GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

January 10, 2014

Elaine Ramsey, Manager Field Operations Branch
Office of Surface Mining Reclamation and Enforcement
Western Region
1999 Broadway, Suite 3320
Denver, Colorado 80202-3050

Subject: Mill Fork Lease Modification, Deer Creek Mine, PacifiCorp, C/015/0018, Task ID #4447

Dear Ms. Ramsey:

The Division has reviewed PacifiCorp's application for the Mill Fork Lease Modification. The Division has determined that the application is complete and accurate and has authorized PacifiCorp to conduct mining activities in the Lease Modification Area conditioned upon receiving federal mine plan approval and concurrence from OSM. PacifiCorp is anxious to proceed with their mining plans. Please review and process the enclosed Decision Document and accompanying documentation so that the company can proceed with their plans to mine in the Mill Fork Modification area.

Thank you for your help with this action. If you have any questions, please call me at (801) 538-5325.

Sincerely,

Daron R. Haddock
Coal Program Manager

DRH/sqs
Enclosure
cc: Ken Fleck, PacifiCorp
Foster Kirby, OSM
O:\015018.DER\PERMIT\2014\OSM LETTER.DOC

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

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State of Utah
DEPARTMENT OF NATURAL RESOURCES
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JOHN R. BAZA
Division Director

January 10, 2014

Kenneth S. Fleck, Manager of Geology and Environmental Affairs
Energy West Mining Company
P.O. Box 310
Huntington, Utah 84528

Subject: Conditional Approval of Mill Fork Lease Modification, Deer Creek Mine, PacifiCorp, C/015/0018, Task ID #4447

Dear Mr. Fleck:

The Division conditionally approves the Mill Fork Lease Modification, contingent upon receipt of Office of Surface Mining concurrence with the attached documents and approval of mine plan action by the Secretary of the Interior. I have attached the Division's Decision Document and Mining Permit Document, the Technical Analysis and Cumulative Hydrologic Impact Assessment. Please note the conditions to the permit including the restriction to mining in the Mill Fork Modification area until OSM has provided their concurrence.

Two copies of the revised permit are included. The permit expiration date remains the same, February 7, 2016. Please have both copies signed by the responsible official for the Deer Creek Mine and return one to the Division. Also, at this time, please submit 2 clean copies of the Mill Fork Lease Modification for insertion into the Mining and Reclamation Plan.

Please proceed with mailing notification letters to the water conservancy district and surface owners, in accordance with R645-301-525.700. If you have any questions, please call me at (801) 538-5334, or Daron Haddock at (801) 538-5325.

Sincerely,

John R. Baza
Director

DRH/sqs
cc: Elaine Ramsey, OSM
O:\015018.DER\PERMIT\2014\CONDITIONALAPPROVAL.DOC

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telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

State Decision Document

PacifiCorp
Lease Modifications UTU-06039, UTU-88554
Mill Fork IBC Expansion
Deer Creek Mine
C/015/0018

January 10, 2014

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

PacifiCorp
Mill Fork Lease Modifications IBC
Deer Creek Mine
C/015/0018

CONTENTS

* Administrative Overview
* Location Map
* Permitting Chronology
* Findings, dated January 10, 2014
* Permit with conditions, dated January 10, 2014
* Technical Analysis, dated December 23, 2013
* Cumulative Hydrologic Impact Assessment, dated December 18, 2013
* U. S. Forest Service Decision Notice and Finding of No Significant Impact on Modification of the Federal Coal Leases, UTU-06039, UTU-88554 dated January 25, 2013
* BLM Decision Notice for Modification of Coal Lease UTU-06039, UTU-88554, dated June 3, 2013.
* AVS Recommendation, dated January 9, 2014

ADMINISTRATIVE OVERVIEW

PacifiCorp
Mill Fork Lease Modifications IBC
Deer Creek Mine
C/015/0018

Emery County, Utah

January 10, 2014

PROPOSAL:

PacifiCorp proposes to expand mining in the Mill Fork lease area by modifying two leases which will expand the mining operations to the south and west of the current permit boundary. .The two leases that have been modified are UTU-88554 which has had 860 acres added to it and UTU-06039 which has had 320 acres added to it. The modifications include various parcels of Sections 22, 23, 24, 25, 26 and 27 of T. 16 S. R. 6 E. SLB&M. Jointly, the modifications add an additional 1,180 acres to the current Mill Fork mine plan area and Deer Creek permit. Mining of these expanded leases is collectively called the "Mill Fork IBC Area". There are no surface facilities or disturbances planned for this proposal. This lease is accessed via the underground works and mining will be conducted using longwall for full extraction. Mining is projected to occur in both the Blind Canyon and Hiawatha coal seams.

BACKGROUND:

The original Mill Fork mine plan area was formerly a SITLA managed lease which was part of the State/Federal coal lease exchange prompted by the formation of the Grand Staircase Escalante National Monument during the Clinton administration. Pacificorp submitted an application on October 24, 2001 and received a SMCRA permit to mine the Mill Fork lease on March 5, 2003. In 2011 the Mill Fork lease reverted back to a federal lease as UTU-88554. The majority of the original mine plan area has been mined out by longwall mining operation. In 2012, PacifiCorp applied for and was granted, lease modification of federal leases UTU-88554 and UTU-06039. These modification added 860 acres and 320 acres, respectively to extend the Mill Fork mine plan area to the south.

PacifiCorp submitted the permit application package for adding the two lease modifications to the Deer Creek Mine on November 15, 2013. The current proposal is to authorize mining in this additional lease area.

ANALYSIS:

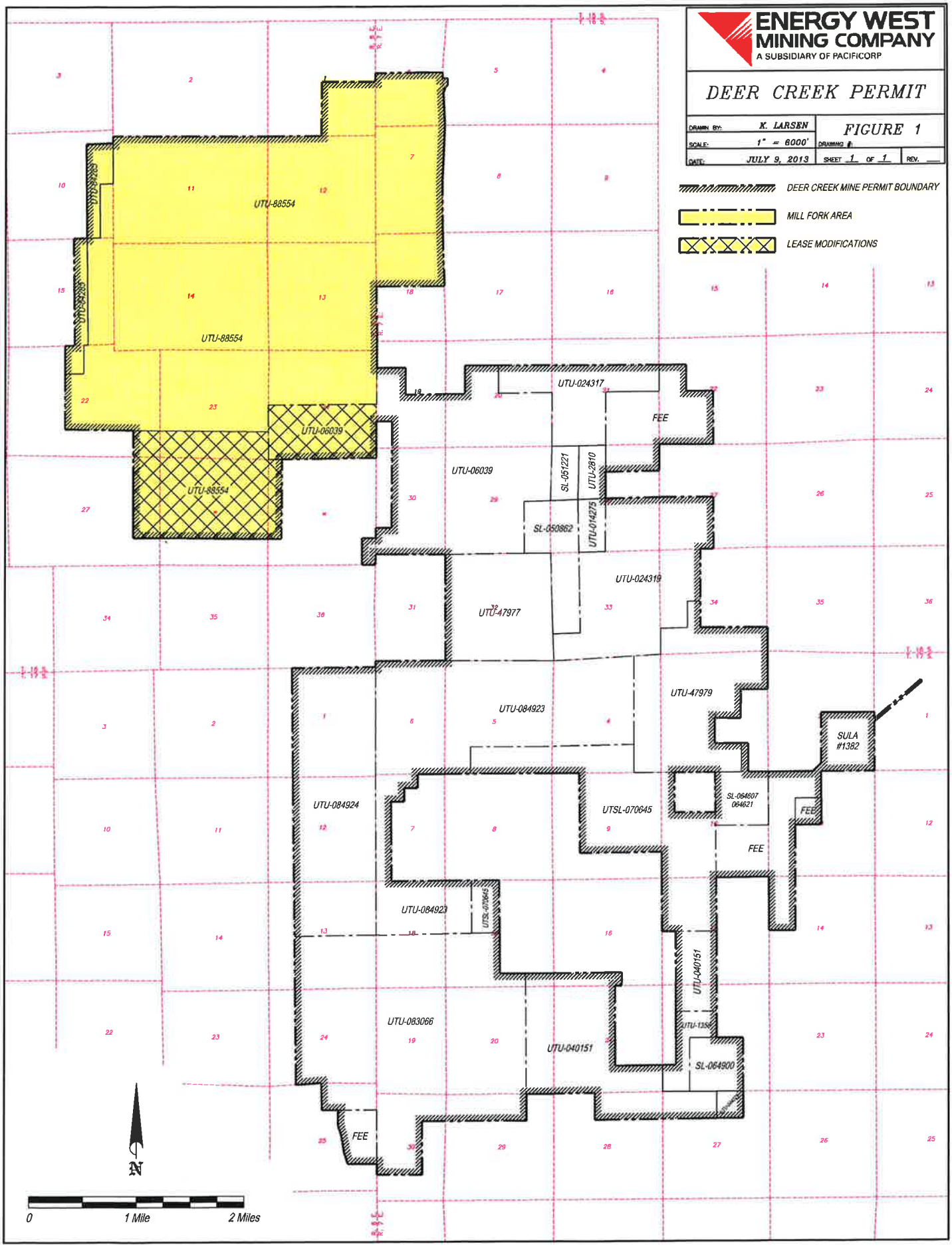
Since the existing permit area consists of 19, 936.88 acres, the addition of 1,180 acres is

less than a 6% change. Thus the Mill Fork lease modifications can be processed as an Incidental Boundary Change (see R645-303-220). The total permit area for the Deer Creek mine after the approval of this IBC will be 21, 116.88 acres. The Division of Oil Gas and Mining has conducted an Administrative and Technical Analysis of the proposed mine Permit Application Package and has produced a written TA. All appropriate State and Federal agencies have been consulted regarding this proposal. It has been determined that the Applicant has the legal right to enter and conduct mining operations in the proposed permit area through acquired lease modifications. The probable hydrologic consequences of the action have been analyzed and a Cumulative Hydrologic Impact Assessment (CHIA) has been prepared. All requirements for public participation have been satisfied. The application meets the requirements of the Utah Coal Regulatory Program.

RECOMMENDATION:

This recommendation is based on the complete permit application package (PAP), the Technical Analysis (TA) conducted by the Division, the Cumulative Hydrologic Impact Assessment (CHIA) also prepared by the Division, and the administrative record. PacifiCorp has demonstrated that mining within the Mill Fork Expansion Area boundary can be done in conformance with the Surface Mining Control and Reclamation Act, and the corresponding Utah Act and performance standards. The 510(c) report on the Applicant Violator System was verified for this mine on January 9, 2014 and there are no violations.

It is recommended that approval be given for mining in the Mill Fork extension to the Deer Creek Mine with the conditions summarized as Attachment A to the Permit.


ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
DEER CREEK PERMIT
DRAWN BY: K. LARSEN
FIGURE 1
SCALE: 1" = 6000'
DATE: JULY 9, 2013
SHEET 1 OF 1
REV.
DEER CREEK MINE PERMIT BOUNDARY
MILL FORK AREA
LEASE MODIFICATIONS
UTU-88554
UTU-88554
UTU-88554
UTU-06039
UTU-06039
UTU-024317
FEE
SL-051221
UTU-2810
SL-050962
UTU-014275
UTU-024319
UTU-47977
UTU-47979
UTU-084923
SULA #1382
UTU-084924
UTSL-070645
SL-064607
064621
FEE
FEE
UTU-084923
UTSL-070645
UTU-040151
UTU-083066
UTU-040151
UTU-1358
SL-064900
FEE
N
0
1 Mile
2 Miles

PERMITTING CHRONOLOGY

PacifiCorp
Mill Fork Lease Modification
Deer Creek Mine
C/015/0018

Emery County, Utah

January 10, 2014

November 15, 2013	PacifiCorp submits the permit application package for the Mill Fork Lease Modification to the Deer Creek Mine.
November 15, 2013	The Initial Review of the permit application was completed.
November 18, 2013	The Division requests OSM determination as to whether or not this action constitutes a Mining Plan Modification.
November 22, 2013	OSM notifies the Division that the proposed action constitutes a Mining Plan Modification.
December 18, 2013	CHIA completed.
December 23, 2013	TA Completed.
January 9, 2014	AVS check completed.
January 10, 2014	Decision Document Completed and Conditional Permit is issued. Permitting Package Sent to OSM for concurrence.

FINDINGS

PacifiCorp
Mill Fork Lease Modifications IBC
Deer Creek Mine
C/015/0018

Emery County, Utah

January 10, 2014

1. The permit application for the expansion of mining of coal from the Mill Fork lease modification area at the Deer Creek Mine is accurate and complete and all requirements of the Surface Mining Control and Reclamation Act, and the approved Utah State Program (the "Act") are in compliance. See Technical Analysis dated December 23, 2013 (R645-300-133.100)

2. The applicant proposes acceptable practices for the reclamation of disturbed lands. The Division has determined that reclamation, as required by the Act can be feasibly accomplished following the approved plan with the attached permit conditions. No new surface disturbance will occur with the mining in the Mill Fork lease modification area. (R645-300-133.710)

3. An assessment of the probable cumulative impacts of all anticipated coal mining and reclamation activities in the general area on the hydrologic balance has been conducted by the Division and no significant impacts were identified. See CHIA dated December 18, 2013. The Mining and Reclamation Plan (MRP) proposed under the revised application has been designed to prevent damage to the hydrologic balance in the permit area and in associated off-site areas (R645-300-133.400 and UCA 40-10-11 (2)(c)).

4. The proposed lands to be included within the permit area are:

    a. Not included within an area designated unsuitable for underground coal mining operation (R645-300-133.220);

    b. not within an area under study for designated land unsuitable for underground coal mining operations (R645-300-133.210);

    c. not on any lands subject to the prohibitions or limitation of 30 CFR 761.11 {a} (national parks, etc), 761.11 {f} (public buildings, etc.) and 761.11 {g} (cemeteries);

    d. not within 100 feet of a public road (R645-300-133.220); and

e. not within 300 feet of any occupied dwelling (R645-300-133.220).

5. The operation would not affect the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats as determined under the Endangered Species Act of 1973. See Technical Analysis dated December 23, 2013. (16 USC 1531 et seq.) (R645-300-133.500).

6. The Division's issuance of a permit is in compliance with the National Historic Preservation Act and implementing regulations (36 CFR 800). See Technical Analysis dated December 23, 2013. There are no surface disturbances associated with underground mining in the Mill Fork Lease Modification Area. (R645-300-133.600)

7. The applicant has the legal right to enter and complete mining activities in the permit area through the federal coal lease issued by the Bureau of Land Management. (Lease Document for Coal Lease UTU-06039 and UTU-88554, Lease Modification dated June 3, 2013) (R645-300-133.300)

8. A 510 (c) report has been run on the Applicant Violator System (AVS), which shows that: prior violations of applicable laws and regulations have been corrected; neither PacifiCorp nor any affiliated company, are delinquent in payment of fees for the Abandoned Mine Reclamation Fund; and the applicant does not control and has not controlled mining operations with demonstrated pattern of willful violations of the Act of such nature, duration, and with such resulting irreparable damage to the environment as to indicate an intent not to comply with the provisions of the Act (A 510 (c) report was run on January 9, 2014, see memo to file dated January 9, 2014). (R645-300-133.730)

9. Underground mining operations to be performed under the permit will not be inconsistent with other operations anticipated to be performed in areas adjacent to the proposed permit area. (This underground mining operation is consistent with other underground mining operations in the Wasatch Plateau).

10. The applicant has posted a surety bond for the Deer Creek Mine in the amount of $3,374,000 issued by Travelers Casualty and Surety Company of America (Surety Number 103908970). The bond will not be affected by this permitting action since there is no new disturbance proposed (R645-300-134).

11. No lands designated as prime farmlands or alluvial valley floors occur on the permit area. See Technical Analysis dated December 23, 2013 (R645-302-313.100 and R645-302-321.100).

12. The proposed postmining land-use will not be affected by this action as this is an extension of an underground mining operation with no new disturbance proposed.

13. The Division has made all specific approvals required by the Act, the Cooperative Agreement, and the Federal Lands Program.

14. All procedures for public participation required by the Act, and the approved Utah State Program are in compliance. No public advertisement was published since this action is processed as an Incidental Boundary Change. (R645-300-120).

15. All existing structures at the mine comply with performance standards. This application is an underground extension of an existing mine with no new surface facilities being proposed (R645-300-133.720).

Permit Supervisor

Associate Director of Mining

Director

O:\015018.DER\PERMIT\2014\DecisionDocument.doc

FEDERAL **PERMIT C/015/0018** **January 10, 2014**

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1594 West North Temple, suite 1210
Salt Lake City, Utah 84114-1210
(801) 538-5340

This permit, C/015/0018, is issued for the state of Utah by the Utah Division of Oil, Gas and Mining (Division) to:

PacifiCorp
1407 West North Temple, Suite 310
Salt Lake City, Utah 84116
(801) 220-2000

for the Deer Creek Mine. A Surety Bond is filed with the Division in the amount of $3,374,000, payable to the State of Utah, Division of Oil, Gas and Mining and the United States Department of Interior, Office of Surface Mining Reclamation and Enforcement (OSM). The Division must receive a copy of this permit signed and dated by the permittee.

Sec. 1 **STATUTES AND REGULATIONS** - This permit is issued pursuant to the Utah Coal Mining and Reclamation Act of 1979, Utah Code Annotated (UCA) 40-10-1 et seq, hereafter referred to as the Act and the R645 regulations.

Sec. 2 **PERMIT AREA** - The permittee is authorized to conduct coal mining and reclamation operations, on the following lands as described in the approved application, situated in the state of Utah, Emery County:

Township 16 South, Range 6 East, SLB&M Emery County, Utah

Section 1: SE¼.
Section 10: E½E½SE¼, S½NE¼NE¼, SE¼NE¼, W½E½SE¼.
Section 11: All.
Section 12: All.
Section 13: All.
Section 14: All.
Section 15: E½E½, E½W½E½.
Section 22: Lots 1, 2, 3, 4, 5, 6, 7, E½NE¼, SW¼NE¼, N½SE¼, SE¼SE¼.
Section 23: All.
Section 24: All.
Section 25: E½SE¼SE¼, W½W½NW¼, W½NW¼SW¼
Section 26: N½, N½S½.
Section 27: E½NE¼, NE¼SE¼.

Township 16 South, Range 7 East, SLB&M Emery County, Utah

Section 5:	Beginning at a point S 02° 40'40" E, 145.00 feet from the west 1/4 corner of Section 5, thence East, 235.00 feet; thence South, 330.00 feet; thence S 48° 48' 00" W, 138.00 feet; thence S 20° 00' 00" W, 133.00 feet; thence South, 45.00 feet; thence S 45° 00' 00" W, 78.42 feet; thence N 02° 40' 40" W, 647.03 feet to the point of beginning. Said area contains 2.41 acres, more or less.
Section 6:	Lots 5,6,7,8, S½SE¼.
Section 7:	All.
Section 18:	Lots 1, 2, NE¼.
Section 19:	Lots 2-3, W½SW¼NE¼, SE¼.
Section 20:	E½E½SW¼NW¼, SE¼NW¼, S½NE¼, S½.
Section 21:	S½N½, S½.
Section 22:	SW¼NW¼, SW¼.
Section 27:	SW¼.
Section 28:	W½, N½ NE¼, SE¼.
Section 29:	All.
Section 30:	E½, Lot 4.
Section 32:	All.
Section 33:	All.
Section 34:	W½NE¼SW¼, S½S½, W½NW¼, W½E½NW¼, NW¼SW¼.

Township 17 South, Range 6 East, SLB&M Emery County, Utah

Section 1:	Lots 1, 2, 3, S½NE¼, SE¼NW¼, E½SW¼, SE¼.
Section 12:	E½W½, E½.
Section 13:	E½W½, E½.
Section 24:	E½W½, E½.
Section 25:	N½NE¼, 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.

Township 17 South, Range 7 East, SLB&M Emery County, Utah

Section 1:	Beginning at a point S 0° 22' E, 142.4 feet from the SW corner of NW¼ of Section 1, T17S, R7E, SLB&M; thence, N 49° 53' 23" E, 2395.4 feet; thence, S 40° 10' 42" E, 101.94 feet; thence, S 49° 52' 03" W, 2481.12 feet; thence, N 0° 22' W, 276.25 feet to the point of beginning. 5.6 acres more or less. (Beltline Corridor)
Section 2:	SE¼ (SULA #1382), within the SE¼SE¼SW¼ (BLM ROW - U52401).
Section 3:	Lots 1 - 8, 10 – 12, SW¼, SW¼SE¼, W½W½SE¼SE¼.
Section 4:	All.

Section 5: All.
Section 6: All.
Section 7: Lots 1-4, W½NW¼NE¼, NE¼NW¼NE¼.
Section 9: E½NW¼, NE¼, NE¼SW¼, N½SE¼.
Section 10: NE¼, W½W½NW¼, SE¼SW¼NW¼, S½SE¼NW¼, SW¼, SE¼.
Section 11: N½NW¼, N½SW¼NW¼, SE¼NW¼, W½SW¼, S½SW¼NW¼.
Section 14: W½NW¼.
Section 15: NW¼, E½SW¼, E½W½SW¼.
Section 16: S½S½SW¼, SW¼SW¼SE¼.
Section 17: NW¼, SW¼, S½S½SE¼.
Section 18: All.
Section 19: All.
Section 20: All.
Section 21: NW¼, SW¼, W½W½W½NE¼, W½W½NW¼SE¼, S½SE¼.
Section 22: E½NW¼, E½W½NW¼, E½SW¼, E½NW¼SW¼, SW¼SW¼, W½SE¼.
Section 27: N½NW¼, NW¼NE¼.

Section 28: N½NE¼, E½NE¼NW¼.
Section 29: NW¼NE¼, N½NW¼.
Section 30: Lots 1, 5, 6, N½NE¼, SW¼NE¼, NW¼SE¼.

Township 17 South, Range 8 East, SLB&M Emery County, Utah

Section 6: Beginning 10 feet South of the NE corner of Section 6, T17S, R8E, SLB&M; thence, S 89° 52' 00" W, 1272.000 feet; thence, S 0° 08' 00" E, 600.000 feet; thence, S 83° 28' 43" E, 302.035 feet; thence, S 72° 54' 35" E, 314.083 feet; thence, S 63° 06' 41" E, 224.508 feet; thence, S 48° 18' 17" E, 268.404 feet; thence, S 20° 06' 29" W, 1066.848 feet; thence, S 39° 24' 03" W, 855.358 feet; thence, S 41° 10' 40" E, 100 feet; thence, N 43° 39' 42" E, 1635.000 feet; thence, N 31° 02' 18" E, 412.959 feet; thence, N 22° 58' 45" E, 1310.908 feet; thence, N 89° 40' 41"W, 740.000 feet; to the point of beginning. 31.92 acres more or less. (Waste Rock Site)

The permittee is authorized to conduct coal mining and reclamation operations on the foregoing described property subject to the conditions of all applicable conditions, laws and regulations.

Sec. 3 **COMPLIANCE** - The permittee will comply with the terms and conditions of the permit, all applicable performance standards and requirements of the State Program.

Sec. 4 **PERMIT TERM** - This permit expires on February 7, 2016.

Sec. 5 **ASSIGNMENT OF PERMIT RIGHTS** - The permit rights may not be transferred, assigned or sold without the approval of the Division Director. Transfer, assignment or sale of permit rights must be done in accordance with applicable regulations, including but not limited to 30 CFR 740.13{e} and R645-303-300.

Sec. 6 **RIGHT OF ENTRY** - The permittee shall allow the authorized representative of the Division, including but not limited to inspectors, and representatives of the Office of Surface Mining Reclamation and Enforcement (OSM), without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay to:

(a) Have the rights of entry provided for in 30 CFR 840.12, R645-400-220, 30 CFR 842.13 and R645-400-110;

(b) Be accompanied by private persons for the purpose of conducting an inspection in accordance with R645-400-100 and R645-400-200 when the inspection is in response to an alleged violation reported to the Division by the private person.

Sec. 7 **SCOPE OF OPERATIONS** - The permittee shall conduct coal mining and reclamation operations only on those lands specifically designated as within the permit area on the maps submitted in the approved plan and approved for the term of the permit and which are subject to the performance bond.

Sec. 8 **ENVIRONMENTAL IMPACTS** - The permittee shall take all possible steps to minimize any adverse impact to the environment or public health and safety resulting from noncompliance with any term or condition of the permit, including, but not limited to:

(a) Any accelerated or additional monitoring necessary to determine the nature and extent of noncompliance and the results of the noncompliance;

(b) Immediate implementation of measures necessary to comply; and

(c) Warning, as soon as possible after learning of such noncompliance, any person whose health and safety is in imminent danger due to the noncompliance.

Sec. 9 **DISPOSAL OF POLLUTANTS** - The permittee shall dispose of solids, sludge, filter backwash or pollutants in the course of treatment or control of waters or emissions to the air in the manner required by the approved Utah State Program and the Federal Lands Program which prevents violation of any applicable state or federal law.

Sec. 10 **CONDUCT OF OPERATIONS** - The permittee shall conduct its operations:

(a) In accordance with the terms of the permit to prevent significant, imminent environmental harm to the health and safety of the public; and

(b) Utilizing methods specified as conditions of the permit by the Division in approving alternative methods of compliance with the performance standards of the Act, the approved Utah State Program and the Federal Lands Program.

Sec. 11 **EXISTING STRUCTURES** - As applicable, the permittee will comply with R645-301 and R645-302 for compliance, modification, or abandonment of existing structures.

Sec. 12 **RECLAMATION FEE PAYMENTS** - The operator shall pay all reclamation fees required by 30 CFR Part 870 for coal produced under the permit, for sale, transfer or use.

Sec. 13 **AUTHORIZED AGENT** - The permittee shall provide the names, addresses and telephone numbers of persons responsible for operations under the permit to whom notices and orders are to be delivered.

Sec. 14 **COMPLIANCE WITH OTHER LAWS** - The permittee shall comply with the provisions of the Water Pollution Control Act (33 USC 1151 et seq,) and the Clean Air Act (42 USC 7401 et seq), UCA 26-11-1 et seq, and UCA 26-13-1 et seq.

Sec. 15 **PERMIT RENEWAL** - Upon expiration, this permit may be renewed for areas within the boundaries of the existing permit area in accordance with the Act, the approved Utah State Program and the Federal Lands Program.

Sec. 16 **CULTURAL RESOURCES** - If during the course of mining operations, previously unidentified cultural resources are discovered, the permittee shall ensure that the site(s) is not disturbed and shall notify the Division of Oil, Gas, and Mining. The Division, after coordination with OSM, shall inform the permittee of necessary actions required. The permittee shall implement the mitigation measures required by the Division within the time frame specified by the Division.

Sec. 17 **APPEALS** - The permittee shall have the right to appeal as provided for under R645-300-200.

Sec. 18 **SPECIAL CONDITIONS** - There are special conditions associated with this permitting action as described in attachment A.

The above conditions (Secs. 1-18) are also imposed upon the permittee's agents and employees. The failure or refusal of any of these persons to comply with these conditions shall be deemed a failure of the permittee to comply with the terms of this permit and the lease. The permittee shall require his agents, contractors and subcontractors involved in activities concerning this permit to include these conditions in the contracts between and among them.

These conditions may be revised or amended, in writing, by the mutual consent of the Division and the permittee at any time to adjust to changed conditions or to correct an oversight. The Division may amend these conditions at any time without the consent of the permittee in order to make them consistent with any federal or state statutes and any regulations.

THE STATE OF UTAH

By: John R. Baza

Date: 1/10/14

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

_____

Authorized Representative of Permittee

Date: _____

Attachment A

SPECIAL CONDITIONS

1. If during entry development, sustained quantities of groundwater are encountered which are greater than 5 gpm from a single source in an individual entry, and which continue after operational activities progress beyond the area of groundwater production, PacifiCorp must monitor these flows for quality and quantity under the approved baseline parameters. PacifiCorp will notify the Division within 24 hours prior to initiation of monitoring.

2. PacifiCorp will submit water quality data for the Deer Creek Mine in an electronic format through the Electronic Data Input web site, http://linux1.ogm.utah.gov/cgi-bin/appx-ogm.cgi.

3. Mining within the boundary of the 1,180 acre Lease Modification area known as Mill Fork Modification can only proceed after Federal Mine Plan Approval is granted and concurrence is received from OSM

GARY R. HERBERT
Governor
GREG BELL
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

Technical Analysis and Findings

Utah Coal Regulatory Program

December 23, 2013

PID: C0150018
TaskID: 4447
Mine Name: DEER CREEK MINE
Title: MILL FORK LEASE MODIFICATION

General Contents

Right of Entry

Analysis:

Lease modifications to the Mill Fork Tract UTU-88554, and federal lease UTU-06039 were approved by the BLM in August of 2013. Details of the lease acquisition process are included in the application. Jointly, the modifications add an additional 1,180 acres to the Mill Fork mine plan area. The lease modification areas are depiction on Figure 1 within the application.

jowen

Legal Description

Analysis:

The legal and financial information within the MRP was updated to include the adjusted right on entry acreages.

jowen

Reclamation Plan

General Requirements

Analysis:

All mining within the permit mine plan area will be underneath the uninhabited East Mountain area. No dwellings or building structures will be undermined. A single gas well, own and operated by Merit Energy, is located within the permit mine plan area (identified as Federal #23-32-23), near the center of Section 23, T.16 S., R.6E. The well is near the southern extent of the mine plan Mill Fork Area. A gas transmission pipeline extends from this well south along forest road #244 for about 2,000 feet, extends down Flat Canyon, and then exits the permit mine plan area to on the southwest corner of the lease modification area of UTU-88554. This pipeline will be undermined by longwall operations. PacifiCorp, Merit Energy, and Utah Division of Oil, Gas, and Mining, entered into an agreement to ensure protection of this gas transmission line. The agreement was signed in May 2012 and will terminate on December 31, 2018. PacifiCorp and Merit Energy entered into the agreement to establish a working relationship regarding multiple mineral development to insure the maximum utilization of the coal and oil and gas estates in certain lands in Emery County, Utah all in the interest of the conservation and full utilization of natural resources. As stated in the agreement, "Merit is the owner and operator of a producing gas well in the Area of Interest identified as Well No. 32-23. The well was drilled in 1989. PacifiCorp has addressed the requirements of this section.

dhaddock

Mine Openings

Analysis:

The plan states, "Each exploration hole or borehole that is uncovered or exposed by coal mining and reclamation operations within the permit mine plan area will be permanently closed, unless approved for water monitoring or otherwise managed in a manner approved by the Division." All exploration holes in the Mill Fork lease modification area were plugged.

dhaddock

Environmental Resource Information

Historic and Archeological Resource Information

Analysis:

Page 3 of the land use section within the Volume 12 MRP was updated to change some wording regarding cultural resource evaluations. The original boundaries of the State Lease ML-48258 and the south Crandall tract were the only areas surveyed (by class II survey and a file search). The general east mountain cultural resource survey located in the confidential binder included sample sites near the proposed lease addition. On page 66, the report states, ""The limited activity sites which are the most common within the project area involve prehistoric lithic scatters and hunting and camping sites. Depth potential on these types of sites is generally low in this area, hence should subsidence occur in the future, only marginal or no disruption of these sites is anticipated. AERC, therefore, concludes that subsidence does not constitute a viable potential impact to any significant or susceptible cultural resources sites situated within the mine plan permit area.""

In the Forest Service Environmental Assessment (EA), it was determined that heritage or cultural resources will not be affected by the proposed action as underground mining will cause little to no ground disturbance nor would it lead to direct or indirect impacts to sites. It also states that SHPO consultation was not necessary based on negative findings.

icampbel

Climatological Resource Information

Analysis:

Climatological information is presented in Section R645-301-724.400 and includes precipitation, temperature, and wind information.

khoffman

Vegetation Resource Information

Analysis:

Vegetation is characterized in the mill fork volume 12 of the MRP. Map MFS 1821D shows the vegetation communities in the lease expansion area and adjacent area. No habitats of unusually high value of fish and wildlife such as important streams, wetlands, riparian areas, cliffs supporting raptors, areas offering special shelter or protection, migration routes, or reproduction and wintering areas that will be affected by undermining exist on the lease expansion area. Therefore, no further site specific information is required.

icampbel

Fish and Wildlife Resource Information

Analysis:

Volume 12 of the MRP contains a general vegetation and wildlife assessment of the original Mill Fork Lease area. Mexican Spotted Owl (MSO) habitat was modeled for the original Mill fork Lease area and adjacent areas (which include the lease expansion area). Further analysis of the model including showing douglas fir or aspen areas as well as cliff ledges or steep walled Canyons typical of MSO nesting habitat showed that the only potential MSO habitat within the original lease area was in the central part of section 22 on the Southwest corner of the UTU 88554 lease (shown in figure 2 on page 3-12). No MSO habitat was modeled in the lease expansion area.

An assessment of Spotted Bat and Townsends Big-eared Bat in the Proposed Cottonwood Canyon Lease Area is located in the MRP after page 3-22. The report concluded that no bat species is being threatened by the mining practices currently in use within sturdy areas. Additionally, spotted bats were found to be common in active and previously mined areas which indicates that past cliff failures have not dramatically impacted resident populations. Furthermore, the report concluded that spotted bats are common enough that local cliff failure does not pose a threat to the population. The presubsidence survey map, MFS1839D located in the confidential binder shows that no cliffs or steep rocky slopes exist in the area of the proposed panels.

Maps MFS1888B, MFS1849B, MFS1822B, show that moose habitat, deer critical summer range, and Elk critical summer range, exist on the permit modification area. Undermining this area should not impact these species.

icampbel

Soils Resource Information

Analysis:

The lease modification of UTU-88554 and UTU-06039 extends these leases southward to include 1,180 additional acres which will extend the life of mine for three years (Section 400 Land Use, p.6) .

Task 4447 presents a revised Mill Fork Lease Soils Map MFS1834D which reflects the lease modification of UTU-88554 and UTU-06039 that are shown on Figure 1. The soils map is corrected for lease ownership (from State Lease ML-48258 to Federal Leases UTU-84285, UTU-88554, and UTU-06039). In addition, it appears that the soil map was revised since the original was provided in 2007. The table of soils included in the narrative and has been edited to agree with the revised information portrayed on the MFS1834D. Finally, use of the words """"permit area""""" have been changed to """"mine plan area""""" in Volume 12 Section 200.

An Order 1 soil survey has not been conducted, as surface disturbance is not expected.

pburton

Land Use Resource Information

Analysis:

The land use maps, MFS1835B, MFS1836B and MFS1856B have been updated to include the lease expansion area. grazing allotments, fire areas, oil and gas leases, and USFS management units are shown. The lease expansion area consists primarily of the Range Forage production and a small area of the Minerals management area management uses.

icampbel

Geologic Resource Information

Analysis:

The Applicant has characterized the geologic resources of the lease modification areas by conducting exploratory drilling in the area. Sixty three coal exploration wells have been drilled in the mine plan area of the Deer Creek Mine. Mining operations at PacifiCorp's mines have historically mined the two major seams present in the area, the Blind Canyon (upper) and the Hiawatha (lower) seams. The coal-bearing portion of the Blackhawk formation is the lower half of the formation, with the Hiawatha seam at or just above the interface between the Blackhawk formation and the Star Point Sandstone below.

The coal reserves in the Mill Fork permit mine plan area are in both the Hiawatha and Blind Canyon seams. The Hiawatha and Blind Canyon seams are close together, usually within 80 vertical feet. The depths of both seams, therefore, are similar in those areas where both seams are present. Overburden depths (Maps MFS 1824D & MFS 1825D) range from 0 feet, where both seams outcrop at the surface, up to about 2,600 feet under the Flagstaff Limestone "caps" on East and Trail mountains. The overburden strata consist of those formations already listed in section R645-301-621:

Flagstaff Limestone
North Horn Formation
Upper Price River Formation
Castlegate Sandstone

Blackhawk Formation

The lease modification area is an extension of the underground mining in the existing Mill Fork lease and is expected to have the same geologic characteristics as are currently found within the lease. No significant Geologic anomaly (faulting, folding, intrusions) exists within the modification areas that would indicate any differing geology than found in the existing mine.

Geologic maps , MFS 1823D, 1824D, 1825D, 1826D, 1827D,1828D, and 1829D have been updated and certified as required.

Deficiencies Details:

dhaddock

Hydro Sampling and Analysis

Analysis:

All baseline samples collected were analyzed by a State certified laboratory for all Section R645-301-731.211 required baseline parameters. Parameters included hardness, acidity, nitrite, nitrate, ortho-phosphate-P, sulfate, anions, cations, anion-cation balance, ammonia, pH, temperature, conductivity, total dissolved solids, chloride, alkalinity, carbonate, bicarbonate, molybdenum, dissolved aluminum, dissolved arsenic, dissolved cadmium, dissolved calcium, dissolved copper, total and dissolved iron, dissolved lead, dissolved magnesium, total and dissolved manganese, dissolved potassium, dissolved sodium, and dissolved zinc. Laboratory reports are included in Volume 12 Appendix C.

khoffman

Hydro Baseline Information

Analysis:

The application includes results of from baseline groundwater sampling in Volume 12 Appendix C of springs during spring and fall of 2010, 2011, 2012, and 2013. Sampling was attempted at all sites during at least two spring and fall events. Volume 12 Appendix C previously included baseline sampling for springs EM-213 and EM-214. Below is a list of baseline sites sampled during the 2010-2013 spring and/or fall. Samples were all baseline parameters unless noted otherwise.

