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July 8, 1997

TO: File

FROM: Pamela Grubaugh-Littig, Permit Supervisor *pgl*

RE: Permittee Commitments to Forest Service Conditions, Letter dated July 3, 1997, North Rilda Lease Area, Deer Creek Mine, PacifiCorp, ACT/015/018 - 97-1, Folder #3, Emery County, Utah

The six conditions that were outlined in the letter dated July 3, 1997 from the Forest have been addressed by PacifiCorp in their permit application package. This memo will enumerate where these commitments are found in the application and attach the pertinent pages:

- #1 Archaeology, survey and documentation and recording of cultural resources, in escarpment area to be failed.

This is found in the engineering section, page 10 and 11, revised 5/6/97

- #2 A survey for spotted bats (USDA-FS Sensitive Species) will be conducted for all escarpment areas to be failed. If bats are located, then evaluations will be made for mitigation needs. Mitigations could include avoidance during specific times and/or prevention of bat occupancy during period of subsidence, such as by netting or screening. Mitigations will be evaluation on a case-by-case basis.

This is found in the biology section, page 3 and 4, revised 5/6/97

- #3 When the mains under the North Fork of Rilda Creek are no longer needed, the operator must backstow, backfill, and/or group the mains, using the best technology available at that time.

This is found in Appendix 1, page 5, revised 7/1/97

- #4 The operator must delineate the Mill Fork Graben with some method other than direct mining. Acceptable methods include, but are not



limited to, surface and in-mine drilling or geophysical methods.

This is found in Appendix 1, page 2, revised 7/1/97

- #5 Only full-support mining is permitted under escarpments along the north side of Rilda Canyon unless the lease stipulation prohibiting escarpment failure is waived by the Forest Service.

This is found in Appendix 1, pages 4 and 5, revised 7/1/97.

- #6 The operator must notify the surface management agency (Forest Service) if a water loss occurs on National Forest System lands.

This is found in the engineering section, pages 32 and 33, revised 7/1/97.

All of the conditions have been adequately addressed by the applicant to satisfy the Forest Service conditions in letter dated July 3, 1997.

detailed plan will be developed to position the 4th North #1 / 4th North #2 intersection to optimize the "no-subsidence" design of the 4th North #2 / Rilda Canyon Right Fork crossing route and rock slope access into the lower Hiawatha Seam as well as maximizing overall reserve recovery within the area.

From the 4th North #2 intersection, mainline development will proceed to the northern boundary of Federal Coal Lease U-024317. Longwall gateroad development sections will be driven due east from the 4th North Mains to the extent of mineable reserves. The sequence of longwall extraction will be from the northern portion of Federal Coal Lease U-024317 to the south (Federal coal leases U-06039, SL-051221, U-2810 and PacifiCorp patent fee claims). Six longwall panels are projected in each seam.

Based on the current layout, the two northern and two southern panels of each seam are projected to extend below the Castlegate Sandstone escarpment. As specified in the lease stipulations, "except at specifically approved locations, the Castlegate escarpment must be protected from mining induced failure". Where escarpment failure is proposed or anticipated, an environmental analysis will be needed to assess the following:

- a. How much escarpment could fail based on analytical methods, observation of similar areas, geologic/topographic conditions, and panel orientation.

b. What resources would be affected by escarpment failure and description of the nature and magnitude of these effects, ie: vegetation, wildlife and habitat, threatened / endangered and sensitive species, cultural and paleontological resources, hazards, visual quality, etc.

The Castlegate Sandstone escarpment within the North Rilda Permit Application area has been defined in the permit application in two (2) distinct portions:

*- NORTH CASTLEGATE ESCARPMENT - NORTH RILDA AREA*

*- SOUTH CASTLEGATE ESCARPMENT - NORTH RILDA AREA*

*NORTH CASTLEGATE ESCARPMENT:* The Castlegate Sandstone escarpment within the northern portion of the North Rilda Area (north face of the ridge) has very limited surface exposure due to the presence of talus slopes and forest vegetation which cover most of the escarpment in this area. Due to the limited surface exposure of the Castlegate escarpment, no special monitoring or mine layout protection is planned for the escarpment in this area, i.e., the four (4) northernmost longwall panels in the Blind Canyon and Hiawatha Seams - North Rilda Area, refer to R645-301-500 Appendix 1 for complete description and comparison of the North Castlegate Escarpment to previously mined areas.

