equally valuable for its high productivity. Pallatablility is reported as excellent in the spring and late fall (SCS Plant Materials Guide, 1988).

Seed Mixture - Final Revegetation

Common Name	Scientific Name	Lbs/Acre Equivalent PLS*
GRASSES		
Western wheatgrass	Agropyron smithii	3
Intermediate wheatgrass	Agropyron intermedium	3
Bluebunch wheatgrass	Agropyron spicatum	3
Indian ricegrass	Oryzposis hymenoides	3
Needle and thread grass	Stipa comata	2
Thickspike wheatgrass	Agropyron dasystachyum	2
FORBS		
Blueleaf aster	Aster glaucodes	0.5
Utah sweet vetch	Hedysarum boreale	1
Small burnet	Sanguisorba minor	3
Lewis flax	Linum Lewisii	1
Globemallow	Sphaeralcea coccinea	0.5
Yellow sweetclover	Melilotus officinalis	2
	TOTAL	24.0

*Application rates result in approximately 80 seeds/ft^2.

SHRUBS		
Serviceberry	Amelanchier Alnifolia	400
Fourwing saltbush	Atriplex canescens	400
Green Mormon tea	Ephedra viridis	400
Big white rabbitbrush	Chrysothamnus nauseosus var. albicaulis	200
TREES		
Douglas fir	Pseudotsuga menziesii	120
Colorado blue spruce	Picea pungens	80
	TOTAL	1600

Final Revegetation Methods

1. Seedbed Preparation

Seeding will take place as contemporaneously as practicable following soil placement; therefore, the seedbed will be in a condition suitable for seed application. However, if a surface crust has developed it will be broken up by hand or mechanical tilling.

2. Seeding

The seed mixture will be hand broadcast with "hurricane spreaders" or applied by hydroseeder at the specified rates. All seed will be inspected by a Utah Department of Agriculture inspector at the time of application.

3. Fertilizer Application

The fertilizer mixture will be applied by hand broadcasting with "hurricane spreaders" or as a separate operation of hydroseeding. Application rates will be determined from soil analysis of the "topsoil". (soil sampling will conducted according to the Divisions Guidelines for Management of Topsoil and Overbuden for Underground and Surface Coal Mines.)

4. Seed Covering

Following hand broadcasting of the seed mixture and fertilizer, the sites will be hand or mechanically raked to cover the seeds.

5. Mulch Application

Following hand broadcasting and raking, the seeded areas will be covered with hay mulch (2 tons per acre) and netting or erosion control mulch blanket. The netting or blanket will be mechanically anchored per the manufacturers specifications. Hay

used for mulch will be inspected by a Utah Department of Agriculture inspector at the time of application.

6. During the spring following seeding, containerized stock of the shrub and tree species will be planted by hand. At each planting site, a basin will be created to retain moisture. A fertilizer tablet will be placed near the root zone of each plant and each planting will be hand watered. The plants will be grouped in the following manner to achieve layering:

   a. Plant groups will be randomly located throughout the reclaimed site at the rate of two hundred (200) groups per acre.
   b. Plant group dimensions and plant spacing will vary. Layering will be as follows:

Lower Layer =	Ephedra viridis
	Atriplex canescens
Middle Layer =	Amelanchier alnifolia
	Chrysothamnus nauseosus
Upper Layer =	Pseudotsuga menziesii
	Picea pungens

   c. Group composition:

Lower Layer =	4 shrubs
Middle Layer =	3 shrubs
Upper Layer = 1 tree	

7. The two sedimentation ponds will be revegetated with the above techniques at end of ten year responsibility period.

8. Irrigation application will be determined from test plot studies.

Maintenance and Monitoring

1. Signs will be placed around the planted slopes for their protection.

2. Weed control will not be undertaken unless it is determined necessary due to weed dominance and delayed rate or succession. Studies indicate that competition from weeds, including Salsola kali, is greatly reduced within three (3) years after revegetation. Preliminary on-site studies support published reports on this matter. All noxious weeds will be eradicated if they become established on the site.

3. Rodent damage on revegetated areas will be assessed species specific control measures will be implemented as necessary.

4. A site visit will be scheduled each spring to check on fitness of the sites and check progress of the plant growth.

5. Annual monitoring will include inspection for rills and gullies. Should these be present, they will be filled and replanted as described earlier, refer to Soil Stablization of Rills and Gullies Section.

6. Monitoring will be conducted in accordance with Division Guidelines as indicated in the following section, Maintenance and Monitoring.

7. Maintenance and monitoring activities will be reported in the Annual Vegetation Monitoring Report.

Sampling for Ten Year Responsibility Period and Bond Release (refer to Part 4: Figure 5)

1. All sampling will be undertaken in the late summer for maximum plant growth.

2. The line intercept or ocular estimation methods will be used to measure cover and species composition.

3. The point-center quarter method will be used to measure shrub and tree density.

4. Sample size for ground cover and shrub density will be tested at a 90 percent confidence level using a one-tail "t" test with a 10 percent change in the mean.

5. Productivity measurements will be a double sampling procedure of clipped plots and ocular estimates. Rectangular plots (6.27" x 100") will be randomly located in reference areas and revegetation sites. Sampling will be at the 90% confidence level.

6. The reference areas will be checked to detect any changes from man-induced activities and to verify they are in fair or better condition.