EM-219 – S10, F10, S11, F11, S12-field only, F12, S13, F13
FC-1 – S10, F10, S11, F11, S12, F13-Seep, S13, F13
FC-2 – S10, F10, S11, F11, S12, F12, S13, F13
FC-3 – S10, F10, S11, F11, S12, F12, S13, F13
FC-4 – S10, S11, F11-seep, S12, F12-dry, S13-seep, F13-seep
FC-5 –S11, F11, S12-seep, F12-dry, S13-seep, F13-seep
FC-6 – S10, F10, S11, F11, S12, F12, S13, F13
FC-7 – S10, F10, S11, F11, S12-dry, F12-dry, S13-dry, F13-dry
FC-8 – S11, F11, S12-seep, F12-seep, S13-seep, F13
FC-9 – S12-seep, F12-dry, S13-seep, F13-seep
FC-10 – S12, F12-dry, S13-seep, F13
Flat Canyon – S10-seep, F10-damp, S11-seep, F11-damp, S12, F12-dry, S13, F13-seep
Notes: S=spring, F=fall, samples were not collected if marked as seep or dry

khoffman

Hydro Probable Consequences Determination

Analysis:

Section R645-301-728 of Volume 12 includes the required discussion of the probable hydrologic consequences for surface water and groundwater. Baseline monitoring was first begun in the Mill Fork area in 1994 and the permittee has been mining in the area for over a decade.

During this update of the Probably Hydrologic Consequences the permittee has updated one post mining concern of elevated iron in the mine water discharge. The permittee is acutely aware of the on goings at the Crandall Canyon mine with mine water requiring chemical treatment. The permittee addresses the potential for elevated iron and discusses

planned methods to minimize this possible impact and hopefully eliminate its' potential.

khoffman

Hydro GroundWater Monitoring Plan

Analysis:

Groundwater hydrologic baseline information is presented in Volume 12 Appendix C Mill Fork Spring and Seep Survey 2000-2001 which now includes 2002 and 2010-2012 Field Data. EM-219, FC-1, FC-2, FC-3, FC-4, FC-5, FC-6, FC-7, FC-8, FC-9, FC-10, and Flat Canyon springs were monitored once during the spring/summer time (as soon as access was possible) and once again during the fall. If flow was sufficient to collect a sample it was analyzed for a full suite of laboratory parameters.

khoffman

Hydro SurfaceWater Monitoring Plan

Analysis:

The existing water monitoring plan samples surface water in Indian Creek. No additional surface water sampling locations were found in the lease modification area.

khoffman

Maps Monitoring and Sampling Locations

Analysis:

Figure MFS1851D is includes as part of Volume 12 showing the baseline monitoring locations along with the operational monitoring locations show overlaid with the mine workings and affected area boundary based on 15 degree angle-of-draw from the lowest coal seam to be mined.

khoffman

Maps Subsurface Water Reources

Analysis:

Figure MFS1830D is includes as part of Volume 12 showing the water rights for the lease modification area.

khoffman

Maps Surface Water Resource

Analysis:

No surface water resources are within the permit modification so no maps were modified in this amendment for surface water resources. However, surface water rights are can be found on Figure MFS1830D of Volume 12.

khoffman

Operation Plan

Air Pollution Control Plan

Analysis:

There has been no change to statements made in the Air Quality Section R645-301-420.

pburton

Subsidence Control Plan Subsidence

Analysis:

The applicant states that the effects of significant subsidence are assumed to be coincident with the outline of the planned mine workings. Therefore, significant subsidence will not cross outside of the permit mine plan boundary.

Map MFS1866D projects the affected area boundary based on the angle-of-draw and the actual subsidence case studies from the East Mountain area. The angle-of-draw method projects potential affected areas beyond the northern permit mine plan boundary. Based on historical case studies of actual subsidence, the affected boundary will not exceed the permit mine plan boundary. If subsidence occurs outside the permit mine plan boundary based on annual subsidence surveys, PacifiCorp commits to amending the permit mine plan boundary to include the affected area.The maximum overburden in the area exceeds 2600'.

The application states that aerial photographs of the entire Mill Fork permit Area will be used in conjunction with 51 widely spaced survey control points on the ground as depicted on Map MFS1857D. This survey will produce a digital elevation model of the ground surface in successive years from which a surface subsidence map is generated for each year. The ground control points are marked and surveyed using conventional survey methods, then flagged so that they can be seen in photographs taken from the air. Approximately 100 140 aerial photographs of the permit area will be taken along 7 8 flight lines that traverse the permit mine plan area from north to south.

The baseline data, including surveying and flagging ground control points, acquiring the aerial photographs, and generating the surface grid and map, for the Mill Fork Area were collected in 2000 and 2013. These elevations will then be compared to elevations measured from the photographs taken annually in each summer. The applicant states that using this method, ninety percent of the points measured will be accurate to within plus or minus one-half foot.

The application states that the applicant will maintain survey control aerial targets within the permit mine plan boundary necessary to allow the interpretation of coordinate points on photos within +0.5 foot. Following this procedure the operator will conduct annually an aerial photo survey of all areas which have been undermined. The operator will continue monitoring all areas undermined until the operator and DOGM agree that the subsidence in a given area has become stable and no further monitoring is necessary. The findings of the survey will continue to be reported to DOGM annually in a summary report.

jowen

Subsidence Control Plan Performance STD

Analysis:

The application states that it has already been determined that there are renewable resources present in the area in the forms of springs, water seeps, grazing land, timber, and wildlife. Also present in the permit mine plan area are unimproved roads, trails, a gas well and pipelines, power transmission lines, and some portions of the Castlegate Sandstone escarpment

A single gas well, own and operated by Merit Energy, is located within the permit mine plan area (identified as Federal #23-32-23), near the center of Section 23, T.16 S., R.6E. This is a producing well, with an attached transmission pipeline. The gas transmission line supporting well #32-23 extends along FS #244 for 2000 feet, turns southwest and follows the Flat Canyon drainage to where the pipeline intersects the main gas pipeline in upper portions of Cottonwood Canyon. This pipeline will be undermined by longwall mining operations beginning in 2017. Map MFS1839D shows the location of the transmission line overlaid upon the projected mine workings.

PacifiCorp, Merit Energy, and Utah Division of Oil, Gas, and Mining again, entered into an agreement to ensure protection of this gas transmission line. The agreement was signed in May 2012 and will terminate on December 31, 2018. DOGM notes that the maps that are included with the agreement are outdated, and do not show the current mine plan layout that will be approved by DOGM. However, the language within the agreement is valid and provides the necessary documentation to allow the operator to undermine and potentially damage the transmission line. Energy West is responsible for any damage to the transmission line and for mitigation of any damage as a result of mining operations. The operator will report the subsidence monitoring related to Well No. 32-23 and its supporting gas transmission line in the Annual Subsidence Reports.

Only two roads (administered by the U.S.D.A. Forest Service) cross the permit mine plan area. These are the Flat Canyon Road, #145, and the East Mountain Road, #244. The Flat Canyon road serves as the access road to the gas well Federal #23 32-23 and to the top of the north end of East Mountain, and has been graveled and graded. No portion A portion of the Flat Canyon road will be undermined. The East Mountain road, #244, is an unimproved dirt track that winds along the top of the main ridge. This road traverses the main second-mining areas of the Mill Fork Area. The road ends in the north half of Section 11, T.16 S., R.6E, and continues to the north as a pack trail. Several smaller roads and tracks branch off from this

main road, but are minor in nature. These roads will not be affected by the lease modification.

Two foot and horse trails are present. The Mill Fork Canyon trail (#391) starts at the top of East Mountain, follows the Mill Fork canyon bottom to the switchback on the main Mill Fork Canyon road (outside the permit boundary mine plan area). A foot/horse trail follows the track of the old road. These trails have not been affected by subsidence and will not be affected by mining in the lease modification area.

jowen

Fish and Wildlife Endangered and Threatened

Analysis:

Page 3-3 of volume 12 includes information on threatened and endangered species in the original Millfork lease area. Mr. Bob Thompson of the USDA Forest Service stated that althogh there may be some TES plant species within the Mill Fork Lease area, impacts to vegetation due to mining induced subsidence will be negligible. The proposed mining panels are not located under significant water resources that could impact water availability to TES plants.

A Biological Assessment was prepared for the Forest Service EA. The BA found that, since there is no surface activity proposed for this project, possible subsidence effects are insignificant and discountable and there are no water depletions or diversions associated with the project, there would be no impact to surface wildlife, fish or rare plant species and a section 7 consultation with the USFWS would therefore not be necessary.

icampbel

Fish and Wildlife Bald and Golden Eagles

Analysis:

Map MFS1852B shows the location of raptor nests. No historic raptor nests are located on or near the lease expansion area. The 2013 raptor survey information is included in the application for incorporation into the confidential folder. No new nests were identified on the lease expansion area.

icampbel

Hydrologic Ground Water Monitoring

Analysis:

The permittee has proposed to monitor 6 additional groundwater springs as part of the lease expansion. Monitoring locations Flat Canyon, FC-1, FC-5, EM-214, and EM-220 will be added to the MRP to be monitored for operational parameters and FC-8 will be monitored for field parameters. The U.S. National Forest Service was consulted on this monitoring program and was in agreement of the program.

Based on a map review eight water rights are in the permit modification with in Lease UTU-88554 where subsidence mining will occur. Again based on a map review six of these rights of these water rights are within or very close in proximity to the affected area boundary based on 15 degree angle of draw from the lowest coal seam to be mined. However, during field visits in 2011 and 2013 three (93-766, 93-727, 93-728) of these six water rights could not be located. The other three water rights have been attributed to sampling locations Flat Canyon (93-798), EM-214 (93-797), and FC-1 (93-788) and are proposed to be monitored in the MRP. Spring FC-5 is included as a reference monitoring locations outside the permit area.

khoffman

Hydro Surface Water Monitoring

Analysis:

No additional surface water sampling locations were found as part of baseline collection for the lease modification area so no new surface water monitoring locations are added as part of the amendment.

khoffman

Hydrologic Discharge Into an Underground Mine

Analysis:

The lease modification is not anticipated cause substantial change in mine water discharge quantity. In addition, during exploration drilling the boreholes were found to be very dry and unlikely to yield substantial inflow into the lease modification area.

khoffman

Hydrologic Water Quality Standards

Analysis:

The lease modification is not anticipated cause substantial change in mine water discharge quality. Deer Creek Mine currently discharges mine water and collects monthly samples as required by their UPDES permit.

khoffman

Hydrologic Stream Buffer Zones

Analysis:

Section R645-301-731.600 states mining related activities will not occur within 100 feet of perennial or intermittent streams.

khoffman

Hydrologic Sediment Control Measures

Analysis:

The lease modification doesn't propose any new surface operations so no additional sediment control measures are included as part of the amendment.

khoffman

Hydrologic Discharge Structures

Analysis:

Any intercepted mine water will be commingled with other Deer Creek mine water flows and discharge to the existing Deer Creek UPDES point to Deer Creek.

khoffman

Maps Affected Area

Analysis:

The permit mine plan area contains areas of mineable coal in both the Blind Canyon and Hiawatha seams. At present, the operation plan is to drive mains in the Hiawatha seam from the northwest corner of the Deer Creek mine northwest into the Mill Fork area then drive mains from south to north, bisecting the lease. Longwall panels in the southern Hiawatha reserves area will be developed as the mains are driven northward. The Blind Canyon seam is mineable in the north half of the lease. When the Hiawatha seam mains pass under the mineable Blind Canyon reserves, slopes will be driven upward into the Blind Canyon seam. Blind Canyon seam development will take place with mains bisecting the reserve from south to north, and east-west longwall panels on either side of the mains. When the Blind Canyon reserves are extracted, development of the Hiawatha reserves that underly the Blind Canyon mineable area will then be developed and extracted. The mine plan map of the Hiawatha seam in the Mill Fork area is map MFU 1840D. The mine plan map of the Blind Canyon seam in the Mill Fork area is map MFU 1841D.

Exploration drilling that has occurred in the Mill Fork area has all been plugged as required.

dhaddock

CHIA

CHIA

Analysis:

The all approved mining activities of the Mill Fork lease modification are fully contained within the boundaries of the existing East Mountain CHIA. The southwest corner of Lease UTU-88554 does stretch across Indian Creek. However, this section of Lease UTU-88554 is not approved for any mining activities so the Division finds the existing CHIA fully address this lease modification. In addition, there are already numerous other leases within the CHIA where this situation occurs. The CHIA was updated on December 20, 2013 to address the addition of the Mill Fork lease modification.

khoffman

EAST MOUNTAIN
CUMULATIVE HYDROLOGIC IMPACT ASSESSMENT
(CHIA)

For

COTTONWOOD/WILBERG MINE
C/015/0019

DEER CREEK MINE
C/015/0018

DES-BEE-DOVE MINE
C/015/0017

CRANDALL CANYON MINE
C/015/0032

In

EMERY COUNTY, UTAH

December 18, 2013

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I. INTRODUCTION

East Mountain and the East Mountain Cumulative Impact Area (CIA) are located in Emery County, Utah, west of the town of Huntington (Plate 1). There are currently two active mines in the East Mountain CIA - PacifiCorp's Deer Creek Mine and the Crandall Canyon Mine, jointly owned by Andalex Resources, Inc. and Intermountain Power Agency (IPA). PacifiCorp has two inactive permitted operations in the East Mountain CIA - the Cottonwood-Wilberg Mines and the Des-Bee-Dove Mines: Phase I reclamation (demolition of structures, backfilling and grading, and seeding) at the Des-Bee-Dove Mines was completed in January 2006. (PacifiCorp's inactive Trail Mountain Mine, located immediately west of East Mountain and separated from it by Cottonwood Creek, is outside the East Mountain CIA.) Mountain Coal Company's Huntington #4 Mine in Mill Fork Canyon was reclaimed in 1985 and released from reclamation bond in 1998 (Plate 2).

Expansion of the Deer Creek Mine into the Mill Fork, Joes Valley, and Crandall Canyon drainages required an update of the Cumulative Hydrologic Impact Assessment (CHIA) in March 2003. Leasing of the coal in the South Crandall Canyon Coal Lease Tract (UTU-78953) by Genwal in June 2003, the addition of several adjacent coal tracts in 2004, and PacifiCorp's 2005 plans for access and fan portals in Rilda Canyon required further modification of the East Mountain CHIA in July 2005. The addition of federal lease UTU-84825, the Mill Fork West Extension IBC, on the east side of the Mill Fork tract is the reason for this update of the CHIA; the area added to the Deer Creek Mine permit area was small but involved a new federal lease, so the mine plan modification required federal approval. In 2013, two leases (UTU-88554 and UTU-06039) of the Deer Creek Mine were modified in the Mill Fork drainage (2013 Mill Fork modification).

The Division has the responsibility to assess the potential for mining impacts both inside and outside permit areas. The CHIA is a findings document prepared by the Division that assesses whether existing, proposed, and anticipated coal mining and reclamation operations have been designed to prevent material damage to the hydrologic balance outside the permit areas. The Division cannot issue a permit to a proposed coal mining operation if the probable, anticipated hydrologic impacts will create material damage to the hydrologic balance outside the permit area. The CHIA is not only a determination if coal mining operations are designed to prevent material damage beyond their respective permit boundaries when considered individually, but also if there will be material damage resulting from effects that may be acceptable when each operation is considered individually but are unacceptable when the cumulative impact is assessed.

The objective of a CHIA document is to:

1.	Identify the Cumulative Impact Area (CIA)	**(Part II)**
2.	Describe baseline conditions in the CIA; identify hydrologic systems, resources and uses; and document baseline conditions of surface and ground water quality and quantity	**(Part III)**
3.	Identify hydrologic concerns	**(Part IV)**
4.	Identify relevant standards against which predicted impacts can be compared	**(Part V)**
5.	Estimate probable future impacts of mining activity with respect to the parameters identified in 4	**(Part VI)**
6.	Assess probable material damage	**(Part VII)**
7.	Make a statement of findings	**(Part VIII)**

This CHIA complies with the federal Surface Mining Control and Reclamation Act of 1977 (SMCRA) and subsequent federal regulatory programs under 30 CFR 784.14(f), and with Utah regulatory programs established under Utah Code Annotated 40-10-et seq. and the attendant State Program rules under R645-301-729.

II. CUMULATIVE IMPACT AREA (CIA)

Reviewing Permit Application Packages (PAP) and Mining and Reclamation Plans (MRP) alone is not sufficient to assess impacts to the geologic and hydrologic regimes. Specific knowledge of the geology and hydrology is crucial in assessing the dynamics and interactions of chemistry, surface- and ground-water movement, and surface disturbance and subsidence impact associated with the minesites. The Division uses pertinent information from many sources, including federal and state agencies; geological and hydrological reports; textbooks and other publications; site visits; and a knowledge base built on experience and training.

Plate 2 delineates the CIA for current and projected mining in the East Mountain area. The CIA encompasses approximately 109 miles^2 centered around East Mountain: the area within the CIA that is above the base of the Blackhawk Formation is approximately 69 miles^2, and the approximate area covered by coal leases is 52 miles^2. Mine workings have or will undermine roughly half of the leased areas. Huntington Canyon, Scad Valley, Joes Valley, and Cottonwood Canyon are the primary features bounding the CIA.

SCOPE OF MINING

Coal has been mined from East Mountain since the late 19th century. The old, typically small mines on East Mountain - such as the Rominger (Ferrell), Jeppson, Leroy (Comfort), Johnson, and Helco Mines - are not discussed in detail. Many of the disturbed areas associated with these old mines have been incorporated into larger, more recent mines permitted under the Utah coal mine regulatory program. The Division's Abandoned Mine Lands (AML) program has done reclamation at some of the old mines.

PacifiCorp Mines

The Cottonwood/Wilberg and Deer Creek permit areas overlap, and the Des-Bee-Dove permit area is immediately adjacent to them. Together, the three permit areas encompass approximately 29,000 acres. Utah Power and Light (UP&L), which was merged into PacifiCorp in 1989, acquired these mines from earlier operators. The mines are permitted by PacifiCorp. Energy West Mining Company, a wholly owned subsidiary of PacifiCorp, has operated the mines since 1990. MidAmerican Energy Holdings Co. purchased PacifiCorp from Scottish Power in 2006 and reorganized operations into three business units: coal mining operations are under PacifiCorp Energy (the other two units are Rocky Mountain Power – formerly UP&L – which delivers electricity in Utah, Idaho, and Wyoming; and Pacific Power, which delivers electricity in the northwest.).

Cottonwood/Wilberg Mine

The Cottonwood/Wilberg Mine permit area presently covers approximately 11,500 acres, a combination of fee lands and federal and state leases: some coal leases have been relinquished by PacifiCorp but the permit still includes those areas. Coal has been produced from the Hiawatha Seam, using both longwall and continuous methods.

Coal mining operations have existed in the Wilberg area since the 1890's. Cyrus Wilberg began operating the Wilberg Mine in 1945. UP&L acquired the Wilberg Mine in September 1977 from the Peabody Coal Company, which had acquired it in 1958. UP&L acquired a large, adjacent federal coal lease, called the South Lease, in 1982.

A tragic fire occurred in the Wilberg Mine in December 1984, and on July 1, 1985, the operation was divided into two separate and independent coal mines, the Cottonwood and the Wilberg Coal Mines. Each mine has a separate MSHA identification number; however, a single mining and reclamation permit (ACT/015/019) was issued to both mines because the surface facilities, on 20 acres at the head of Grimes Wash, are shared by both mines.

Mining resumed in the Wilberg Mine in September 1987 and the last coal was mined in January 1988. Longwall mining in the Cottonwood Mine ended in September 1995 and the equipment was moved to the Trail Mountain Mine. Total production to that time was 40 million tons, and remaining reserves in the Hiawatha Seam are estimated at 2 million tons. Portals for both mines are in the Hiawatha Seam, and only the Hiawatha Seam has been mined. There are Blind Canyon reserves, but there currently is no plan to recover these through the Cottonwood/Wilberg Mine.

After mining ceased in the Cottonwood/Wilberg Mine in 1995, a conveyor through the Cottonwood Mine continued to transport coal from the Trail Mountain Mine through East Mountain to the to the truck load-out at the Cottonwood Mine surface facilities in Grimes Wash. After operations ceased at the Trail Mountain Mine in 2001, the Cottonwood/Wilberg Mine was placed in temporary cessation.

Deer Creek Mine

Coal mining operations had taken place on fee land in Deer Creek Canyon prior to 1946, when the first federal coal lease was issued in this area. Peabody Coal Company acquired leases on the Deer Creek property and began operations in 1969. UP&L purchased the Deer Creek Mine in 1977 from Peabody. The current Deer Creek Mine permit area is approximately 25,980 acres, including approximately 5,560 acres added by the Mill Fork Extension in 2003, 214 acres added by the Mill Fork West Extension IBC in 2006, and 1,180 acres added in 2013 with the Mill Fork Modification.

The Deer Creek Mine surface facilities are located on a 25-acre site at the junction of Deer Creek and Elk Canyons, side canyons in the Huntington Creek drainage. The portals are in the Blind Canyon Seam. In the southern portion of the Deer Creek Mine, the underground workings are in the Blind Canyon Seam only: they overlap but are separate from the Cottonwood/Wilberg Mine workings in the Hiawatha Seam. In the Rilda Canyon area, rock slopes from the Blind Canyon Seam provide access to the Hiawatha Seam.

Entry to the Mill Fork Lease is by entries advanced from the Hiawatha Seam through Lease Modification #3, a 65.7-acre area that has been added to Lease U-06039 for this purpose. Coal will be mined in both the Blind Canyon and Hiawatha Seams. The Blind Canyon Seam is to be mined first, accessed from the Hiawatha through rock slopes that are to be built within the Mill Fork Lease area. Total cumulative vertical extraction from both seams will not exceed 20 feet. The full extraction methods to be used are anticipated to cause subsidence that can be planned and controlled.

The Division has approved plans for construction of new portals and a bathhouse in Rilda Canyon. The Division had consensus from the BLM, USFS, and DWR. The disturbed area in Rilda Canyon will be approximately 12 acres, 3 acres being for topsoil and subsoil storage. The sedimentation pond will be on land previously disturbed by the Leroy (Comfort) Mine. These new portals will not be used for coal transport but will be used only for ventilation and transportation of workers and materials into the mine. As of the end of 2006, only ventilation and emergency escape portals have been built (there has also been mitigation work at the Leroy Mine site, which involved removal of coal-mine waste buried by the AML program).

PacifiCorp may eventually add a ventilation breakout in Crandall Canyon, upstream of the existing Crandall Canyon Mine, but an application to add this breakout to the mine plan has not been submitted to the Division. The design of the breakout and the request for permit modification will be made based on the results of future coal exploration.

The majority of the Deer Creek Mine utilizes the longwall mining method. All underground operations, including the Mill Fork Extension, are projected to end around the year 2032.

Table 1
Annual Production in millions of tons
Deer Creek Mine
(Production data from MSHA, 2007)

1983	2.2	1995	4.1
1984	1.9	1996	4.3
1985	2.0	1997	4.5
1986	2.1	1998	3.8
1987	2.5	1999	3.8
1988	2.9	2000	4.2
1989	3.3	2001	4.3
1990	3.4	2002	4.0
1991	3.0	2003	3.9
1992	3.5	2004	3.4
1993	3.2	2005	3.9
1994	4.0	2006	3.7

Des-Bee-Dove Mines (Deseret, Beehive and Little Dove Mines)

The Des-Bee-Dove Mines are located in an unnamed narrow, steep canyon that is part of the Grimes Wash drainage. Mining began in the canyon in 1898 as the Griffith Mine. From 1936 to 1938, the Castle Valley Fuel Company, owned by Messrs. Edwards and Broderick, operated the mine workings. The Church of Jesus Christ of Latter-day Saints (LDS Church) acquired 400 acres adjacent to the Castle Valley Fuel Company mine in 1938, and the adjoining properties were mined by both operators from 1938 to 1947. The LDS Church purchased Castle Valley Fuel Company in 1947, and Deseret Coal Company operated the mines for the church. UP&L acquired the Des-Bee-Dove Mine complex in 1972.

The Dove and Beehive Mines accessed the Blind Canyon Seam and the Deseret Mine the Hiawatha Seam. Mining was done by a series of continuous room and pillar sections. A series of north-south trending faults dictated mine layout. The mines were very dry, requiring importation of water to operate.

The three mines ceased operations on February 6, 1987 and the portals were sealed. Before operations ceased, the Des-Bee-Dove Mines were producing 725,000 tons per year. Reclamation of the entire Des-Bee-Dove site began in 1999 and Phase I reclamation (demolition of structures, backfilling and grading, and seeding) was completed in January 2006.

The Des-Bee-Dove Mine permit area, a combination of fee land and state and federal leases, at one time encompassed over 2,800 acres. The Des-Bee-Dove paved coal-haul road was transferred to Emery County and removed from the permit in 1998, so the site of the reclaimed sedimentation pond and associated access road are now isolated from the rest of the permit area. The permit area was reduced to 155 acres in November 2001, and BLM Right of Way UTU-53809 was relinquished in 2005. PacifiCorp recalculated the acreage in 2005, and the best determination is that the Des Bee Dove permit area is 153.9 acres.

XTO holds a federal oil and gas lease that includes the USFS Special Use area in the Des Bee Dove permit. Wells have been completed in the lands around the Des Bee Dove Mines, and XTO has a well location on the lower end of the reclaimed Des Bee Dove main access road. The Division is currently reviewing PacifiCorp's application for PMLU change and Phase III bond release for the area.

Associated Sites

Underground development waste, sediment from sedimentation ponds, and other coal-mine waste from the Deer Creek, Des-Bee-Dove and Cottonwood/Wilberg Mines are stored at waste rock disposal areas located near the mines (Plate 2).

- Cottonwood/Wilberg - Des-Bee-Dove Waste Rock Disposal Site (inactive). BLM ROW U-37642 was issued in 1981. It is along the east side of state road 57. Of the original 49 acres, 14 acres were relinquished to Texaco for coal-bed methane operations, including a roadway that cuts through the middle of the site. South of the road, 14 acres have been reclaimed and 5 acres remain to be reclaimed, and 16 acres north of the road (including a vegetation reference area) remain undisturbed. Phase I Bond Release on the 14 reclaimed acres was granted on July 22, 1999 (ACT/015/019-BR98). There are no plans for further waste disposal at this site.

- Cottonwood/Wilberg –Trail Mountain - Des-Bee-Dove Waste Rock Disposal Site (inactive). BLM ROW-UTU-65027 was issued in 1990. This site is across state road 57 from the disposal site on ROW-U37642. Total area is approximately 26 acres, with 17 acres disturbed. Presently, waste is not being placed here because the mines are inactive.

- Deer Creek Mine Waste Rock Disposal Site (active). This site lies northeast of state road 31 on land owned by Utah Power & Light. The access road and waste disposal area cover approximately 32 acres.

The Cottonwood/Wilberg Mine sewer absorption field and sewer line, part of the permitted area, are located on BLM right-of-way U-37641 outside the main permit area boundary. This system is designed to also handle Trail Mountain Mine sewage, which is piped

through the Cottonwood/Wilberg Mine.

There are several additional, small rights-of-way for power and telephone lines and haul roads.

Huntington Canyon #4 (Beaver Creek Coal Company)

The Huntington Canyon #4 Mine permit area contained 1,320 acres. The underground operations utilized room and pillar mining methods in the Blind Canyon and Hiawatha coal seams in Federal Leases U-33454 and SL-064903. All underground mine operations ceased November 1, 1984.

The mine working advanced generally to the northwest. The Blind Canyon Seam was mined within and northwest of the Mill Fork Graben. According to Dan Guy, former Engineering Manager for the mine (personal communication, February 26, 2003), the mine closed because of economic conditions related to coal quality: as mining moved northwest from the graben into what was called the Dellenbach Lease, the coal was oxidized and could not be economically processed.

The mine intercepted faults and some water sources, but Mr. Guy does not recollect large inflows to the mine. He speculated that the oxidation was the result of ancient activities and did not know if it was related to the recharge source to Little Bear Spring. Beaver Creek Coal Company commissioned a study by Vaughn Hansen and Associates (1977) that included Little Bear Spring; they concluded there was no connection between the mine and the spring.

Beaver Creek Coal Company reclaimed the #4 Mine site during the period of August 15, 1985 through September 30, 1985. Three portals and one opening were sealed. The disturbed area, including the access road, was backfilled and regraded. Soil was replaced and reseeded. The reclamation bond was released in May 1998.

Crandall Canyon Mines (Genwal Resources, Inc.)

Coal for local, domestic use was mined from Crandall Canyon from November 1939 to September 1955. Approximately 35,000 tons were mined from the Hiawatha Seam (Crandall Canyon Mine MRP, p. 4-6 and 4-7). There was no reclamation done.

Genwal Resources (Genwal) began mining in this area in 1983. Some of the older workings have been incorporated into the Crandall Canyon No. 1 Mine. Andalex and Intermountain Power Agency (IPA) purchased Genwal and the mine in 1995, but Genwal is still the operator. Andalex Resources was purchased by Murray Energy, Inc. in 2006. Both continuous and longwall mining methods are currently used. Pillars will be fully extracted unless they are needed for safety or to protect the outcrop.

Table 2
Annual Production in millions of tons
Crandall Canyon and South Crandall Canyon (starting in 2003) Mines
(Production data from MSHA, 2007)

1983	0.002	1995	2.1
1984	0.1	1996	2.5
1985	0.2	1997	2.7
1986	0.1	1998	3.5
1987	0.2	1999	3.8
1988	0.2	2000	3.9
1989	0.4	2001	4.0
1990	0.6	2002	3.3
1991	0.9	2003	1.2
1992	1.2	2004	1.0
1993	1.5	2005	1.8
1994	1.7	2006 (through Oct.)	1.2

The permit area for the Crandall Canyon No. 1 Mine contains approximately 5,320 acres in Huntington Canyon in Emery County, Utah. Approximately 11 acres are disturbed. In February 1993, Genwal applied to lease 4,053 acres of Federal coal lands adjacent to the south of the Crandall Canyon No. 1 Mine, initiating the process that led to the leasing of the Mill Fork tract. However, PacifiCorp won the bid for that lease, which became the Mill Fork Extension of the Deer Creek Mine. In February 2005, Genwal received approval to begin mining an additional 120-acre Incidental Boundary Change (IBC) (addition to Lease U-68082) located at the northeast portion of the existing permit boundary.

The South Crandall Canyon Coal Lease Tract - Lease U-78953

The South Crandall Canyon Coal Lease Tract was deleted from the Mill Fork tract because of the concerns that were raised regarding Little Bear Spring. The South Crandall Canyon area was reevaluated, and based on a Decision Notice/Finding of No Significant Impact (DN/FONSI) signed by the BLM and USFS in February 2003, the South Crandall Canyon Tract was leased through competitive bid to Andalex in 2003.

The South Crandall Canyon tract covers 880 acres. There are an estimated 6 million tons of recoverable coal. Access is through the South Crandall Canyon portals constructed in 2003 on the south side of Crandall Canyon, in fee coal that is jointly owned by IPA and Andalex but commonly referred to as the “Dellenbach“ lease.

A 40-acre parcel of the Mill Fork Lease has been transferred from PacifiCorp to Genwal to allow more efficient mine layout and increased coal recovery. A 160-acre fee tract has also been added, bringing total acreage to 1,080 acres in the South Crandall Canyon extension.

III. DEFINE BASELINE CONDITIONS; IDENTIFY HYDROLOGIC SYSTEMS AND USES, AND DOCUMENT BASELINE CONDITIONS OF SURFACE AND GROUND-WATER QUALITY AND QUANTITY

BASELINE CONDITIONS

East Mountain is located in Emery County, Utah, west of the town of Huntington and approximately 20 miles southwest of Price (Plate 1). It is in the Wasatch Plateau Coal Field. The eastern margin of the Wasatch Plateau is a rugged escarpment that overlooks Castle Valley and the San Rafael Swell to the east. Elevations along the entire eastern escarpment of the Wasatch Plateau range from approximately 6,500 to over 9,000 feet. The climate of the Wasatch Plateau has been classified as semiarid to subhumid. Precipitation varies from 40 inches at higher elevations to less than 10 inches at lower elevations, and ranges from 10 to 30 inches per year within the CIA (Danielson and others, 1981).

East Mountain is a north-south trending ridge, bounded by Huntington Canyon on the northeast and north, Left Fork of Huntington Canyon and Scad Valley on the north and northwest, Joes Valley and upper Cottonwood Canyon on the west, and lower Cottonwood Canyon on the south. The southeast side of the mountain is part of the Wasatch Plateau escarpment that separates the plateau from Castle Valley. Elevations in the East Mountain CIA range from 7,000 in the canyon bottoms to over 10,700 feet along the crest of East Mountain. Much of the surface is steep and dissected by steep, narrow canyons with heavy vegetation and barren cliffs.

Soils - based on information in the USFS 1997 Environmental Assessment (EA), pages III-3 and III-4

Shallow to very deep soils on the lease tract have developed primarily from sandstone and shale parent materials. Rock outcrops are common, especially within the Castlegate Formation. Because of the steepness of the slopes and rapid runoff, most soils are well drained.

Soils derived from sandstone are typically cobbly or stony with textures of loamy sand, sandy loam, or loam. Clay loam, silty clay loam, and clay are common in soils derived from North Horn Formation. Subsoils often have higher clay content than the surface.

Topsoil development is most pronounced under aspen vegetation types, where it is commonly 20 to 30 inches thick and has a relatively high organic matter and nutrient content.

On the steep, north facing slopes that support a spruce-fir type, topsoil thickness may vary from about three to ten inches. Alluvial soils are found in drainages.

The elevation range, steep slopes, and contrasting aspects account for large soil temperature and moisture differences. Soils on the lower-elevation south-facing slopes are hot and dry, and those at the higher elevations and on north-facing slopes are cool and moist. Soil temperature regimes include cryic (cold) and frigid, and the soil moisture regimes are udic (moist) and ustic (semiarid). The aspen and spruce-fir vegetation types are characteristic of the cryic/udic environment, and lower-elevation mountain brush with some pinyon-juniper is characteristic of the frigid/ustic situation.

Vegetation

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

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

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

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

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

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

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

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

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

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

Aquatic Species - based on information in the USFS 1997 EA, pages III-14, 15 and 16

Some stream channels in the CIA support naturally-reproducing trout fisheries and typical coldwater, mountain-environment aquatic communities, including aquatic plants, insect populations, periphyton, and zooplankton. Information provided by the Utah Division of Wildlife Resources and cited in the EA indicates that in addition to trout, it is likely that there are speckled dace, mottled sculpin, bluehead suckers, and mountain suckers. It is likely adult cutthroat trout and sculpins are present in spawning habitats in headwater areas of the intermittent channels only during the spring reproductive period. The EA cites evidence that tiger salamanders, western toads, and Great Basin spadefoot toads probably inhabit the area.

High-gradient streams in the CIA are characterized by rock- and wood-created step-pools, deeply incised channels, and occasional beaver ponds. Riparian zones are composed of spruce-fir/aspen communities and thick willows. Spawning gravels are patchy and distributed in lower-gradient reaches. Successful spawning requires the presence of clean, well-oxygenated spawning gravels, so protecting these channels from excessive erosion and sedimentation is a high priority. In the past, stream channels throughout the area were degraded by livestock grazing and erosion from high runoff, such as occurred in 1983-84.

Small seep or pothole-type wetlands act as water reserves and provide baseflows that can support aquatic communities during low-water periods. Potholes, small ponds and marshy areas provide subsurface flow that supplements direct water sources like springs and run-off. These wet areas also provide important habitat for invertebrate and amphibian populations. Wet areas need to be protected from soil compaction, disturbance, and the removal of woody material to maintain existing habitat quality and quantity for aquatic organisms.

Geology

Stratigraphy

Consolidated strata exposed in the Wasatch Plateau Coal Field range in age from Late Cretaceous to Tertiary (Eocene), as seen in Figure 1 and Plate 3. The oldest exposed rocks are upper members of the Mancos Shale. The Cretaceous Mesaverde Group, which in the Wasatch Plateau consists of the Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, and Price River Formation, overlies the Mancos. Above the Mesaverde Group are the Paleocene North Horn Formation and Flagstaff Limestone of the Wasatch Group: the Flagstaff is the youngest and uppermost consolidated formation exposed in the CIA. Unconsolidated Quaternary colluvium, alluvium, and soils have been formed by weathering and erosion and are found on terraces, along canyon bottoms, and are especially prominent along the base of East Mountain in Joes Valley. Upper Cottonwood Canyon contains deposits of glacial till.