*SOUTH CASTLEGATE ESCARPMENT:* The Castlegate Sandstone escarpment within the southern portion of the North Rilda Area (south face of ridge) has a prominent surface exposure. Based on an on-going geotechnical study evaluating the potential effects of longwall (full-

## FISH & WILDLIFE

Wildlife studies have been conducted within the Deer Creek Mine permit areas and those areas adjacent to it. The wildlife habitats of the North Rilda Area include Mixed Conifer and Pinyon-Juniper and probably some riparian communities. Descriptions of these and other habitats that exist within the permit boundaries have been given in previous wildlife sections of the MRP.

"Species of Special Significance", threatened, endangered, and "Special Status Species" have been described previously. Table 1 of Vol. 1, Part 2 of the MRP lists Vertebrate Species of the Wasatch Plateau of which the Deer Creek Mine permit area and the North Rilda Area are part. The tables include the species status (common, rare, threatened, etc.), the habitats in which they occur, and the likelihood of their occurrence within the boundaries of the lease area.

Mule deer habitats have been mapped for the permit and adjacent areas, part of which are within the North Rilda Area boundaries (Vol. 4, Map 2-19). Neither "Critical Deer Winter Range", nor "High Priority Deer Winter Range" exist in the North Rilda Area. Instead, the area is mapped as "High Priority Summer Habitat" (Vol. 4, Map 2-19).

Raptor nesting studies and nest mapping have been conducted in the North Rilda Area. Much of the area is raptor nesting habitat. Specific nests have been numbered and mapped in the area (see Biology Section Appendix). The status of these nests have also been included (see Biology Section Appendix). Nest information and locations are based on results from the 1996 annual raptor survey conducted by Energy West Mining Co., in conjunction with the Utah Department

of Wildlife Resources. Energy West Mining Co. will conduct annual raptor surveys in the area.

The results of those surveys will be available upon request.

Due to the potential for Townsends Big-eared bats and Spotted bats to occur along the cliff escarpment in Rilda Canyon, a bat survey of the areas of potential failure will be conducted to determine the presence of these mammals. The bat survey will occur during the summer of

1997.

No surface disturbance has been proposed to the wildlife habitats in the North Rilda Area, therefore little or no influence on the proposed new permit area is expected.

### BEAM ANALYSIS:

To further address the long term stability of the mine openings within the Right Fork area of Rilda Canyon, beam theory analysis was also employed (See Attachment #3).

Beam theory suggests, that when an underground opening is excavated, the immediate roof strata acts as a beam to support the strata overlying the opening. If the beam is strong enough to support itself and the effected overlying strata, then the opening will be stable.

When an underground opening is excavated, the stress distribution in the surrounding rock mass changes. The support that the excavated material supplied to the surrounding rock mass is no longer there. The stress therefore, arches over the opening and redistributes itself to the surrounding rock. In underground excavations, it is an accepted value that the zone of influence of an opening is determined to be approximately two (2) times the opening height. In beam theory, when an underground opening is excavated, the strata overlying the mine opening acts as a beam to support the immediate roof, or the material within the opening's affected zone.

Beam stability is evaluated by calculating the assumed beam's factor of safety. The factor of safety is the tensile strength of the beam divided by the maximum tensile stress that the beam is subjected to. It is assumed that a factor of safety of 1.5 - 2.0 (or greater) represents long term stability. Based on the proposed layout of the 4th North Mains within the area of the Right Fork of Rilda Canyon, this factor of safety is calculated at approximately 4.92 (See Attachment #3); indicating long term stability of the assumed roof beam and thus the mine entries.

### SUPPLEMENTAL SUBSIDENCE MONITORING

Prior to development mining below the riparian zone of the right fork of Rilda Canyon, permanent subsidence monitoring sites will be established directly above the proposed mains to verify ground stability conditions. Location of the stations will be determined based upon the final mine layout for the proposed crossing. Monitoring will be conducted on a quarterly basis during accesible periods until lease relinquishment or an alternate schedule is approved by D.O.G.M. and surface land management agency (U.S.D.A. Forest Service).

