

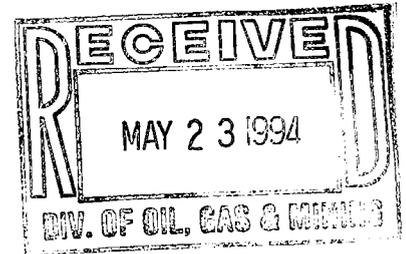
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A Division of PacifiCorp



May 6, 1994



Utah Coal Regulatory Program
Division of Oil, Gas and Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203

Attention: Ms. Pamela Grubaugh-Littig

*File ACT/015/018 # 2
Copy PAM (all)*

**RE: EAST MOUNTAIN PROBABLE HYDROLOGIC CONSEQUENCES REVIEW,
PACIFICORP, DES-BEE-DOVE MINE, ACT/015/017, DEER CREEK MINE,
ACT/015/018, COTTONWOOD/WILBERG MINE, ACT/015/019, EMERY
COUNTY, UTAH**

Dear Ms. Grubaugh-Littig:

The following information is submitted in response to deficiencies identified in your letter of April, 20, 1994 regarding the above referenced matter. To facilitate your review of these materials, each deficiency is restated herein with the response following.

1) Data needs to be completed and submitted for the packer/slug tests of all the drill holes now included as part of the groundwater monitoring program. Please submit all of the requisite data.

The packer/slug tests are scheduled to be completed during the week of 5/16/94. The test results will be reported to the Division by 5/31/94.

2) The permittee committed to collect and analyze macroinvertebrate population data associated with the Deer Creek Mine emergency bypass. This report needs to be submitted and included as part of the PHC.

Macroinvertebrate sampling was initiated in October of 1990, prior to discharge associated with the emergency bypass. Sampling has continued to provide monitoring data related to the bypass. Sampling, to provide data for completion of the impact assessment report, is scheduled for July of 1994. All data and the report will be provided to the Division upon completion. The report is expected to be completed by August 15, 1994.

3) The spring inventory sheets for Spring 91-72, 91-83 (Willow Spring), Cottonwood Spring and Roan's Spring must be submitted and included as part of the PHC.

The spring inventory sheets are enclosed herein. They are to be placed in sequence in the first part of Section 5, Volume 9A.

4) The Cottonwood Canyon drill logs all show alluvial deposits in the canyon to be between 110 and 120 feet, whereas the resistivity survey depicts the alluvium to be about 45 feet deep. This discrepancy must be clarified.

A discussion of the apparent discrepancy is contained in revised pages 6 and 7 of Appendix F, enclosed within. Please replace pages 6 and 7 of Appendix F, found in Volume 9.

You indicated that the reviewed material does not include the Rilda Canyon Lease Extension information. Volumes 9, 9A and 9B contain information which addresses the Rilda Canyon area. Two (2) sheets, accompanying this letter, identify locations wherein Rilda Canyon hydrologic concerns are discussed. These sheets, along with the Agency/Applicant Action Summary, contained in the February 1994 submittal, guide the reviewer to sections of the PHC where Rilda Canyon information is found.

Early attention by the Division, regarding this matter, is greatly appreciated. If you have questions, please call me at 653-2312.

Sincerely,



Val Payne

Sr. Environmental Engineer

cc: M. Moon
C. Semborski
File

**PacifiCorp
Deer Creek - Rilda Canyon Extension
ACT/015/018**

**Volume 9
Rilda Canyon Hydrologic Information**

To complete comprehensive evaluation of the hydrologic information pertaining to the Deer Creek Mine Extension the following sections of Volume 9 should be reviewed:

- ▶ **Existing Groundwater Resources** **Pages 3-57**
 - Regional Groundwater Hydrology
 - Regional Geology Regional Geology
 - Regional Groundwater Characteristics

- ★ **Areas of Special Interest**
 - Groundwater Rights and Users **Pages 36-57**
 - ◆ North Emery Water Users Association
 - ◆ Description of NEWUA Spring Collection System

- ▶ **Existing Surface Resources** **Pages 59-75**
 - Regional and Permit Area Surface Water Hydrology
 - Water Quality and Quantity

- ★ **Areas of Special Interest**
 - Huntington Drainage System **Pages 64-70**
 - ◆ Rilda Canyon (review Annual Hydrologic Reports for Updated Quality and Quantity Information)

- ▶ **Probable Hydrologic Consequences Determination** **Pages 87-127**
 - Description of Mining Operation
 - Geology
 - Mining Methods
 - Surface Water System
 - Hydrologic Balance
 - Mitigation and Control Plans
 - Surface Monitoring Plan
 - Groundwater System
 - Hydrologic Balance - Groundwater

- ★ **Areas of Special Interest**
 - Hydrologic Balance - Groundwater **Pages 99-127**
 - ◆ Mining in the Rilda Canyon Area-NEWUA Springs

Appendices, Hydrologic Support Information, and Maps referenced in the above text:

★ Areas of Special Interest

Appendix Information:

- ◆ **Appendix A - Hydrologic Monitoring Program**
- ◆ **Appendix E - Rilda Canyon Lease Tract PHC Response**
- ◆ **Appendix G - NEWUA Mitigation Alternative**

Hydrologic Support Information: Volume A

- ◆ **2. Rilda Canyon Pump Test**
- ◆ **4. Rilda Canyon Resistivity - I.P. Study**
- ◆ **5. Hydrologic Baseline Information (Updated information submittal annually)**

Hydrologic Support Information: Volume B

- ◆ **6. Well Completion Information**
- ◆ **9. Cottonwood Canyon Creek/Rilda Canyon Resistivity-I.P. Study**

Hydrologic Maps:

- ◆ **HM-8: NEWUA Spring Collection System**

INSERT
SPRINGS GEOLOGIC CONDITIONS INVENTORY SHEETS
IN VOLUME 9A
SECTION 5

SPRINGS GEOLOGIC CONDITIONS INVENTORY

Spring Name/Number: 91-72 (17-14-3)

Location: 2300 Feet South : 600 Feet West of the : NE Corner
of Section : 14 Township : 17 South Range : 6 East

Elevation: 8080 Feet above mean sea level

Location Comments: Spring located on hillside which is densely populated with Cottonwoods and Mountain Mahogany.

Formation: Blackhawk 100 Feet from Top

Probable Recharge Area: Highland areas of East Mountain located to the Northeast

Relationship to Adjacent Springs: Occurrence similar to spring 79-30 and 79-31

Geologic Circumstances of Spring: The spring is located near the northern fault of the Roans Canyon fault graben. Water traveling downward along fractures associated with the Roans Canyon fault intersects impermeable mudstone layers of the upper Blackhawk and flows laterally along the fractures until it intersects the land surface forming a spring.

SPRINGS GEOLOGIC CONDITIONS INVENTORY

Spring Name/Number: 91-73 (17-14-2) Willow Spring

Location: 300 Feet South : 2300 Feet West of the : NE Corner
of Section : 14 Township : 17 South Range : 6 East

Elevation: 8120 Feet above mean sea level

Location Comments: Spring located on hillside which is densely populated with Willows and Mountain Mahogany.

Formation: Blackhawk 100 Feet from Top

Probable Recharge Area: Highland areas of East Mountain located to the Northeast

Relationship to Adjacent Springs: Occurrence similar to spring 91-72

Geologic Circumstances of Spring: The spring is located approximately 100 feet below the base of the Castlegate Sandstone formation. Water traveling downward along fractures/joints in the Castlegate Sandstone formation intersects impermeable mudstone layers of the upper Blackhawk and flows laterally along the fractures until it intersects the land surface forming a spring.

SPRINGS GEOLOGIC CONDITIONS INVENTORY

Spring Name/Number: (17-14-4 of TM-23) Cottonwood Spring

Location: 50 Feet North : 350 Feet West of the : SE Corner
of Section : 14 Township : 17 South Range : 6 East

Elevation: 7880 Feet above mean sea level

Location Comments: Spring located in the base of Cottonwood Canyon Creek, access road to spring area, 2" pipe inserted into the embankment.

Formation: Alluvium Feet from Top

Probable Recharge Area: Highland areas of East and Trail Mountain located to the North

Relationship to Adjacent Springs: Occurrence similar to Roans Spring

Geologic Circumstances of Spring: The spring is located in alluvium near the southern extent of glaciation in Cottonwood Canyon Creek. The level of groundwater increases in the area of Cottonwood/Roans Springs due to the change in the volume of the alluvium caused by the change in geomorphology (glaciated-nonglaciated). Flow from the spring would reflect the level of groundwater within the alluvial deposits and the recharge to the alluvial deposits and surrounding strata.

SPRINGS GEOLOGIC CONDITIONS INVENTORY

Spring Name/Number: (17-23-3) Roans Spring

Location: 1000 Feet South : 750 Feet East of the : NW Corner
of Section : 24 Township : 17 South Range : 6 East

Elevation: 7840 Feet above mean sea level

Location Comments: Spring located in the base of Cottonwood Canyon Creek, approximately 1500 feet downstream from Cottonwood Spring near the intersection of Cottonwood Canyon Creek and Roans Canyon.

Formation: Alluvium Feet from Top

Probable Recharge Area: Highland areas of East and Trail Mountain located to the North

Relationship to Adjacent Springs: Occurrence similar to Cottonwood Spring

Geologic Circumstances of Spring: The spring is located in alluvium near the southern extent of glaciation in Cottonwood Canyon Creek. The level of groundwater increases in the area of Cottonwood/Roans Springs due to the change in the volume of the alluvium caused by the change in geomorphology (glaciated-nonglaciated). Flow from the spring would reflect the level of groundwater within the alluvial deposits and the recharge to the alluvial deposits and surrounding strata.