7. Revegetation Success:
   a. Sampling of reference sites at end of ten year responsibility period will be conducted concurrently with final reclamation sampling, using the same methodology. The range condition of all reference areas will be re-assessed in 1989. This will be repeated every five year.
   b. Ground cover is established for two consecutive years at the end of responsibility period at 90 percent of reference site ground cover.
   c. At least 80% of the shrubs and trees will have been in place for a least 8 growing seasons, the tree or shrub is alive and healthy.
   d. The woody plants established on the revegetated site are equal to or greater than 90 percent of the stocking of live woody plants of the same life form of the approved reference areas with 90 percent statistical confidence.

e. Productivity will equal 90 percent of that of the reference areas at 90 percent statistical confidence.

f. A one-tail students "t" test of the sample means will be used for the statistical test.

WASTE ROCK DISPOSAL SITE~~S~~ AND WILBERG DRAIN FIELD

Old Waste Rock Site: UTU-37642 – Phase III Bond Release Accepted July 22, 2009

~~Environment Conditions~~

~~The surrounding vegetation is a pinyon-juniper community. Important perennial understory species include curlleaf mountain mahogany, Cutler ephedra, black sagebrush, Harriman yucca, Indian ricegrass and bottlebrush squirreltail. Grasses are rare within this pinyon-juniper community.~~

~~The soil is a loamy-skeletal, mixed, mesic Xerollic Calciorthid and belongs to the Kenilworth series. These soils have a pH of around 7.7 and an exchangeable sodium of 4 percent. Erosion potential is moderate. The soil is classified in Capability Unit VIIIs-SX (nonirrigated). Soils of this classification have severe limitations that restrict their use to primarily rangeland, woodland and wildlife habitat. The soils are limited by their shallow, droughty or stony conditions. Range improvement potential is limited by the presence of large boulders on the surface. The present range condition is fair.~~

~~Reclamation~~

~~Soil grading and revegetation of the cells and berms for the most part was accomplished during the construction of the individual cells. A total of seven cells were developed and final reclamation was completed in 1993. The berms and cells were revegetated by hand methods per Items 1 thru 6, refer to Final Revegetation Methods Phase I bond release was approved by the Division on July 22, 1999.~~

~~The range site is a semi-desert stony loam (Pinyon-Juniper). Slopes vary from 3 to 5 percent. Annual precipitation is 8 to 12 inches with the majority being received during late summer. The frost-free season is 110 to 130 days. Elevation varies around 6800 feet. Present use of the area is rangeland. The post-mining use will also be rangeland.~~

~~A native plant mixture was selected that is adapted to the site. These species are perennial, drought resistant and fairly salinity resistant. Planting occurred after September 1 when soil, water~~

~~and weather conditions are favorable. A grass, forb and shrub mixture was broadcast seeded at a rate of 19.2 pounds of pure live seed per acre (refer Final Revegetation Seed Mixture). Fertilizer was applied per soil tests.~~

~~Immediately after seeding alfalfa hay was used to mulch the area at a rate of two tons per acre. The mulch was crimped into the soil.~~

~~Proper management is important following the revegetation process. Vehicle and foot traffic will be restricted from the area. Fencing the revegetated area prevented livestock grazing and keep unwanted traffic away. Rodent, rabbit and deer damage were monitored. Revegetation maintenance, monitoring, and sampling will be as described earlier in the Final Revegetation Method section.~~

New Waste Rock Site: UTU-65027

For complete details refer to Volume 10. Bond estimation is included in Part 4: Appendix C. Soil sample analyses are found in Appendix D.

Wilberg Drain Field

The drain field will be harrowed by tractor and revegetated with the same techniques and seed mixture as the waste rock site. Costs are included in reclamation costs.

Final Revegetation Seed Mixture (Old Waste Rock Site and Drain Field)

Species	Planting Rate (PLS/acre)
GRASSES	
Western wheatgrass	2.0
Indian ricegrass	2.0
Needle-and-thread grass	2.0
Galleta	2.0
Crested wheatgrass	1.0
	9.0
FORBS	
Scarlet globemallow	1.0
Yellow sweet clover	1.0
	2.0

SHRUBS	
Four-wing Saltbush	2.0
Curlleaf Mountain Mahogany	2.0
Ephedra Mormon Tea	4.0
Vasey Big Sagebrush	0.2
	8.2
TOTAL	19.2

This seed mix and planting rate is as requested by the BLM and approved by the DOGM. The introduction of Crested Wheatgrass is at the insistence of the BLM and as requested by DOGM will be monitored following reclamation of successive cells for dominance of species. The seed mix will be revised if necessary. See Appendix VII.

Reclamation of the Cottonwood Fan Portal Area

Final reclamation of the Cottonwood Fan Portal was completed in November 1998, ~~refer to Volume 11~~ and Phase III Bond Release was accepted on September 28, 2010. Approximately 1.86 acres of disturbance exists at this location. The disturbed area includes the Trail Mountain Access (TMA) portal and belt portal.

Surface Exploration Drill Holes

Initial stages of development required surface exploration drilling. From 1976 through 1999 PacifiCorp drilled approximately 150 exploration holes.

Authority to conduct such activities was gained through the State of Utah, US Geological Survey and the US Forest Service and BLM. Privately-owned surface was secured separately.

All surface drilled exploration holes were reclaimed according to the US Geological Survey's published Drill Hole Plugging Procedure in the form of stipulations for approval.

Each exploration drill site has been reclaimed and approved by the appropriate agency.

POSTMINING USES

Geographically, the site of the Cottonwood/Wilberg portal (surface operations) is restricted by a narrow canyon headed with two drainages, the left and right forks of Grimes Wash. Both tributaries are non-accessible beyond the portal site limiting uses, excepting wildlife use.

It is planned, following mining, to restore the affected by the mining operation to its premining state. Principle land use after reclamation shall be grazing and wildlife habitat. Grazing permits are presently issued for areas surrounding the surface operations by both the US Forest Service and the Bureau of Land Management. Both agencies have stated no foreseeable changes to its present use.