### FINAL RETREAT - NORTH RILDA ABANDONMENT

Prior to final mine retreat and abandonment of the North Rilda Canyon Area Mains, PacifiCorp will submit (for technical review and evaluation to the appropriate permitting management agencies) historical in-mine and surface stability data necessary to assess the long-term surface stability of the Right Fork area of Rilda Canyon. An on-site review will be conducted to evaluate long-term stability of the right fork of Rilda Canyon.

With regard to PacifiCorp's pending North Rilda Area Permit Application, the 4th North Mains are projected to be developed northwest (approximately 3000 feet) from the 4th North / 10th West Mains intersection. The 4th North Mains development then changes course to a northeast bearing, with development proceeding across the right fork area of Rilda Canyon. The proposed location and layout of the 4th North #1 / 4th North #2 intersection are currently only a projection. Preliminary mine plan sequence and layout provides for the current 4th North Mains to continue as a 5-entry development system to a point just south of the proposed 4th North #1/4th North #2 intersection. At this point the development is planned to be reduced to a 2-entry "exploration" section continuing on the original northwest bearing to delineate the western margin of the Blind Canyon coal seam or to intersect the projected Mill Fork Fault Graben. In addition to in-mine exploration, PacifiCorp has submitted a surface exploration plan to be conducted in 1997 prior to the proposed in-mine exploration to determine the extent of mineable reserves and evaluate potential faulting on the west side of Federal Coal Lease U-06039. The proposed plan includes drilling a series of exploration holes on 200-foot spacing from existing drill holes EM-158 to EM-56C. Information collected during this exploration will include depth of colluvial / alluvial deposits, structure and stratigraphy of the lower Blackhawk and upper Star Point formations, and hydrologic characteristics of the penetrated strata. Data from the exploration program will be submitted to the Division and both surface and underground management agencies.

Based on the information gained from the surface exploration drilling and proposed 2-entry "exploration" development, a detailed plan will be developed to position the 4th North #1 / 4th North #2 intersection to optimize the "no subsidence / long term stability" design the 4th North #2 / Rilda Canyon Right Fork crossing route and rock slope access into the lower Hiawatha Seam as well as maximizing overall reserve recovery within the area.

#### **RIPARIAN ZONE - RIGHT FORK OF RILDA CANYON**

The riparian zone within the Right Fork of Rilda Canyon (as shown on the above referenced enclosures) was delineated by field observation, aerial photography, and map contour analysis. The extent of the identified zone is based on the contact of the alluvial fill with the canyon's side slopes. The alluvial/colluvial fill contacts were inferred from existing map contours where rapid changes in slope gradient were assumed to indicate a material composition change. The alluvial/colluvial fill contact was assumed to occur where these grade changes occurred.

The riparian zone (as mapped) also includes an agency requested "buffer zone". This "buffer zone" is calculated from the lower Hiawatha seam's horizon/elevation @ 15 degrees to a point of intersection on the surface. The "buffer zone" delineates an area restricted from full extraction second mining.

This referenced 15 degree "angle-of-draw" / "angle-of-influence" is an industry/agency accepted standard used for delineation of surface influence protection from mining areas considered for full-extraction mining. Mining experience at Energy West's Deer Creek, Cottonwood, and Trail Mountain mines has provided a sound, scientific basis for using the 15° angle of draw mentioned above. The angle of draw of subsidence produced by full-extraction mining can be influenced by

(within the Left Fork area of Rilda Canyon). Both canyon crossings are considered designed and protected for " **ZERO-SUBSIDENCE** " to insure the required long term (hundreds of years) stability and integrity of the underground openings with regard to limiting the potential of any future surface impact.