The stratigraphy displays an overall regressive sequence from marine (Mancos Shale) through littoral (Star Point Sandstone) and lagoonal (Blackhawk Formation) to fluvial (Castlegate Sandstone, Price River Formation and North Horn Formation) and lacustrine (Flagstaff Limestone) depositional environments. There are no major disconformities exposed in this area, but Spieker (1931, p. 42) considered the Castlegate-Blackhawk contact as likely unconformable in the Wasatch Plateau. Oscillating depositional environments within the overall regressive trend are represented by intertongueing lithologies, especially within the Blackhawk Formation and Star Point Sandstone. The Star Point consists of three main sandstone tongues - in ascending order, the Panther, Storrs, and Spring Canyon Sandstone Members.

The major coal-bearing unit in the Wasatch Plateau Coal Field is the Blackhawk Formation. The commercial coal seams are usually near the base of the Blackhawk, and in the East Mountain area the lowest seam, the Hiawatha, is often directly on or just above the Spring Canyon Sandstone. The Hiawatha Seam has been mined in the Crandall Canyon No. 1, Deer Creek, Des-Bee-Dove, Cottonwood-Wilberg, and Huntington #4 Mines. The Blind Canyon Seam has been mined at the Deer Creek, Des-Bee-Dove, and Huntington #4 Mines. Both seams will be mined in the South Crandall Canyon tract.

System	Series	Stratigraphic Unit			Thickness (feet)	Description
Tertiary	Eocene	Green River Formation			-	Greenish-gray and white claystone and shale, also contains fine-grained and thin-bedded sandstone. Shales often dark brown, containing carbonaceous matter. Full thickness not exposed.
		Colton Formation	Wasatch Formation		300 - 2,000	Colton consist of brown and dark-red lenticular sandstone, shale, and siltstone, thins westward and considered a tongue of the Wasatch.
	Paleocene	Flagstaff Limestone			3,000	Wasatch predominantly sandstone with interbedded red and green shales with basal conglomerate. Found in east part of field and equivalent to Colton and Flagstaff in west.
					0 – 500	Flagstaff mainly gray and cream colored limestone, variegated shale, and fine-grained, reddish-brown sandstone.
		North Horn Formation *MINOR COAL*	Tucher Formation		350 – 2,500	North Horn Formation - Gray and gray-green calcareous and silty shale, tan to yellow-gray fine-grained sandstone, and minor conglomerate. Unit thickens to the west. Tucher Formation - Light gray to cream-white friable massive sandstone and subordinate buff to gray shale that exhibits light greenish cast. Contains minor conglomerate and probably represents lower part of North Horn, only present in east part of coal field.
Cretaceous	Danian				0 – 200	
	Maestrichthian	Price River Formation MINOR COAL		Mesaverde Group	500 – 1,500	Yellow-gray to white medium-grained sandstone and shaley sandstone with gray to olive green shale. Contains carbonaceous shale with minor coal and thickens along east edge of field.
	Campanian	Castlegate Formation *MINOR COAL*			100 – 500	White to gray, fine-grained sandstone, argillaceous massive resistant sandstone thinning eastwardly with subordinate shale. Carbonaceous east of Horse Canyon but coal is thin and lignitic.

		Blackhawk Formation *MAJOR COAL SEAMS*		600 – 1,100	Cyclical littoral and lagoonal deposits with six major cycles. Littoral deposits mainly thick-bedded to massive cliff-forming yellow-gray, fine- to medium-grained sandstone, individual beds separated by gray shale. Lagoonal facies consist of thin- to thick-bedded yellow-gray sandstones, shaley sandstones, shale, and coal. Coal beds of Wasatch Plateau and Book Cliffs Coal Fields. Unit thins eastward, grading into the Mancos Shale.
		Star Point Sandstone		0 – 580	Yellow-gray, massive medium- to fine-grained littoral sandstone tongues projecting easterly, separated by gray marine shale tongues projecting westerly.
	Santonian	Masuk Tongue Emery Sandstone	Mancos Shale	4,300 - 5,050	Gray marine shale, locally heavily charged with carbonaceous material, slightly calcareous and gypsiferous, nonresistant forming flat desert surfaces and rounded hills and badlands. Separated mainly to into tongues by westward projecting littoral; sandstone that eventually grade into shale. Sandstones are fine- to medium-grained, yellow-gray to tan, and medium-bedded to massive and cliff-forming.
	Coniacian	Garley Canyon Sandstone Blue Gate Shale			
	Turonian	Ferron Sandstone *MINOR COAL* Tununk Shale			
	Cenomanian	Dakota Sandstone		2 - 126	Heterogeneous sandstone, conglomerate, and shale, thin resistant cuesta former.

Figure 1 - General Stratigraphy of the Wasatch Plateau Coal Field (after Doelling, 1972)

Regional aquifer is a phrase commonly used by mine operators in the Book Cliffs and Wasatch Plateau coal fields. In such usage, regional aquifer usually refers to any water found in the Star Point Sandstone and Blackhawk Formation irrespective of quality, quantity, use, storage, flow and transport, and discharge. In preparing this CHIA, the Division has adhered to the definition of *aquifer* as found in the Coal Mining Rules (R645-100-200), and the term regional aquifer has been deliberately used or avoided, as appropriate, throughout this CHIA. Although there are local perched and fracture-related aquifers at East Mountain, the quality, quantity, use, storage, flow and transport, and discharge of ground water do not indicate the presence of a regional aquifer or aquifer system. After evaluating the geologic and hydrologic evidence, the Division does not consider the saturated strata in the Star Point, Blackhawk and associated formations in the East Mountain CIA to be a regional aquifer.

Hydraulic Conductivity and Permeability

In sedimentary rocks, there is a wide range of textures or fabrics that determine the hydraulic characteristics of the unfractured medium. These textures or fabrics are related to the mineralogy or composition of the sediments, the range of sizes of the sedimentary particles (sorting), the spatial distribution of different sediment-sizes (grading), the shape and spatial orientation or arrangement of the sediment particles after compaction (packing), cementation, and properties acquired or altered as and after the sediments were lithified. Lateral and vertical

variations in these characteristics can create internal low-permeability zones or barriers, so that a unit that to the eye appears to be very uniform and to have aquifer characteristics can actually be incapable of storing or transporting water in any significant amount. Such vertical and lateral inhomogeneities are common within sandstone units of the Blackhawk and Price River Formations and in the Star Point Sandstone.

Based on slug tests and determinations from core samples, hydraulic conductivity of the Star Point Sandstone is typically low, so movement of ground water through the unfractured sandstone is slow and unfractured Star Point Sandstone is not generally considered to be an aquifer. However, hydraulic conductivity values within the Star Point Sandstone vary through several orders-of-magnitude, and unfractured units in the Star Point Sandstone can locally transmit sufficient ground water to sustain small springs or wells. (As a very general rule-of-thumb, aquifers have hydraulic conductivities of 10^{-5} cm/sec or greater.) Strata above the Star Point Sandstone have hydraulic conductivities that are generally as low or lower than those in the Star Point Sandstone.

Table 3 – Hydraulic Properties of Strata in the Wasatch Plateau Coal Field

cm/sec = hydraulic conductivity cm²/sec = transmissivity						
			Price River	North Horn	Blackhawk	Star Point
USGS Lab Measurements on Cores (Lines, 1985)		*17-6 27bda* Horizontal			Ss 5.3x10^{-6} cm/sec	
					Silt 3.3x10^{-11} cm/sec	
					Ss 3.9x10^{-6} cm/sec	
					Shale 3.9x10^{-12} cm/sec	
					Silt 7.0x10^{-11} cm/sec	
						Ss 1.1x10^{-5} cm/sec
						Ss 5.3x10^{-6} cm/sec
		17-6 27bda Vertical			Ss 1.3x10^{-6} cm/sec	
					Silt 4.2x10^{-11} cm/sec	
					Ss 1.4x10^{-6} cm/sec	
					Silt 7.8x10^{-10} cm/sec	
						Ss 3.9x10^{-6} cm/sec
						Ss 2.3x10^{-6} cm/sec
USGS Recovery or Drawdown Test (Lines, 1985)		17-6 24dcd			2.2x10^{-2}cm²/sec (~ 3.9x10^{-6} cm/sec)	
		17-6 27bda			8.6 x10^{-2}cm²/sec (~ 4.8x10^{-6} cm/sec)	
						6.4 x10^{-2}cm²/sec (~ 2.6x10^{-6} cm/sec)
		17-6 28bad	8.6 x10^{-3}cm²/sec (~5.6x10^{-6} cm/sec)			
		17-6 34dda		1.1 x10^{-1}cm²/sec (~ 7.8x10^{-5} cm/sec)		
					7.5 x10^{-3}cm²/sec (~ 1.6x10^{-5} cm/sec)	
		18-6 4bac			1.07cm²/sec (~ 5.8x10^{-5} cm/sec)	
Genwal Mine Slug Tests	MRP	Panther Tongue	MW-1 (1987)			3.5x10^{-5} cm²/sec
			MW-4 (1992)			2.1x10^{-4} cm²/sec
			MW-5 (1992)			8.8x10^{-4} cm²/sec
	A	Spring	MW-2 (1997)			1.5x10^{-6} cm/sec

cm/sec = hydraulic conductivity cm^2/sec = transmissivity							
				Price River	North Horn	Blackhawk	Star Point
		Cyn Tongue	MW-6a (1997)				$1.3 \text{ to } 1.8 \times 10^{-6}$ cm/sec
			MW-7 (1997)				2.2×10^{-6} cm/sec
		Panther Tongue	MW-6 (1997)				$1.9 \text{ to } 2.2 \times 10^{-6}$ cm/sec
Trail Mountain Mine			TM-3				5.1×10^{-3} cm/sec
Skyline Mine Hansen Associates, 1979, p. 85			Blackhawk coal			2.7×10^{-8} cm^2/sec ($\sim 4.4 \times 10^{-6}$ cm/sec)	
			Aberdeen Ss			2.5×10^{-2} cm^2/sec ($\sim 2.5 \times 10^{-6}$ cm/sec)	
Bear Canyon Mine Slug Tests	Panther Tongue		DH-1A				5.5×10^{-1} cm^2/sec ($\sim 2.6 \times 10^{-4}$ cm/sec)
			DH-2				2.4×10^{-2} cm^2/sec ($\sim 8.8 \times 10^{-6}$ cm/sec)
			DH-3				7.4×10^{-2} cm^2/sec ($\sim 3.4 \times 10^{-5}$ cm/sec)
	Storrs Tongue		DH-1A				3.2×10^{-2} cm^2/sec ($\sim 1.1 \times 10^{-5}$ cm/sec)
			DH-2				89.3 cm^2/sec ($\sim 2.7 \times 10^{-2}$ cm/sec)
			DH-3				7.5×10^{-4} cm^2/sec ($\sim 2.8 \times 10^{-6}$ cm/sec)
	Spring Cyn Tongue		DH-1A				1.4×10^{-1} cm^2/sec ($\sim 5.1 \times 10^{-5}$ cm/sec)
			DH-2				1.5×10^{-2} cm^2/sec ($\sim 4.2 \times 10^{-6}$ cm/sec)
			DH-3				4.0×10^{-2} cm^2/sec ($\sim 2.0 \times 10^{-5}$ cm/sec)
			DH-4				3.1×10^{-1} cm^2/sec ($\sim 5.7 \times 10^{-5}$ cm/sec)
Horizon Mine MRP Slug test	HZ-95-1S (shallow Blackhawk)					7.3×10^{-3} cm/sec	
	HZ-95-1						5.7×10^{-3}cm/sec
	HZ-95-2						8.8×10^{-5}cm/sec
	HZ-95-3						7.1×10^{-5}cm/sec

Falling–head permeability tests of the Mancos Shale at the Deer Creek Mine Waste Rock Storage Facility yielded values of 0.0 ft/yr for unweathered, unfractured shale and 0.0 ft/yr to 820 ft/yr (7.9×10^{-4} cm/sec) for weathered shales and mudstones.

Swelling Clays

The interbedded claystones, siltstones, and sandstones of the Wasatch Plateau are rich in swelling clay minerals of the montmorillonite or smectite group. Swelling clays absorb water and expand to as much as 150 percent of their dry volume. These swelling clays reduce the hydraulic conductivity of the rock or soil that contains them and contribute to the rapid closing

or healing of tension fractures that result from subsidence. Genwal examined six shale and siltstone samples from the Blackhawk Formation by X-ray diffraction and cross-polarized light microscopy and found the samples contained 3 to 34 percent smectitic clays, with an average of 24 percent. Siltstones and shales in the Castlegate (three samples) averaged 19 percent smectitic clay, and the Price River Formation (three samples) 15 percent. Non-swelling clays, which also inhibit ground-water flow, constituted an additional 1 to 6 percent of the rock volume (Crandall Canyon Mine MRP, App. 7-41).

Coal

The Blackhawk Formation contains the economic coal resource in the Wasatch Plateau Coal Field. The Hiawatha and Blind Canyon are the only seams in the East Mountain area that can be mined economically. Coal washing facilities at the Hunter Power Plant allow lower-quality and higher-ash coal to be mined and used for power generation. The Cottonwood Seam, which lies between the Hiawatha and Blind Canyon Seams, has been determined by UP&L and the BLM to be unminable: temperatures indicate it may be burning in areas. The Bear Canyon Seam, which is above the Blind Canyon Seam in Crandall Canyon, is thick but not extensive enough to be mined economically.

The lowest coal seam is the Hiawatha, characteristically lying on or just above the Star Point Sandstone. This seam has been mined in the Cottonwood/Wilberg, Deer Creek, Des-Bee-Dove, Huntington #4, and Crandall Canyon No. 1 Mines. The Hiawatha Seam thins to less than 5 feet in the north end of the Cottonwood/Wilberg Mine, but then thickens again to the north, where it is mined in the Rilda Canyon area by way of rock slopes down from the Deer Creek Mine. Access to this seam in the Mill Fork Extension is by way of entries advanced from the Deer Creek Mine through the 65.7-acre lease modification added to Lease U-06039, and PacifiCorp's Rilda Canyon portals will connect with these entries. The Hiawatha Seam reaches a thickness of 12 feet in the north workings of the Crandall Canyon Mine and over 6 feet where it will be mined in the South Crandall Canyon Tract.

The Blind Canyon Seam lies 40 to 100 feet above the Hiawatha Seam. The Blind Canyon Seam has been mined in the Deer Creek, Huntington #4, and Des-Bee-Dove Mines. This seam is too thin to be mined economically south of the Deer Creek Mine and in the area of the Crandall Canyon No. 1 Mine, but it will be mined in the Mill Fork Extension (up to 19 feet thick) and South Crandall Canyon tract (up to 7 feet thick). In both the Mill Fork Extension and South Crandall Canyon Tract, this seam will be accessed by way of rock slopes from the Hiawatha Seam.

Overburden thickness in areas where full-extraction mining has been done or is projected in the Deer Creek, Cottonwood/Wilberg, Des-Bee-Dove, and the Crandall Canyon No. 1 Mines is 200 to 2,600 feet. Where subsidence is projected for the Mill Fork Tract, overburden ranges from 900 feet in the South Fork of Crandall Canyon to 2,600 feet under East Mountain, and for

the South Crandall Canyon Tract it varies from under 500 feet, near the coal outcrops, to 1,500 feet.

Structure

Cliffs, narrow canyons, and high plateaus characterize topography in the East Mountain CIA. Strata in the Wasatch Plateau were tilted in response to the rise of the San Rafael Swell and modified by subsequent tectonic, orogenic, and erosional events. Strike of the beds is generally parallel to the face of the Wasatch Plateau escarpment, and dip is usually less than 5 degrees, whether it is regional or caused by local structural deformation. Major structural features associated with East Mountain are:

- Flat Canyon Anticline;
- Crandall Canyon Syncline;
- Straight Canyon Syncline;
- Roans Canyon Graben;
- Mill Fork Fault Graben or Fault Zone;
- Deer Creek Fault;
- Pleasant Valley Fault; and
- Joes Valley Graben, Joes Valley Fault, and other related faults

These are shown on Plate 3. PacifiCorp has mapped the Flat Canyon anticline as a gentle fold that begins at Joes Valley Fault and trends northeast and then north before dying-out in upper Mill Fork Canyon. The EA prepared by the USFS and BLM described this anticline as simply having a north-south orientation (p. III-3).

In the area of the Crandall Canyon No. 1 Mine, strata dip at less than 5^{O} on both flanks of a gently south-plunging, unnamed anticline that terminates in the Crandall Canyon Syncline. Because the axis of this fold is near Joes Valley Fault, the west flank of this anticline is limited in extent and may simply be a drag fold caused by movement on Joes Valley Fault.

The Crandall Canyon Syncline is oriented northeast-southwest on the Joes Valley side of East Mountain but curves roughly 90^{O} and trends northwest–southeast where it crosses Little Bear Canyon on the Huntington Canyon side of the mountain. This syncline terminates at approximately a right angle against the Mill Fork Fault Graben, near Little Bear Spring.

Straight Canyon Syncline extends southwest to northeast from Trail Mountain, across Cottonwood Canyon, and then terminates between the upper forks of Meetinghouse Canyon. Its axis is just south of and parallel to Roans Canyon Graben.

Roans Canyon Graben is a series of several parallel normal faults, with four main faults. The graben extends from Trail Mountain to Meetinghouse Canyon. Maximum displacement on

the faults is 150 feet. Where the Deer Creek Mine crosses the graben at the 3rd North crossing, strata north of the graben are 40 feet lower than those south of the graben and the floor of the graben has been dropped 114 feet. Gouge in the four main faults is absent at some locations and up to 30 feet thick at others (1988 PacifiCorp Annual Report). Experience in the Deer Creek Mine indicates the faults impede ground-water movement across the graben but facilitate flow parallel to the graben, both vertically and horizontally.

The Mill Fork Fault Graben or Zone is a northeast-southwest trending series of faults. PacifiCorp has mapped this zone as branching from the Roans Canyon Fault Graben at Trail Mountain and extending to Huntington Canyon. In places, the faults that mark this zone can be mapped from features visible at the surface, but the zone has been extended across the CIA based on underground encounters in the Deer Creek and Huntington #4 Mines and a geophysical study performed by PacifiCorp in the Rilda Canyon area. Offset is approximately 25 to 30 feet on the faults bounding both sides of the graben. The faults are exposed in Little Bear Canyon, where Little Bear Spring flows from the bounding fault on the west side of the graben.

The Deer Creek and Pleasant Valley Faults trend north-south along the southeast side of East Mountain. They are representative of a series of en-echelon faults that extend from the south end of Gentry Mountain and across Huntington Canyon to East Mountain. These faults are the southern end of a group of major north-south faults that includes the Pleasant Valley, Trail Canyon, and Bear Canyon Faults. Layout of the Des-Bee-Dove Mines was dictated by a system of these north-south faults, and the Deer Creek Fault separates the Des-Bee-Dove Mines from the Deer Creek and Wilberg Mines. Fault displacements are generally less than 30 feet and not more than 200 feet.

Joes Valley lies west of East and Trail Mountains in Joes Valley Graben. At the north end of Joes Valley, at the northwest corner of the CIA (Plate 3), the elevation of the divide between Joes Valley and Scad Valley is 9,200 feet. From that divide Joes Valley slopes south to Joes Valley Reservoir, located several miles south of the CIA, where the elevation of the valley floor (submerged below the reservoir) is 6,800 feet.

Joes Valley Graben and its bounding faults are regional features that run north-south for roughly 80 miles and extend both north and south well beyond the geographic area named Joes Valley. Joes Valley Fault is the eastern bounding fault of Joes Valley Graben. It is a normal fault with up to 3,000 feet of vertical offset, but maximum offset in the CIA is approximately 1,500 feet. The fault scarp has eroded to form the steep, western flank of East Mountain. Joes Valley Graben is itself broken into a number of smaller grabens and horsts. Bald Ridge and Middle Mountain, two horsts that expose Upper Price River and North Horn Formation bedrock, separate Indian Creek from other Joes Valley Graben drainages to the west.

Indian Creek flows in a narrow sub-drainage between Joes Valley Fault on the east and Bald Ridge and Middle Mountain. This drainage is surfaced with a westward thinning wedge of

colluvial and alluvial material that has been shed from East Mountain and deposited over North Horn Formation bedrock. Indian Creek does not flow down the middle of this drainage, rather, having been displaced by the alluvial-colluvial wedge, it flows on the west side of the valley, near the North Horn-alluvium contact at the base Bald Ridge and Middle Mountain.

Jointing, which affects hydrologic characteristics, is significant in the Mill Fork Lease area. As the Crandall Canyon Mine workings neared Joes Valley Fault, a series of subsidiary tensional fractures was encountered. The dominant joints parallel Joes Valley Fault, trending predominantly north-south to north 10^0 east, and secondary fracture sets follow other orientations (Mill Fork Extension MRP, R845-301-624).

Climate

Temperatures range from 32^O to 90^O F in the summer and -10^O to 40^O F in the winter. Potential evapotranspiration has been estimated to be 18 to 21 inches per year. Prevailing winds are from the west and northwest. The average velocity at the Crandall Canyon Mine, based on information from the Utah State Climatological Office, is 12 mph (Crandall Canyon Mine MRP, Section 7.24.4).

Annual precipitation ranges from 10 to 30 inches per year in the CIA (see Plate 1 *in* Danielson and others, 1981). Table 4 shows variation is not strictly controlled by elevation; for example, the Crandall Canyon Mine averages 40 percent more precipitation than PacifiCorp's higher elevation East Mountain station. At the East Mountain station, there are two wet-dry cycles during the year: June is typically the driest month, with another dry period in December. Precipitation peaks in March and September, but no month averages over 1.5 inches. June is also the driest month at the Crandall Canyon Mine, but the five months from November through March each average over 2 inches of precipitation, with December being the wettest, averaging over 3 inches. August also has over 2 inches of precipitation from the late-summer so-called *monsoon* rains typical of the region.

Table 4
Annual Precipitation in the
East Mountain CIA Area

	Annual Precipitation (inches)	Water Years	Elevation (feet)	Source of Information
Crandall Canyon Mine	20	NA	8,000	Crandall Canyon Mine MRP, Section 7.24.4
Hunter Power Plant*	8	1976 – 2003	5,800	2003 PacifiCorp Annual Report -

Huntington Power Plant	10	1971 – 2000	6,500	Tables 3,4,5, and 6
Electric Lake*	23	1971 - 2003	8,350	
East Mountain	13	1981 - 2003	9,000	

* - Located outside the East Mountain CIA

The East Mountain CIA straddles the boundary between Palmer Hydrologic Drought Index (PHDI) Regions 4 and 7 and is near Region 5; Figure 2 shows the PHDI for 1978 through 2004. The area was in a drought, at times extreme drought, from 2000 to the end of 2004.

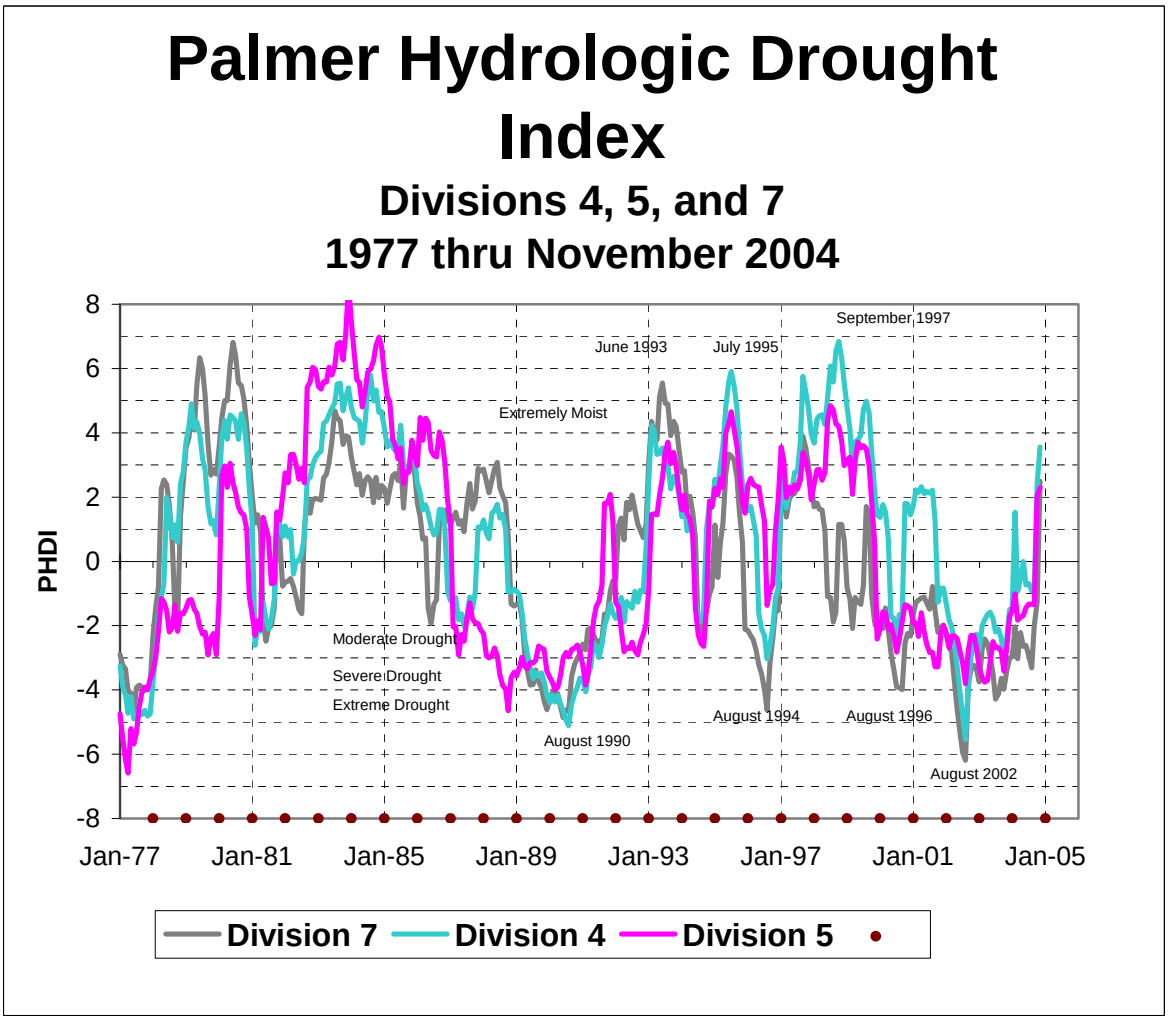

Figure 2 - PHDI, Divisions 4, 5, and 7

HYDROLOGIC SYSTEMS and USES

Ground Water

Ground-water regimes in the CIA are dependent upon climatic and geologic parameters that establish systems of recharge, movement, and discharge.

In the East Mountain CIA, snowmelt at higher elevations provides most of the water for ground-water recharge. Recharge has been estimated to be 3 to 8 percent (Danielson and Sylla, 1983) and 9 percent (Waddell and others, 1986) of the average annual precipitation for areas in the Wasatch Plateau and Book Cliffs coal fields. Well-developed soils and permeable or fractured lithologies exposed at the surface facilitate recharge.

Recent studies in Australia (Barnes and others, 1994) and at the Nevada Test Site (French and others, 1996) indicate that recharge is not a linear process in arid and semi-arid environments, but rather there are threshold conditions involving the soil and the amount, rate, and timing of precipitation that must be met before recharge occurs. Therefore, precipitation data can be used to estimate possible recharge, but used alone they may not accurately predict recharge: there can be years with precipitation but no recharge.

Once recharge enters the ground, the rate and direction of ground-water flow is governed mainly by gravity and geology. Lateral ground-water flow dominates in the gently dipping Tertiary and Cretaceous strata of the Wasatch Plateau, where layers of low-permeability rock that impede downward movement are common. Both lateral and vertical flow may be channeled through faults and fractures, but plastic or swelling clays that can seal faults and fractures are abundant.

Ground water tends to flow more readily through shallower systems where weathering and fracturing produce hydraulic conductivities that are generally larger than in deeper systems. Much of the ground-water flow continues both laterally and downward through these shallower, local systems until it intercepts the surface and is discharged at a spring or seep, enters a stream as baseflow, is transpired by vegetation, or simply evaporates to the atmosphere. However, some of the ground water follows deeper and slower flow-paths where it becomes isolated from the surface and is, in effect, stored.

The Star Point Sandstone, Blackhawk Formation, Castlegate Sandstone, Price River Formation, North Horn Formation, Flagstaff Limestone, and Quaternary deposits contain potential reservoirs or conduits for ground water in the CIA. Strata of the Mesaverde Group do not readily receive recharge from surface water because they are dominantly low-permeability claystones and siltstones. Large volumes of these rocks may be unsaturated or even dry.

In the Blackhawk, Price River, and North Horn Formations, higher permeability sandstones occur as lenticular and tabular channel and overbank deposits within a lower permeability claystone and siltstone matrix. The sandstones are laterally and vertically discontinuous and pinch-out over short distances, and individual sandstone units are poorly interconnected, isolated by claystones and siltstones. However, these sandstones, especially where fractured, can produce significant ground-water flows from local systems.

Although the Star Point Sandstone is often characterized as a homogeneous sandstone body, it consists of three major sandstone members – Panther, Storrs, and Spring Canyon - intertongued with finer-grained rock. These major members can be further subdivided into coarser- and finer-grained units or sequences. As with the other strata in the CIA, significant ground-water flows are usually associated with fractures.

There are some isolated Flagstaff Limestone outcrops on East Mountain that have reservoir properties which have developed through dissolution and fracturing.

As is typical of ground water throughout the plateaus and mountains surrounding the Price River basin, ground water in the CIA occurs under both confined and unconfined conditions. Shale, siltstone and cemented sandstone beds act as aquicludes to impede ground-water movement. Such localized aquitards occur within all stratigraphic units. The Mancos Shale is considered a regional aquiclude that limits downward flow within and adjacent to the CIA.

Piezometric data from the Crandall Canyon Mine indicate ground water in the Spring Canyon Member of the Star Point Sandstone moves from northwest to southeast, from the crest of East Mountain towards Huntington Canyon. The USGS has identified the Star Point and Blackhawk Formations as an aquifer (Danielson and others, 1981), and Lines (1984) designated these formations as a regional aquifer. *Regional aquifer* is a common phrase used by mining operators in the Carbon and Emery County coal fields. In such usage, regional aquifer usually refers to any water found in the Star Point Sandstone and Blackhawk Formation irrespective of quality, quantity, use, storage, flow and transport, and discharge. The Division has adhered to the definition of *aquifer* as found in the Coal Mining Rules (R645-100-200). Although there are local aquifers in the Star Point and Blackhawk strata, the Division does not consider the Star Point Sandstone and Blackhawk Formation in the East Mountain CIA to constitute a regional aquifer.

Faults and fractures can act as effective conduits for ground water and allow downward flow, even potentially bypassing unsaturated strata. Fractures in the Roans Canyon Fault Graben appear to act as significant vertical conduits for ground water. Drilling from within the Deer Creek Mine in advance of mining operations identified two major hydrogeologic units associated with the graben, and aquifer testing indicated a horizontal flow component within the graben towards the east, with discharge into the Huntington Creek drainage (1988 PacifiCorp Annual

Report).

There are numerous seeps and springs within the CIA. PacifiCorp identified 198 seeps and springs in and adjacent to the Mill Fork Tract in their 2000-2002 baseline survey, and another 83 are listed in Volume 9 of the Deer Creek, Des-Bee-Dove, Cottonwood-Wilberg, Trail Mountain PAP. The Crandall Canyon No. 1 Mine PAP lists 357 seeps and springs in Crandall and Horse Canyons. Between them, Genwal and PacifiCorp have monitored 167 springs and seeps (this undoubtedly double-counts some sites that have been monitored by both companies.) The discharge volumes given in Table 5 are very general because not all sources were monitored over the same time period; however, the total of the average discharges from the monitored springs appears to be on the order of 3,000 gpm. Based on data from the springs that have been monitored, spring discharge is distributed roughly as follows:

Table 5
Spring Discharge Volumes in the
East Mountain CIA

Lithologic Unit	Number of Springs Listed by Permittees	Number of Springs Monitored	Total Average Monitored Discharge
Flagstaff Limestone	17	8	45 gpm
North Horn Formation	243	100	2,610 gpm
Price River Formation	127	34	109 gpm
Castlegate Sandstone	32	6	6 gpm
Blackhawk Formation	83	17	110 gpm
Star Point Sandstone	19	3	350 gpm
Alluvium	120	8	190 gpm
Total	641	167	3,420

Water quality progressively decreases from the Flagstaff Limestone to the Star Point Sandstone.

The sandstones of the Star Point generally have low permeability and typically produce water where permeability has been enhanced by fracturing or weathering; however, culinary water-supply well MW-1 at the Crandall Canyon Mine flows from apparently unfractured Star Point Sandstone, from a zone noted by the driller as being coarser-grained than the rest of the unit. The water-bearing sandstone was 290 to 335 feet below the surface. When initially completed in March and April 1987, pressure head in MW-1 was 130 ft. MW-1 has provided culinary and mine process water for use in the mine and bathhouse, but generally at rates of less than 1 gpm (Crandall Canyon Mine MRP, Section 7.24.1.Mine Plan Aquifers). There has been no flow reported since March 2002. Tritium and radiogenic carbon values have not been reported for this water.

At an exploratory hole in Dairy Canyon (SE¼SE¼SE¼ Sec 3, T. 17 S., R 6 E.) on Trail Mountain, water from the Blackhawk Formation flowed to the surface at 150 gpm from a depth of 129 feet, approximately 500 feet above the Star Point Sandstone (Davis and Doelling, 1977, p. 36). The Division has not located any other information on this bore hole and its water.

Well TM-3 in Straight Canyon was completed through the Star Point Sandstone by PacifiCorp in 1994. It is 1,300 feet from the nearest mine workings. This well flowed 25 gpm and had a pressure head of 65 psi when completed. The head remained relatively constant until late 1996, and then began to decline in November 1996 when gate entries for the 8th and 9th Right longwall panels were being opened. The 9th, 8th, and then 10th Right panels were mined beginning in March 1997 and TM-3 ceased flowing when the head fell below the top of the casing in April 1997. The Trail Mountain Mine began discharging water to Cottonwood Creek in June 1997. Pumping from the mine ended in 2001 and the head in TM-3 has been recovering. The gauge was reinstalled in August 2003 because the water level was approaching the top of the casing, but pressures were not recorded until July 2003 (Figure 3).

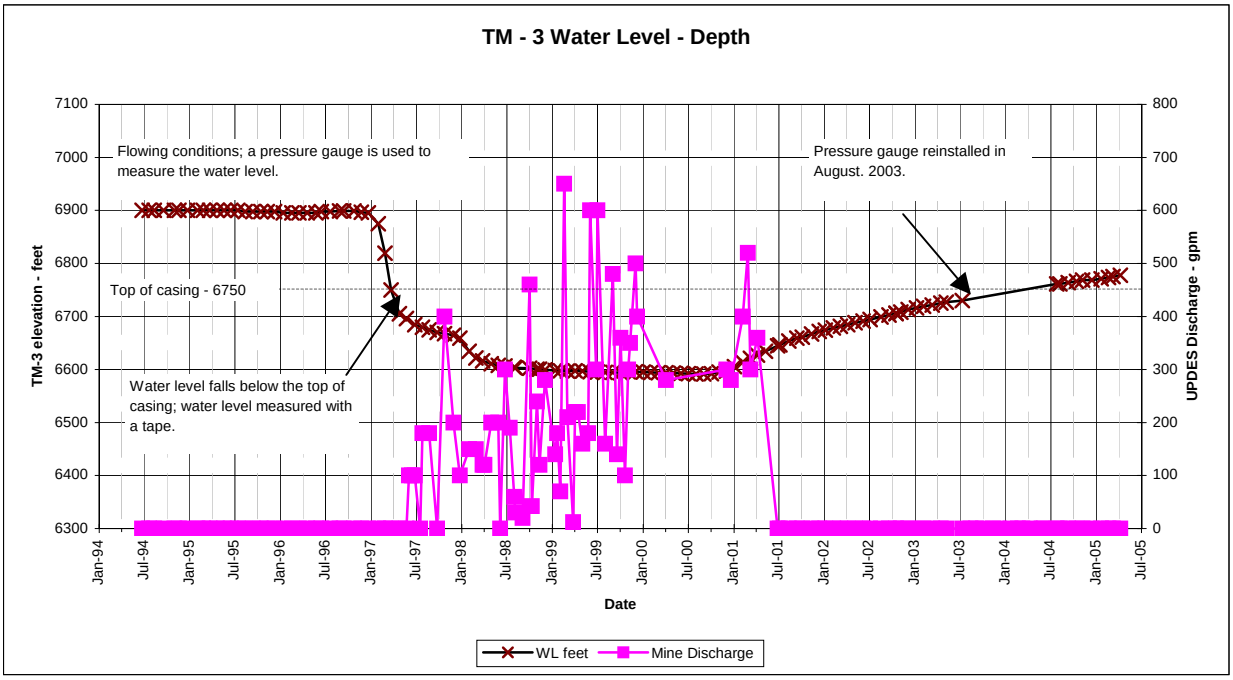

Figure 3 – Water level in well TM-3, adjacent to the Trail Mountain Mine

Mine Inflow and Discharge

Water that flows into the mines in the CIA is ground water that has been stored in the

adjacent Blackhawk Formation and Star Point Sandstone, including faults and fractures, or is actively flowing along faults and fractures. A substantial portion of the water that enters the mines is lost as water vapor during mine ventilation and extracted during the mining process as coal moisture content. Table 6 shows the estimated ground-water discharge rates and volumes for mines in the East Mountain CIA for 2004.