According to the Manti-LaSal National Forest Land and Resource Management Plan (1986), the main portal area is within the Forest Service MMA classification. This classification emphasizes Leasable Mineral Development and includes areas where land surface is, or will be, used for mineral development facilities. The surrounding area is classified GWR, General Big Game Winter Range. It is inaccessible from East Mountain but will probably be utilized by BLM permittees whose cattle would naturally migrate north into the portal area from the adjacent BLM allotments which include the waste rock site. Both those areas will be established to meet the requirements of grazing and wildlife and will be fenced during rehabilitation to allow for vegetation success.

The Proposed Cottonwood Fan Portal site is located on fee land within Forest Service grazing allotments. Postmining land use ~~will be~~ is basically wildlife habitat. Due to the steep slopes and exposed hard rock surfaces that are now present, probability of range grazing is minimal. Approximately 7.47 acres have been reclaimed (completed 1998) and Phase III Bond Release was granted on September 28, 2010.

~~During the reclamation work described earlier(refer to Final Reclamation),~~ Of the remaining 1.86 acres of disturbance, the lands ~~were~~ will be recontoured to there approximate original slopes, drainages opened, and vegetation reestablished to meet the reference area's cover, species density,

and productivity as measured at the time of reclamation. Applicant feels that the ten years following mining (bond period), there is sufficient time to manage the vegetation establishment of growth to meet the requirements of the postmine land use as stated.

PROTECTION OF PUBLIC PARKS AND HISTORIC PLACES

No public parks are located in or adjacent to the permit area. Cultural resource information contained in this application was based on field surveys contracted to AERC (Archeological Environmental Research Corporation) and conducted under the auspices of Richard Hauck.

Several separate surveys were conducted. Prior to the construction of the Wilberg Mine portal site and associated offsite facilities, archeological surveys were conducted. Results of these surveys disclosed several sites adjacent to Grimes Wash. These reports are included in the Environment Section.

During the planning of the proposed Cottonwood fan portal site (site reclaimed in 1998, Phase III Bond Release in 2010) and utility corridor, an archeological survey was conducted. It also identified several sites. Although this project has since been reduced to only the proposed fan portal, this report is also included.

The delineated Old Johnson Mine area is outside the reclamation area of the Cottonwood Fan Portal site disturbance, and was protected from any disturbance. The roadway in front of the old portal was utilized for access into the disturbed area for reclamation of the Cottonwood Fan Portal ~~reclaiming purposes~~. Final reclamation of the Cottonwood Fan Portal was completed in November 1998. A berm was established along the outside slope above the weigh shed etc. to provide protection and keep any material or rocks from entering the potential historic site area. The roadway was reclaimed as close to existing conditions as possible.

For lands within the permit area not covered by planned surface disturbances, but yet could be affected by subsidence, a general 15 percent random survey was conducted. Basis of this survey was extrapolated from requirements mandated by OSM for authorization to mine coal from the Des Bee

Dove Mine, an adjacent mine. Results of this survey are contained in the report found in the Environment Section.

SUBSIDENCE CONTROL PLAN

This section describes in further detail the applicant's design of mine plan ensuring minimal environmental impacts, specifically surface subsidence effects of the on-going Cottonwood/Wilberg Mine. Operation Plan describes in detail the proposed methods of coal resource extraction and mine development. Geology Description presents the detailed geological information, site specific and general, which provides an analytical base for mine plan and subsidence control design. The following subsections described the principal factors involved in controlling subsidence impacts resultant of the proposed mining operations.

Subsidence Damage Probability Survey

A survey has been conducted on that portion of East Mountain surface which could possibly be affected by the mining of coal from the Cottonwood/Wilberg Mine.

It has been determined that there are renewable resources present in the area in the forms of springs, water seeps, grazing land, timber and wildlife habitat.

The water seeps and springs are numerous and varied in nature; a few are perennial during the unfrozen months, while some dry up over the summer and some only appear in "wet" years.

Most of these springs emanate from permeable beds in the North Horn Formation. Recharge of these limited perched aquifers is formed by water migrating from the higher elevations of East Mountain located to the northwest of the permit area. Initially this water migrates vertically down from the surface through fractures in the North Horn Formation where it is free to move laterally. A few springs emanate from the Starpoint Sandstone which is also a limited perched aquifer.

The hydrologic monitoring plan has been designed to identify any hydrologic effects of these aquifers that are induced by mining subsidence.

There is one small building on the surface above the Cottonwood/Wilberg Mine area. It is a wooden, one-room cabin which has a measured floor area of 168 square feet. Water is piped to this cabin from Burnt Tree Spring, a short distance away and flows by gravity through a pipe laid on the surface of the ground.

There are no electrical power lines, oil or gas wells, pipelines or other utility structures which would be affected by surface subsidence within the Cottonwood/Wilberg Mine limits with the exception of a small waterline from Burnt Tree Springs used for stock watering. Timber and wildlife would probably not be affected.

There are minor stock watering troughs in various places and these are usually located close by springs or seeps.

Mining Method

PacifiCorp intends to minimize surface effects of subsidence by adopting, wherever practical, the longwall method of mining and mining the coal deposit as completely as possible. Those areas within the mine limits not mined by the longwall method will be mined by continuous miner in order to extract the maximum amount of the coal reserve possible. A further description of the mining operation is found in the Operation portion of this permit.

The longwall mining method allows almost total extraction of the mineral and induces caving of the immediate and upper roof strata. The caving process propagates upwards to a horizon located at a distance equal to approximately 35 to 50 times the mining height over the coal seam as indicated by the data (refer to Part 4: Figure 6). The curve in the figure shows the elongation of a borehole due to caving of the overburden over a longwall panel (from Dahl and von Schonfeldt).