4. RESISTIVITY RESULTS

PacifiCorp/Energy West Mining Company contracted Geowestern to conduct a Resistivity-Induced Polarization (I.P.) Survey in Cottonwood Canyon Creek in the summer 1992. The intent of the survey was to identify fractures/faults and estimate the depth and the extent of alluvium in Cottonwood Canyon Creek by contrasting areas of Resistivity and I.P. response (see Volume 9, Hydrologic Support Information - Results of a Resistivity-Induced Polarization Survey, Rilda and Cottonwood Canyons: East Mountain Property). Profiling in Cottonwood Canyon Creek included six lines perpendicular to the canyon generally extending to outcrops of the Blackhawk Formation and one parallel to the canyon bottom. Based upon the results of the resistivity and induced polarization survey it is apparent that the depth of the alluvium is relatively consistent throughout the length of the canyon surveyed but the lateral extent of the deposits increases from north to south to a point just north of CCCR-2. The pseudosections indicate that the fractures/faults cutting the lower end of the Cottonwood Canyon impound water in the alluvium approximately 300-500 feet up-canyon from the fracture/fault. The pseudosections also indicate that the level of groundwater increases in the area of Cottonwood Spring due to the change in the volume of the alluvium caused by change in geomorphology (glaciated-nonglaciated). It is also apparent that the lithologic contrast/fracture displaying high resistivity values on the east side of Cottonwood Canyon may be contributing water to the alluvial area.

Cottonwood Spring, located at 880 on Line CCCR-2, is probably fed by flow from the water coursing through the alluvium with additional flow contributed from the lithologic contrast/fracture on the east side of Cottonwood Canyon. Discharge rates from the spring area would reflect the level of groundwater within the alluvial deposits and the recharge both to the alluvial deposits and the strata above the Blackhawk Formation on the south side of Cottonwood Canyon.

Maximum alluvial depths (depth to bedrock estimates) within the survey area appear to range from 40 to 70 feet. These estimates are dependent upon the configuration of the survey spacing, lithologic contrast and the presence of groundwater. As discussed in the resistivity results (see Volume 9, Hydrologic Support Information - Results of Resistivity-Induced Polarization Survey, Rilda and Cottonwood Canyon Creek: East Mountain Property) electrode separation for profiling in Cottonwood Canyon Creek consisted of four 20-foot spacings with a horizontal setup interval of 20 feet. Although this provides a very dense data pattern, the maximum depth of penetration is roughly seventy to eighty percent of the maximum spacing, or approximately 50 to 60 feet. Generally, 50 to 60 feet of penetration was adequate for determining the depth to bedrock contrast, but in areas where the presence of groundwater or lithologic contrast existed with the alluvium (resistivity highs) and coincided with the maximum depth of penetration, the depth to bedrock was biased toward those factors. As the drilling of the alluvial wells indicated (discussed in detail in the following section), the depth to groundwater/saturated alluvium or lithologic contrast within the alluvium was fairly consistent with the pseudosections conducted

perpendicular to the well locations. The depth estimates on the road profile CCCR-7 do not reflect maximum alluvial thickness since the cross profiles indicate maximum depths further eastward in the center of the drainage.

5. DRILLING RESULTS

To delineate any potential impact to the first aquifer-saturated zone below the lowest minable seam (Starpoint Sandstone-Spring Canyon Member), PacifiCorp proposed to drill a series of wells downgradient of the existing and proposed mine development (see map in Appendix E, Volume 9 of the PAP). The proposed locations were originally submitted to DOGM on March 23, 1992. An on site location review was held with the Forest Service and DOGM on June 4, 1992 to finalize the site locations. It was agreed that a total of three sites would be completed, one south and two north of the Roans Canyon fault system. At each of the three proposed sites (one alternate site was chosen should difficulties arise during the permitting process or site access) two single completion wells will be installed, one in the colluvial/alluvial deposits and one in the first saturated zone (Spring Canyon Member). Holes completed in the colluvial/alluvial deposits will be utilized to compare the well hydrographs to those of Cottonwood Canyon Creek and the Spring Canyon Member. The locations were selected for the following reasons.

- a. Location of the drill sites was based on the regional dip of the top of the Spring Canyon Member of the Starpoint Sandstone Formation and positioned downgradient of the projected mine workings of the Deer Creek Mine.
- b. Site selection was also based on the confinements of drilling in Cottonwood Canyon as well as to minimize environmental impacts. The sites will not require extensive site preparation (crossing the stream will not be necessary) and are positioned at least 500 feet from existing natural gas holes.
- c. The sites are as close to the permit boundary as will allow year-round access. Positioning the holes in the canyon also minimizes the depth necessary to intersect the Starpoint Sandstone.

Drilling of the wells was initiated on November 17, 1992 and was completed on January 19, 1993. Six (6) wells were drilled, and five (5) were completed for hydrologic monitoring. Data regarding coal thickness is confidential and is being withheld from this submittal. The following table lists the hole identification, location, depth drilled, screened zone, and initial water level.