Table 6
Estimated Ground-Water Discharge and Consumption in 2004
East and Trail Mountains

Mine	UPDES Discharge (gpm)	Evaporation, Extraction, and Domestic Use (gpm)	Yearly Total	
			(gallons/year)	(acre-feet/year)
Crandall Canyon Mine	900	120	540×10^6	1,640
Deer Creek Mine	220	55	140×10^6	440
Des-Bee-Dove Mines	0	0	0	0
Cottonwood/Wilberg Mine	28	0	15×10^6	50
Trail Mountain Mine	0	0	0	0
Total	**1,148**	**175**	**695×10^6**	**2,130**

In the Crandall Canyon Mine, little water was encountered before 1996, and water was pumped from Crandall Creek to supply water for mine operations. In late 1996, ground-water inflow increased as mining progressed westward towards the fractured zone adjacent to the Joes Valley Fault and water no longer needed to be pumped into the mine; rather, excess water was discharged directly to Crandall Creek under a UPDES permit (UPDES Site 002). Figure 4 shows estimated yearly discharge. The mine operator reported monthly average discharges ranging from 90 to 700 gpm from November 1996 through 1999, and 900 to 1,200 gpm from January 2000 through December 2004. Water mainly dripped from fractures and channel sandstones exposed in the roof, but there was also slow leakage through the floor from the underlying Spring Canyon Member of the Star Point Sandstone.

According to the Crandall Canyon Mine MRP, the estimated volume of water extracted by ventilation is approximately 50 to 60 gpm, and the volume lost due to coal moisture content is approximately 70 gpm. Water seeping into the mine consumes 10 gpm, and mine operations another14 gpm, for total estimated consumption of approximately 150 gpm (Section 7.24.1, Mine Dewatering).

Mine water was never discharged at the Des-Bee-Dove Mines. In 2000, estimated discharge from the other three PacifiCorp mines totaled 1.03×10^9 gallons, or roughly 2,000 gpm: 57×10^6 gallons was discharged as water vapor during mine ventilation, 15×10^6 gallons diverted for various domestic uses in the mines, and the remainder discharged to the surface (2000

Annual Report).

The Cottonwood/Wilberg ventilation portals in Miller Canyon were permanently sealed in 1987, but 2-inch drainpipe was placed through one of the seals. A small volume of water still seeps out of the mine, bypassing the seals and drainpipe by way of sandstones that underlie the coal seam (Cottonwood/Wilberg Mine MRP, Appendix XXII). Volumes are small, and since 2001, when the portal area was reclaimed and UPDES UT0022896-001 moved from the portal area to the confluence of Miller Canyon with Cottonwood Creek, there has been no measured flow.

Operations ceased at the Trail Mountain and Cottonwood/Wilberg Mines in 2001. There has been no further discharge from the Trail Mountain Mine. The Cottonwood/Wilberg Mine was placed in temporary cessation and pumping within the mine and discharge to Grimes Wash ceased. The Cottonwood/Wilberg UPDES permit was modified and water now drains by gravity to the Trail Mountain Access Tunnel in Cottonwood Canyon, where it discharges to Cottonwood Creek (point UT0022896-001). Discharge has averaged 27 gpm since 2001.

By 2003, the total discharge from the PacifiCorp mines had dropped to 244×10^6 gallons. Total discharge was down to 208×10^6 gallons in 2005, with no discharge from Trail Mountain and only 8×10^6 gallons from Cottonwood/Wilberg (2000, 2003, and 2005 Annual Reports).

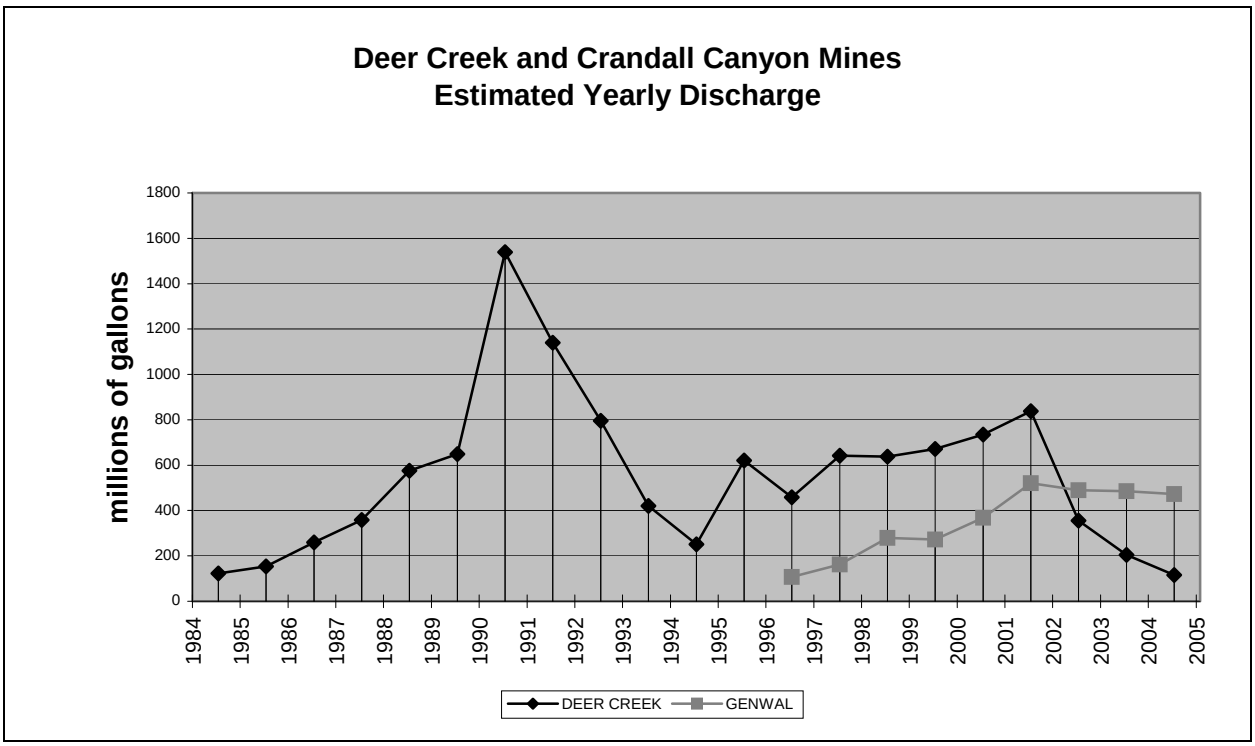

Figure 4 – Estimated Yearly Discharge of Active Mines

Estimated total yearly discharge from the Deer Creek Mine shown in Figure 4 is based on DMR Average Discharge rates reported to the Division and Water Quality. Between 1992 and 2001, discharge averaged roughly $1.6x10^6$ gallons/day, or 1,100 gpm. In addition to the mine discharge, PacifiCorp estimates each ventilation fan causes evaporation of an additional $19x10^6$ gallons (36 gpm) yearly, and domestic consumption is up to $10x10^6$ gallons (19 gpm) (Annual Reports). In the past, discharge from the Deer Creek Mine went directly to the Huntington Power Plant, but the power plant no longer accepts water from the mine and all discharge goes to Deer Creek (Dennis Oakley – Energy West, personal communication, January 7, 2003).

PacifiCorp has estimated that inflow to the Mill Fork Extension will be similar to what has occurred in the Deer Creek Mine, except interception of a fault zone is not expected. Where Deer Creek Mine operations intercepted open joint-systems in the Roans Canyon fault zone at two locations in the 4th North section in 1990, there were large ground-water inflows to the mine, estimated to be as much as 5,000 gpm. In 1992, the 4th South area was sealed and water production dropped significantly. The rate of discharge was back on an upward trend, but in 2002 it dropped again. PacifiCorp attributes the 2002 drop to installation of a more accurate flow meter and development of new in-mine sumps (PacifiCorp, 2005 Annual Hydrologic Report, pp. 23-24).

In the down-plunge end of the Straight Canyon Syncline, Trail Mountain Mine

operations exposed the Spring Canyon Member. Ground water under pressure entered the mine at a rate of 200 to 300 gpm until the Spring Canyon Member was depressurized (Mill Fork Tract MRP, Appendix 700-B): the sandstone was not described as fractured.

The Huntington #4 Mine recovered Blind Canyon coal from within the Mill Fork Graben and northwest of the graben. Offset at the bounding faults on both sides of the graben was approximately 25 to 30 feet. PacifiCorp reports that within the graben and at the bounding faults, only minor amounts of ground water were encountered (Deer Creek Mine MRP - Volume 12, Hydrology, R645-301-721, A, 15, b). Flow at Little Bear Spring was not measurably impacted: either the mine was above the potentiometric surface or there is an aquitard – perhaps one of the coal seams – that isolated the mine from the water.

Little Bear Spring

Little Bear Spring in Little Bear Canyon, east and south of the South Crandall Canyon lease, is an important source of water for the Castle Valley Special Services District (CVSSD), supplying 65 percent of the culinary water to the residents of Huntington, Cleveland, and Elmo. The only treatment required before use is chlorination. It is probably the largest and most consistently flowing spring in the region.

Little Bear Spring is on the south side of Little Bear Creek. It flows from the Panther Tongue of the Star Point Sandstone and appears to be issuing from a fracture that is the bounding fault on the northwest side of the Mill Fork Graben.

Several investigations - including isotope analyses (Mayo and Associates, 1997a and 1997d), geophysical studies (Sunrise Engineering, 2001a and 2001b; WTR, 1999), dye-tracer tests (Mayo and Associates, 2001c), and analyses of piezometric, chemical, and flow data - indicate that one important recharge area for Little Bear Spring, perhaps the principle recharge area, is upper Mill Fork Canyon. Precipitation runoff, snowmelt, and discharge from numerous springs collect in both the channel and alluvium of Mill Fork, and the water is diverted to Little Bear Spring through the Mill Fork Graben. PacifiCorp added a stream-monitoring point in Mill Fork, upstream of the Mill Fork Graben, at the request of the USFS.

However, investigations of Little Bear Spring conducted prior to 1998 indicated a component of flow from the north or northwest. These hydrogeologic analyses concluded recharge was coming from the north, perhaps from Crandall Canyon or Huntington Creek and flowing along the Mill Fork Graben or faults parallel to it. During the review of the South Crandall Lease addition to the Crandall Canyon Mine, the USFS maintained that this northerly component of flow to Little Bear Spring was not eliminated as a possibility in later studies. In addition, more recent interpretations indicate fractures oriented north-south to northwest-southeast may provide some of the flow to the spring, 30 to 40 percent according to the 1998

AquaTrack study (WTR, 1998), but a recharge area has not been identified.

At Little Bear Spring, Danielson (Danielson and others, 1981) measured flows of 110 to 165 gpm between April 1978 and March 1979, apparently before the spring was developed as a culinary water source by CVSSD. CVSSD has measured flow at Little Bear Spring monthly since 1982, and regularly monitors the quality of the water. Recent water-quality and isotopic analyses (Mayo and Associates, 1997a) show the water from Little Bear Spring is similar to waters in Huntington and Little Bear Creeks. The high tritium and modern carbon content show the water is of modern origin, indicating regional flow through unfractured, low-permeability Star Point Sandstone is not a significant source of water for this spring.

Average flow measured by CVSSD has been approximately 340 gpm. Flow varies seasonally, one indication of a shallow-circulating ground-water system, but minimum flows have never dropped significantly below 190 gpm. This sustained baseflow indicates that the system has considerable storage capacity, probably in the channel-bottom alluvium of Mill Fork Canyon and in the fractures of the Mill Fork Graben, and possibly some in the Star Point Sandstone adjoining the fractures.

Because there is a small possibility that mining in the Mill Fork tract or the Crandall Canyon lease area could impact some portion of the flow at Little Bear Spring, PacifiCorp and Genwal were required to develop water replacement plans before mining in the Mill Fork and South Crandall Canyon Extensions. Additional stipulations were placed on the federal lease for the South Crandall Canyon Extension by the USFS to reduce possible impacts from mining into fractures northwest of the Mill Fork Graben and Little Bear Spring.

Recharge to Little Bear Spring from unfractured Star Point Sandstone and Blackhawk Formation is generally discounted because of low hydraulic conductivity and permeability (Mayo and Associates, 1997c); however, even with low permeabilities, the large area exposed by the fractures in the graben could provide some recharge to Little Bear Spring from these formations. The down-plunge end of the Crandall Canyon Syncline could concentrate or enhance ground-water flow where it intercepts the Mill Fork Graben between Mill Fork and Little Bear Canyons.

Rilda Canyon Springs

North Emery Water Users Special Service District (NEWUSSD) has developed springs in lower Rilda Canyon to provide domestic and industrial water for areas outside the cities of Huntington, Cleveland, and Elmo. Studies performed by PacifiCorp indicate that approximately 80 percent of the recharge to these springs originates in the Right Fork of Rilda Canyon.

Studies have been proposed by PacifiCorp to see if the NEWUSSD collection system can be relocated in the Right Fork, which would move the collection system away from the access

and ventilation portals proposed by PacifiCorp for Rilda Canyon.

Elk Spring

NEWUSSD has discussed developing Elk Spring to replace or supplement other water supplies, but the Division does not know of any firm plans or commitments from the mine operators to proceed with this option.

Joes Valley

Joes Valley Fault separates Joes Valley from the coal mining activities at East and Trail Mountains. Joes Valley Fault is a normal fault with up to 3,000 feet of vertical offset, downthrown on the west side, but maximum offset within the CIA is approximately 1,500 feet. The fault forms the eastern side of the Joes Valley Graben, and uplift along the fault resulted in the steep western flank of East Mountain. Joes Valley Graben is a regional feature that runs north-south for roughly 80 miles and extends well beyond the East Mountain CIA.

Even with the uplift of East Mountain along the Joes Valley Fault, the Blind Canyon and Hiawatha Seams in the East Mountain mines are still several hundred feet lower in elevation than the floor of Joes Valley.

Indian Creek drains the section of Joes Valley adjacent to East Mountain. Upper Price River Formation crops out just to the north, in Scad Valley, but the floor of Joes Valley along Indian Creek consists of North Horn Formation overlain by a westward thinning wedge of alluvium and colluvium that was shed from the west flank of East Mountain. Indian Creek does not flow down the middle of this drainage, rather, having been displaced by deposition of the wedge of sediments, it flows on the west side of the valley at the base of Bald Ridge and Middle Mountain. Springs in the Indian Creek drainage flow mainly from the alluvium or from the North Horn Formation exposed west of the creek. Wetlands in the Indian Creek drainage are supported in part by ephemeral flows from the west flank of East Mountain. These wetlands often support diverse communities of amphibians, macroinvertebrates, and other flora and fauna.

Springs also flow in the small canyons that have been eroded into the west flank of East Mountain. These springs appear to be less numerous to the north, at the Crandall Canyon Mine where the Joes Valley Fault and the mountain ridge are close to each other, and to become more numerous towards the south as the distance between the fault and ridge increases (Deer Creek Mine MRP, Volume 12, Plate 1 and Drawing MFU1823D). This indicates ground-water flow to these springs is most likely related to the amount of adjacent surface area exposed for recharge.

Three samples of water were collected inside the Crandall Canyon Mine in 1997: two from fractures that were encountered where Main West and 5th West approached Joes Valley Fault, and one from in-mine well MW-7, which was drilled to the Star Point Sandstone from a

location in Main West approximately 200 feet from the fault. Water quality and age were determined for these samples. There was a small amount of tritium (0.95 TU) in the 5th West sample but none in the other two. Mean residence time determined from radiocarbon dating was 2,000 to 5,000 years. Based on these analyses, mining near Joes Valley Fault could intercept modern water recharged from the surface, but this so-called active zone near the fault will also yield deeper, older water (Mayo and Associates, 1997a; Deer Creek Mine MRP, Volume 12, Appendix B). A stipulation in the Mill Fork tract coal lease does not allow full extraction mining within a 22 degree angle-of-draw of the Joes Valley Fault. Mining projections for the Mill Fork Extension show no full-extraction mining within 400 feet of the projected fault trace, although bleeders and entries may intercept the fault.

When the Mill Fork lease was originally outlined by the BLM, the west boundary was based roughly on the location of the Joes Valley Fault projected by the USFS in 1997. The coal tract was transferred to SITLA as part of an exchange of federal and state lands and minerals under the Utah Schools and Land Exchange Act of 1998 (Public Law 105-335). PacifiCorp obtained the lease, ML-48258, from SITLA in 1999. In 2005, PacifiCorp made a new determination of the location of the Joes Valley Fault based on topography, aerial photography, resistivity and IP surveys, and in-mine horizontal drilling information. The new location for the fault is several hundred feet west of the one used to define the Mill Fork lease. It became evident that a considerable volume of federal coal between the fault and the west boundary of the Mill Fork lease would become isolated and unrecoverable if the Deer Creek Mine plan were not modified to include recovery of this coal. During 2013, Deer Creek Mine again made a determination to modify the Mill Fork lease to recover coal from a 1,180 acre area to the south of the existing leases.

The BLM granted an exploration license for the Mill Fork West Extension LBA area with the intent of allowing PacifiCorp to build gate roads, bleeders, and longwall set-up rooms in the federal coal. However, longwall mining could not be done and coal recovered from mine development could not be sold until this coal had been leased and the area added to the state permit. Anticipating the lease acquisition, PacifiCorp submitted the IBC amendment to add this area to the permit on April 30, 2006. Federal lease UTU-84825 was issued in August 2006.

Surface Water

Surface runoff from the east side of the Wasatch Plateau flows either to the Price River or San Rafael River (Plate 1). The Price River Basin, which includes about 1,800 square miles in six counties, is located primarily in Carbon and Emery Counties in east-central Utah. Headwaters of the Price River are the drainages around Scofield Reservoir and Soldier Summit. The river flows southeasterly and joins the Green River approximately 15 miles north of the town of Green River, Utah. The drainage is bounded by the Book Cliffs on the northeast, the Wasatch Plateau on the west and the San Rafael Swell on the south.

All drainage from the East Mountain CIA flows to the San Rafael River. The San Rafael River Basin lies south of the Price River Basin. This basin includes about 2,300 square miles in three counties, but is located mainly in Emery Country. The San Rafael River Basin occupies part of two physiographic sections of the Colorado Plateau - the High Plateaus to the north and west and Canyonlands to the south and east (Fenneman, 1946). Headwaters extend for 40 miles along the high central ridges and peaks of the Wasatch Plateau. Principal streams in the basin are Huntington and Cottonwood Creeks, which merge to form the San Rafael River, and Ferron Creek, which joins the San Rafael River within a mile of the Cottonwood - Huntington confluence. The San Rafael River flows in a southeasterly direction to eventually join the Green River.

The CIA can be subdivided into 15 drainage basins as shown on Plate 4. Crandall, Little Bear, Mill Fork and Rilda Creeks drain the east side of East Mountain, flowing generally from west to Huntington Creek on the east. Cottonwood Creek flows down Cottonwood Canyon between Trail and East Mountains, and the west slopes of East and Trail Mountains drain to Indian Creek through a number of short but steep tributaries. Indian Creek flows south to Lowry Water and then to Joes Valley Reservoir, which discharges to Cottonwood Creek by way of Straight Canyon.

Sixty-five percent of runoff in Huntington Creek occurs from April to July as a result of snowmelt. Water-content of the April 1 snowpack correlates well with annual discharge (Danielson and others, 1981, p. 11).

Under the Standards of Quality for Waters of the State of Utah (UAC R-317-2.13), waters in Huntington and Cottonwood Creeks and their tributaries are classified as 1C, 2B, 3A and 4.

- 1C - protected for domestic use with prior treatment,
- 2B - protected for recreational uses except swimming,
- 3A - protected for cold water aquatic life, and
- 4 - protected for agricultural uses.

All waters on USFS lands are designated as High Quality Water Category 1 (no point-source UPDES discharge allowed), except part of Deer Creek is designated as High Quality Water Category 2 (UPDES discharge permitted but no degradation of quality allowed).

Water quality of both the Price and San Rafael Rivers is good in the mountainous headwater tributaries, but deteriorates rapidly as flow traverses the Mancos Shale. The shale lithology typically has low permeability, is easily eroded, and contains large quantities of soluble salts that are major contributors to poor water quality. Depending on the duration of contact, water quality degrades downstream to where TDS levels of 4,000 mg/L are not uncommon. The predominant ion leached from the Mancos Shale is sulfate, with values over 1,000 mg/L

common in the lower reaches of the Price River.

Left Fork of Huntington Creek (1)

This drainage, including the major tributary, Scad Valley Creek, delineates the north and northwestern-most boundary of the CIA. There is little, if any, surface or subsurface drainage to these waters from areas potentially affected by any mine operations.

Horse Canyon (2)

Horse Canyon drainage encompasses approximately 2,700 acres. The upper canyon divides into a main and south fork. The stream flows east into Huntington Creek and is perennial downstream of where the two forks join. The main fork is considered intermittent above where the stream forks, and the south fork is considered perennial for approximately one mile above where the stream forks. The south fork flows almost entirely within the Crandall Canyon Mine permit area. The mine permit limits retreat mining within the stream buffer zone of the perennial section.

Blind Canyon (3)

Blind Canyon drainage encompasses approximately 1,140 acres. The upper reaches of Blind Canyon Creek are intermittent and become perennial within approximately one mile of Huntington Creek. The creek is mostly intermittent within the Crandall Canyon Mine permit area, with approximately ¼ mile of the perennial portion extending into the permit area. In July 1991 Genwal installed a 12-inch Parshall flume near the mouth of Blind Canyon. As of June 2005, maximum flow was 488 gpm (May 2002), but the stream has frequently been dry. TDS has ranged from 234 to 450 mg/L, and TSS from below detection to 54 mg/L.

The coal beneath Blind Canyon has been retreat mined and the effects of subsidence on watershed erosion and stream flow were to have been studied under the direction of the USFS Intermountain Research Station. In addition to determining effects of retreat-mining induced subsidence on stream flow and interconnectivity of surface and ground water, goals were to determine changes in channel relief and morphology, watershed erosion, and sediment routing. The final report was due September 1995. The Division has never received the report on this study, and the study (or at least the final report) may have never been completed.

Shingle Creek Canyon (4A)

Shingle Creek Canyon is a smaller drainage encompassing 480 acres with an intermittent stream flowing east into Huntington Creek. The upper reaches of the stream branch into left and right forks. Both of the forks extend into the Crandall Canyon Mine permit area as part of a 120-acre lease modification addition to Lease U-68082. A stipulation of the lease agreement (Special Coal Lease Stipulation #1) states that full extraction mining will not be authorized with

overburden less than 50 times the thickness of coal removed plus 50 feet (projected to be 300 feet in the lease modification area).

Crandall Canyon (4)

Crandall Canyon drainage encompasses approximately 3,580 acres. The Crandall Canyon Mine underlies 2,145 acres of the drainage (including 330 acres of the South Crandall Canyon lease area), and the Mill Fork Lease underlies 1,120 acres.

The average gradient of Crandall Creek is 16 percent. The channel immediately below the mine is described as steeper than 4 percent, and it has a boulder or bedrock channel (EA 1997, p. III-5). Crandall Creek flows east into Huntington Creek. It is considered perennial from the confluence with Huntington Creek to approximately ¾ mile up each of its two main forks.

The USGS measured streamflow at station 09317919 at the mouth of Crandall Canyon on a seasonal basis (typically May through November) for water years 1977 to 1984. Daily mean streamflow ranged from no-flow (for one week) in November 1977 to 88 cfs (39,512 gpm) in May 1983, and averaged 5.4 cfs (2,425 gpm). Except for the winter of 1978-1979, values for flow were not reported during winters, presumably because the gauge and stream were frozen: during the 1978 - 1979 winter, flow was 0.4 to 0.9 cfs (180 to 404 gpm). About 80 percent of streamflow in Crandall Creek occurs between April and July as a result of snowmelt, peak flow usually occurring in late May. Suspended sediment concentration in Crandall Creek in 1978 and 1979, when there was no mining in the canyon, ranged from 15 to 60 mg/L, which equaled a calculated daily load of 0.08 to 0.41 tons/day (Danielson and others, 1981, p. 17).

Genwal has measured water quality at sites located upstream and downstream of the mine since October 1983. The flumes equipped with automatic continuous recorders were installed in 1986: flow values were reported for most months between March 1988 and December 1992, and have been reported quarterly since. Before 1996 water was pumped from Crandall Creek to supply water for mine operations, which partially explains why during that time the measured average flow was greater above the mine than below (Table 7). Periodically the stream experiences extremely high flows from snowmelt or thunderstorms.

The Crandall Canyon Mine facility is in the lower reaches of the canyon and consists of approximately 11 acres of surface disturbance. Several hundred feet of the Crandall Creek channel has been diverted through a culvert beneath the mine pad. All surface disturbance is treated by maintained sediment controls. Because Crandall Creek has a boulder and bedrock channel, there have been no observed changes to the channel morphology from the discharge of mine water to the creek.

Table 7
Measured Flow in Crandall Canyon Flumes
(1986 - 1995, and 1996 - 2004)

Time Interval	Site ID	Flow in gpm		
		Min	Max	Avg.
07/86 – 12/95	UPF	0	12,023	1,131
	LOF	0	6,890	672
03/96 – 06/06	UPF	1.5	12,930	862
	LOF	4.2	10,156	1,258

UPF – Upper Crandall Canyon Creek Flume
LOF - Lower Crandall Canyon Creek Flume

Little Bear Canyon (5)

Little Bear Canyon drains approximately 820 acres. The average gradient of Little Bear Creek is 30 percent. The South Crandall Canyon tract includes approximately 360 acres in Little Bear Canyon. Little Bear Creek is considered ephemeral and intermittent upstream of Little Bear Spring (located approximately ½ mile from the confluence with Huntington Creek), and perennial downstream of the spring. The USFS considers much of the creek above the spring to be 'functionally perennial' in that sufficient water flows subsurface in the alluvium to support riparian vegetation. Because of USFS concerns on the effects of subsidence to Little Bear Creek and associated ecosystem within the South Crandall Canyon Lease, a lease stipulation was added to prevent subsidence in Little Bear Canyon area where overburden is less than 600 feet unless it can be demonstrated that the effects of subsidence would be negligible (Special Coal Lease Stipulation #9).

CVSSD diverts 200 to 400 gpm from Little Bear Spring to provide culinary water to nearly 2,500 residents in the towns of Huntington, Cleveland and Elmo. The flow from Little Bear Spring is perennial and has not dropped below 190 gpm since CVSSD began keeping records in 1982. Flows in Little Bear Creek in 1978 and 1979, measured by Danielson at the point the stream discharges to Huntington Creek, are shown in Table 8 (Danielson and others, 1981). However, it is not known if Little Bear Spring was being diverted at the time Danielson made these measurements.

Table 8
Flow in Little Bear Stream
Measured by Danielson (1981)

Date	Flow	
	cfs	gpm
October 13, 1978	0.24	108

October 18, 1978	0.5 (est.)	224
July 19, 1979	1.0	449
October 16, 1979	0.75	337
October 30, 1979	0.24	108

The USFS excluded the area covered by the South Crandall Canyon Coal Lease Tract from the Mill Fork Lease because of concerns for potential adverse impacts to Little Bear Spring. The South Crandall Canyon area was reevaluated, and based on a Decision Notice/Finding of No Significant Impact (DN/FONSI) signed by the BLM and USFS in February 2003, the South Crandall Canyon Tract was leased through competitive bid to Andalex in 2003. A stipulation of the lease agreement (Special Coal Lease Stipulation #17) states "In order to adequately protect flow from Little Bear Spring, the Lessee must enter into a written agreement with Castle Valley Special Services District (CVSSD) to assure an uninterrupted supply of culinary water equivalent to historical flows from the spring. The agreement must be in place prior to mining." A water treatment plant was constructed under the provisions of an agreement between Genwal, PacifiCorp, and CVSSD. A copy of the agreement that meets the requirements of Special Coal Lease Stipulation #17 is included as Appendix 7-51 of the Crandall Canyon Mine MRP.

Mill Fork Canyon (6)

Approximately 3,960 acres are drained by Mill Fork Canyon. The average gradient of Mill Creek is 13 percent. PacifiCorp leases cover approximately 3,480 acres in Mill Fork Canyon but do not extend into Little Bear Canyon.

The old Huntington #4 Mine underlies approximately 1,300 acres in Mill Fork and Little Bear Canyons. The 12-acre surface disturbance for the #4 Mine, all in Mill Fork Canyon, has been reclaimed and bond has been released.

Mill Creek is considered perennial in its lower reaches. Field observations by USFS personnel in August 1996 found that Mill Fork Creek was dry at the lower forks in Section 17, T. 16 S., R. 7 E., but flow was observed emanating from the creek bottom approximately 0.5 mile downstream of the forks. In the seep and spring inventory done by Genwal for the EA, 49 springs in the head of Mill Fork Canyon were identified. Flows ranged from seeps to 50 gpm, with most flows below 5 gpm (EA 1997, p. III-6). The occurrences were classed as follows:

Table 9
Springs in upper Mill Fork Canyon

Flow in gpm	Number of Springs
>25	4
20-25	0

15-19	4
10-14	5
5- 9	7
0- 4	29

Utah DWR has identified cutthroat and rainbow trout in Mill Fork and Little Bear Creeks, and considers these streams likely habitat for non-game fish as well (Deer Creek Mine MRP, Volume 12, p. 3-7).

Rilda Creek (7)

Lower Rilda Creek has historically been a perennial stream, mainly due to several large springs found in the middle reaches of the creek just below the confluence of the left and right forks. Several of these large springs have been developed by NEWUSSD, so some of what naturally flowed down the stream is now diverted for use in the NEWUSSD culinary water system. The average gradient of Rilda Creek is 11 percent.

Rilda Canyon drains approximately 5,100 acres, and the PacifiCorp permit area covers 3,600 acres of this drainage. The Right Fork drains about 2,114 acres and is the larger of the two main forks. The Left and Right Forks join above the NEWUSSD springs. Studies performed by PacifiCorp indicate that approximately 80 percent of the recharge to these springs originates in the Right Fork of Rilda Canyon.

PacifiCorp measures flow at six locations, which are shown on Plate 6. Maximum, minimum, and average flow for the streams and NEWUSSD springs are summarized in Table 10.

Table 10
Rilda Canyon Flow

ID in Database	Description	First and Last Measurement		Flow in gpm		
				Min	Max	Avg.
RCF-1	Upper Right Fork Flume, just downstream of the Mill Fork Graben	4/89	6/06	0	10,000	490
RCF-2	Flume Above the NEWUSSD Springs	4/89	6/06	0	6,800	370
RCF-3	Flume Below the NEWUSSD Springs	4/89	6/06	0	18,800	480
RCW-4	Flume Above the confluence with Huntington Creek	6/89	6/06	0	23,800	600
RCLF-1	Lower Left Fork	4/90	6/06	0	440	20
RCLF-2	Upper Left Fork	10/95	6/06	0	490	26
NEWUA Meter-2	Combined flow from Side Canyon and South Spring.	9/90	6/06	0	20	3
NEWUA Meter-3	Collection system from the central area. Includes old Meter #4 flow.	9/90	6/06	0	220	83

Genwal's EA spring and seep inventory found 41 springs and seeps in the Right Fork of Rilda drainage, 25 of which reached the stream (EA 1997, p. III-7). The occurrences were classed as shown in Table 11.

Table 11
Springs and Seeps in the Right Fork of Rilda Canyon

Flow in gpm	Number of Springs
>25	4
20-25	3
15-19	4
10-14	7
5- 9	4
0- 4	19

Near the NEWUSSD springs, surface disturbances from the Helco, Jeppson, Rominger, and Leroy Mines were reclaimed by the Division's AMLprogram in 1988 through 1991, with additional reclamation work done in late 2002. Construction of new portals and a bathhouse in Rilda Canyon has been discussed with the Division, BLM, USFS, US Fish and Wildlife Service, and Utah DWR and Energy West has submitted plans to the Division. The disturbed area will be approximately 12 acres, 3 acres being for topsoil and subsoil storage. The sedimentation pond will be on land previously disturbed by the Leroy (Comfort) Mine. Current projections are that

these new portals will not be used for coal transport but will be used only for ventilation and transportation of workers and materials into the mine. As of the end of 2006, only ventilation and emergency escape portals have been built (there has also been mitigation work at the Leroy Mine site, which involved removal of coal-mine waste buried by the AML program).

Meetinghouse Canyon (8) and Deer Creek Canyon (9)

Meetinghouse Creek is considered ephemeral and Deer Creek is considered perennial. The average gradient of Meetinghouse Creek is 12 percent and the average gradient of Deer Creek is 13 percent. The approximate areas of Meetinghouse and Deer Creek Canyons are, respectively, 5,500 acres and 4,000 acres: PacifiCorp's permit area includes approximately 5,000 acres in Meetinghouse Canyon and 3,700 acres in Deer Creek Canyon.

Deer Creek Mine operations have disturbed approximately 30 acres in the middle of Deer Creek Canyon. Runoff from surface facilities is treated by sediment controls. All coal produced at the mine is conveyed to the Huntington Power Plant, which is located near the bottom of Deer Creek Canyon and adjacent to Huntington Creek.

Discharges from the Deer Creek Mine have averaged 1,030 gpm, and the maximum reported discharge was 3,680 gpm in December 1990. Prior to December 1990, all discharge was piped to the Huntington Power Plant and none entered the natural drainages. A temporary discharge permit was issued in November 1990 because of high inflows into the mine at the Roans Fault crossing, and 1990 and 1991 was a period of consistently high discharge rates (Figure 4). The power plant is no longer accepting water from the mine (Dennis Oakley – Energy West, personal communication, January 7, 2003). Water is now diverted to abandoned mine sections and used underground for mine operations, and only excess water is discharged directly to Deer Creek at UPDES discharge point UT0023604-002.

Table 12
Flow in Deer Creek

ID in Database	Description	First and Last Measurement		Flow in gpm		
				Min	Max	Avg.
DCR01	Deer Creek above the mine.	1/84	9/06	0	2,900	150
DCR04	Deer Creek as it leaves the permit area	6/84	9/06	0	3,100	660
DCR06	Deer Creek at confluence with Huntington Creek	1/84	9/06	0	3,100	580

Maple Gulch (10) and Danish Bench (11)

Approximately 5,400 acres of Maple Gulch and 4,600 acres of the Danish Bench drainages are associated with the CIA. Both areas are primarily Mancos Shale flats draining away from the southern end of East Mountain, so steep, deeply incised canyons are not as prominent as in the other drainages in the CIA. Danish Bench drains to Cottonwood Creek with an average gradient of 12.5 percent. Maple Gulch drains to Huntington Creek and has an average gradient of 17 percent. Permitted areas of the PacifiCorp mines encompass 840 acres of Maple Gulch and 250 acres of Danish Bench. The Des-Bee-Dove underground workings are beneath Maple Gulch drainage, and there are reclaimed ventilation portals in Maple Gulch.

Grimes Wash (12)

Grimes Wash drainage has an area of approximately 8,400 acres, 4,600 of which are in PacifiCorp's permit areas. The average gradient of Grimes Wash is 14 percent.

Cottonwood/Wilberg Mine surface facilities are located in Grimes Wash. There are 31 acres of surface disturbance, with a sedimentation pond and other and sediment controls to treat runoff from the disturbed area.

The Des-Bee-Dove mine portals, located at the head of a small, narrow canyon in the Grimes Wash drainage, disturbed 36 acres. Reclamation of the Des-Bee-Dove mines began in 1999 and grading and reseeding were completed in 2006.

Cottonwood Creek (13)

This area encompasses approximately 11,000 acres that drain to Cottonwood Creek along the southwest edge of the CIA. The portion of PacifiCorp's permit areas contained in this drainage is approximately 5,200 acres. The Cottonwood Creek drainage has many small tributary canyons.

This drainage contains 12 acres of surface disturbance associated with the never-completed Cottonwood Fan Portal of the Cottonwood/Wilberg Mine. The disturbed area has been reclaimed, and Phase I reclamation bond release was completed in 2003. The 10.69-acre disturbed area for the Trail Mountain Mine is also in this canyon, directly across from the reclaimed Cottonwood Fan Portal area.

There are also three reclaimed Cottonwood/Wilberg portals in Miller Canyon, a side canyon to Cottonwood Creek. Although the portals are sealed, drainage in the mine apparently accumulates behind the seals and periodically discharges through the sandstones that underlie the coal seam. The discharge drains to Miller Canyon and potentially can reach Cottonwood Creek. There is a UPDES discharge point where Miller Canyon meets Cottonwood Creek, but, to date, the discharge from the mine through the sandstones has been insufficient to reach that point. In addition to the UPDES monitoring, the USFS stipulated sampling of any water at the

sealed portals in June and October of 2002 and 2003, but only one time was there sufficient water to collect a sample.