The differential settlement of the overburden was normalized by dividing it by the seam thickness. As can be seen, the deformation decreases from a maximum of 1 at the seam roof to near 0 at approximately 37 times the mining height above the coal seam. The deformation or deflection above

this horizon is essentially continuous; the upper strata settle down on the gob without any further increase in volume (porosity).

A similar conclusion was reached by Orchard in 1973 and is illustrated in Part 4: Figure 7 and Figure 8.

It is PacifiCorp's intent to mine areas as wide and long as present mining technology allows in order to minimize the area which would be on the sloping edge of the subsidence trough. Also, the pillars of support for the longwall gate roads have been designed on the yielding pillar principle so that they will eventually yield to destruction. This has been proven in practice in the mines, therefore, will not affect the subsidence trough.

The size of the normal coal pillars used in the mine planning for both the Blind Canyon and Hiawatha Seams to ensure stability has been determined by basic calculation for the deepest expected cover, from prior mining practice in the area, and a USBM study (Pariseau). Experience has also shown that in multi-seam mining circumstance columnizing main development pillars in both these seams is essential for main stability.

The mine plan indicates that only first mining, i.e., forming pillars only, will protect high voltage power line structure from any possible subsidence. Barrier size for this essential protection has been devised from data obtained from ongoing subsidence monitoring survey (USBM Algire) on East Mountain.

Full extraction areas (room-and-pillar panels with pillar removal and longwall panels) are, by definition, planned and controlled subsidence areas. It is anticipated that this planned subsidence will result in a generally uniform lowering of the surface lands in broad areas, thereby limiting the extent of material damage to those lands and causing no appreciable change to present land uses. The extent of these full extraction areas is shown on Map 3-1 thru 3-2. Subsidence prediction work has shown the expected maximum planned and controlled subsidence will vary from 0 to 15 feet assuming that the total cumulative extraction from the two minable seams will not exceed 20 feet.

Subsidence Damage Prevention Measures

The proposed mining plan has been designed in such a way as to align the full extraction panels parallel to the margin faults and joints. This alignment with respect to jointing will prevent the formation of irregular sawtooth subsidence cracks in the overlying surface lands.

In order to more accurately forecast the overall extent and the amount of subsidence, PacifiCorp conducted subsidence studies, similar to those done by the NCB and Abel and Gentry, in cooperation with the US Bureau of Mines (Algire), refer to 1981 Annual Subsidence Report.

The results of these studies were used to developed information which, when interpolated into proven existing formulas and models, will allow prediction of probable behavior during and after mining.

Extensive field geologic investigation for the past years is designed to locate all faults in the lease area. The mine plan is designed to:

a. Clear all coal to these faults.
b. Prove by actual eventual contact in mining and underground drilling the size and direction of these disturbances.

All mining, except for planned breakouts, is stopped at a minimum distance of 200 feet from any outcrop line. Experience to date, except for one occasion, has shown that "burned coal" is always encountered before this minimum distance is reached.

Subsidence monitoring indicates that when pillar mining is adjacent to "burned coal" the subsidence continues over the burned coal area minimizing the sloping edge of the subsidence trough.

To date mining has shown extreme changes in roof conditions in both the Blind Canyon and Hiawatha seams when ancient river channel scours are encountered. The ongoing surface drilling of the lease area, in those areas not yet reached by actual underground mining, indicates little or no

change in normal roof conditions or coal strength. Therefore, no new problems are anticipated from these factors that should cause any alteration to the basic mine plan as submitted.

Subsidence monitoring plans have been submitted for the Deer Creek and Cottonwood Mines and are included in the Appendix.

A photogrammetrical subsidence monitoring plan was initiated and first flown during August 1980. In addition, a site specific longwall panel (the first longwall panel being mined in the Wilberg Mine) was monumented and monitored by conventional survey methods. The last ground survey was done in 1988. No ground survey was done in 1987.

Results of both monitoring systems provide a base on which predictable subsidence can be forecasted. It was determined that aerial photographic means provided a better method to monitor that large area of East Mountain so conventional surveys were discontinued. Information relating to subsidence information can be found in the Annual Subsidence Reports.

Regarding the seeps and springs, PacifiCorp has been actively monitoring these, together with water generated within the mines since 1978 and has set up an organization with the full intention of monitoring them for the next several years.

The hydrologic monitoring indicates that mining under the seeps and springs at the depths of cover of Cottonwood Mine, up to 2,400 feet, does not dry up the seep or spring. This phenomenon is most probably due to the presence of bentonitic shale layers in the overburden which swell when wet forming an impervious clay layer. This healing characteristic is expected to seal subsidence cracks to prevent downward migration of water and subsequent loss of springs and other water sources.

The Cottonwood Mine will be mining some 8 feet of coal at depths from 1,500 to 2,400 feet of cover. Therefore, it is PacifiCorp's belief that the seeps and springs on East Mountain will not be adversely affected.

Regarding the small wooden building on East Mountain (located on PacifiCorp fee porperty), subsidence studies (NCB) show that structures constructed of rigid materials such as brick work, concrete or stone work suffer greater damage than buildings with frame construction. Therefore, it is PacifiCorp's belief that the cabin referred to will not suffer material damage.

Mitigation of Subsidence Damage Effects

Should material damage be incurred by the cabin despite the planned subsidence damage prevention measures, the applicant will repair the damage caused by subsidence resulting from the applicant's activities or compensate the owner of the cabin for such damage.