Indian Creek (14)

The EA (p. III-7) reported that the USFS measured Indian Creek flows ranging from 1 cfs to 30 cfs (450 to 13,500 gpm) from 1972 to 1975. Since 1996, Genwal has monitored Indian Creek quarterly at a flume located approximately one-half mile south of the USFS guard station, next to the east-west road that crosses the creek (near the common corner of Sections 15, 16, 21, and 22, T. 16 S., R. 6 E.). The flume is usually inaccessible during the end of the fourth quarter and the entire first quarter. Measured flow has ranged from 0.0 gpm in March 1998 to 7,070 gpm in October 1996.

Numerous short, steep unnamed channels or gulleys carry precipitation and snowmelt runoff down the west side of East Mountain to Indian Creek. These ephemeral drainages not only provide seasonal flow directly to Indian Creek but also recharge the alluvial and bedrock aquifers that provide baseflow throughout the year. The valley contains several marshy wetland areas along the stream.

Water draining from East Mountain could be intercepted if subsidence were to localize along Joes Valley Fault or if ground movement produced fractures at the surface. A stipulation in the Mill Fork Tract lease does not allow full extraction mining within a 22 degree angle-of-draw of the fault, so the possibility of such interception is greatly reduced.

Only the north end of the Indian Creek drainage, upstream of the Genwal flume, is included in the CIA. The drainage continues south of the flume for roughly 8 miles. Indian Creek flows into Lowry Water, which then flows to Joes Valley Reservoir. The Crandall Canyon and Mill Fork leases occupy 3,100 acres in the upper end of this drainage.

BASELINE CONDITIONS

Surface-Water Quality And Quantity

In the Wasatch Plateau, water quality is good in headwater areas, where rocks contain only small amounts of readily soluble material, TDS concentrations are typically less than 500 mg/L and dominant ions are calcium, magnesium and bicarbonate. TDS concentrations increase at lower elevations, where streams flow onto more saline marine sediments such as the Mancos Shale. Sodium and sulfate ions become more common. Diversion of low-TDS water for irrigation, return drainage of irrigation water from saline soils, and inflow of sewage and other pollutants add to the natural increase of dissolved solids in the lower elevation reaches of these streams. The lowest dissolved solids concentrations are associated with high flows from snowmelt, and highest concentrations with low-flows during late summer through winter.

Sediment yields in the Upper Huntington Creek drainage were estimated at 0.1 acre-feet per square mile, and increasing to 3 acre-feet per square mile at lower elevations where rocks are predominantly shale and sandstone (Waddell and others 1981, pp. 17, 25-26, 28, Plate 6).

Ground-Water Quality and Quantity

Ground water occurs in all of the strata exposed in the Wasatch Plateau, but the units are not saturated uniformly. It is unlikely that large amounts of recharge infiltrate from the surface through the Star Point Sandstone, Blackhawk Formation and overlying units due to low permeability materials that impede downward migration of water. Ground water is found on several modes:

- Laterally discontinuous, perched, local water-bearing zones where permeable layers of sandstone overlie less permeable layers of shale, mudstone or clay;
- A more continuous saturated zone in the Star Point Sandstone;
- Alluvial materials in canyon bottoms; and
- Faults and fractures in the local strata.

According to Lines (1985), the Blackhawk Formation and Star Point Sandstone contain a regional ground-water system in the Trail Mountain area. In the East Mountain CIA, it does not appear that the Blackhawk contains large quantities of water. The Division adheres to the definition of "aquifer" as found in the Coal Mining Rules (R645-100-200); although there are local or perched aquifers in the Star Point and Blackhawk strata at East Mountain, the quality, quantity, use, storage, flow and transport, and discharge of ground water do not indicate a regional aquifer. Mine inflow is from channel-sandstones in the Blackhawk Formation that are exposed in the mine roof, discharges from the Star Point Sandstone through the floor, and in fault zones.

Precipitation occurs mainly as snow, augmented by intense thundershowers during late summer. Steep slopes drain excess water away quickly, so most water from snowmelt and thundershowers runs off rather than percolating into the ground. Thin soils with high clay content are rapidly saturated by runoff and reject additional infiltration from snowmelt and thundershowers. Only an estimated 3 percent (Danielson and Sylla, 1983) to 9 percent (Waddell and others, 1986) of the average annual precipitation goes to ground-water recharge, and most of this is retained in shallow, local, perched water-bearing zones. If threshold conditions involving the soil and the amount, rate, and timing of precipitation are not met, there can be years with precipitation but no recharge (Barnes and others 1994, French and others, 1996).

Recharge percolates into permeable soils and rock, flows vertically until it hits an impermeable layer, then flows laterally. Impermeable layers present in the local strata tend to impede downward flow, but fractures can locally enhance vertical flow. Some water does infiltrate to deeper strata, where it becomes, in effect, stored water.

Perched Water-Bearing Zones

Springs associated with perched water-bearing units generally exhibit their highest flow during or immediately after snowmelt and recede to a baseflow condition or cease flowing by late summer or fall. Such rapid response indicates that the springs are close to their recharge sources and the systems are local rather than regional. Flow from these perched systems is often associated with fractures.

These systems may not always be perched in the strict sense because they may be underlain or even enveloped by saturated low-permeability rock, but large contrasts in hydraulic conductivity effectively isolate them.

The water may be either confined or unconfined. At an exploratory hole in Dairy Canyon (SE¼SE¼SE¼ Sec 3, T. 17 S., R 6 E.) on Trail Mountain, water from the Blackhawk Formation flowed to the surface at 150 gpm from a depth of 129 feet, approximately 500 feet above the Star Point Sandstone (Davis and Doelling, 1977, p. 36).

Perched water-bearing zones and associated springs are typically located in the North Horn Formation, at the North Horn - Price River contact, or at the base of the Castlegate Sandstone. A cluster of springs at the head of Little Bear Canyon issue from the base of the Castlegate Sandstone or are associated with landslides: these flow from 0.25 to 2 gpm. Numerous springs on the west flank of East Mountain issue from the Price River Formation and Castlegate Sandstone. Flows range from seepage to 10 gpm and are typically in the 1-2 gpm range.

In the coalmines, perched or isolated sandstone channels are routinely exposed in mine roofs or breached while installing roof bolts. Inflow can be significant initially but decreases, usually rapidly, as the system is drained, with no source of recharge sufficient to maintain the flow.

Ground Water in the Star Point Sandstone

Values of hydraulic conductivity in the Star Point Sandstone, measured at a number of locations and using different methods, range from 2.7×10^{-2} cm/sec to 5.3×10^{-6} cm/sec (Table 3). In general, the Star Point is not a good aquifer and exhibits aquifer characteristics only locally, usually where weathering or fracturing have produced secondary permeability. Age dating of ground water from wells completed in the Star Point Sandstone from inside the Crandall Canyon Mine indicates a mean residence time of about 15,000 years (Mayo and Associates, 1999), which supports the concept that flow rates through the sandstone are very slow. The exact recharge mechanism for the Star Point sandstone is not known but it is more likely that recharge reaches

the sandstones mainly through faults and fractures rather than by infiltration at outcrops or through overlying strata.

Water levels in monitoring wells in the Crandall Canyon No. 1 Mine workings and in the southernmost portion of the Crandall Canyon tract indicate a local east-southeast flow direction in the Spring Canyon Member. Local geologic structures, such as the South Crandall Syncline or the Flat Canyon Anticline, likely influence any ground-water flow through the Star Point, assuming flow generally follows the dip of the strata (EA, p. III-10).

Artesian conditions in the Star Point Sandstone have been confirmed at several locations. Well MW-1, located near the portals of the Crandall Canyon No. 1 Mine, was completed in the Spring Canyon Member of the Star Point Sandstone in March and April 1987, in apparently unfractured Star Point Sandstone from a zone noted by the driller as being coarser-grained than the rest of the unit. The water-bearing sandstone was 290 to 335 feet below the surface. When initially completed in March and April 1987, pressure head in MW-1 was 130 ft. MW-1 has provided culinary and mine process water for use in the mine and bathhouse, but generally at rates of less than 1 gpm (Crandall Canyon Mine MRP, Section 7.24.1.Mine Plan Aquifers). There has been no flow reported since March 2002. MW-7, another Crandall Canyon in-mine well, flowed 0.05 to 0.6 gpm (average 0.16 gpm) from June 1997 until the well became inaccessible in the last quarter of 2002.

In places, the Hiawatha Seam rests directly on the Spring Canyon Member of the Star Point Sandstone; otherwise, there is an intervening shale layer of varying thickness. Unfractured coal and fine-grained sediments under the coal seam are an effective aquiclude. Unless they are fractured, under-coal rocks continue to confine the water after the coal is removed. In 1997, operations in the Trail Mountain Mine were in the down-plunge end of the Straight Canyon Syncline, where the Hiawatha Seam was directly on the Star Point Sandstone. Water flowed through the floor of the Trail Mountain Mine at 200 to 300 gpm until the Star Point was depressurized.

Alluvial Water-bearing Zones

Alluvial water-bearing zones are associated with two important sources of culinary water. The waters are of high quality, requiring only chlorination before use.

NEWUSSD has developed springs and collection galleries in the alluvial materials in lower Rilda Canyon. Springs higher in the basin contribute flow to the creek and likely support the shallow ground-water flow in the alluvial deposits. Studies performed by PacifiCorp indicate that approximately 80 percent of the recharge to the NEWUSSD springs originates in the Right Fork of Rilda Canyon.

Similarly, springs in upper Mill Fork Canyon contribute to ground water in the alluvium in the lower canyon, which produces flow in the lower canyon. This alluvial flow appears to be a major source of recharge to Little Bear Spring by way of the Mill Fork Fault Graben, so it is an important, although indirect, source of water for the CVSSD.

Springs and seeps in the Indian Creek drainage occur in both the wedge of colluvial and alluvial sediments that were shed from East Mountain and in the exposed North Horn Formation. They are major factors in maintaining perennial flow in Indian Creek. Flows measured in these springs range from 0.5 to 50 gpm, with most springs flowing approximately 1 to 2 gpm (EA, 1997, p. III-9).

Faults

The hydraulic function of faults in the CIA is not well defined. Faults in this area, as elsewhere on the Wasatch Plateau, are generally thought to act as barriers to ground-water flow across the faults but as conduits for flow, both horizontal and vertical, through fractures that parallel the faults. In the Huntington #4 Mine, mining in the Blind Canyon Seam across and within the Mill Fork Graben encountered only minor quantities of groundwater (Deer Creek Mine MRP, Volume 12, Hydrology p. 51). When the Roans Canyon Fault was intercepted by the Deer Creek Mine workings in the Blind Canyon Seam, it initially yielded water at up to 5,000 gpm, but flow eventually dropped to 150 gpm or less (Deer Creek Mine MRP, Volume 12, Hydrology Appendix B, p. 74-76).

The northeast-southwest trending Mill Fork Fault Graben branches from the Roans Canyon Fault Graben at Trail Mountain and extends to Huntington Canyon. Little Bear Spring flows from the fault on the northwest side of the graben. At least some of the recharge to Little Bear Spring flows from Mill Fork through this graben: some more recent studies support almost all recharge to Little Bear Spring coming through the graben (Mayo, 2001c), although earlier reports attribute 70 percent or less to this source (see for example WTR, 1998).

Synthetic faults associated with the Joes Valley Fault zone yielded water at a rate of 30 gpm when intercepted in the Crandall Canyon Mine in the Hiawatha Seam; flow subsequently reduced to approximately 10 gpm (EA, p. III-10). Isotopic dating of water samples collected near this fault indicated the water has a mean residence time of 2,000 years or more (Mayo and Associates 1999).

In the CIA, strata along the upthrown side of Joes Valley Fault dip to the west, very likely from drag-folding. Flow along the fault could be contributing to the system of springs that supports flow in Indian Creek (Hansen, Allen and Luce, 1997).

Little Bear Spring

Little Bear Spring is one of the largest springs in the Wasatch Plateau. It flows from a fracture in the Panther Member of the Star Point Sandstone on the west side of the Mill Fork Graben, at the contact with the Mancos Shale. The elevation of the spring is 7,650 feet, approximately 100 to 150 feet below the Hiawatha coal bed. Little Bear Spring is developed and maintained by CVSSD and provides 65 percent of the culinary water for the cities of Huntington, Cleveland and Elmo. Water in the spring is of good quality, requiring only chlorine treatment before it is suitable for consumptive use.

Little Bear spring flows continuously, with average monthly discharge ranging from 200 to 440 gpm. Flow varies seasonally, with a typical increase of 20 percent in response to spring runoff, although spring runoff in 1994 and 2002 did not produce a seasonal increase and flow decreased from the beginning to the end of the year. The lowest average monthly measured baseflow was 198 gpm in April 1995. Isotopic analyses to evaluate the age of the water indicate that the spring discharges modern water that is isotopically similar to water in both Crandall and Huntington Creeks (Mayo and Associates, 1997a). Chemical analyses show the water is very similar to surface water in both Little Bear and Huntington Creeks.

The hydraulic conductivity of the Star Point Sandstone is low, so movement of ground water through the sandstone is slow, and flow from the Star Point Sandstone into the fracture system of the graben is not generally considered to be the source of water discharging at Little Bear Spring. Assuming a 5,000-foot capture zone along the Mill Fork Graben, a total saturated thickness of 50 feet in the Star Point Sandstone, and lateral hydraulic conductivity of 5.0×10^{-6} cm/sec, the potential flow available for discharge at the spring would be only 18.4 gpm (EA, p. III-12). However, it's easy to see that the flow estimate is very sensitive to the assumed value of hydraulic conductivity, and based on slug tests and determinations from core samples, hydraulic conductivity values in the Star Point Sandstone vary through at least a one order-of-magnitude range (Table 3).

Several investigations - including isotope analyses (Mayo and Associates, 1997a and 1997d), geophysical studies (Sunrise Engineering, 2001a and 2001b; WTR, 1999), dye-tracer tests (Mayo and Associates, 2001c), and analyses of piezometric, chemical, and flow data - indicate that one, perhaps the main, recharge area for Little Bear Spring is upper Mill Fork Canyon. Precipitation runoff, snowmelt, and discharge from numerous springs collect in both the channel and alluvium of Mill Fork, and water is diverted to Little Bear Spring through the Mill Fork Graben. Studies conducted prior to 1998 have indicated that there is also a component of flow reaching the spring from the north and west.

Rilda Canyon - NEWUSSD Springs

NEWUSSD has developed the springs in Rilda Canyon as a culinary water supply. Based on investigations by PacifiCorp, approximately 80 percent of the discharge at the springs originates as snowmelt and precipitation runoff that percolates into the alluvium in the Right

Fork of Rilda Canyon (PacifiCorp 2002 Annul Hydrologic Report). Additional water enters the alluvium from nearby faults. Above the Rilda springs the stream is ephemeral, losing water to the alluvium, and below the springs it is considered perennial (even though there has occasionally been no measurable flow for brief periods). Estimated ground-water yield from the Rilda Canyon basin is on the order of 400 gpm during high flow (Hansen, Allen and Luce, 1997). Reported flow through the NEWUSSD system averaged 90 gpm from 1990-2003, and ranged from 40 gpm to 340 gpm. Water quality from the spring system is good, with major constituents being calcium, bicarbonate and magnesium. Isotope data show the water is recent or modern in age.

Ground Water Intercepted by Mining

Water intercepted in mines on the Wasatch Plateau typically comes from channel-sandstones that are exposed in the mine roof as mining progresses. When mining is in areas where the roof is of finer-grained rock, inflows are much lower than where the roof is sandstone (1987 Cottonwood/Wilberg Mine Annual Report; 2001 PacifiCorp Annual Report). These sandstones typically drain for a few weeks, but flows decline rapidly and eventually cease, which indicates sources very limited in size and without extensive interconnection. Water also seeps or flows up through the floor from the Star Point Sandstone and from fractures or faults. Available information indicates that most of the water intercepted in mines is not in direct communication with the surface or near-surface ground water.

In 1996, water was sampled where the Deer Creek Mine crosses the Roans Canyon Graben. Isotopic analyses indicated this was modern water; however, these samples were taken after water had flowed from the fault for seven years: water that flowed from the fault when it was breached in 1989 might have been older water stored in the fault zone. Water temperatures in 1996 were 4 degrees cooler than other ground waters in the Deer Creek Mine, indicating a source closer to the surface. Fractured rocks in the fault were iron-stained, indicating oxygen from communication with the atmosphere. These all indicate that, at the time the samples were collected, the water entering the mine at the Roans Canyon fault crossing in the Deer Creek Mine was in recent connection with the surface, probably infiltrating through the nearby highly-fractured cliff faces. Mayo and Associates (1997b) collected a sample of gob-water that included water from where the 1st and 2nd Right entries intercepted the fault in 1990, a location more remote from the fractured outcrops. Isotopic analysis of this gob-water indicated water in the fault at locations more distant from the outcrop is older water and likely is not in communication with recent or shallow ground water (Mayo and Associates, 1997b).

Water intercepted as the Crandall Canyon No. 1 Mine approached Joes Valley Fault was a mixture of old and modern water. There was a minor tritium content in one of three samples, but ^{14}C indicated a mean residence time of 2,500 to 5,000 years (Mill Fork Extension MRP, Appendix B). There is apparently some modern water infiltrating from the surface through synthetic fractures associated with Joes Valley Fault and mixing with older water stored in the

fractures. Isotopic analyses taken from water coming from the Crandall Canyon mine roof showed the water has a mean residence time of over 14,000 years (Mayo and Associates, 1997a).

IV. IDENTIFY HYDROLOGIC CONCERNS

SUBSIDENCE

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

Subsidence due to mining in the Blind Canyon and Hiawatha Seams is expected to be similar to that which has been experienced at other mines in the East Mountain area. Mining in the area has been by both room-and-pillar and longwall methods, and both will be used in future mining. Surface cracks are common above mines on East Mountain, especially along faults and in shallow overburden areas. Subsidence is likely only over longwall panels, over room-and-pillar areas where second mining is done, and in surrounding areas within the expected angle-of-draw.

The predicted angle-of-draw is 15 degrees for most areas, which is based largely on the experience of coalmine operators at East Mountain. Because of the possibility of subsidence fractures propagating to the surface along existing fault fractures, the USFS feels the greatest potential for opening of subsidence-caused cracks would be along Joes Valley Fault; therefore, the USFS has stipulated a 22 degree angle-of-draw adjacent to Joes Valley Fault. Based on angle-of-draw calculations, there will be some subsidence outside the Mill Fork Tract permit area, along the common boundary with the Crandall Canyon No. 1 Mine; however, based on PacifiCorp's experience, significant subsidence will remain inside the permit boundary (Deer Creek Mine MRP, Volume 12, Engineering, Section R645-301-525, Lease Boundary Subsidence Barriers).

Within the Crandall Canyon No. 1 Mine permit area, subsidence from mining in the Hiawatha Seam has been less than anticipated. Layout of the mine has not allowed longwall-mining of large blocks (2000 Crandall Canyon Mine Annual Report), and therefore critical width (at which maximum subsidence occurs) has not been reached. Also, an overlying, competent 30-foot thick sandstone limits rubbelization and subsidence by acting as a structural beam that bridges the voids left by mining.

Because of USFS concerns on the effects of subsidence to Little Bear Creek and its associated ecosystem within the South Crandall Canyon Lease, a lease stipulation was added to

prevent subsidence in the Little Bear Canyon area where overburden is less than 600 feet unless it can be demonstrated that the effects of subsidence would be negligible (Special Coal Lease Stipulation #9). Although Little Bear Creek is intermittent within the South Crandall Lease area, the USFS considers the creek to be 'perennially functioning'. The ecosystem associated with Little Bear Creek is also reliant on the many springs emanating from the Blackhawk Formation and the base of the Castlegate Sandstone. Little Bear Creek is not projected to be undermined, but, in order to comply with the lease stipulation and conduct single-seam mining in Little Bear Canyon, Genwal has committed to: 1) additional monitoring of springs in Little Bear Canyon, 2) compiling a map identifying and showing the general location of vegetation in the area that could potentially be affected by mining, and 3) compiling a detailed map of riparian and wetland vegetation associated with the monitored springs. In the event of multiple-seam mining beyond spring site LB-7 in Little Bear Canyon, Genwal has committed to submitting a monitoring plan to be approved by the Division in concurrence with the USFS.

Because of USFS concerns on the effects of subsidence to Shingle Creek and springs within Lease U-68082, a lease stipulation was added to prevent full extraction mining with overburden less than 50 times the thickness of coal removed plus 50 feet - projected to be 300 feet in the lease modification area (Special Coal Lease Stipulation #1).

In the Mill Fork tract, the plan is to mine adjacent long-wall panels, which should result in critical width and maximum subsidence similar to that at other PacifiCorp mines at East and Trail Mountains. Mining in the Mill Fork tract has been planned so that subsidence will occur as a general lowering of the surface over broad areas, which will limit change or damage to the land surface, land uses, and renewable resources. Based on PacifiCorp's experience, the surface will stabilize in most areas after two years. Based on a total combined thickness 20 feet of coal removed, maximum predicted subsidence for the Mill Fork tract is 75 percent or 15 feet (Mill Fork Extension MRP R645-301-525, Mining Methods and Subsidence). Actual subsidence is anticipated to be less than the predicted maximum because of the sandstone layers above the coal. Subsidence of the ground surface over other PacifiCorp operations on East Mountain has typically been at or below the predicted amount, although in one area it exceeded the predicted displacement by 84 percent (2001 PacifiCorp Annual Report, p. 131).

Tension cracks occur along the edges of full-extraction areas under shallow overburden on canyon slopes. The Castlegate Sandstone yields to subsidence by fracturing, so fracturing and spalling from tension cracks occur at Castlegate outcrops. Where overburden is thick, the clay-rich strata yield by plastic deformation, reducing the impacts of subsidence at the surface for most of the area (2001 PacifiCorp Annual Report, p. 134). With the exception of cracks in the Castlegate Sandstone, cracks are expected to heal naturally over a period of 2 to 5 years (EA, 1997, p. IV-2). Only limited and isolated surface cracks are reasonably foreseeable in other areas. The Division studied subsidence effects on East Mountain in 2003 and 2004. Surface fractures caused by subsidence were found in several areas, but no permanent damage to the surface or land uses were indicated.

GROUND WATER

The greatest mining-related potential for impacting ground-water resources in the CIA comes from dewatering and subsidence. Following spring and seep surveys and baseline studies prior to mine permitting, representative springs and seeps are chosen for a mine's monitoring plan to aid in the determination of mining-related impacts to the hydrologic balance and water rights.

Under the currently proposed mine layout for the Mill Fork Tract, mining will occur beneath numerous seeps and springs. Seventeen springs are being monitored within the Mill Fork Tract area, and another six in the adjacent area. (Mill Fork Tract MRP, Drawing MFS1830D). In addition to the 200 to 400 gpm flowing from Little Bear Spring, the other sixteen springs had a combined average flow of 40 gpm during the 2001 - 2002 baseline period, the largest average being 20 gpm from MF-213. Overburden thickness averages more than 1,000 feet beneath areas where springs are located. Diversion of spring flow is considered to be at overall low risk.

Twenty-five springs and seeps are being monitored within and adjacent to the Crandall Canyon Mine permit area (including seven within the South Crandall Lease tract). Monitoring of springs for the Crandall Canyon Mine has not identified any mining-related impacts and future diversion of spring flow is considered to be an overall low risk. Because of the importance of Little Bear Spring as a municipal water supply, the mine has committed to mitigate for potential disruption to the spring as a stipulation of the South Crandall Lease Agreement (Special Coal Lease Stipulation #17). A water treatment plant is to be constructed under the provisions of an agreement between Genwal, PacifiCorp, and the CVSSD to assure an uninterrupted supply of culinary water equivalent to historical flows from the spring. The supply of culinary water will be assured irrespective of whether mining can be conclusively shown to have affected Little Bear Spring.

Changes in vegetation will have minimal impact on ground-water recharge because mining will disturb less than 150 acres of the 44,000-acre CIA. Probability of disturbance of phreatophytic vegetation, primarily cottonwood and some willow, is negligible.

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

Intercepted ground water is used in the mines underground, disposed of underground in sumps, or discharged to the surface. Other than MW-a, there are no developed wells in the Mill Fork or South Crandall Canyon tracts that use ground water from the area. Ground water

encountered in the Crandall Canyon mine has been determined to have mean residence times of 2,500 years to over 14,000 years. Except for the modern water at TW-10, water intercepted in the PacifiCorp mines has mean residence times of 1,000 to 12,000 years.

Water users have expressed concerns that water intercepted underground may be discharged into a watershed other than the one where the ground water was originally destined. According to the Utah Coal Mining and Reclamation Act and rules, a mine may divert water underground and discharge to the surface if material damage to the hydrologic balance outside of a permit area is prevented and disturbance to the hydrologic balance within the permit area is minimized (R645-301-731.214.1). Furthermore, any state-appropriated water affected by contamination, diminution, or interruption resulting from underground mining must be replaced (R645-301-731.530). The Division evaluates a mine's Probable Hydrologic Consequences Determination (PHC) and updates the CHIA prior to permitting, and reviews water monitoring data during mining and post-mining reclamation to determine if adverse hydrologic impacts, as defined by the rules, can be demonstrated. Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. The PHCs of mines in the East Mountain CIA have demonstrated that water that is projected to be intercepted is mostly ancient and therefore hydrologically isolated from springs, seeps, and streams. If it is subsequently demonstrated that the mining has caused or will cause a diminution, contamination, or interruption of an appropriated water right or a material impact to the hydrologic balance either within or outside of the permit area, the permittee will be required by the division to address means of minimizing the impact and replacing any appropriated water rights.

Dewatering

Plate 2 delineates the CIA for current and projected mining in the East Mountain area. The CIA encompasses approximately 70,000 acres (109 miles^2) centered on East Mountain. The area within the CIA that is above the base of the Blackhawk Formation is approximately 44,000 acres (69 miles^2), the approximate area covered by coal leases is 33,000 acres (52 miles^2). Mine workings have or will undermine roughly half of the leased areas.

Where channels intersect ground water within the Blackhawk Formation and Star Point Sandstone, baseflow discharge occurs directly to perennial streams. Horse, Blind, Crandall, Little Bear, Mill Fork, Rilda, Deer, Cottonwood, Huntington, and Indian Creeks are the perennial streams in the CIA. All of these streams except Indian Creek intersect the lower Blackhawk Formation and Star Point Sandstone.

A study conducted along Miller Creek in the adjacent Gentry Mountain area indicated streamflow substantially increases (from 8 to 115 gpm) as a result of baseflow discharge from the Blackhawk Formation and Star Point Sandstone (Cyprus-Plateau Mining Company, Star Point Mine PAP, pages 783-40). The results from this Miller Creek Study suggest perennial

steams that traverse the Blackhawk Formation and Star Point Sandstone on East Mountain receive similar base-flow recharge; accordingly, total base-flow recharge to the nine perennial streams that cross the Blackhawk Formation and Star Point Sandstone in the CIA can be roughly estimated to be on the order of 100 to 1,000 gpm.

Based on UPDES discharge data reported for 2004 and information provided in annual reports and MRPs, the estimated volume of water that coal-mining operations within the CIA are withdrawing from the ground-water system, including coal extraction and evaporation from mine ventilation, is approximately 1,320 gpm, or 2,400 acre-feet/year (Table 6). A rough estimate of ground water discharge in the East Mountain CIA is 2,000 gpm or 3,000 ac-ft/year (Table 13).

Table 13
Estimated Ground-Water Discharge
East Mountain CIA

Discharge	Rate (gpm)	2004 Yearly Total	
		(gallons)	(acre-feet/yr)
Baseflow to Perennial Streams*	550	290×10^6	890
Crandall Canyon, Deer Creek, and Cottonwood/Wilberg Mines (Table 6)	1,320	695×10^6	2,400
Total	**1,870**	**985×10^6**	**3,290**

* Average based on the estimated 100 to 1,000 gpm

Another rough estimate of total discharge can be made based on available recharge and the assumption that recharge and discharge are in equilibrium. Approximately 44,000 acres within the CIA are a potential recharge area for the strata above the coal seams (Plate 5). Using 20 inches as the average annual precipitation over this potential recharge area, the estimated total annual precipitation over the outcropping recharge area is 73,000 acre-feet (Table 14). Using 3 to 9 percent as rates of recharge (Danielson and Sylla, 1983; Waddell and others, 1986), water available for discharge would be between 2,200 to 6,600 acre-feet /year.

Table 14 compares the number of springs from rock units overlying the coal seams with area of outcrop and estimated precipitation. Values for Total Precipitation on Outcrop are skewed because 20-inches of precipitation/year was used for all strata: the amount of precipitation is not strictly related to elevation, but this estimate of Precipitation on Outcrop is probably low for the Flagstaff and North Horn formations at the highest elevations and high for the Blackhawk Formation at lower elevations. Along with greater precipitation at higher elevations, the large surface area of Flagstaff and North Horn that is exposed for recharge is undoubtedly an important factor as to why the number of springs and amount of discharge are so much greater in the Flagstaff and North Horn formations than in lower strata.

Springs that issue from the Star Point Sandstone (most notably Little Bear Spring that flows from the lower Star Point Sandstone but is not recharged from adjacent strata) and those

that issue from alluvium are not accounted for in Table 14 because they discharge below the Blackhawk Formation. Little Bear Spring discharges 200 to 400 gpm, and average flow measured by CVSSD has been approximately 340 gpm. Of the 120 identified alluvial springs, the 8 that are monitored yield 190 gpm.

Table 14
Precipitation and Springs for Areas Above the Blackhawk Coal Seams
East Mountain CIA

Lithologic Unit	Outcrop Area (acres)	Total Precipitation on Outcrop * (acre-feet)	Seeps and Springs Identified	Seeps and Springs Monitored	Total Average Measured Discharge
Undivided - Flagstaff Limestone, North Horn Fm.	17,600	29,000	260	108	2,655 gpm
Price River Fm.	9,400	16,000	127	34	109 gpm
Castlegate Sandstone	5,000	8,000	32	6	6 gpm
Blackhawk Formation	12,000	20,000	83	17	110 gpm
Totals	**44,000**	**73,000**	**502**	**157**	**~2,900 gpm**

* based on 20-inches/year

Flows have been measured at only about one-third of the known seeps and springs; however, monitored springs are those with the greatest and most consistent flow, so the flow from the unmeasured springs and seeps is a fraction of measured flow. Using 50 percent of the measured flow as a very rough estimate of the flow at unmonitored seeps and springs, estimated ground-water discharge by seeps and springs in the CIA is on the order of 4,000 to 4,500 gpm.

Total ground-water discharge within the CIA is therefore estimated to be roughly 5,400 to 6,800 gpm (8,700 to 11,000 acre-feet/year), where 100 to 1,000 gpm represents baseflow to streams, 1,323 gpm results from mining activities, and 4,000 to 4,500 gpm is spring discharge.

Inflow to the Deer Creek Mine increased in the late 1980's as mining progressed northward. The increased flow into the mine was attributed partially to better record keeping, but also to the increasing amount of sandstone being exposed in the mine roof and to mining in the trough of the Straight Canyon Syncline and near the Roans Canyon Fault Graben. 1990 and 1991 was a period of consistently high discharge rates because of high inflows into the mine at the Roans Fault Graben (Figure 4).

To access coal reserves for the Deer Creek Mine, PacifiCorp drove a rock tunnel across the Roans Canyon Fault Graben in 1989 and 1990. Prior to advancing the tunnels, a drilling and testing program identified two water-bearing fracture zones within the graben (HIS, 1988). The mine operator minimized inflow during development of the rock tunnels by dewatering the zone prior to development and by pressure-grouting the water-bearing zones during development. Predicted potential inflow to the tunnels was as much as 500 gpm (HIS, 1988). There is no record on what the actual inflow was from the tunnel construction, but mine discharge increased significantly during construction of the tunnels (Figure 4) (Mayo and Associates, 1997b; 1990 PacifiCorp Annual Report). When work was completed, inflow to the tunnels was 50 gpm (1990 PacifiCorp Annual Report).

Also in 1990, mining operations unexpectedly breached the Roans Canyon Fault Graben at two locations in the 4th North section. The first penetration was in January 1990 in the 1st Right entries, where several hundred gallons per minute entered through the mine roof. The next breach was in April when the 2nd Right entries intercepted a small sympathetic fault: the mine operator estimated peak discharge to be as much as 5,000 gpm initially, but flow had declined to 125 gpm by March 1991 (Mayo and Associates, 1997b; 1990 PacifiCorp Annual Report).

Mining in the Mill Fork Extension (including the 2013 modification) and South Crandall Canyon Tract will not cross any major structures such as the Roans Canyon Fault, so the only expected inflows are drippers from channel-sandstones in the roof. These flows may increase when operations reach the trough of the Crandall Canyon Syncline. Planned mining operations should remain far enough from the Joes Valley Fault zone that there will be no significant increase in flows from that fracture zone.

Following the cessation of mining, the discharge of ground water to streams, the Huntington Power Plant, and the atmosphere will cease and workings will flood. Complete flooding of the abandoned mine workings will probably never occur because hydraulic head will increase as the mines flood until it reaches equilibrium with water within the surrounding rock. The potentiometric surface is below the coal throughout most areas that have been or will be mined. Mine flooding will conceivably recharge storage and re-establish the natural ground-water conduit system that was operational prior to mining, and restore stream baseflow that might have been lost.

SURFACE WATER

Increased discharge, especially runoff from disturbed areas, could alter flow volumes, water quality, and runoff and flood patterns in creeks. Mining in the Mill Fork Extension and South Crandall Canyon Tract is not expected to increase discharge of surface or ground water beyond current levels. Creeks and drainage areas discussed are shown on Plate 4, Surface Water Drainage Map.

Subsidence could affect the character of drainages by altering the natural slope of the channel. However, large-scale impacts are unlikely because of the thick overburden (typically projected to be from 600 to 2,600 feet thick) between the mine operations and the surface drainages. In addition, full extraction mining is not planned under any perennial reaches of streams within the CIA. Where undermining beneath a drainage, the thinnest overburden (600 feet) is projected to be in the Right Fork of Mill Fork Canyon above the 8th North Mains in the Blind Canyon Seam. Where full extraction of both seams is planned under this drainage, overburden thickness will be 800 feet for a small area but rapidly thickens upstream because of the steep gradient of the stream channel. Minimum overburden thickness in Rilda Canyon is 1,200 feet, above the access tunnels; the minimum over longwall panels will be 1,800 to 2,000, and 2,200 feet over areas where both seams are mined. Only a small area of the Left Fork of Crandall Canyon will be involved in full-extraction mining, where minimum thickness is projected to be 800 to 1,000 feet. At the Skyline Mine, mining under perennial drainages has been monitored: where there was 600 feet or more of overburden, single-seam longwall mining has not produced permanent adverse effects at the surface (Sidle, 1995). Surface cracks are possible above subsided areas but, because of thick overburden in the CIA, conductivity between surface cracks and the rubbelized zone is not likely.

The potential for cracks to divert water underground is limited by the self-healing characteristics of the formations, which consist of interbedded claystone, siltstone, and sandstone that are rich in montmorillonite clays. Fractures at the surface are prone to heal rapidly because of the expanding nature of these clays. Material from the Blackhawk Formation was examined by X-ray diffraction and found to contain up to 58 percent montmorillonite clays (Crandall Canyon Mine MRP, App. 7-41). These clays absorb water and their volume can expand as much as 50 percent even when they are associated with other soil and rock materials.

Cottonwood/Wilberg Mine

The Cottonwood/Wilberg Mine is located in Grimes Wash. Headwaters of the Right Fork of Grimes Wash are on interbedded shales, siltstones, and sandstones of the North Horn Formation, which contain an abundance of calcareous material. As a result, the Right Fork contributes a relatively high amount of suspended solids to the Grimes Wash drainage. Mine discharge and flow from the Left Fork have lower solids concentrations than the Right Fork. Seeps emanating from the Mancos Shale have been known to raise the TDS level in the stream below the mine (Annual Hydrologic Monitoring Report for 1988, pg. 24).

All surface facilities are treated by sediment controls and as such, potential impacts from sediments generated from disturbed areas are minimized.

Waste Rock Disposal Site

Waste rock generated from the Des-Bee-Dove and Cottonwood/Wilberg Coal Mines has been disposed of in a series of seven interconnected storage cells at a waste rock disposal site (Plate 3). The waste rock storage site is at an elevation of 6,800 feet. Annual precipitation is approximately 14 inches, and the vegetation surrounding the waste rock storage area is the pinyon-juniper community type.

Each complete waste rock containment structure consists of over four feet of shot and crushed coal, sandstone, and mudstone rock. The anticipated waste rock was approximately 70 percent sandstone, 20 percent interbedded mudstone and siltstone, and 10 percent bony coal. Roof and floor materials are sandy loam to loamy sand in nature. Analyses of roof and floor material indicate high Sodium Adsorption Ratios (SAR) (Mean = 17.36, Standard Deviation = 25.14), and movement of sodic materials is typically associated with hydroscopic rise and leaching processes. High SAR in the waste rock storage area should not be a concern to water quality because drainage from the storage site should be minor.