Any roads, fences, stock ponds, earth dams or water troughs, which are materially damaged by subsidence will be repaired and regraded to restore them to their pre-subsidence usefulness.

Should significant subsidence impacts occur, the applicant will restore, to the extent technologically and economically feasible, those surface lands that were reduced in reasonably foreseeable use as a result of such subsidence, to a condition capable of supporting reasonably foreseeable uses that such lands were capable of supporting before subsidence.

In the event that surface waters above the Wilberg Mine are diminished as a result of the operations of the applicant, including any subsidence therefrom, to the extent that appropriated surface water is measurably diminished, applicant will comply with the following:

> In order to fulfill the requirement to restore the land affected by permittee's mining operations to a condition capable of supporting the current and postmining land uses which are stated in the permit (Cottonwood/Wilberg Mine Plan, refer to Postmining Land Use), the permittee will replace water determined to have been lost or adversely affected as a result of permittee's mining operations if such loss or adverse impact occurs prior to final bond release. The water will be replaced from an alternate source in sufficient quantity and quality to maintain the current and postmining land uses which are stated in the permit.

During the course of regular monitoring activities required by the permit, or as the permittee otherwise acquires knowledge, the permittee will advise the Division of the loss or adverse occurrence discussed above, within ten working days of having determined that it has occurred. Within ten working days after the Division notifies the permittee in writing that it has determined that the water loss is the result of the permittee's mining operation, the permittee shall meet with the Division to determine if a plan for replacement is necessary, and if so, to establish a schedule for submittal of a plan to replace the affected water. Upon acceptance of the plan by the Division, the plan shall be implemented. Permittee reserves the right to appeal the Division's water loss determination as well as the proposed plan and schedule for water replacement as provided by Utah Code Ann. 40-10-22 (3)(a).

All cabins that could be effected by subsidence have been surveyed and documented and are included in the Appendix.

Subsidence Control

PacifiCorp will conduct the underground mining operations so as to prevent subsidence from causing material damage to the surface and to maintain the value and reasonable foreseeable use of that surface in accordance with the preceding subsidence control plan.

Public Notice

Applicant will not mine in any areas that would allow potential subsidence effects (as indicated by the angle of draw) to effect any area outside of the lease and permit boundary until those constraint on coal recovery is resolved by the OSM and the BLM Branch of Solid Minerals or permission is granted by the adjacent surface agencies.

A mining schedule has been submitted to the affected surface owners which details the area in which mining is to take place and the planned date of the mining activity.

Subsidence Monitoring

Applicant will conduct monitoring by photogrammetry methods as detailed in the Subsidence Monitoring Plan (Appendix XVI).

Subsidence related escarpment failures and surface cracking have occurred in Newberry Canyon (Cottonwood 6th and 7th East longwall panels, reclaimed in 1998) and the Right Fork of Grimes Wash (Deer Creek 9th East - Wilberg 1st Right room-and-pillar sections, reclaimed in 1997).

Subsidence in the Right Fork of Grimes Wash area was first documented in the 1981 Subsidence Monitoring Report. Maximum subsidence in this area is approximately twenty-five (25) feet. Surface fractures which have created a graben-like structure have begun to fill in naturally since 1981. To protect livestock, UP&L erected a fence around the area where fractures are of sufficient magnitude to pose a hazard. Escarpment failure in this area has been confined to a small portion (approximately 700 feet) of the east side of the Right Fork. No raptor nests have been impacted. This area was reclaimed in September 1997. The fence remains to deter livestock and wildlife grazing within the reclaimed area and will be removed once revegetation efforts are determined to be successful.

Subsidence monitoring began in Newberry Canyon in August 1986 as part of the Golden Eagle Nesting/Cliff Subsidence Monitoring Plan developed for this area (see Appendix XVI, Part H). Subsidence related escarpment failure first occurred in October 1986 and continued intermittently through 1988 as reported in the 1988 Cliff Subsidence/Eagle Monitoring Report. Surface fractures were observed in July 1987 along the north ridge of Newberry Canyon, as reported in the document entitled "Assessment of Mining Related Impacts in Newberry Canyon", submitted to the Utah DOGM. Total vertical displacement in this area is less than five (5) feet. This area was reclaimed in August 1998.

Two inactive golden eagle nests were destroyed as a result of escarpment failure; however, no impact to nesting has occurred. Nesting and production of young by the resident pair of eagles has occurred in 1987, 1988 and 1989.

The above memtioned study, "Assessment of Mining Related Impacts in Newberry Canyon", found that mining related impacts to the environmental resources associated with longwall mining results from three effects; surface cracking, escrapment failure, and talus deposition. The major imapct resulting from the formation of surface cracks is to land use, primarily grazing and recreation (hunting). This imapcts limits accessibility and raises safety concerns. Mitigation of these areas is comparatively unconstrained when accessible. Backfilling, recontouring and revegetation projects occur after subsidence discontinues.

Escarpment failure can potentially have greater impacts as it speeds up the natural process of cliff spalling. Cliff spalling disrupts raptor nest locations and/or suitable nest sites. Major spalling occurred in Newberry Canyon during the entire 1987 breeding season. This includes the phases when disturbance would be most disruptive; nest selection, breeding, egg laying and incubation. Although spalling was in progress, successful nesting occurred. Mitigation was based on the reaction of the breeding raptor pair to the loss of the nests in 1986. As memtioned above, nesting and production of young by the resident pair of eagles occurred in 1987, 1988, and 1989.

The major imapcts caused by talus deposition is visual. Visual impacts are experienced along the Cottonwood/Wilberg mine access road. This road does not receive substantial public use; therefore, maximum visual imapcts to the general public does not occur.