Analyses from Drill Hole EM-23C, indicates low pH (3.3, 2.9, 3.7) within the mudstones and siltstones directly below the Hiawatha Coal Seam. Analyses of roof and floor samples indicate that Fe_2 in pyrite and marcasite averages 8.15% (Standard Deviation = 10.82%). However, the colluvium and Mancos Shale that underlie the waste rock storage area are calcareous and should be sufficient to neutralize any acidic seepage from within the waste rock storage site.

Most water associated with the Cottonwood/Wilberg Waste Rock Storage Area will evaporate, but some will inevitably percolate through the storage cells and underlying colluvium deposits. Drainage from the waste rock storage site should have little down-gradient effect: it will eventually contact the Mancos Shale, where waters have naturally high TDS, mainly sodium, chloride, and sulfate ions.

Deer Creek Mine

Referencing Table 15, it is apparent that the quality of Deer Creek runoff degrades from the upper to lower sampling points. The quality of the lower point is dominated by chloride, sulfate and sodium. In addition to the mine and sedimentation pond discharges, quality is affected by the Mancos Shale at the lower end of the mine site.

Table 15
Deer Creek Water Quality
(1984 – 2002)

		Conductivity (umhos/cm)	TDS (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	Magnesium (mg/L)	TSS (mg/L)
Above Mine (DCR01)	Max	1,140	897	53	176	45	255	33	162
	Mean	566	342	44	17	34	61	28	21
Mine Discharge (UPDES 002)	Max	1,380	3,300	150	1,460	150	520	90	2,780
	Mean	850	630	90	40	30	200	50	70
At Permit Boundary (DCR04)	Max	7,000	2.340	96	1,093	728	560	56	547
	Mean	1,059	590	66	85	113	146	42	31

Surface water originating from undisturbed lands upstream of the facilities area is controlled and diverted around the operation. Surface drainage facilities are designed to safely control water and sediment runoff from all disturbed areas. Storm runoff from 25 acres of disturbed land within the mine facilities area is collected in a system of open ditches, bermed roadways and culverts, then temporarily detained in the Deer Creek Mine sedimentation pond and released to Deer Creek at UPDES discharge point UT0023604-001. The sedimentation pond is designed to detain the 10-year, 24-hour storm event. When the 10-year, 24-hour design event is exceeded, sediment detention times are reduced, leading to a slightly higher sediment load in Deer Creek. Surface-water impacts associated with the Deer Creek Mine operations have been minimal. The Deer Creek sedimentation pond discharge exceeded UPDES limits for TDS in May 1990 during an emergency discharge from the mine; otherwise it has been within limits.

Discharges from the Deer Creek Mine have been reported as early as 1978, and discharge has been almost continuous since 1980 (Figure 4). Discharge has averaged 1,400 gpm, and the maximum reported discharge was 3,700 gpm, in December 1990. The minimum was 6 gpm, in February 1995. Prior to December 1990, all discharge was piped to the Huntington Power Plant and none entered the natural drainages. A temporary discharge permit was issued in November 1990 because of high inflows into the mine at the Roans Fault crossing, and 1990 and 1991 was a period of consistently high discharge rates. Currently, the power plant is not accepting water from the mine (Dennis Oakley – Energy West, personal communication, January 7, 2003). Water is now diverted to abandoned mine sections and used underground for mine operations, and only excess water is discharged directly to Deer Creek at UPDES discharge point UT0023604-002: excess water from the Mill Fork Extension will also be discharged through this point.

Reclamation of the drainage at the Deer Creek Mine will consist of removing the temporary drainage system, diversions, and sedimentation pond. Permanent channels will be constructed over the fill and into a splash basin. All channels are designed to pass the 100-year, 24-hour runoff peak flow. The proposed surface-water reclamation plan will have negligible impact on water quantity or quality of Deer Creek and its tributaries.

Des-Bee-Dove Mine

The Des-Bee-Dove Mine complex ceased operations in February 1987 for economic reasons. The mines were dry and water for mine operations was piped from springs higher on East Mountain.

Reclamation began in 1999, and Phase I reclamation was completed in 2003. Deep surface pocking and vegetation are the primary sediment control measures. Runoff reports to a sedimentation pond built to capture the entire runoff of the ephemeral drainage. Because there are no active operations other than reclamation, and because surface roughening, vegetation, and a sedimentation pond treat all runoff, the effects of the Des-Bee-Dove Mine operations on the hydrologic balance are negligible.

Huntington #4 Mine

The old workings of the Huntington #4 Mine underlie approximately 1,300 acres in Mill Fork and Little Bear Canyons. There were 12 acres of surface disturbance in Mill Fork Canyon. The mine is reclaimed and bond has been released. There is no anticipated impact to Mill Creek from the Huntington #4 Mine due to the lack of potential sources.

Crandall Canyon Mine

The Crandall Canyon No. 1 Mine is located in Crandall Canyon. The U.S. Geological Survey established a gauging station at the mouth of Crandall Canyon in 1978. Flow data collected at the gauging station are not complete for the winter in most years, due presumably to the gauge or flume freezing. However, the limited data indicate that most of the flow of Crandall Canyon Creek occurs in the period of May through July. For the periods when flows were recorded, maximum flow was 39,000 gpm, the average was 2,400 gpm, and there were short periods when there was no flow. Assuming an average of 0.5 gpm for the period when records were missing, the average annual flow for the six-year period of data would be approximately 2,800 acre-feet.

Crandall Canyon Creek is diverted beneath the mine facility in Crandall Canyon through a culvert. Water monitoring is conducted in the creek at a flume above the facility and the culvert (upper flume – UPF) and approximately 500 feet downstream of the culvert at another

flume (lower flume – LOF). Surface water quality data collected from Crandall Canyon Creek by Genwal since 1985 indicate that the dominant ions are calcium and bicarbonate. As shown in Table 16, the water quality of Crandall Canyon Creek degrades from the upper to lower monitoring point. The change in water quality is likely due to a combination of mine discharge and runoff through the Mancos Shale at the lower end of the mine site.

Table 16
Crandall Canyon Creek Water Quality
(1994 – 2004)

		Conductivity (umhos/cm)	TDS (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	Magnesium (mg/L)	TSS (mg/L)
Above Mine Facility (UPF)	Max	1,200	678	111	58	39	341	60	44
	Mean	571	337	68	3	5	63	38	6
Mine Discharge (UPDES 002)	Max	808	1,293	NS	NS	NS	NS	NS	14
	Mean	708	439	NS	NS	NS	NS	NS	6
Below Mine Facility (LOF)	Max	976	700	97	230	116	193	53	41
	Mean	670	413	63	17	30	90	39	9

NS = Not Sampled

Surface drainage facilities are designed to safely control water and sediment runoff from all disturbed areas. Storm runoff from disturbed land within the mine facilities area is collected in a system of open ditches, bermed roadways, and culverts and then temporarily detained in the Crandall Canyon Mine sedimentation pond. The sedimentation pond is designed to detain the 10-year, 24-hour storm event. There has been only one reported discharge from the sediment pond UPDES discharge point UT0024368-001 (March 2000) to Crandall Canyon Creek between 1988 and 2005. This sediment pond discharge was within UPDES limits for all parameters.

Reclamation of the drainage at the Crandall Canyon Mine will consist of removing the temporary drainage system, diversion and sedimentation pond. The proposed surface-water reclamation plan will have negligible impact on water quantity or quality of Crandall Canyon Creek and its tributaries.

Mill Fork Extension

Headwaters of Rilda, Mill Fork, and Crandall Creeks are in the Mill Fork tract, but full extraction mining is not planned under the main channels of these streams (Mill Fork Extension MRP, p. 5-23). The lease impinges on the perennial reach of Crandall Canyon, but no mining is planned for this area.

The short, steep tributaries of Indian Creek that are on the west side of the tract could be influenced by surface subsidence. Cracks on the surface along the Joes Valley Fault trace might divert water from these tributaries, and such loss of water could reduce the flow that supports the streamflow and wetlands in Joes Valley. Under the proposed mine plan, active workings would extend within approximately 500 feet of Joes Valley Fault at the mine level; however, no full extraction mining is to be done in the areas nearest the fault, as determined by the 22 degree angle-of-draw stipulated by the USFS. Projections of subsidence effects indicate there should be no subsidence or tension cracking involving the Joes Valley Fault zone, so the potential for adverse impacts to the tributaries that cross this fault is very small.

AQUATIC HABITAT

Only intermittent headwaters will be undermined and subsided; no perennial reaches will be undermined or subsided by planned mine operations in the CIA.

Intermittent channels provide aquatic habitat when water is present. Because flows in these small streams decrease in late summer and early fall, their primary use by fish - such as cutthroat trout and sculpins - will be as spawning and rearing streams. If present at all, adult fish are likely present in headwater areas only during the spring reproductive period. The intermittent streams probably contribute invertebrates to Huntington Creek, an important sports fishery in the region. Aquatic habitat could be lost or degraded if the character or quantity of streams and streamflows change as a result of subsidence.

Gravels suitable for spawning are patchy in lower-gradient reaches of the tributaries to Huntington Creek. Because successful spawning requires the presence of clean, well-oxygenated spawning gravels, the USFS considers it a high priority to protect these channels from excessive erosion and sedimentation (EA, 1997, p. III-16). Studies in Burnout Canyon (Sidel, 1995) are inconclusive but suggest that subsidence may cause fragmentation of riffles into cascades, so spawning habitat in low-gradient riffles could become inaccessible due to step-like fragmentation of the longitudinal profile of the stream: drops of twelve inches or more are considered barriers for inland trout species. It is conceivable that subsidence could shift the stream substrate enough to present barriers to the movement of spawning fish. None of the lower reaches of streams will be subsided in the Mill Fork CIA.

Crandall Creek has a year-round population of adult cutthroat trout. Prior to expansion of the Crandall Canyon No. 1 Mine pad, the fish were in the beaver ponds immediately adjacent to the mine portal. Expansion of the pad and culverting of the stream required mitigation to protect this population: the mitigation is described in Appendix 3-12 of the Crandall Canyon Mine MRP.

Water withdrawals within the Colorado River Basin impact habitats of four endangered fish species in the Colorado River and its tributaries: the Colorado squawfish, razorback sucker, bonytail chub, and humpback chub. Annual water withdrawals in excess of 75 acre-feet could trigger consultation requirements with the U.S. Fish and Wildlife Service (USFWS). The mines in the CIA discharge more water than they consume.

V. IDENTIFY RELEVANT STANDARDS AGAINST WHICH PREDICTED IMPACTS CAN BE COMPARED

The UPDES permits for the PacifiCorp and Genwal mines provide some standards for water quality in the area.

Utah water quality standards exist for numerous parameters other than those discussed below, but at this time there is neither evidence to indicate nor reason to believe that those parameters are of concern in the East Mountain CIA. However, additional parameters recommended for routine monitoring in UDOGM directive Tech-004 are included in the water-monitoring plans of the PacifiCorp and Crandall Canyon Mine operations.

Flow: There is no standard for flow in the Utah water quality standards. The UPDES permits for the PacifiCorp and Crandall Canyon Mines contain no limit on flow. Discharge is to be measured monthly, and the duration of intermittent discharge is to be reported along with flow. Characteristics such as stream morphology, vertebrate and invertebrate populations, and water chemistry can be affected by changes in flow and therefore can provide an indirect standard for flow.

R645-301-731.530 and -731.800 require prompt replacement of State-appropriated water that is contaminated, diminished, or interrupted. Baseline hydrologic and geologic information is to be used to determine the impact of mining activities upon ground- and surface-water supplies.

Oil and Grease: There is no State water quality standard for oil and grease, but the limit in the PacifiCorp and Crandall Canyon Mines UPDES permits is 10 mg/L, which is typical of UPDES permits for coalmines in the Wasatch Plateau and Book Cliffs. One grab-sample a month is required to measure oil and grease at the Crandall Canyon Mine. Oil and grease are not analyzed routinely at the PacifiCorp Mines, but any observation of visual sheen requires a sample be taken immediately.

A 10 mg/L oil and grease limit does not protect fish and benthic organisms from soluble oils such as those used in longwall hydraulic systems, and UDWR has recommended soluble oils be limited to 1 mg/L (Darrell H. Nish, Acting Director UDWR, letter dated April 17, 1989 to Dianne R. Nielsen, Director UDOGM).

pH: Allowable pH ranges are 6.5 to 9.0 under State water quality standards for all Classes, and also under the UPDES permits.

Total Dissolved Solids (TDS) concentrations: TDS is commonly used to indicate general

water quality with respect to inorganic constituents. There is no state water quality standard for TDS for Classes 1, 2, and 3, but 1,200 mg/L is the limit for agricultural use (Class 4).

The Crandall Canyon Mine UPDES permit allows a daily maximum concentration of 723 mg/L TDS, to be determined by one grab sample per month. TDS allowances vary for the PacifiCorp mines:

Table 17
TDS Limits for PacifiCorp Mines

Mine	UPDES Site	Maximum Loading lbs/day	Quantity or Concentration Average	Quantity or Concentration Daily Max.
Des-Bee-Dove*		2,000		Report Daily Max.
Deer Creek 001	001	2,000	Report 30-day Average	5,000 mg/L
	002		800 mg/L Quarter Average	1,000 mg/L
Trail Mountain 001	001	2,000		5,000 mg/L
	002			1,200 mg/L
Cottonwood/Wilberg	001	2,000		
	002**, 003, and 005	2,000 (Combined)		
	004	2,000		

* The Des Bee Dove sedimentation pond was reclaimed in 2006 so there are no longer UPDES discharges
** The Cottonwood/Wilberg sedimentation pond for UPDES site 002 was reclaimed in 2002 so there are no longer UPDES discharges.

Total Suspended Solids (TSS) and Settleable Solids: There is no State water quality standard for solids in the water, but an increase in turbidity is limited to 10 NTU for Class 2A, 2B, 3A, and 3B waters and to 15 NTU for Class 3C and 3D waters.

The PacifiCorp and Crandall Canyon Mine UPDES permits have the following allowable limits on TSS: 30-day average, 25 mg/L; 7-day average, 35 mg/L; daily maximum, 70 mg/L. TSS is to be determined by a monthly grab sample.

Under the current UPDES permits, all samples collected during storm water discharge events are to be analyzed for settleable solids. Samples collected from increased discharge, overflow, or bypass that is the result of precipitation that does not exceed the 10-year, 24-hour precipitation event may comply with a settleable solids standard of 0.5 ml/L daily maximum rather than the TSS standard, although TSS and the other UPDES parameters are still to be

determined. If the increased discharge, overflow, or bypass is the result of precipitation that exceeds the 10-year, 24-hour precipitation event, then neither the TSS nor settleable solids standard applies.

Iron and Manganese: UPDES limits on daily maximum total iron, determined by a monthly grab sample, are as follows:\

Crandall Canyon Mine	1.24 mg/L
Trail Mountain Mine	1.4 mg/L
Deer Creek Mine	1.0 mg/L
Cottonwood/Wilberg Mine	1.8 mg/L at 001 and 002
	1.0 mg/L at 003, 004, and 005
Des-Bee-Dove Mine	1.0 mg/L

State water quality standards (UDWQ 1994) allow a maximum of 1,000 µg/L (1 mg/L) dissolved iron in Class 3A, 3B, 3C, and 3D waters, with no standard for Class 1, 2, and 4 waters.

Monitoring of total manganese is required by SMCRA and the Utah Coal Mining rules, but there is no UPDES or Utah water quality standard for either total or dissolved manganese.

Macroinvertebrates: Macroinvertebrates are excellent indicators of stream quality and can be used to evaluate suitability of a stream to support fish and other aquatic life. Baseline studies of invertebrates (Lines and Plantz, 1981; USGS, 1980, 1981,and 1982; and Price and Plantz, 1987) provide standards against which actual conditions in Huntington, Crandall, and Cottonwood Creeks can be evaluated if desired.

UDWR is to conduct pre and post-disturbance evaluations of macroinvertebrate populations and identify resident fish populations in Rilda Creek. The "Preliminary Report on Surveys Conducted to Determine Potential Impacts of Rilda Surface Facility Development in Rilda Canyon During 2004" in Volume 11, Biology Appendix C marks the completion of the predisturbance work.

Whole effluent testing - chronic toxicity: Requirements for biological testing with Ceriodaphnia and fathead minnows have been recently added to the UPDES permits for outfall 002 at the Crandall Canyon Mine and outfall 001at the Cottonwood/Wilberg Mine.

MATERIAL DAMAGE

Material damage to the hydrologic balance would possibly manifest itself as an economic loss to the current and potential water users, would result in quantifiable reduction of the capability of an area to support fish and wildlife communities, or would cause other quantifiable adverse change to the hydrologic balance outside the permit area. The basis for determining material damage may differ from site-to-site within the CIA according to specific site conditions. Surface-water and ground-water concerns have been identified for CHIA evaluation.

The Division received comments from NEWUSSD and Huntington-Cleveland Irrigation Company, plus from several individuals who receive water from these companies regarding permitting of the Mill Fork Extension. The main concern was that flows from streams and springs, in particular Little Bear Spring, would be diminished by mining operations in the Mill Fork Extension and the South Crandall Lease area.

The USFS excluded the area covered by the South Crandall Canyon Coal Lease Tract from the Mill Fork Lease because of concerns for potential adverse impacts to Little Bear Spring. The South Crandall Canyon area was reevaluated, and based on a Decision Notice/Finding of No Significant Impact (DN/FONSI) signed by the BLM and USFS in February 2003, the South Crandall Canyon Tract was leased through competitive bid to Andalex in 2003. Genwal has committed to mitigate for potential disruption to the spring as a stipulation of the South Crandall Lease Agreement (Special Coal Lease Stipulation #17). A water treatment plant is to be constructed under the provisions of an agreement between Genwal, PacifiCorp, and the CVSSD to assure an uninterrupted supply of culinary water equivalent to historical flows from the spring. The supply of culinary water will be assured irrespective of whether mining can be conclusively shown to have affected Little Bear Spring.

Parameters for surface-water quantity and quality

The potential material-damage concerns this CHIA focuses on are changes of surface flow rates and chemical composition that would physically affect the off-permit stream channel systems as they presently function and affect aquatic and wildlife communities. There is no farming in the CIA; however, there is livestock production. Therefore, water-quality and quantity criteria are intended to identify changes in the present discharge regime that might be indicators of economic loss to the water users and grazing-right owners, of significant alteration to the channel size or gradient, or of loss of capacity to support existing fish and wildlife communities within the CIA. In order to assess the potential for material-damage to these elements of the hydrologic system, the following indicator parameters were selected for evaluation at each evaluation site: low-flow discharge rate, TDS, total iron, and sediment load.

Low-Flow Discharge Rate

Measurements provided by mine operators are generally of instantaneous flow and provide some indication of long-term trends, but are probably no more accurate either individually or as a whole than the *poor* USGS measurements. In the Wasatch Plateau, Waddell and others (1981) found that correlating three years of low-flow records (September) at stream sites against corresponding records from long-term monitoring sites would allow the development of a relationship that could be used to estimate future low-flow volumes at the stream sites within a standard deviation of approximately 20 %. Ten years of measurements reduced the standard deviation to 16 - 17 % and 15 years of data reduced it to about 15 %. This relationship indicates that a change in low-flow rates of less than 15 to 20 % probably would not be detectable. A 20 % decrease in the low-flow rate will provide a threshold indicator that decreased flows are persisting and that an evaluation for material damage is needed. However, because flow in many streams is intermittent, material damage due to loss of flow is very unlikely, and the intermittent nature of the flow will also make any such loss almost impossible to detect. Any such apparent change in discharge would need to be correlated against precipitation and a drought index such as the PHDI.

Monitoring of mine-water discharge rates will provide a means to evaluate effects of the mine discharge on the receiving streams. The potential for material damage by mine discharge water is tied to the effect of that discharge on the flow in the receiving streams, and that effect will be most pronounced during low-flow. Water from disturbed areas will be monitored at the discharge from the sedimentation ponds.

Total Dissolved Solids (TDS)

The concentration of dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. Wildlife and livestock use is the designated post-mining land use for the CIA**,** so established dissolved solids tolerance levels for wildlife and livestock have been adopted as the thresholds beyond which material damage may occur. The state standard for TDS for irrigation of crops and stockwatering (Class 4) is 1,200 mg/L. If TDS concentrations persistently exceed 1,200 mg/L in springs, UPDES discharges, or receiving streams, it will be an indication that evaluation for potential material damage is needed.

Total Iron

The concentration of total iron is used to protect surface water aquatic life. Wildlife and livestock use is the designated post-mining land use for the CIA**,** so established total iron tolerance levels for wildlife have been adopted as the thresholds beyond which material damage may occur. The total iron state numeric criterion for aquatic wildlife (Class 3A) is 1 mg/L. If total iron concentrations exceed 1 mg/L in springs, UPDES discharges, or receiving streams, it

will be an indication that evaluation for potential material damage is needed.

Sediment Load

Sediment is a common constituent of ephemeral stream flow in the western United States. The quantity of sediment in the flows affects stream-channel stability and most uses of the water. Excessive sediment deposition is detrimental to existing aquatic and wildlife communities. Large concentrations of sediment in streamflow may preclude use of the water for irrigating crops because fine sediment tends to reduce infiltration rates in the irrigated fields, and the sediment reduces capacities of storage facilities and damages pumping equipment. Sediment load measurement error is, at a minimum, the same as the flow measurement error because sediment load is directly dependent on flow and in practice cannot be measured more accurately than the flow.

TSS is the indicator parameter initially chosen for evaluating the sediment hazard to stream-channel stability and irrigation. Threshold values have initially been set as the greater of 1 standard error above the baseline mean TSS value or 120 % of the baseline mean TSS value (by analogy with the low-flow discharge rate measurement accuracy and assuming that the error in TSS will contribute equally to the error in flow when determining mean sediment load). If TSS concentrations persistently exceed these threshold values it will be an indication that evaluation for material damage from sediment load in the streams might be needed.

Parameters for ground-water quantity and quality

The potential material-damage concerns of this CHIA are intended to limit changes in the quantity and chemical composition of water from ground-water sources to magnitudes that:

- Will not cause economic loss to existing or potential agricultural and livestock enterprises;
- Will not degrade domestic supplies;
- Would not cause structural damage to aquifers; and
- Will maintain adequate capacity for existing fish and wildlife communities.

To assess the potential for material damage to these elements of the ground-water hydrologic system, the following indicator parameters were selected for evaluation: seasonal flow from springs and TDS concentration in spring and mine-discharge water.

Ground-water concerns will be monitored at numerous springs, wells, and UPDES discharge points. Locations are identified on Plate 3. If inflow to a mine is significant or persistent, UDOGM can require monitoring of mine inflow.

Seasonal flow from springs

Maintain potentiometric heads that sustain average spring discharge rates, on a seasonal basis, equal or greater than 80 % of the mean seasonal baseline discharge, or in other words baseline minus 20 % probable measurement error. The 20 % measurement error is based on analogy with the accuracy of measuring low-flow surface discharge rates. A 20 % decrease in flows, determined on a seasonal basis, will indicate that decreased flows are probably persisting and that an evaluation for material damage is needed.

TDS concentration

The concentration of total dissolved solids is commonly used to indicate general water quality with respect to inorganic constituents. The quality of water from underground sources reflects the chemical composition of the rocks the water passes through. Ground-water quality may be degraded by intrusion of poorer quality water from wells or mines, by leakage from adjoining formations, or by recharge through disturbed materials. Wildlife and livestock use ground water discharging from seeps and springs, and those are the designated postmining users most likely to be impacted. There is no water quality standard for TDS for aquatic wildlife. The state standard for TDS for irrigation of crops and stockwatering (Class 4) is 1,200 mg/L. If TDS concentrations persistently exceed 1,200 mg/L it will be an indication that evaluation for material damage is needed.

VI. ESTIMATE PROBABLE FUTURE IMPACTS OF MINING ACTIVITY WITH RESPECT TO THE PARAMETERS IDENTIFIED IN V.

GROUND WATER

Dewatering and subsidence related to mining have the greatest potential for impacting ground-water resources in the CIA.

Dewatering

Underground mining removes the support to overlying rock, causing caving and fracturing of overlying strata. In areas where fracturing is extensive, subsidence induced caving and fracturing can create conduits that allow ground water to flow into the mine. Dewatering caused by fracturing may decrease ground-water storage. Ground water in storage is not a major recharge source to springs. Fracturing of overlying strata will only intercept some of the deep ground-water storage. These areas will eventually drain and dry up because most of the beds have low hydrologic conductivities. In the CIA, it is unlikely that fractures will reach shallower perched aquifers that supply springs because of the thickness of the overlying strata over most areas to be mined is well over 600 feet. Water discharged from the mines is at times of better quality than natural spring flow or baseflow.

Total ground-water storage above the Blackhawk coal seams in the Mill Fork Tract can be estimated by assuming an area of 5,544 acres and a large storage coefficient of 0.10. Over much of the Mill Fork Lease Tract, cover above the coal seams reaches 2,600, so 1,000 feet is a reasonable estimate of potentially saturated thickness. Using these estimates as input, total ground-water storage above possible Mill Fork Extension workings could be as much as 554,400 acre-feet.

Approximately 44,000 acres (69 miles^2) within the CIA are a potential recharge area for the strata above the coal seams (Plate 5). Using 20 inches as the average annual precipitation over this potential recharge area, the estimated total annual precipitation over the outcropping recharge area is 73,000 acre-feet (Table 14). Using 9 percent as rate of recharge (Waddell and others, 1986), estimated annual average ground-water recharge would be 6,600 acre-feet /year. For the 33,000 acres (52 miles^2) above the PacifiCorp and Crandall Canyon Mines leases, recharge is roughly estimated to be 5,000 acre-feet. Because of hydrologic isolation between the Blackhawk Formation and the surface, neither an increase in recharge rates nor a decrease in discharge rates at the surface is a probable consequence of dewatering deeper strata. A notable or measurable increase in recharge is also unlikely because recharge is generally available only for a few months during spring snowmelt and for very brief periods during summer thundershowers. During these seasonal, relatively short events the soils reach saturation quickly

and reject most available water.

The Blackhawk Formation is probably saturated in most areas (Waddell and others, 1986, p. 41) and new mining can be expected to produce water at rates similar to those currently observed in the Genwal and PacifiCorp mines. Most water entering mines comes from ground water stored in the immediately overlying strata after fracturing of the rock above the mine.

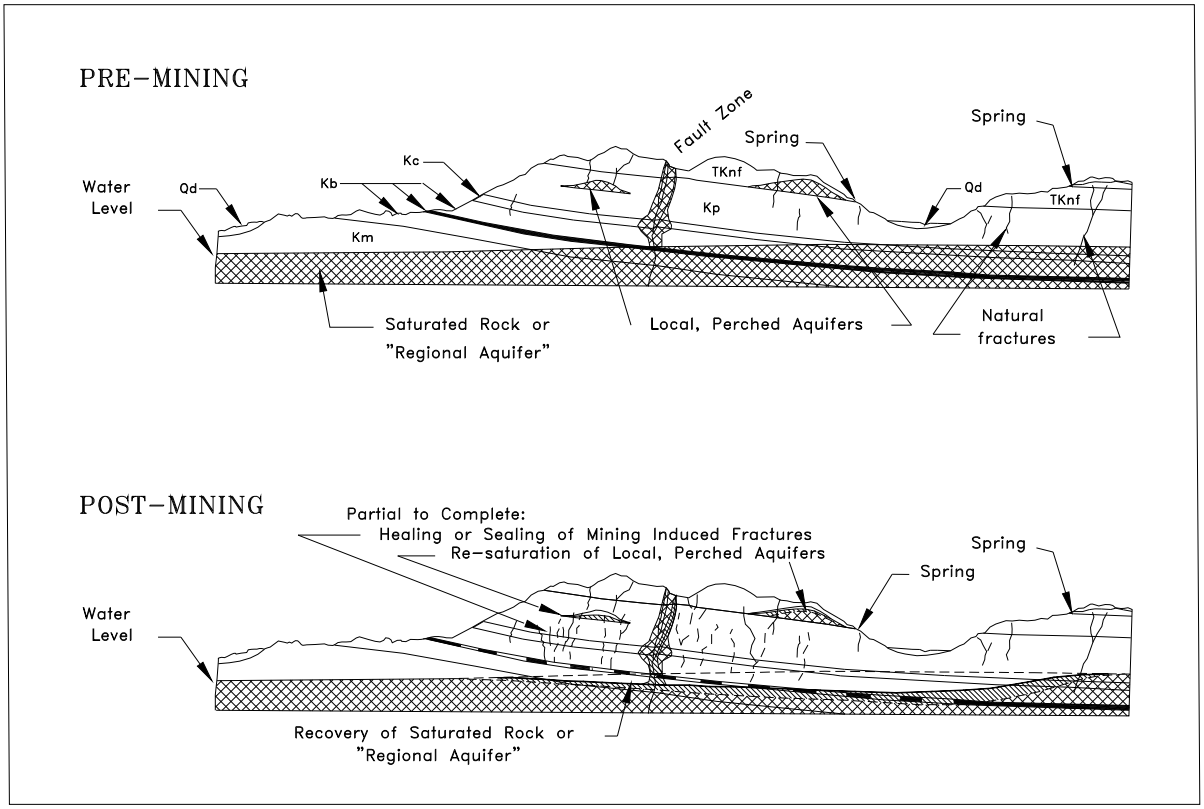

Figure 6. A diagrammatic cross-section of the Wasatch Plateau showing the relationship between mining, geologic strata and ground water before and after mining.

Affects to springs in the Mill Fork Extension or their recharge sources are not expected due to the great thickness of strata between the coal and springs on the surface. The mobility and expanding characteristics of clays, shales and mudstones in the overlying strata should also help seal conduits created by fracturing (Figure 5). Overlying, competent sandstone units limit rubbelization and subsidence by acting as a structural beam that bridges the voids left by mining.

Subsidence

Subsidence impacts are largely related to extension and expansion of existing fracture systems and upward propagation of new fractures. Inasmuch as vertical and lateral migration of water appears to be partially controlled by fracture conduits, readjustment or realignment in the conduit system will inevitably produce changes in the configuration of ground-water flow. Fracturing and spalling can be expected where tension cracks intercept Castlegate outcrops. With the exception of cracks in the Castlegate Sandstone, cracks are expected to heal naturally over a period of 2 to 5 years (EA, 1997, p. IV-2). Only limited and isolated surface cracks are reasonably foreseeable in other areas. Subsidence induced fractures rarely extend from mine workings to the surface, and the thicker the overburden, the less likely this is to occur. The Division studied subsidence effects on East Mountain in 2003 and 2004; surface fractures caused by subsidence were found in several areas, but no permanent damage to the surface or land uses were indicated.

Potential hydrologic changes include decreased flow through existing fractures that close, increased flow rates along existing fractures that open further, and the diverting of ground-water flow along new fractures or within newly accessible permeable lithologies. Subsurface flow diversion may cause the depletion of water in local aquifers and loss of flow to springs that are undermined.

Because of the possibility of subsidence fractures propagating to the surface along existing fault fractures, the USFS has stipulated a 22 degree angle-of-draw along the west side of the Mill Fork Extension adjacent to Joes Valley Fault, which should be more than adequate to avoid interaction between mine-induced subsidence and the fractures of the Joes Valley Fault system. Because of USFS concerns on the effects of subsidence to Little Bear Creek and its associated ecosystem, a lease stipulation was added to prevent subsidence in the Little Bear Canyon area where overburden is less than 600 feet unless it can be demonstrated that the effects of subsidence would be negligible. Similar concerns for Shingle Creek and springs within the addition to Lease U-68082 resulted in a lease stipulation to prevent full extraction mining with overburden less than 50 times the thickness of coal removed plus 50 feet - projected to be 300 feet in the lease modification area. Commitments in the Crandall Canyon Mine MRP address these stipulations.

Mining in the Mill Fork tract has been planned so that subsidence will occur as a general lowering of the surface over broad areas, which will limit change or damage to the land surface, land uses, and renewable resources. The Castlegate Sandstone and thick overburden are responsible for minimizing surface subsidence over mines in the CIA, and it is anticipated that similar thicknesses - 600 feet to 2,600 feet - of the same formations over the Mill Fork Extension will also prevent subsidence. Annual reports for the PacifiCorp Mines indicate surface subsidence over current permit areas is as much as 75 percent of the thickness of the extracted coal, but actual subsidence on East Mountain has typically been at or below the predicted amount. Under much of the Mill Fork Extension, mining will be done in two seams, with a combined removed thickness of up to 20 feet (Mill Fork Extension MRP R645-301-525, Mining

Methods and Subsidence), (2001 PacifiCorp Annual Report, p. 131).

SURFACE WATER

Changes in flow volume and in water quality have the greatest potential for impacting water resources in the CIA. Sites that have been or are currently being used to monitor surface and ground water are shown on Plate 3.

Water Quality

Uncontrolled runoff from the disturbed lands and waste piles could increase sediment concentrations and alter the distribution and concentration of dissolved solids in the receiving streams. Sediment control measures such as sedimentation ponds and ASCAs are already in place at the Crandall Canyon and PacifiCorp mines to protect receiving streams from impacts from the mine's disturbed areas.

Deer Creek and Crandall Creek are monitored above and below the respective mine discharges. Monitoring of ephemeral and perennial flows will continue in the major perennial and ephemeral drainages tributary to Huntington Creek. Indian Creek, a perennial tributary to Cottonwood Creek, will also continue to be monitored. Discharges directly from mines and from sedimentation ponds will be monitored when they occur.

There will be no additional surface disturbance with the Mill Fork Extension (or 2013 modification) or the South Crandall Lease Tract (with the exception of the Rilda Canyon portal facilities associated with the Mill Fork Extension). Water from the Mill Fork Extension or the South Crandall Lease Tract will be discharged into Deer Creek or Crandall Canyon Creek, respectively, at the existing UPDES discharge points and subjected to monthly monitoring stipulated by a UPDES permit. If total iron concentrations in mine water discharge are found to be above the numeric criterion during UPDES monthly monitoring then mitigation measure will be conducted. Treatment method such as the treatment system in place at the Crandall Canyon North Leases could be implemented at other discharges.

There is no plan to discharge water from the Rilda Canyon portal facilities. Disturbed-area runoff and gray water from the Rilda facilities is to be pumped into abandoned mine workings, but if monitoring detects changes to the hydrologic balance due to this water, PacifiCorp will cease the pumping, transport the water through the mine dewatering system, and discharge it at the UPDES location in Deer Creek Canyon (Volume 11, Section 728, Hydrologic Balance-Groundwater, F. RUNOFF AND GRAY WATER DISPOSAL – ABANDONED MINE WORKINGS). The Division also considers this the alternative plan should other agencies deny the permits needed for underground disposal of this water.

CIA Sediment Control

Sedimentation controls are already in place at the Crandall Canyon Mine and PacifiCorp mines. The Helco and Huntington #4 mines have been reclaimed and are no longer under reclamation bond. The Des-Bee-Dove mine is being reclaimed, but the sedimentation pond is still in place and the permitted area is bonded. Portions of the Cottonwood/Wilberg Mine and Deer Creek Mine permit areas have been reclaimed.

Water Quantity

If it becomes necessary to discharge water from the Mill Fork Extension (or 2013 Mill Fork modification) or the South Crandall Lease Tract, the water will discharge into Deer Creek or Crandall Canyon Creek, respectively, at the existing UPDES discharge points and will be subject to monthly monitoring stipulated by a UPDES permit. In addition, flow volumes of Deer Creek and Crandall Creek are monitored above and below the mine discharge.

There is no plan to discharge water from the Rilda Canyon portal facilities. Disturbed-area runoff and gray water from the Rilda facilities is to be pumped into abandoned mine workings, but if monitoring detects changes to the hydrologic balance due to this water, PacifiCorp will cease the pumping, transport the water through the mine dewatering system, and discharge it at the UPDES location in Deer Creek Canyon (Volume 11, Section 728, Hydrologic Balance-Groundwater, F. RUNOFF AND GRAY WATER DISPOSAL – ABANDONED MINE WORKINGS). The Division also considers this the alternative plan should other agencies deny the permits needed for underground disposal of this water.

Upon termination of mining operations, discharge will be discontinued and the mines will begin to flood. There will be a reduction in surface flow because of the loss of the mine discharge. There is little or no baseflow to the intermittent streams, and surface flow will probably be unaffected by a return to pre-mining conditions as the mines flood. The time required for mine flooding will depend not only on the rate of water inflow but also on the amount of caving and the void space remaining after caving. Complete flooding of the mines may never occur because flow out of the mines through the roof, floor, and ribs and into the surrounding rock will increase as flooding increases the hydraulic head within the abandoned workings.

It is anticipated that discharge of water from the Mill Fork Extension and 2013 Mill Fork modification mine operations will be similar what has been observed or predicted at the Deer Creek Mine. Upon termination of mining operations, workings will probably flood to some extent, but because the formations slope back away from the mine portals there will be no gravity discharge from the mine.