Mitigation for the resulting impacts through talus removal is unfeasible and revegetation is of only limited feasibility. Therefore, mitigation can be accomplished most effectively through improvement of habitat for the impacted species in another area, or enhancement of habitat for another selected species.

PROTECTION OF FISH AND WILDLIFE

The portal facilities of the Cottonwood/Wilberg Mine are located in the lower reaches of a mountainous drainage called Grimes Wash. This active area (portal facilities) consists of about 20 acres and is physically separated from the remaining permit area by imposing and inaccessible cliffs that rise over 1,600 feet vertically from the active portal area.

The east escarpment face of the Wasatch Plateau is used extensively by nesting raptors. Most of the escarpment face is naturally inaccessible so the birds are undisturbed by man. Nest sites in Grimes Wash are in inaccessible cliffs (refer to Annual Raptor Reports on file for raptor activity and nest status).

Excepting the occasional use for exploration, the wildlife inhabitants on top of East Mountain are relatively unaffected during the mining operation and require no special plans other than the hydrological and subsidence monitoring now initiated.

There are no prime fisheries located on the East Mountain plateau within the permit area.

A 69 KV line serves as the power source of the Cottonwood/Wilberg complex. Mostly single pole and suspension insulators, this transmission line provides sufficient phase to phase and phase to ground clearance to preclude electrical contact of raptors including eagles. The structure types are approved as eagle-safe by USFWS by letter dated November 26, 1982 from the DOGM.

Although Grimes Wash is not a fishery it is a tributary to Cottonwood Creek (Straight Canyon) which is a limited fishery.

Protection from coal dust and increased sediments to these waters is by diversion of the natural flowing waters throughout piping systems past the mining area proper. Two sedimentation ponds have been installed for control of sediment and coal dust from storm runoff waters within the portal facilities area. Coal is transported by trucks on hard-surfaced roads. Truck covers are not necessary as the moisture of processed coal is sufficient to prevent flowing coal dust; plus the loaded coal trucks negotiating the 12% grade are limited to slow speeds.

To reduce the undue disturbance and killing of wildlife the video produced by UDWR at Price has been obtained to instruct all the coal mining company employees of the value of all wildlife and

problems inherent to Utah wildlife. This instructional video has been shown at employee training sessions so all employees receive the information.

This series explains the effect of harassing wildlife during their different life stages and the needs of species resident to Utah. During winter wildlife are always in a depleted condition. Unnecessary disturbance by man causes them to use up critical limited energy reserves, which often times results in mortality. In less severe cases the fetus being carried by mammals may be aborted or absorbed by the animal, thus reducing reproductive success of a population.

During breeding seasons, disturbance by man can negatively affect the number of breeding territories for some species of wildlife. Disturbance can also interrupt courtship displays and preclude timely interaction between breeding animals. This can result in reduced reproductive success and ultimate reductions in population levels.

Early in the rearing process, young animals need the peace and tranquillity normally afforded by remote wildlands. It is also during this crucial period that young animals gain the strength and ability to elude man and other predators.

This especially applies to raptors which may be attracted to the cliff sites adjacent to the mine for a nest site. These species readily abandon nesting and rearing efforts if intruded upon by man. Any nest initiated adjacent to the existing facilities would not require cessation of operations because this nesting action signifies acceptance of the present situation. All golden eagle nests will be reported to the USFWS, Salt Lake City and UDWR in Price.

If any additional mine related developments are planned in the raptor nesting zone they will require prior consultation with the UDWR and USFWS to determine impacts, if any, and mitigation requirements for implementation of development plans.

Information regarding mule deer seasonal distribution and numbers within the permit area is not available due to the dynamic characteristics of the deer herds involved. UDWR personnel indicate

such information would not be truly representative of the demographics of the deer population; therefore, it is not available from them.

If hazardous areas are identified on the Wilberg Mine access road, within the permit area, appropriate mitigating measures will be instituted based on consultation with UDWR personnel.

A flyer containing the following information on avoiding deer vehicle collisions has been distributed during training to all employees:

1. Drivers are to be aware of deer in the area.
2. Be aware that deer are most active at night and during dawn and dusk.
3. At night, flash lights at deer on road to break their trance and allow them to react to the oncoming vehicle.

This instruction includes the precaution against shooting at raptors.

Personnel involved in surface construction operations will be advised of the critical value of snake dens. They will be advised to be particularly observant for concentrations of snakes during the months of April, May, September and October. Such concentrations indicate the presence of snake dens. If a den is located, it will be reported to the UDWR for assistance in the necessary mitigating measures.

Surface water disturbance due to subsidence on East Mountain from mining activities in the Cottonwood/Wilberg Mine will be addressed as stated in Part 4: Mitigation of Subsidence Damage Effects.

The interim reclamation plans provide for the stabilization of all the fill slopes with a vegetative cover. Because the fill slopes are intertwined with the mine facilities, the planting mixture is designed more for soil stabilization than for an attraction to wildlife. The large mammals especially would be a nuisance in and around the operation and the operations a hazard to them. The final reclamation plan will restore the stream channels and revegetate the disturbed sites. The planting

mix of forbs, grasses, shrubs and trees is similar to the adjacent native plant communities and would provide food and cover for wildlife through grouping of shrub plantings. See details in Final Reclamation section.

The UDWR general mitigation plan for the East Mountain area follows. Applicant has stated compliance to these recommendations insofar as they are applicable. Additional specific monitoring and mitigation plans are discussed in Appendix XVI.

Applicant will not use persistent pesticides on the area during underground coal mining and reclamation activities, unless approved by the Division.

The necessary measures will be taken at the Cottonwood Mine to prevent, control and suppress range, forest and coal fires resulting from its mining operations.

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 2, Part 4, Reclamation Plan, Appendix C, Bond Calculations

Replace Summary Sheet
Remove Pages 74, 75, and 76 of 88

Cottonwood/Wilberg Mine
Bond Summary
C/015/0019

Revised November 2010

Direct Costs

Grimes Wash Facility		
Demolition	$965,168.00	
Earthwork	$345,767.00	
Revegetation	$253,147.00	
Subtotal	$1,564,082.00	
~~**Cottonwood Fan Portal**~~		
~~Earthwork~~	~~$43,282.00~~	
~~Revegetation~~	~~$42,023.00~~	
~~Subtotal~~	~~$85,305.00~~	
Overland Conveyor		
Demolition	$22,178.00	
Earthwork	$7,057.00	
Revegetation	$8,403.00	
Subtotal	$37,638.00	
Cottonwood Waste Rock Site		
Demolition	$12,495.00	
Earthwork	$351,530.00	
Revegetation	$143,750.00	
Subtotal	$507,775.00	
Total Direct Costs	**$2,109,495.00**	

Indirect Costs

Mob/Demob	$210,950.00	10.0%
Contingency	$105,475.00	5.0%
Engineering Redesign	$52,737.00	2.5%
Main Office Expense	$143,446.00	6.8%
Project Mainagement Fee	$52,737.00	2.5%
Total Indirect Costs	**$565,345.00**	26.8%
Total Cost (2007 Dollars)	**$2,674,840.00**	
Escalation factor		0.032
Number of years		5
Escalation	$456,255.00	
Reclamation Cost	$3,131,095.00	
Bond Amount (2012 Dollars)	**$3,131,000.00**	

(Rounded to nearest $1,000)

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 3, Maps

Replace Maps – Plate 1-1 thru 1-3

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 6, Maps

Add Map – Plate 3-16a
Replace Map – Plate 4-4 and 4-5

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Volume 7, Appendix Volume

Appendix III – Replace Plate 3-16a
Appendix IV - Remove Earthwork Quantities Report
Appendix VII – Remove Entire Appendix
Appendix XIX - Remove Entire Appendix
Appendix XXII - Remove Entire Appendix

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Amendment to Update Cottonwood/Wilberg MRP Following Phase III Bond Release of Mine Disturbed Areas, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Legal and Financial Volume

Appendix G - Replace Cottonwood/Wilberg Permit Boundary Description

Cottonwood/Wilberg Permit Boundary Description

T17S, R6E, SLB&M Emery County, UT

Section	Description	Acreage
Sec 13:		
	E½SW¼	80.00
	SE¼	160.00
Sec 24:	E½W½	160.00
	E½	320.00
Sec 25:	N½NE¼	80.00
	Beginning at the Southeast corner of the NE¼ of the SE¼ of Section 25; thence N 160 rods: thence W 116 rods, more or less, to the center line of Cottonwood Creek; thence in a Southerly direction along the center line of said Cottonwood Creek to a point 84 rods, more or less, W of the beginning; thence E 84 rods, more or less, to the point of beginning. Containing 100 acres, more or less of fee lands.	100.00
	Total for Township	**900.00**

T17S, R7E, SLB&M Emery County, UT

Section	Description	Acreage
Sec 15:	E½SW¼	80.00
	E½W½SW¼	40.00
Sec 16:	S½S½SW¼	40.00
	SW¼SW¼SE¼	10.00
Sec 17:	E½SW¼	80.00
	W½SW¼	80.00
	S½SW¼SE¼	20.00
	S½SE¼SE¼	20.00
Sec 18:	Lots 3 and 4	47.10
	SE¼	160.00
Sec 19: (ALL)	Lots 1 - 4	92.67
	E½	320.00
Sec 20: (ALL)	W½	320.00
	W½E½	160.00
	E½E½	160.00
Sec 21:	N½NW¼	80.00
	SE¼NW¼	40.00
	N½SW¼NW¼	20.00
	W½W½W½NE¼	20.00
	SW¼SW¼	40.00
	S½SE¼	80.00
	W½W½NW¼SE¼	10.00
	E½SW¼	80.00
	NW¼SW¼	40.00
	S½SW¼NW¼	20.00
	NE¼NW¼	40.00
Sec 22:	E½NW¼NW¼	20.00
	E½SW¼NW¼	20.00
	E½NW¼SW¼	20.00
	SE¼NW¼	40.00
	SW¼SW¼	40.00
	W½SE¼	80.00
	E½SW¼	80.00
	N½NW¼	80.00
Sec 27:	S½NW¼	80.00
	NW¼NE¼	40.00
	N½NE¼	80.00
	SW¼SW¼ (USFSSUP)	40.00
Sec 28:	E½NE¼NW¼	20.00
	S½NE¼	80.00
	E½SE¼NW¼	20.00
	NW¼NE¼	40.00
Sec 29:	N½NW¼	80.00
	Lots 1 - 3	63.00
Sec 30:	N½NE¼	80.00
	SW¼NE¼	40.00
	NW¼SE¼	40.00

Cottonwood/Wilberg Permit Boundary Description

Sec 34:

Sewer Absorption Field: Beginning S52◦06'48"W, 1664.59 ft. from the Sec. corners of 34, 27, 26, and 35, thence, S15◦23'50"E, 193.05 feet; thence,N69◦13'28"W, 354.72 feet; thence,N14◦04'20"W, 185.61 feet; thence,N29◦53'51"E, 488.38 feet; thence,N00◦47'31"E, 474.97 feet; thence,E, 30 feet; thence,S00◦47'31"W, 421.50 feet; thence,S04◦55'10"E, 598.80 feet, to the point of beginning.
Said parcel contains 3.70 acres more or less.