It is anticipated that no acid or toxic mineral contamination will take place during or

anytime after mining. Soils and bedrock surrounding the coal contain buffering compounds of calcium carbonates and bicarbonates. All rock and coal waste removed from the PacifiCorp mines and having a potential of acid or toxic forming materials will be buried at least four feet deep at the waste rock disposal site. All disturbed area runoff will be contained, monitored, and treated if required before discharge to ensure water quality standards are met.

ALLUVIAL VALLEY FLOORS

There are no alluvial valley floors within the CIA
.

VII. ASSESS PROBABLE MATERIAL DAMAGE

FIVE-YEAR PERMIT TERM

Deer Creek Mine

Planned operational monitoring will document any measurable changes in the surface- and ground-water systems. Surface disturbances and UPDES permitted discharges are not expected to degrade surface- or ground-water quality. There is no AVF to be impacted. Sediment control measures should continue to effectively prevent diminution of water quality in the receiving drainages.

The Mill Fork Extension (including the 2013 modification) is expected to have water inflow similar to that in the existing workings under East Mountain. Overburden thickness of 600 to 2,600 feet will minimize surface impacts of subsidence. No adverse impacts to streams or springs are anticipated from subsidence.

Crandall Canyon Mine

Planned operational monitoring will document any measurable changes in the surface- and ground-water systems. Surface disturbances and UPDES permitted discharges are not expected to degrade surface- or ground-water quality. There is no AVF to be impacted. Sediment control measures should continue to effectively prevent diminution of water quality in the receiving drainages.

Mining at the Crandall Canyon mine entered cessation in August 2007 and the North Crandall leases have been relinquished. No new surface disturbance is anticipated. No mine water has been discharged from the South leases since cessation. Although Little Bear Spring is located outside of the South Crandall Permit boundary and adverse impacts are not expected, because it is such an important source of water in the region, a water replacement agreement is in place to assure an uninterrupted supply of culinary water equivalent to historical flows from the spring. No adverse impacts to streams or springs are anticipated from subsidence.

FUTURE MINING

Underground mining may result in some diversions of intercepted ground water into drainages that are not topographically within (above) the area where the water was encountered. If it is demonstrated that mining has caused or will cause a diminution, contamination, or interruption of an appropriated water right or a material impact either within or outside of the permit area, the permittee will be required by the Division to address means of minimizing the impact and replacing any appropriated water rights. Evaluations of PHCs and the preparation of this CHIA do not indicate that there is any evidence that such impacts will result from the

proposed mining in the East Mountain CIA, and as a consequence, there is no reason to require operators to propose alternatives for disposing of the displaced water or other possible actions as part of the PAP.

Increased rates of dewatering may in the future result in depletion of ground-water storage in some beds above the coal seams. Upon cessation of mining, ventilation losses and mine water discharge, if there has been any, will be discontinued. Ground-water conditions similar to those that existed before mining will probably be established as the mine workings flood.

Drainage from surface disturbance due to coal mining and reclamation operations will be managed through appropriate sediment controls. Waste rock storage areas will be adequately covered with topsoil and all disturbed areas will be stabilized and revegetated to prevent surface water contamination.

VIII. STATEMENT OF FINDINGS

Based on the information presented in this CHIA, the Utah Division of Oil, Gas and Mining finds that the proposed coal mining and reclamation operations in of the Deer Creek Mine, including the Mill Fork Extension, 2013 Mill Fork modification, and Rilda Canyon portal facilities, and the Crandall Canyon Mine, including the South Crandall Lease area, have been designed to prevent material damage to the hydrologic balance outside the permit areas. No evidence of material damage from actual mining operations in the CIA has been found. No probability of material damage from existing and anticipated mining operations in the CIA has been found.

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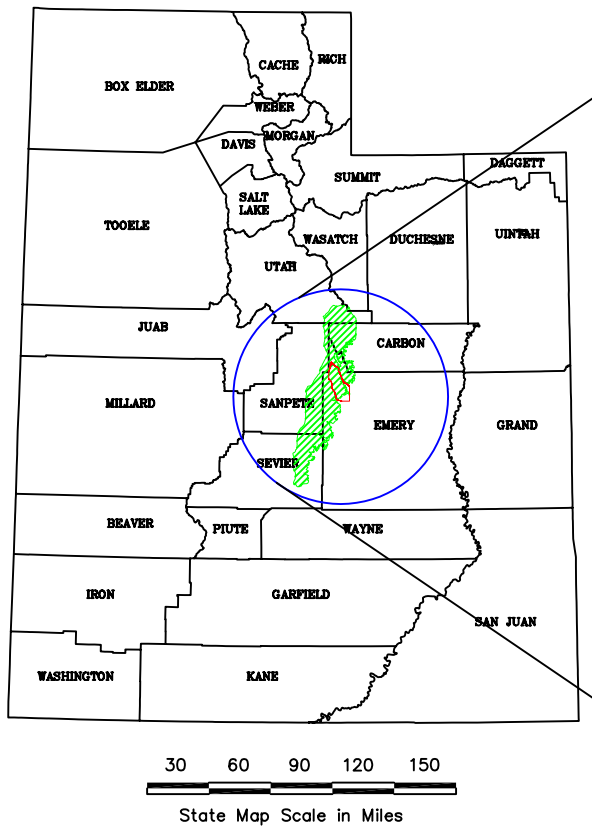
ABREVIATIONS

AML	Abandoned Mine Lands
AVF	Alluvial Valley Floor
BLM	Bureau of Land Management
CIA	Cumulative Impact Area
CHIA	Cumulative Hydrologic Impact Area
CVSSD	Castle Valley Special Service District
DWR	Utah Division of Wildlife Resources
EA	Environmental Assessment
NEWUSSD	North Emery Water Users Special Service District
MRP	Mining and Reclamation Plan
MSHA	Mine Safety and Health Administration
PAP	Permit Application Package
PHC	Probable Hydrologic Consequences
PHDI	Palmer Hydrologic Drought Index
SMCRA	Surface Mining Control and Reclamation Act of 1977
UDOGM	Utah Division of Oil, Gas and Mining
UDWR	Utah Division of Water Resources
UDWQ	Utah Division of Water Quality
UPDES	Utah Pollution Discharge Elimination System
UP&L	Utah Power and Light
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

PLATES

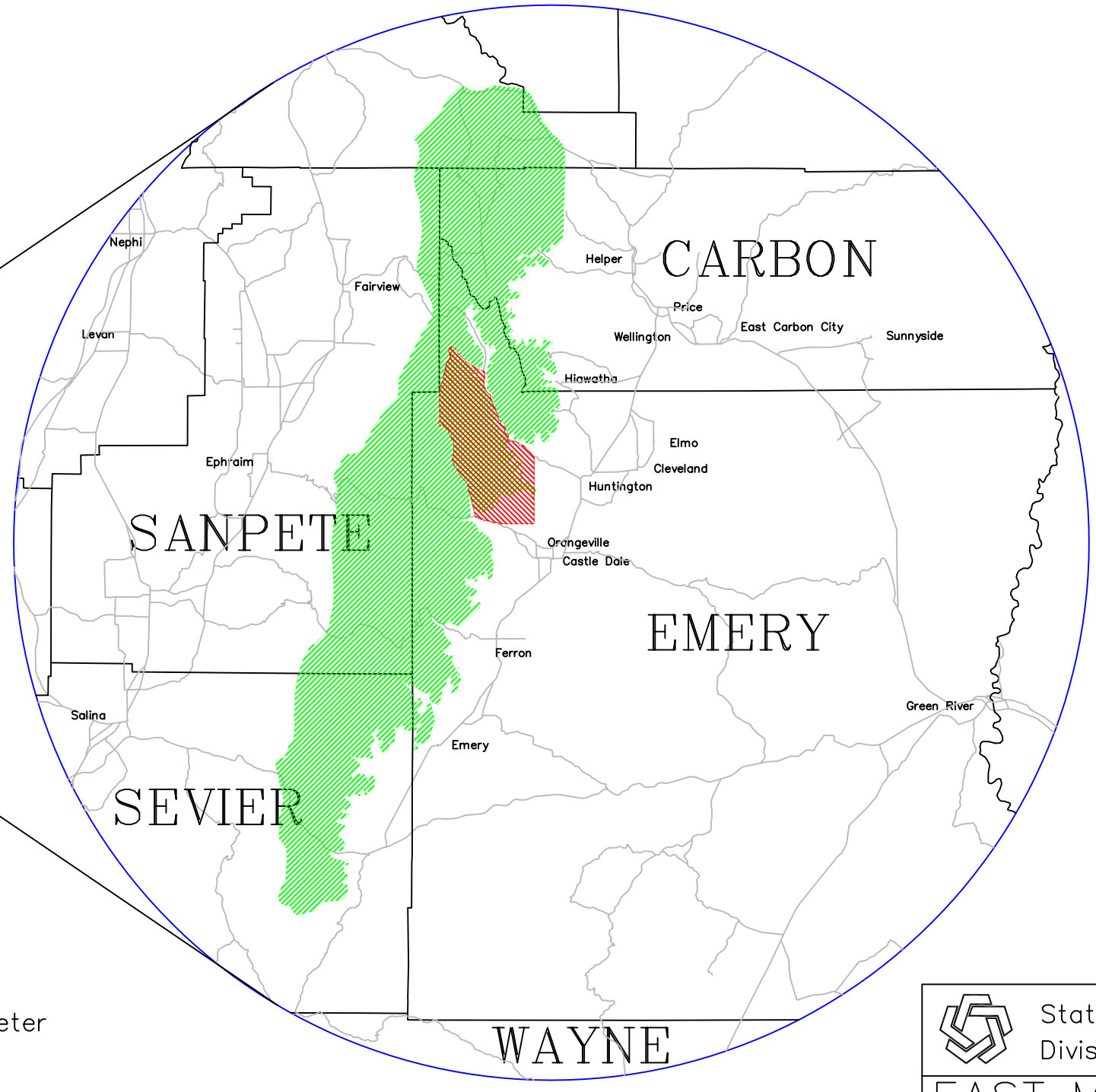
Plate 1 Wasatch Plateau Coal Field
Plate 2 CIA and Mining Map
Plate 3 Major Hydrogeologic Features
Plate 4 Surface Water Drainage Map
Plate 5 Potential Recharge Areas Above the Coal Resources
Plate 6 Water Monitoring Locations

PLATE 1: Wasatch Plateau Coal Field



30 60 90 120 150

State Map Scale in Miles



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6 12 18 24 30

Inset Scale in Miles

LEGEND

- County Boundaries
- East Mountain CHIA Perimeter
- Roads
- Wasatch Plateau Coal Field
- East Mountain CIA

State of Utah
Division of Oil, Gas & Mining

EAST MOUNTAIN CHIA
Wasatch Plateau Coal Field

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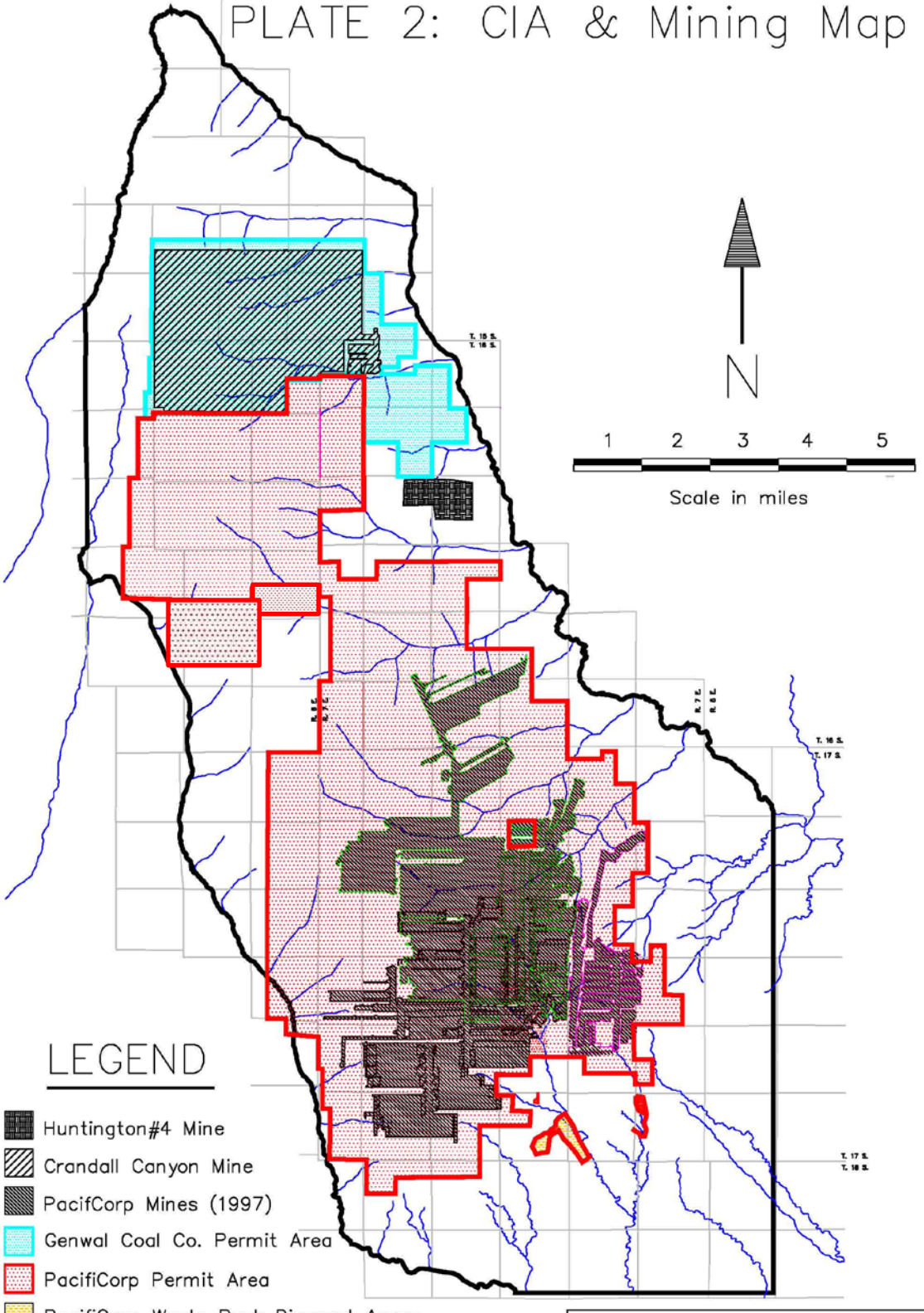
PLATE 2: CIA & Mining Map



LEGEND

- Huntington#4 Mine
- Crandall Canyon Mine
- PacifCorp Mines (1997)
- Genwal Coal Co. Permit Area
- PacifiCorp Permit Area
- PacifiCorp Waste Rock Disposal Areas
- Deer Creek Mine workings
- Des-Bee-Dove Mine workings
- Cottonwood/Wilberg Mine workings
- Streams
- CHIA Boundary

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EAST MOUNTAIN CHIA
CIA and Mining Map

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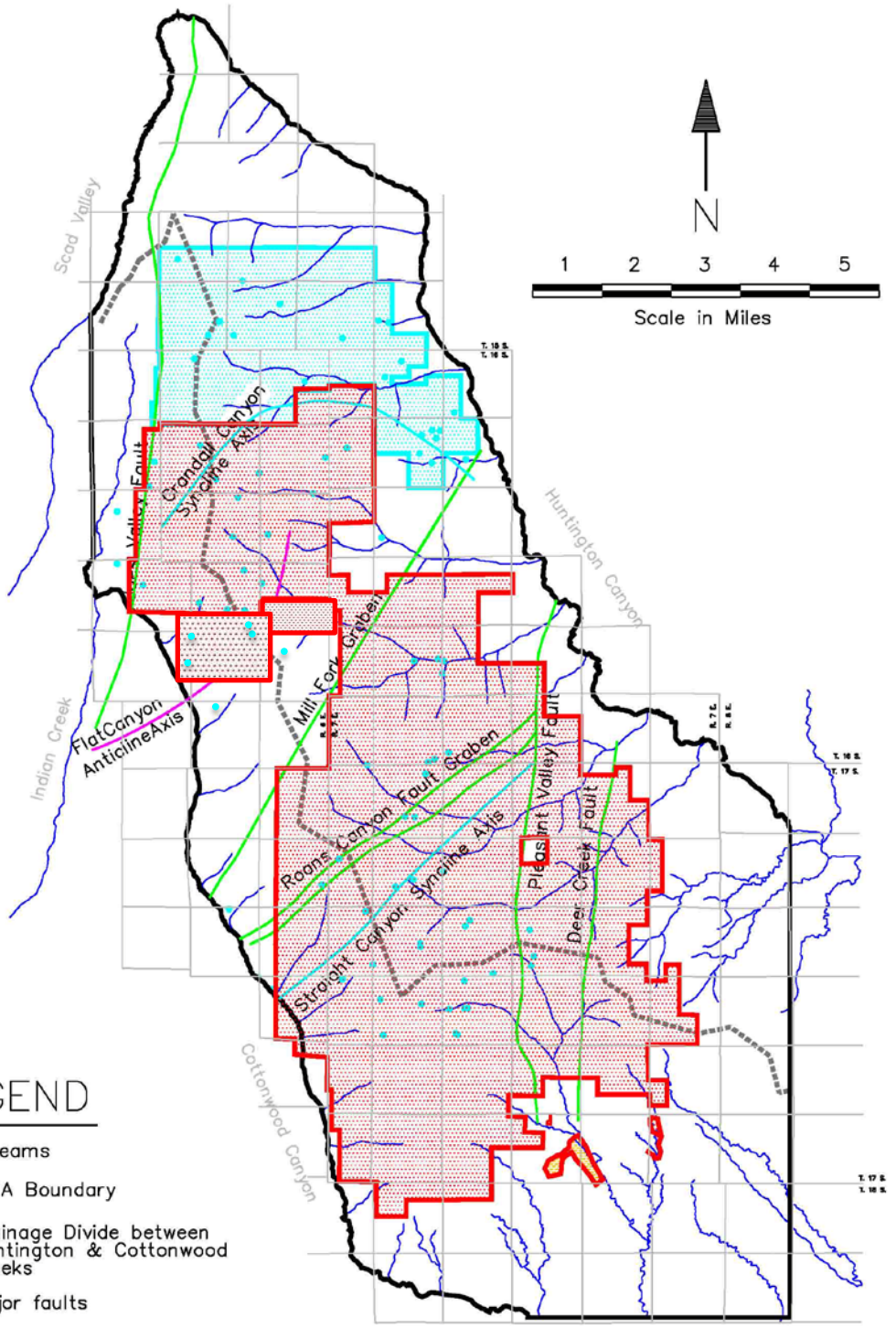
PLATE 3: Major Hydrogeologic Features



LEGEND

- Streams
- CHIA Boundary
- Drainage Divide between Huntington & Cottonwood Creeks
- Major faults
- Syncline Axis
- Anticline Axis
- Monitored Springs
- Genwal Coal Co. Permit Area
- PacifiCorp Permit Area
- PacifiCorp Waste Rock Disposal Areas

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EAST MOUNTAIN CHIA
Major Hydrogeologic Features

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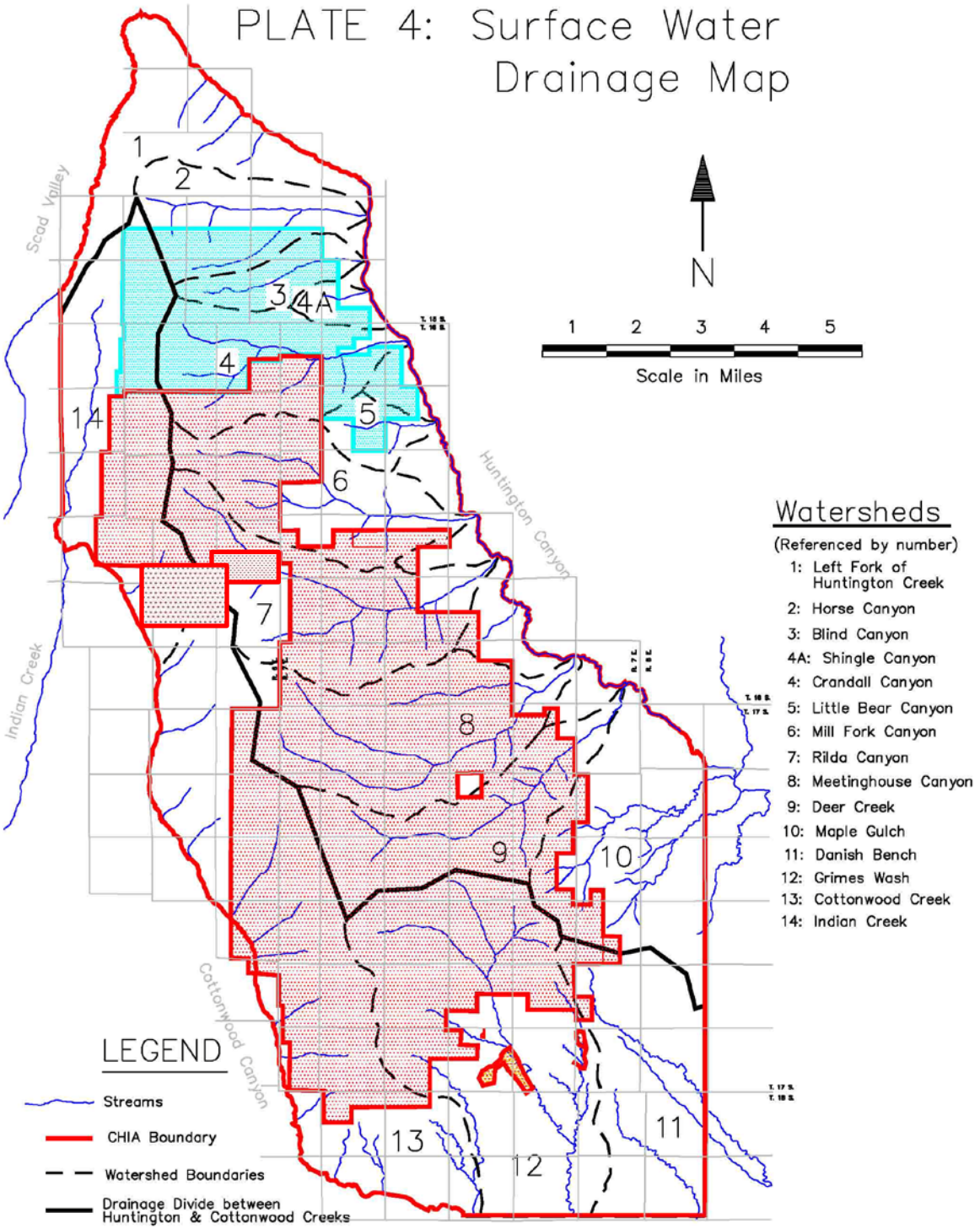
DATE: 10/31/06	UPDATED BY: JDS

PLATE 4: Surface Water Drainage Map



Watersheds

(Referenced by number)

1: Left Fork of Huntington Creek
2: Horse Canyon
3: Blind Canyon
4A: Shingle Canyon
4: Crandall Canyon
5: Little Bear Canyon
6: Mill Fork Canyon
7: Rilda Canyon
8: Meetinghouse Canyon
9: Deer Creek
10: Maple Gulch
11: Danish Bench
12: Grimes Wash
13: Cottonwood Creek
14: Indian Creek

LEGEND

- Streams
- CHIA Boundary
- Watershed Boundaries
- Drainage Divide between Huntington & Cottonwood Creeks
- Genwal Coal Co. Permit Area
- PacifiCorp Permit Area
- PacifiCorp Waste Rock Disposal Areas

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EAST MOUNTAIN CHIA
Major Hydrogeologic Features

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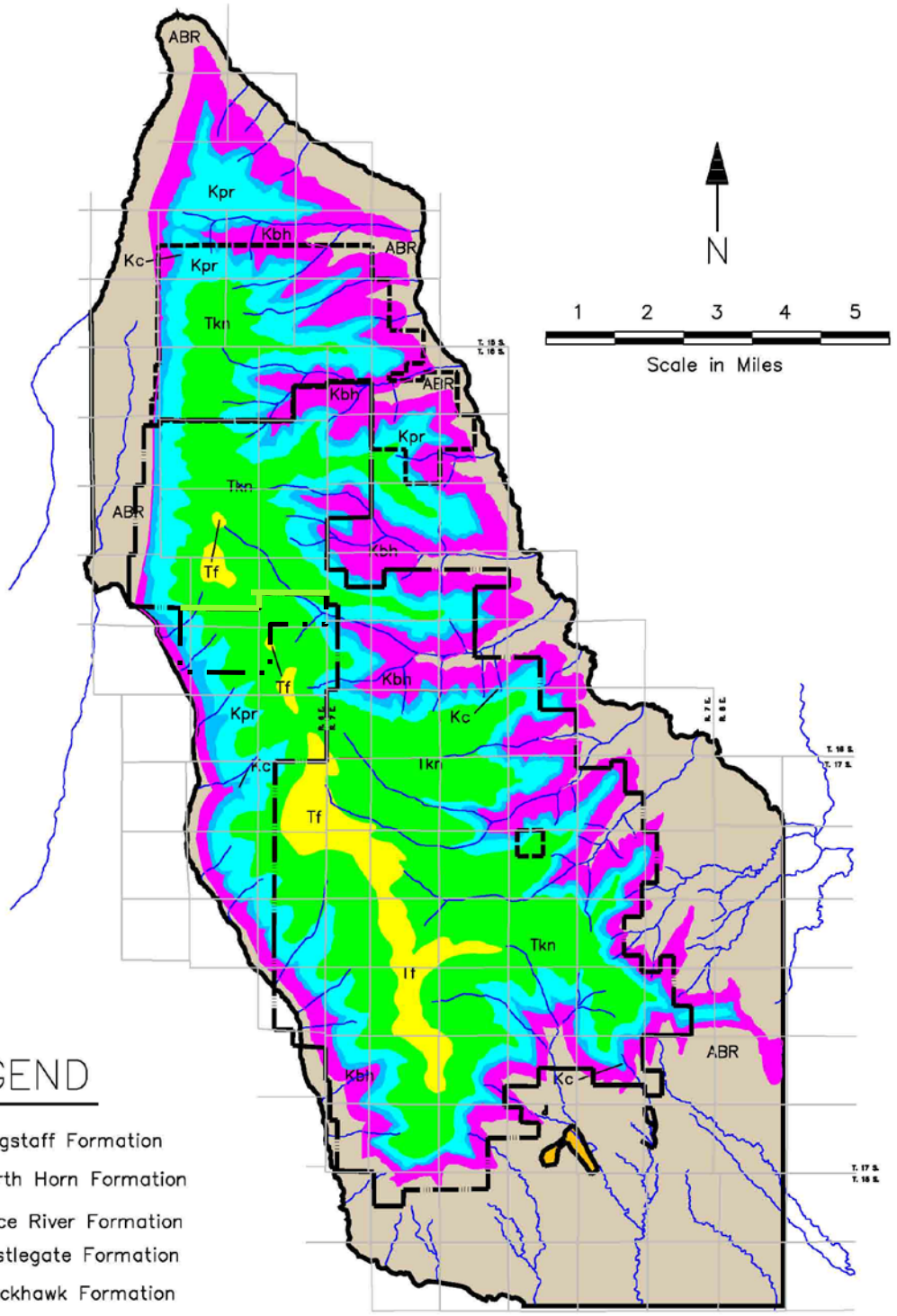
PLATE 5: Potential Recharge Areas Above the Coal Resource



LEGEND

- Flagstaff Formation
- North Horn Formation
- Price River Formation
- Castlegate Formation
- Blackhawk Formation
- Areas below the Coal resource (ABR)
- Genwal Coal Co. Permit Boundary
- PacifiCorp Permit Boundary
- PacifiCorp Waste Rock Disposal Areas

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EAST MOUNTAIN CHIA

Potential Recharge Areas
Above the Coal Resource

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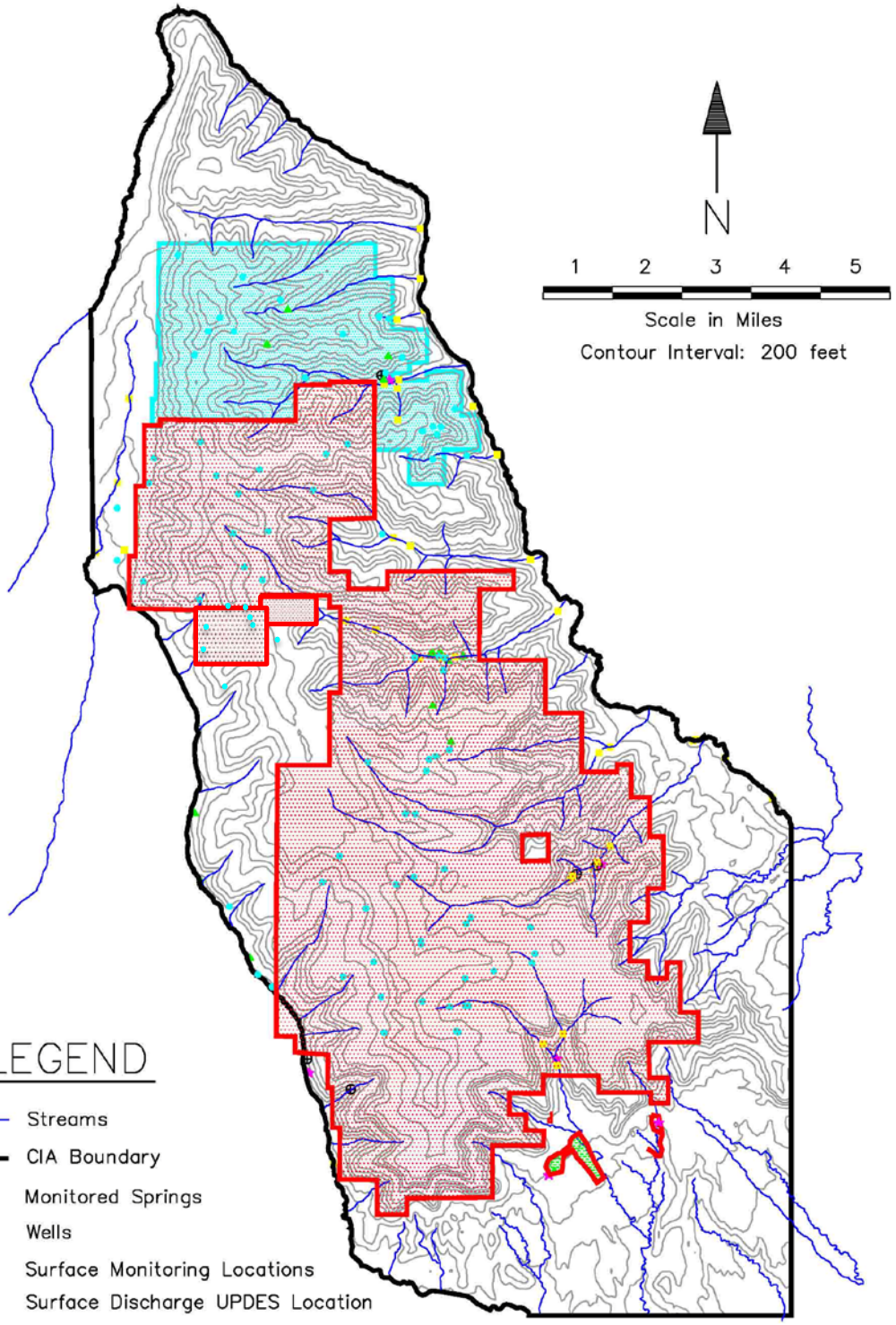
PLATE 6: Water Monitoring Locations



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EAST MOUNTAIN CHIA
Water Monitoring Locations

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DECISION NOTICE

AND

FINDING OF NO SIGNIFICANT IMPACT

DEER CREEK – UPPER COTTONWOOD TWO LEASE MODIFICATIONS TO FEDERAL COAL LEASES UTU-06039 AND UTU-88554

Ferron-Price Ranger District

Manti-La Sal National Forest

Emery County, Utah

I. INTRODUCTION

An Environmental Assessment (EA) has been prepared by the Manti-La Sal National Forest (MLNF), Price Field Office of the Bureau of Land Management (BLM) and Office of Surface Mining, Reclamation and Enforcement (OSM) which analyzes the impacts of modifying Federal Coal Leases UTU-06039 and UTU-88554 in response to an application received by the BLM Utah State Office. PacifiCorp c/o Interwest Mining Company applied to modify two existing federal coal leases by adding 320 acres to lease UTU-06039 and 860 acres lease UTU-88554. Coal in the existing leases is mined by PacifiCorp from their Deer Creek Mine in Salina, Utah. The application was made under 43 CFR 3432 to prevent the potential bypass of federal coal reserves which contain bituminous coal resources that are compliant with the Clean Air Act.

The two lease modification areas are located in Sections 22, 23, 24, 25, 26, and 27 of Township 16 South, Range 6 East Salt Lake Base and Meridian. The modification area includes National Forest System (NFS) surface lands managed by the MLNF. The coal estate is administered by the BLM. Maps designating the lease modification areas are available in the EA and Project Record.

The BLM is required, by law, to consider leasing Federally-owned minerals for economic recovery. With respect to lands managed by the Forest Service (FS), the agency considers consenting to the BLM leasing coal reserves underlying lands under its jurisdiction and prescribes stipulations for the protection of non-mineral resources.

This leasing action itself does not authorize actual mining; however, the EA does evaluate the possible effects of modifying the leases and possible subsequent mining. At the leasing stage, federal agencies evaluate the effects of subsidence (i.e. the land surface lowered as a result of mining) on surface resources, and identify where surface resources may require specific protection from subsidence or foreseeable surface uses. Under the practical mining plan scenario, coal within the lease modification areas would be accessed and recovered by underground longwall mining methods from the existing Deer Creek Mine. The coal would be transported using existing roads. Surface use on these modifications is not anticipated.

Approximately 10 acres of the East Mountain Inventoried Roadless Area overlap the north east corner of the proposed modification to UTU-88554. The entire 320 acres of the proposed modification to UTU-06039 lies within the East Mountain IRA. This leasing action itself does not authorize surface disturbing activities; however, the EA associated with it does evaluate the need for stipulations for subsequent use of the land surface. In this case, stipulations required can be seen in Appendix A of the EA. Included is the requirement to comply with the rules and regulations of the Secretary of Agriculture.

II. SCOPE OF DECISION AND AUTHORITY

Scope of Decision

With respect to modifying federal coal leases, the MLNF, as the surface managing agency, is responsible for deciding whether or not to consent to the BLM modifying existing Federal Coal Lease by adding 320 acres to lease UTU-06039 and 860 acres to lease UTU-88554 according to the Federal Coal Leasing Amendments Act of 1976; and if so, prescribing stipulations needed for the protection of non-mineral resources.

Authorities

The primary authorities for issuing coal lease modifications are found in the EA, Section 1.5 and as restated below.

Mining and Minerals Policy Act of 1970 and Mineral Leasing Act of 1920, as amended

The Forest Service and BLM manage their minerals programs under guidance given in the Mining and Minerals Policy Act of 1970 which states in part that it is the "continuing policy of the federal government in the national interest to foster and encourage private enterprise in... (the) development of economically sound and stable domestic mining minerals and mineral reclamation industries... (and) the orderly and economic development of domestic mineral resources...." Further, federal mineral leasing follows the Mineral Leasing Act of 1920 as amended by the Federal Coal Leasing Amendments Act of 1976 (MLA), and specific procedures set forth in 43 CFR 3400.

Federal coal leasing follows the Mineral Leasing Act of 1920 (MLA) as amended by the Federal Coal Leasing Amendments Act of 1976 and specific procedures set forth in 43 CFR 3400.

These lease modification applications are being processed according to procedures set forth in 43 CFR 3432. Lease modifications can be non-competitive leasing actions. In this case, PacifiCorp applied for the modifications to add acreage to existing leases and no other coal company could obtain the rights to the coal if it is approved; therefore, this is a non-competitive leasing action.

Subsequent permitting actions to allow mining and changing of the approved mine permit boundary to include the modification area would be evaluated by the Utah Division of Oil, Gas, and Mining (UDOGM) under procedures set forth in 30 CFR PART 906.30 Appendix B. Adding this modification to the mine permit may also require approval from the USDI through the Office of Surface Mining, Reclamation and Enforcement (OSM).

Energy Policy Act of 2005

The purpose of the Energy Policy Act of 2005 was to ensure jobs for the future with secure, affordable, and reliable energy.

This Act Amends 30 U.S.C. 203(c)(4)(A) to ``secure modifications of the original coal lease by including additional coal lands or coal deposits contiguous or cornering to those embraced in the lease...(3) In no case shall the total area added by modifications to an existing coal lease under paragraph (1)--(A) exceed 960 acres; or (B) add acreage larger than that in the original lease."

III. DECISION

I have decided to select the Proposed Action Alternative as described in the EA (EA, Section 2.2) and summarized in Section V of this document. Selection of this alternative provides the BLM-Utah State Office my consent to lease NFS lands by including them in Federal Coal Leases, 320 acres to lease UTU-06039 and 860 acres lease UTU-88554, as described in the EA and as shown in Figure 1.2. My consent decision includes the application of terms and conditions, identified as stipulations, to protect surface resources on NFS lands (Appendices A of the EA).