3.70

Old Waste Rock Site (Northern Parcel): Beginning from the east 1/4 corner of Sec. 34; thence, S32◦35'06"E, 333.34 feet; thence, S25◦37'57"E, 113.14 feet; thence, S25◦27'00"W, 117.42 feet; thence, S72◦20'00"W, 214.90 feet; thence, S62◦54'12"W, 69.67 feet; thence S54◦05'38"W, 334.79 feet; thence, N31◦22'00"W, 421.95 feet; thence, N24◦13'43"W, 219.34 feet; thence, N16◦11'43"W, 669.30 feet; thence, N54◦04'29"E, 168.18 feet; thence, S54◦11'25"E, 887.95 feet to the point of beginning. Said parcel contains 16.11 acres more or less.

16.11

Old Waste Rock Site (Southern Parcel): Beginning at a point S32◦35'06"E, 582.18 feet from the east 1/4 corner of Sec. 34; thence, S32◦35'06"E, 1296.31 feet; thence, S55◦31'08"W, 411.69 feet; thence, N48◦03'42"W, 656.18 feet; thence, N46◦38'41"W, 472.77 feet; thence, N37◦57'15"W, 229.19 feet; thence, N31◦22'00"W, 90.38 feet; thence, S72◦32'03"E, 65.63 feet; thence, N50◦27'20"E, 295.51 feet; thence, N69◦41'04"E, 398.55 feet to the point of beginning. Said parcel contains 18.45 acres more or less.

18.45

New Waste Rock Site: Beginning at point N82°39'28"W, 809.58 feet from the east 1/4 corner of Sec. 34; thence, S 74 09' 46" W, 246.23 feet; thence, S 27 14' 28" W, 647.59 feet; thence, S 46 59' 05" W, 165.64 feet; thence, S 76 41' 51" W, 264.72 feet; thence, N 72 09' 12" W, 670.20 feet; thence, S 06 10' 47" W, 105.57 feet; thence, S 23 08' 12" W, 35.27 feet; thence, S 36 59' 41" W, 71.59 feet; thence, S 40 44' 45" W, 114.04 feet; thence, S 23 37' 34" W, 93.77 feet; thence, S 60 40' 32" W, 113.86 feet; thence, S 05 17' 52" E, 108.19 feet; thence, S 23 20' 37" E, 105.29 feet; thence, S 24 38' 51" W, 61.70 feet; thence, S 31 19' 19" E, 129.90 feet; thence, S 29 19' 58" E, 80.45 feet; thence, S 24 11' 44" E, 104.97 feet; thence, S 47 47' 54" E, 168.95 feet; thence, S 40 17' 54" E, 87.31 feet; thence, S 17 50' 49" W, 43.32 feet; thence, S 72 11' 49" E, 213.13 feet; thence, S 78 08' 28" E, 287.64 feet; thence, N 11 43' 23" E, 86.24 feet; thence, N 73 40' 14" E, 120.87 feet; thence, N 17 04' 33" E, 74.31 feet; thence, N 14 20' 36" W, 65.70 feet; thence, N 17 05' 06" E, 75.21 feet; thence, N 09 13' 24" W, 65.92

82.47 feet; thence, N 08 32' 17" W, 85.51 feet; thence, N 01 39' 36" W, 104.82 feet; thence, N 17 50' 48" E, 218.03 feet; thence, N 76 41' 51" E, 353.88 feet; thence, N 27 14' 28" E, 629.52 feet; thence, N 50 42' 06" E, 123.74 feet; thence, N 74 09' 48" E, 113.70 feet; thence, N 15 50' 13" W, 150.00 feet; to the point of beginning.
Said parcel contains 25.85 acres more or less.

25.85

Total for Township	**3,228.43**
	4,128.43

Total Permit Acres

The Cottonwood/Wilberg Permit Area contains the areas as described above. The area within the described boundary is approximately 4,128.43 acres. The total disturbed area at the mine is ~~62.24~~ 45.27 acres. The disturbance is distrubuted as follows:

~~Mine Site~~	~~20.46~~
~~Leach Field~~	~~3.70~~
~~Old Waste Rock Site~~	~~15.62~~
~~New Waste Rock Site~~	~~17.44~~
~~Cottonwood Fan Portal~~	~~5.00~~
~~Miller Canyon Portals~~	~~0.02~~
~~**Total**~~	~~**62.24**~~

Cottonwood/Wilberg Permit Boundary Description

Disturbed Area Reconciliation Table

Type Area	Area Name	Reclamation Completion Date	Original Disturbed Acreage	Phase I Bond Release Date	Phase II Bond Release Date	Phase III Bond Release Date	Remaining Disturbed Acreage
Mine Site	Cottonwood/Wilberg Main Mine	N/A	20.46				20.46
Mine Site	Leach Field	N/A	3.70				3.70
Storage Area	Rock and Soil Storage Area - AKA Cottonwood/Wilberg/Trail/DesBee Dove Old Waste Rock Site		15.62	Jul-99	Jul-09	Jul-09	1.81
Waste Rock Site	Cottonwood/Trail/DesBeeDove Waste Rock Site - New	N/A	17.44				17.44
Remote Portal	Cottonwood Canyon Area - AKA Fan Portal Area	Nov-98	9.33	Mar-04	Sep-10	Sep-10	1.86
Remote Portal	Miller Canyon Portal Area	Jun-99	0.02	Jun-02	Oct-10	Oct-10	0.00
Total			66.57				45.27

Refer to Surface and Subsurface ownership maps in Volume 3.