This decision will be implemented through my issuance of a letter to the BLM State Office consenting to the lease modifications. This will be followed by BLM's action of

making a subsequent and independent decision on whether to modify the original leases by including all or part of the lands applied for if it is determined that 1) the modifications serve the interest of the United States, 2) there is no competitive interest in the lands, and 3) the additional lands cannot be leased as part of another potential or existing independent operation. The lessee would then be responsible to secure any Local, State or Federal permits and approvals, as applicable, and required by law for future operations or development on the lease modifications.

In the event of any contradiction or conflict between descriptions or depictions of authorized actions, my decision is to be taken from the project documents in the following order of precedence: first the description in this DN, second the representations in Figure 1.2 and Stipulations in Appendices A, and finally descriptions in the EA.

IV. REASONS FOR THE DECISION

Applicable Laws, Regulations, and Policy

This decision is consistent with applicable laws, regulations, and policies (refer to Section VIII of this document and EA Section 1.6) and are consistent with Forest Land and Resource Management Plan (LRMP) direction (EA, Section 1.7).

How Issues Were Considered

Issues were identified by the interdisciplinary team (IDT) and through public involvement. Significant issues were identified in EA (Section 1.8) and carried forward for analysis in EA in both the development of the Proposed Action (Section 2.2) and in the individual resource sections (Chapter 3). Other resources/concerns brought forward were reviewed and addressed (EA, Section 1.7) and in Alternatives Considered but Eliminated from Detailed Study (EA, Section 2.4).

I have reviewed the comments submitted by the public and response to those comments. I have determined that they have been addressed in the analysis.

Cumulative Effects

Consenting to lease does not result in any direct effects on the ground; however, potential future development of the leases may result in indirect and cumulative effects. Indirect and cumulative effects (EA, Chapter 4) were addressed based on a practical mine plan scenario (EA Section 2.2.1) for each resource area based on PacifiCorp's currently permitted activities on the parent leases, coal reserve available in the modification areas, anticipated mining sequence, and subsidence potential. Lease stipulations (EA Appendix A) are being prescribed for conformance with all laws, rules and regulations, cultural and paleontological resources; endangered or threatened species; water depletions, geologic hazards, baseline studies, monitoring requirements, riparian, wetland or floodplain, subsidence, roadless, and visuals, wildlife, surface resources, and dust control.

Mitigation Measures

The lease stipulations which have been *adopted* (CEQ terminology) are the mitigation measures identified to protect non-mineral, surface resources. The analysis presented in the EA considers the lease stipulations as part of the Proposed Action; therefore, they are analyzed in detail (under the CEQ described as having been "explained and committed").

Air Quality & Greenhouse Gas Emissions

Review of the effects of this project on air quality and greenhouse gas emissions can be seen in Table 1.3 of the EA.

Hydrology

Projected impacts of the project on hydrological resources including groundwater quality and quantity and surface springs and seeps were evaluated.

It was identified that groundwater resources would be intercepted during mining operations; however, dewatering of this inactive-zone perched groundwater should not result in decreases to water quality and quantity in overlying active zone groundwater systems. Intercepted groundwater would be discharged from the Deer Creek Mine through approved Utah Pollution Discharge Elimination System (UPDES) discharge points into Deer Creek. This discharged water would be similar in quality to that currently being discharging from the mine. In the event that the quality of the discharged mine water exceeds standards set by the State of Utah the mine owner would be required to treat the water before it is released. Because the anticipated mining rate would not change and geologic conditions are believed to be similar to those in the parent lease areas, the discharge rate would likely remain unchanged.

It was also determined that negligible to no impacts to spring and seep discharge rates in the lease modification areas would result from shallow subsidence cracking anticipated. However, it is possible that spring discharge locations could move short distances if shallow subsidence cracks intersected the spring discharge locations.

After reviewing the predicted effects of the proposal on hydrological resources presented in the EA and summarized above and considering the required stipulations for the protection of hydrological resources (Stipulation 4, 8, 10, 18 and 19); consenting to the proposal will have negligible to no effect on surface and groundwater of the area.

Roadless

The entire 320 acres that would be added to UTU-06039 and approximately 10 acres of the northeast corner that would be added to UTU-88554 are located within the East Mountain Inventoried Roadless Area (IRA). These 330 acres would be subject to restrictions on road construction and timber harvest pursuant to rules and regulations of the Secretary of Agriculture pertaining to IRA management. This project is consistent with current direction.

The East Mountain IRA was inventoried in 1979 as part of Roadless Area Review and Evaluation (RARE II), but not carried forward for wilderness designation.

The decision to consent to the coal lease modifications with the potential for associated coal mining will not affect roadless status as subsidence does not create roads or remove timber. In addition, no post-leasing surface facilities are expected within the lease modification areas. In any event, the lease modifications are restricted by whatever roadless area management direction is in place and will be compliant with Forest Plan direction.

Factors Other Than Environmental Effects Considered In Making the Decision

The BLM and FS have identified a need to respond to applications made to modify existing federal coal leases that would prevent bypass of federal coal resources. The BLM administers the minerals on federal lands and is required, by law, to consider leasing federally-owned minerals when requested. BLM directives indicate the need to offer federal coal in quantities responsive to public market conditions and assure maximum economic recovery (MER) of mineable federal coal reserves. The FS, as the surface management agency, has legal and regulatory responsibility to consider consenting to BLM's leasing of coal reserves underlying lands within its jurisdiction and recommend appropriate stipulations for the protection of non-mineral resources.

The Proposed Action is consistent with the overall direction of the MLNF Land and Resource Management Plan (Forest Plan) which is to: provide appropriate opportunities for and manage activities related to locating, leasing, exploration, development, and production of mineral and energy resources. Section 1.6 of the EA provides a review of Forest Plan direction related to leasable minerals management. The Proposed Action also responds to direction in the Price BLM Resource Management Plan goal for Mineral and Energy Resources to provide opportunities for mineral development under the mining and mineral leasing laws.

The purpose of the federal agencies' actions is to facilitate recovery of federal coal resources in an environmentally sound manner. Further, the purpose includes ensuring that compliant and super-compliant coal reserves are recovered and not bypassed. The Proposed Action responds to the federal government's overall policy to foster and encourage private enterprise in the development of economically sound and stable industries, to help assure satisfaction of industrial, security and environmental needs (Mining and Minerals Policy Act of 1970).

The OSM has and will continue to participate as a cooperating agency during the review of mining plans and oversight of the subsequent permitting process.

My decision fulfills the Federal Government's policy to foster and encourage mineral development (Mining and Mineral Policy Act of 1970), the Federal Land Policy and Management Act (FLPMA), and complies with MLNF Forest Plan direction.

I considered the FS Strategic Plan which calls for the Forest to "help meet energy resource needs," the Forest Service Implementation of the National Energy Plan (2001) generally directing the agency to expedite federal actions necessary for energy- related project approvals including those related to geothermal energy, and Executive Order 13212 directing federal agencies to take steps to increase the energy supply to our nation.

Identification of the Environmental Documents Considered in Making the Decision

This decision was made after carefully considering the contents of the EA, public comments, agency response to comments, and the supporting documents including the

Tract Delineation Reports for modification of Federal Coal Leases UTU-06039 and UTU-88554. The MLNF Forest Plan was reviewed and this decision was determined to be consistent with it.

How Considerations Were Weighed and Balanced In Arriving At the Decision

The resource effects analyses presented in the EA (Table 2.1 and Chapter 4) describes potential impacts to surface resources from leasing as minor. Stipulations were identified and will be required for the protection of non-mineral resources including cultural and paleontological resources, threatened or endangered species, wildlife and its habitat, water resources, geologic hazards, and roadless areas. Because of the surface protections in place, and the potential effects from subsidence is minimal, I chose to consent to lease modifications as applied for by PacifiCorp to BLM.

My decision to consent to the lease modifications included evaluating the role and responsibility of the FS in meeting overall energy needs for the nation. This consideration, along with our legal responsibilities led me to the consent to the decision.

Relationship to Public Involvement

Public and agency comments were sought during preparation of the EA (refer to Section VI of this document and Section 1.7 and Chapter 5 of the EA). Using the comments from the public, environmental groups, other agencies, and those developed internally, the interdisciplinary team developed a list of issues to address (EA, Section 1.8).

The Forest Service addressed comments received during scoping on the project which are included in the EA in Sections 1.7 and 2.4. The manner in which I have considered specific public comments in my decision is described in this section and Section VI.

V. SUMMARY OF ALTERNATIVES CONSIDERED

Two alternatives were considered and carried forward for detailed analysis in the EA (Sections 2.2 and 2.3). The selected action is the Proposed Action conditioned with stipulations. A summary of the Alternatives Considered in Detail in the EA follows:

No Action Alternative

Under this alternative, the FS would not consent to BLM issuing the modifications, and BLM would not modify the leases. Other resource management activities would continue. Selection of the No Action Alternative would not preclude the lands being considered for coal leasing in the future.

Proposed Action Alternative

Under the Proposed Action Alternative, the FS would consent to the BLM modifying two federal coal leases by adding 860 acres to UTU-88554 and 320 acres to UTU-06039 with stipulations (refer to Appendix A of the EA) for the protection of non-mineral resources. Based on FS consent, the BLM would modify the existing leases

The Proposed Action assumes a practical and economical mine plan scenario. The plan would allow for the logical progression of mining and planned sequenced main entry and gate road development for mining additional longwall panels within both proposed lease areas. As proposed, coal would be mined from two coal seams, the Blind Canyon and Hiawatha coal seams. The Blind Canyon coal seam would be the target coal seam for

development and longwall mining within UTU-88554. Existing main entries would be extended with the use of continuous miners southward into UTU-06039 Lease Modification area. Rock slopes would be driven through the interburden from the Hiawatha seam to access the Blind Canyon seam. No surface facilities or additional roads are anticipated on the lease modification areas. Longwall panels would be positioned so as not to impact the electrical power transmission line support towers.
Mining activities would be subject to established federal lease terms, conditions, and stipulations.

Stipulations for Action Alternative

As part of the Proposed Action alternative the MLNF Forest Supervisor must decide if the existing stipulations on the existing parent leases are sufficient for the protection of non-mineral (i.e. surface) resources. If not, additional stipulations that will provide for the protection of non-mineral resources must be prescribed. Appendix A of the EA shows the stipulations that were identified and will be required for these lease modifications.

In accordance with Forest Service Manual (FSM) 2820, the Standard Notice for Lands under the jurisdiction of the Dept. of Agriculture would apply to the lease modification. This Standard Notice includes requirements for Cultural and Paleontological Resources, and Threatened and Endangered Species as noted in Appendix A of the EA. Further, the Standard Notice contains the following language: "The permittee/lessee must comply with all the rules and regulations of the Secretary of Agriculture set forth at Title 36, Chapter II, of the Code of Federal Regulations governing the use and management of the National Forest System (NFS) when not inconsistent with the rights granted by the Secretary of Interior in the permit. The Secretary of Agriculture's rules and regulations must be complied with for (1) all use and occupancy of the NFS prior to approval of an exploration plan by the Secretary of the Interior, (2) uses of all existing improvements, such as forest development roads, within and outside the area permitted by the Secretary of the Interior, and (3) use and occupancy of the NFS not authorized by the permit/operation approved by the Secretary of the Interior."

VI. PUBLIC INVOLVEMENT

The Legal Notice of Proposed Action was published in *the Sun Advocate* (newspaper of record) and the *Emery County Progress* on 2/7/2012. At that time letters notifying the public were also sent to 49 individuals or groups who have requested information on planned projects on the MLNF. Information on the project was also included in the Manti/La Sal's Schedule of Proposed Action and the BLM's Electronic Notification Bulletin Board. These efforts initiated public scoping by asking for comments on the proposed lease modifications. Two comment letters were received in response to scoping. A summary of those comments and the agency's response to them are located in Section 1.7 of the EA.

Advertisements of "Requests for Comments" on the proposed project were also published in the *Emery County Progress* on 11/13/2012 and the *Sun Advocate* on 11/15/2012. One comment was received. No "appeal standing" was established.

Using the comments from the public, environmental groups, other agencies, and those developed internally, the interdisciplinary team developed a list of issues to address (EA, Section 1.8).

VII. FINDING OF NO SIGNIFICANT IMPACT

Based on my review of the EA, public comments on the EA, the agency responses to comments, resource analysis (EA, Sections 1.8, 2.5 and Chapters 3 and 4, and project file), the supporting project record, and upon my analysis immediately below, I find that actions resulting from my decision do not constitute major Federal actions significantly affecting the quality of the human environment, as defined in the Code of Federal Regulations Title 40 Part 1508, Section 27 (40 CFR 1508.27) in terms of either context or intensity; and therefore, an environmental impact statement need not be prepared.

Context

Locality

This decision would commit approximately 1180 acres of NFS lands on the Ferron/Price Ranger District to mineral leasing. However, under the practical mine plan scenario analyzed (EA, Section 2.2.1) no surface development incidental to underground mining will be required.

Lands in the coal lease modifications areas are managed for multiple uses. Lands adjacent to the lease modifications have had underground coal mining for many decades. Given the extent of other activities occurring in the vicinity of the coal lease modifications, leasing and potential subsequent disturbance (minor subsidence) would not appreciably add to existing surface uses. Post-leasing surface activity would be identical to existing activities and it would continue to be managed through lease stipulations to reduce overall effects. Therefore, the effects on public land and users over both the short-term and long-term would remain consistent with that which is presently occurring. No short- or long-term significant impacts are expected as a result of this decision in the local context (EA, Chapter 4).

Affected Interests and Affected Region

Affected interests for this project are ranchers with grazing permits in the project area; people using the area for dispersed recreation, wildlife watching and hunting; public and Forest road users; residents in local counties; and adjacent private landowners. Concerns raised focus mainly on local issues in the immediate vicinity of the lease modifications. The decision to consent to leasing allows continued use by current permit holders and recreational users of the area. Monitoring and mitigation measures in the form of lease stipulations have been identified and prescribed to protect and preserve other forest uses in the immediate area. Other required permits would specify terms of use to further reduce effects on other forest uses. Emery County will receive economic benefit (royalties, jobs, local expenditures, etc.) from the lease modifications consistent with existing conditions. No short- or long-term significant impacts on affected interests are expected as a result of this decision in the regional context (EA, Chapter 4).

Society as a Whole

This decision provides the opportunity for federal coal resources to be made available for commercial production that, in turn, would be used to meet U.S. demand for compliant and super-compliant coal to aid in meeting air quality standards in electrical generation and further maintaining affordable energy supplies. While this decision could result in disturbance of the land surface from minor subsidence, requirements for careful project design, lease stipulations, and ultimate reclamation would keep these effects to negligible to low levels. Therefore, no negative impacts to society as a whole are

expected. Some positive socio-economic benefits will be derived from the development of these coal sources. Positive air quality benefits will also come from development of these complaint and super-compliant quality coal resources compared to development of a lower quality coal. (EA, Chapter 4).

Intensity

Consideration of Beneficial and Adverse Impacts

Beneficial and adverse impacts were described in the EA (Chapter 4) and considered in Section IV and VII of this Decision Notice. A benefit of this decision will be the continued employment of a high percentage of the local communities and the resultant wide- spread economic factors that extend throughout parts of Utah. Although both beneficial and adverse effects are disclosed, they are of small scale and focused geographically and in duration. None are severe enough to be considered significant (EA, Table 2.1). None of the expected beneficial or adverse impacts have a significant amount of intensity that would require documentation in an EIS.

Consideration of Public Health and Safety

I considered public health and safety issues (EA, Table 1.3) in this decision. Leasing in and of itself does not impart any risk to public health and safety. Potential post-leasing operations would have to comply with lease terms, UDOGM permit, and Mine Health and Safety Administration requirements. Due to the very limited access into this area, public hazards would be consistent with other areas of the forest.

Consideration of Unique Characteristics such as Proximity to Historic or Cultural Resources, Park Lands, Prime Farmlands, Wetlands, Wild and Scenic Rivers, or Ecologically Critical Areas

Historic and cultural resources are addressed in the subsequent paragraphs. There are no prime farmlands, rangeland, or forest land as defined in the Secretary of Agriculture's Memorandum Number 1827, Supplement 1, identified on the MLNF. There are no identified wetlands, parklands or Wild and Scenic rivers in proximity to the project. The area of my decision has not been identified by any source as an ecologically critical area. For further information, refer to the EA.

Consideration of the Degree to Which the Effects on the Quality of the Human Environment Are Likely to be Highly Controversial

This decision and its effects are not unique. Mineral-related (oil/gas and coal) leasing decisions have been made on the MLNF for the past 30 years. The quality and use of the human environment in the project area is understood (EA, Chapter 3 & 4), has been analyzed, and is not highly controversial from a scientific standpoint. Although the FS is consenting to lease, subsequent actions must be taken by BLM to issue the leases, and subsequent post-lease operations brought forward in a mine plan must be approved by the State and/or OSM in order for any effects to be realized. This sequence and future surface disturbance related to subsidence are projected to occur at a low to very low level, would pose a minimal risk of effects spreading to local communities. Information or data demonstrating that the effects described in the EA are highly controversial have not been brought forward. Given the small scale, localized impacts associated with this project, the intensity of this factor does not require documentation in an EIS.

Consideration of the Degree to Which the Possible Effects on the Human Environment is Highly Uncertain or Involve Unique or Unknown Risks

This decision is not unique for the MLNF from the standpoint of understanding potential effects. The MLNF has decades of experience analyzing and managing similar projects that involve mineral leasing and subsequent post-lease activity. The MLNF has experience implementing and monitoring similar projects, the effects of which have been found to be reasonably predictable. Based on review of this analysis and compared to our local conditions, the risks associated with leasing and post-lease activities and associated operations are understood, and can be evaluated and reasonably predicted. No effects from this decision would be classified as highly uncertain or involving unique or unknown risks. The intensity of this factor does not require documentation in an EIS.

Consideration of the Degree to Which the Action May Establish a Precedent for Future Actions with Significant Effects or Represents a Decision in Principle about a Future Consideration

Consenting to leasing the modification area will not create a precedent for future similar leasing actions. The MLNF Forest Plan acknowledges and allows for coal leasing and resource development in areas where such activities would be consistent with the Plan. Further, my decision follows the legal direction for coal resource management (EA, Section 1.5 & 1.6). Because mineral leasing is a discretionary decision on the part of the surface managing agency, any future lease proposals would have to be evaluated on their own merits based on the issues and effects related to the location, timing and intensity of each action. My decision does not set a precedent or represent a decision in principle about a future consideration; therefore, documentation in an EIS is not required.

Consideration of the Action in Relation to Other Actions with Individually Insignificant but Cumulatively Significant Impacts

The lands in proximity to the coal lease modifications are managed for multiple uses or are developed for public access and private use. Since leasing itself does not impart specific direct or indirect effects and post-lease activities are projected to be of limited scale, minimal individual effects and minimal cumulative effects are expected when added to the existing situation and other potential activities (EA, Chapter 4). The proposed action will not result in significant effects.

Consideration of the Degree to Which the Action May Adversely Affect Areas or Objects Listed in or Eligible for Listing in the National Register Of Historic Places or May Cause Loss or Destruction of Significant Scientific, Cultural, or Historical Resources.

The project record and literature reviews support that heritage or cultural resources will not be affected by the proposed action as underground mining will cause little to no ground disturbance nor would it lead to direct or indirect impacts to sites, if any actually exist, in the lease modifications (EA, Table 1.3 and project file). SHPO consultation was not necessary based on negative findings (EA, Table 1.3).

Consideration of the Degree to Which the Action May Adversely Affect an Endangered or Threatened Species or Its Habitat Has Been Determined Not to be Critical Under The Endangered Species Act.

A Biological Assessment (BA) was prepared for this decision (EA, Sections 3.4 and 3.5, 4.4 and 4.5, and Project File). All known endangered or threatened species in the area were considered. The BA found that, since there is no surface activity proposed for this project, possible subsidence effects are insignificant and discountable and there are no water depletions or diversions associated with this project, there would be no impact to

surface wildlife, fish, or rare plant species and consultation with US Fish and Wildlife Service was not required under Section 7 of the Endangered Species Act at this time.

If additional findings regarding threatened or endangered, proposed or sensitive species are discovered in the lease modification areas, a new biological assessment or evaluation will be written, and formal consultation initiated, if required.

Consideration of Whether the Action Threatens a Violation of Law or Requirement Imposed for the Protection of the Environment

To the best of my knowledge, this decision does not threaten violation of any Federal, State or local laws and regulations imposed for the protection of the environment (see Section VIII).

VIII. FINDINGS REQUIRED BY OTHER LAWS AND REGULATIONS

To the best of my knowledge, this decision complies with all applicable laws and regulations. In the following, I have summarized the association of my decision to some pertinent legal requirements.

Executive Order 13212 of May 18, 2001

This Order called the federal agencies to expedite their review of permits for energy-related projects while maintaining safety, public health, and environmental protections. My decision is consistent with this Order.

Federal Land Policy and Management Act of 1976

The Federal Land Policy and Management Act of 1976 states that public lands are to be managed in a manner that recognizes the need for the domestic sources of minerals, including renewable and non-renewable resources. My decision is consistent with this Act.

National Forest Management Act of 1976

The Forest Plan was approved in 1986 as required by this Act. This long-range land and resource management plan provides guidance for all resource management activities in the Forest. The National Forest Management Act requires all projects and activities to be consistent with the Forest Plan. The Forest Plan has been reviewed in consideration of this project (EA, Section 1.6). My decision is consistent with the Forest Plan.

Mining and Minerals Policy Act of 1970

This Act declared it would be the continuing policy of the Federal government and in the Nation's interest to foster and encourage private enterprise in the development of economically sound and stable domestic mining industries, and the orderly and economic development of domestic mineral resources. My decision is consistent with this Act.

Mineral Leasing Act of 1920, as amended

Federal coal leasing follows the Mineral Leasing Act of 1920 (MLA), as amended and specific procedures set forth in 43 CFR 3400. These lease modification applications are being processed according to procedures set forth in 43 CFR 3432. Therefore, my decision is consistent with this Act.

Surface Mining Control and Reclamation Act of 1977

The Surface Mining Control and Reclamation Act of 1977, as amended, (SMCRA) gives OSMRE primary responsibility to administer programs that regulate surface coal mining operations and the surface effects of underground coal mining operations in the United States. Pursuant to Section 503 of SMCRA, UDOGM developed, and the Secretary of the Interior approved, Utah's permanent regulatory program authorizing UDOGM to regulate surface coal mining operations and the surface effects of underground coal mining on private and State lands within the State of Utah. Under Section 523(c) of SMCRA, UDOGM entered into a cooperative agreement with the Secretary of the Interior authorizing UDOGM to regulate surface coal mining operations and the surface effects of underground coal mining on Federal lands within the State. My decision is consistent with this act and cooperative agreements.

Energy Policy Act of 2005

The purpose of the Energy Policy Act of 2005 was to ensure jobs for the future with secure, affordable, and reliable energy.

This Act Amends 30 U.S.C. 203(c)(4)(A) to ``secure modifications of the original coal lease by including additional coal lands or coal deposits contiguous or cornering to those embraced in the lease...(3) In no case shall the total area added by modifications to an existing coal lease under paragraph (1)--(A) exceed 960 acres; or (B) add acreage larger than that in the original lease." My decision is consistent with this Act.

Clean Air Act of 1955, as amended 1977

This Clean Air Act (CAA) required States to develop plans to implement, maintain, and enforce primary and secondary ambient air quality standards for any criteria air pollutants, and called federal agencies to prevent deterioration of air quality. Effects on air quality as a result of this project were analyzed and showed that this project will have negligible effects on air quality. Further, PacifiCorp is required to hold and maintain state air quality permits for their activities under the CAA. This decision is consistent with this Act.

Clean Water Amendments of 1972 (Clean Water Act)

This Act requires State and Federal agencies to control and abate water pollution. This project was designed to comply with this Act (EA, Sections 2.5, 3.3, and 4.3) through the inclusion of stipulations for surface water, water depletions, baseline data and monitoring and further compliance with all state and local laws. This decision is consistent with this Act.

Executive Order 11990 and 11988

The management of wetlands and floodplains are subject to Executive Orders 11990 and 11988, respectively. The purpose of the EOs are to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and floodplains and to avoid direct or indirect support of new construction in wetlands wherever there is a practical alternative. This order requires the Forest Service to take action to minimize destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. In compliance with this order, Forest Service direction requires that an analysis be completed to determine whether adverse impacts would result (EA, Chapter 4). The project was designed to avoid impacts to wetlands and floodplains through the addition of lease stipulations. My decision is consistent with these orders.

National Historic Preservation Act

Cultural resource inventories have occurred within the project area and no heritage resources were located. Therefore the lease modifications are found to have no potential to affect cultural resources, as defined in regulations 36 CFR 800. The addition of the standard lease clause will protect currently undiscovered sites (EA, Table 1.3 and Project File). Therefore, no further inventory will be carried out and no consultation with the State Historic Preservation Office is required. My decision is consistent with this and other acts protecting heritage resources.

Endangered Species Act

Compliance with this Act is addressed in Section VII, of this document.

National Environmental Policy Act

The documentation for this project supports compliance with this Act. The process of environmental analysis and decision making for this proposed action, and the associated documentation, have been conducted to fully comply with the requirements of NEPA. These include requirements of the Act itself, CEQ regulations at 40 CFR 1500, Forest Service policies at Forest Service Handbook 1909.15 and 36 CFR 220, requirements that evolved through the practice of NEPA, and from case law.

Forest Service Manual Direction

Under Region 4 FSM Supplement 2800-2011-1, Section 2822-04c: Forest Supervisors are delegated the authority to sign all decision documents for mineral licenses, permits and leases. Through previous experiences in both leasing and permitting actions, the MLNF has adequate and appropriate staff to provide permit processing and coordination with technical experts in agencies of Department of the Interior, state mineral organizations and the mineral/mining industry. The MLNF has coordinated with the BLM and OSM during this environmental analysis.

43 CFR 3400.3-3 / 3461.1

Under 43 CFR 3400.3-3 (as well as 30 CFR 761), the Secretary of Interior may issue leases that authorize coal mining operations on Federal lands within the National Forest System, provided that such leases may not be issued on lands within a national forest unless the tract is assessed to be acceptable for all or certain stipulated methods of surface coal mining operations under the provisions of Criterion No. 1 in 43 CFR 3461.1. This states that (i) A lease may be issued within the boundaries of any National Forest if the Secretary of Interior finds no significant recreational, timber, economic or other values which may be incompatible with the lease; and (A) surface operations and impacts are incident to an underground coal mine. This documentation is provided by the BLM prior to lease issuance per 30 U.S.C. Chapter 25, Section 1272-4(e)(2), 30 CFR Subchapter F- 761.11, Surface Mining Control Reclamation Act Section 522 (2) and 43 CFR 3461.5.

IX. IMPLEMENTATION DATE AND ADMINISTRATIVE REVIEW AND APPEAL OPPORTUNITY

Implementation Date

Consent to the lease modifications may be implemented immediately after my decision has been published in the newspaper of record as it is not subject to appeal (36 CFR

215.9 (c) (1)). BLM decision making relating to leasing these lands could occur thereafter.

Administrative Review or Appeal Opportunities

This decision is not subject to appeal as a Notice of Proposed Action and Opportunity to Comment related to the project was published in the newspaper of record and no substantive comments expressing concerns were received during the comment period (36 CFR 215.12 (e)(1)).

Contact

For more information about this project, contact Rob Hamilton, 115 E. 900 N., Richfield, UT 84701; phone 435-896-1022 or rhamilton@fs.fed.us.

X. SIGNATURE AND DATE

ALLEN ROWLEY
Acting Forest Supervisor
Manti-La Sal National Forest

Date

opportunity provider and employer

C/015/018 Incoming
RJB

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Utah State Office
440 West 200 South, Suite 500
Salt Lake City, UT 84101-1345
http://www.blm.gov/ut/st/en.html

JUN 0 3 2013

RECEIVED
JUN 1 2 2013
DIV. OF OIL, GAS & MINING

IN REPLY REFER TO:
3432 / (UT-9223)
UTU-06039
UTU-88554

CERTIFIED MAIL – 7010 2780 0000 9887 5411
Return Receipt Requested

DECISION

PacifiCorp	:	
c/o Interwest Mining Company	:	Coal Leases
1407 W. North Temple, Suite 310	:	UTU-06039
Salt Lake City, Utah 84116	:	UTU-88554

Coal Leases UTU-06039 and UTU-88554 Modified
Extension of Coverage of Surety Bond Accepted
Submittal of Cost Recovery Estimate Requested

Enclosed are copies of modified coal leases UTU-06039 and UTU-88554 effective on June 1, 2013. The terms and conditions of the original leases are made consistent with the laws, regulations and lease terms applicable at the time of this modification. The anniversary dates of these coal leases remain as May 1, 1953 and April 1, 1999, respectively.

On May 16, 2013, a surety rider submitted by Claudia A. Rathbun, an Attorney-in-Fact for the Travelers Casualty and Surety Company of America agreed to extend the coverage of the $2,100,000 logical mining unit (LMU) bond to the additional modified acreage. This rider is acceptable to extend that coverage and is accepted as of the date of filing.

Please note that rental in the amount of $3.00 per acre, or fraction thereof, or a total of $5,517 for coal lease UTU-06039 and $19,149 for coal lease UTU-88554 is due on the next anniversary dates, beginning with May 1, 2014 and April 1, 2014, respectively.

The Bureau of Land Management (BLM) requires that these lands be placed in the East Mountain LMU or the lands in these lease modifications will be segregated into new leases per 43 CFR 3487.1(f)(3). The BLM has enclosed a cost estimate to perform this LMU modification. Pacificorp has 30 days to submit the estimated $3,000 to process this LMU modification or

submit comments on the cost estimate. If no response is received within 30 days, the BLM will segregate the leases.

If you have any further questions, please contact Stan Perkes of this office at (801) 539-4183.

Kent Hoffman
Deputy State Director,
Division of Lands and Minerals

Enclosures:
1. 2 Modified Coal Leases (9 pp. each)
2. Preliminary Cost Estimate LMU modification

cc: Price Field Office (UTG02)

Mr. John Baza, Director, UDOGM, Box 145801, Salt Lake City, Utah 84114-5801

ONNR, MRM, Solid Minerals Staff, Attn: LeeAnn Martin, MS390B2, Box 25165, Denver, Colorado 80225-0165 (w encl.)

Claudia A. Rathbun, Travelers Casualty and Surety Company of America, One Tower Square, Hartford, Connecticut 06183-6014

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

January 9, 2014

To: Internal File

From: Daron R. Haddock, Coal Program Manager

Subject: 510 (c) Recommendation for PacifiCorp, Deer Creek Mine, C/015/0018 Task ID #4447

As of writing of this memo, there are no NOVs or COs which are not corrected or in the process of being corrected for the Deer Creek Mine. There are no finalized civil penalties, which are outstanding and overdue in the name of PacifiCorp. PacifiCorp does not have a demonstrated pattern of willful violations, nor have they been subject to any bond forfeitures for any operation in the state of Utah.

Attached is a recommendation from the OSM Applicant Violator System for the Deer Creek Mine that states there are no outstanding violations.

O:\015018.DER\WG4447\510c.doc

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

UTAH DNR OIL, GAS & MINING

Evaluation on Permit Number: C0150018 SEQ:7
0 Violations

Print Report

Permit Evaluation

Permit Number	C0150018 SEQ:7
Permitee Name	108521 Pacificorp
Date of Request	1/9/2014 9:36:14 AM
Requestor	suzanne.steab

CAUTION: The Applicant/Violator System (AVS) is an informational database. Permit eligibility determinations are made by the regulatory authority with jurisdiction over the permit application not by the AVS. Results which display outstanding violations may not include critical information about settlements or other conditions that affect permit eligibility. Consult the AVS Office at 800-643-9748 for verification of information prior to making decisions on these results.

There were no violations retrieved by the system

Evaluation OFT

Entities: 48

158506 Berkshire Hathaway Inc - ()
---104006 Walter Scott Jr - (Director)
---154396 Thomas S Murphy - (Director)
---158507 Warren E Buffett - (Chairman of the Board)
---158507 Warren E Buffett - (Chief Executive Officer)
---158508 Charles T Munger - (Chairman of the Board)
---158509 Marc D Hamburg - (Corporate Officer)
---158509 Marc D Hamburg - (Vice President)
---158510 Daniel J Jaksich - (Corporate Officer)
---158510 Daniel J Jaksich - (Vice President)
---158511 Howard G Buffett - (Director)
---158513 William H Gates Iii - (Director)
---158514 David S Gottesman - (Director)
---158515 Charlotte Guyman - (Director)
---158516 Donald R Keough - (Director)
---158517 Ronald L Olson - (Director)

---158518 Midamerican Energy Holdings Co - (Subsidiary Company)
------104006 Walter Scott Jr - (Director)
------129287 Paul J Leighton - (General Counsel)
------129287 Paul J Leighton - (Secretary)
------129287 Paul J Leighton - (Vice President)
------158507 Warren E Buffett - (Director)
------158509 Marc D Hamburg - (Director)
------158519 Gregory E Abel - (Chairman of the Board)
------158519 Gregory E Abel - (Chief Executive Officer)
------158519 Gregory E Abel - (Director)
------158519 Gregory E Abel - (President)
------158521 Douglas L Anderson - (Executive Vice President)
------158521 Douglas L Anderson - (General Counsel)
------158521 Douglas L Anderson - (Secretary)
------158522 Patrick J Goodman - (Chief Financial Officer)
------158522 Patrick J Goodman - (Executive Vice President)
------158523 John Diesing Jr - (Vice President)
------158524 William J Fehrman - (Senior Vice President)
------158525 Brent E Gale - (Senior Vice President)
------158528 Maureen E Sammon - (Corporate Officer)
------158528 Maureen E Sammon - (Senior Vice President)
------158529 Steven R Evans - (Senior Vice President)
------158531 Wayne F Irmiter - (Corporate Officer)
------158531 Wayne F Irmiter - (Senior Vice President)
------158532 Jonathan W Weisgall - (Vice President)
------158533 Russell H White - (Vice President)
------158534 Cathy S Woollums - (Corporate Officer)
------158534 Cathy S Woollums - (Senior Vice President)
------158538 A Robert Lasich - (General Counsel)
------158538 A Robert Lasich - (Vice President)
------158541 Ppw Holdings Llc - (Subsidiary Company)
---------108521 Pacificorp - (Subsidiary Company)
----------118430 Energy West Mining Co - (Subsidiary Company)
----------124840 Bruce N Williams - (Treasurer)
----------151620 Tanya S Sacks - (Assistant Treasurer)
----------152797 Jeffery B Erb - (Secretary)
----------249210 Cindy Crane - (Vice President)
----------251461 Micheal G Dunn - (Director)
----------124840 Bruce N Williams - (Treasurer)
----------124840 Bruce N Williams - (Vice President)
----------147401 A Richard Walje - (Chief Executive Officer)
----------147401 A Richard Walje - (Director)
----------147401 A Richard Walje - (President)
----------152797 Jeffery B Erb - (Assistant Secretary)
----------158519 Gregory E Abel - (Chairman of the Board)
----------158519 Gregory E Abel - (Chief Executive Officer)
----------158519 Gregory E Abel - (Director)
----------158521 Douglas L Anderson - (Director)
----------158522 Patrick J Goodman - (Director)

----------158525 Brent E Gale - (Director)
----------158527 Mark C Moench - (Director)
----------158527 Mark C Moench - (General Counsel)
----------158527 Mark C Moench - (Secretary)
----------158527 Mark C Moench - (Senior Vice President)
----------247556 R Patrick Reiten - (Chief Executive Officer)
----------247556 R Patrick Reiten - (Director)
----------247556 R Patrick Reiten - (President)
----------247558 Natalie L Hocken - (Director)
----------247622 Dean S Brockbank - (General Counsel)
----------247622 Dean S Brockbank - (Vice President)
----------248434 Douglas K Stuver - (Chief Financial Officer)
----------248434 Douglas K Stuver - (Senior Vice President)
----------251461 Micheal G Dunn - (Chief Executive Officer)
----------251461 Micheal G Dunn - (Director)
----------251461 Micheal G Dunn - (President)
----------251466 Stefan A Bird - (Vice President)
---------129287 Paul J Leighton - (Secretary)
---------129287 Paul J Leighton - (Vice President)
---------158519 Gregory E Abel - (President)
---------158521 Douglas L Anderson - (Manager)
---------158522 Patrick J Goodman - (Manager)
---------158529 Steven R Evans - (Vice President)
---------158531 Wayne F Irmiter - (Controller)
---------158531 Wayne F Irmiter - (Vice President)
---------158537 James C Galt - (Assistant Treasurer)
---------251468 Calvin Haack - (Treasurer)
---------251468 Calvin Haack - (Vice President)
---------254720 Jack Stark - (Manager)
------251468 Calvin Haack - (Treasurer)
------251468 Calvin Haack - (Vice President)
---248432 Susan Decker - (Director)
---251467 Stephen B Burke - (Director)

Narrative

Request Narrative