To insure long term stability of the 4th North Mains and afford further protection to the riparian zone throughout the effected area of 4th North Mains crossing of the Right Fork area, entry/pillar configuration will consist of a 5-entry development with staggered cross-cuts on 80ft. x 150 ft. pillar centers (See Attachment #1). Primary roof support throughout the immediate area will consist of standard 5 ft. resin grouted roof bolts on 5 ft. centers. Secondary roof support (as ground/roof conditions dictate) will consist of a combination of available materials (ie: point-anchor [active/grouted] roof bolts, steel bearing plates, wire mesh, steel roof mats, grouted cable bolts, "CAN" cribs, wooden cribs, etc.).

### **STABILITY ANALYSIS**

To address the concerns with regard to the long term stability of the mine openings proposed within the Right Fork area of Rilda Canyon, pillar stability and beam theory analysis is presented within this report.

### **PILLAR STABILITY:**

The long term stability of the proposed 80 ft. x 150 ft. support pillars (proposed within the riparian zone of the Right Fork crossing) were evaluated using the Tributary Area Analysis Method (See Attachment #2).

This analysis is very conservative because it assumes that an in-mine pillar will support **ALL** of the immediate overburden directly above it. Actual in-mine studies have indicated that a support pillar will only see a portion (60% - 70%) of the actual vertical overburden weight. The overburden cross-section, along the projected bearing of the proposed 4th North Mains (Section A - A'; See Map HM-11), details the immediate area of the alluvial/riparian zone of the Right Fork of Rilda Canyon. Overburden thickness varies from 648 ft. at the northeast margin to 99 ft. in the bottom of the Right Fork Canyon.

Pillar stress and safety factors were calculated at different locations along the development bearing using the Tributary Area Analysis method. The pillar compressive strengths used in the analysis are actual measured (in-mine) strength values, averaging approximately 4000 psi.

Once pillar strength and pillar stress is known, a factor of safety is calculated. The factor of safety is calculated by dividing the pillar strength by the pillar stress. A factor of safety of 1.0 or greater indicates stability. A factor of safety of 1.5 - 2.0 (or greater) indicates long term stability. The calculated factors of safety along the projected bearing of the 4th North Mains range from 3.57 under the deepest cover to 23.94 in the canyon bottom. These factors of safety indicate long term stability for the 4th North Mains layout throughout the area of the crossing of the Right Fork of

have been lost or adversely affected as a result of operator's mining operations if such loss or adverse impact occurs prior to final bond release. The water will be replaced from an alternate source in sufficient quantity and quality to maintain the current and postmining land uses as stated herein.

During the course of regular monitoring activities required by the permit, or as the operator otherwise acquires knowledge, the operator will advise DOGM and the surface land management agency of the loss or adverse occurrence discussed above, within ten working days of having determined that it has occurred. Within ten working days after DOGM notifies operator in writing that it has determined that the water loss is the result of the operator's mining operation, the operator will meet with DOGM to determine if a plan for replacement is necessary and, if so, establish a schedule for submittal of a plan to replace the affected water. Upon acceptance of the plan by DOGM, the plan shall be implemented. The operator reserves the right to appeal DOGM's water loss determinations as well as the proposed plan and schedule for water replacement as provided by Utah Code Ann. 40-10-22(3)(a). As outlined earlier, there are no springs or seeps located above the projected mining activities in the North Rilda Area. Most of the streams within the permit area are ephemeral and/or intermittent. Only the lower portion of Rilda Canyon Creek below the forks is considered perennial. The streams are fed by springs that emanate primarily in the North Horn Formation west of the permit boundary. Second mining, ie. longwall extraction, room & pillar, of the North Rilda area will be limited to the ridge separating Rilda and Mill Fork canyons and subsidence will not occur beneath the stream channels of these canyons. First mining, ie. mainline, gateroad development, will occur below the Right Fork of Rilda Canyon. For a complete analysis of the proposed "no subsidence / long term stability" design of the 4th North Mains development within the Right Fork of Rilda and long-term

stability analysis refer to the Engineering Section R645-301-500 Appendix 1. To protect the alluvial/colluvial system of the Right Fork of Rilda Canyon a stream buffer zone was established based on the extent of the riparian zone and the angle of draw from the Hiawatha Seam, the lowest seam to be mined. The riparian zone within the Right Fork of Rilda Canyon was delineated by field observation, aerial photography, and map contour analysis. The extent of the identified zone is based on the contact of the alluvial/colluvial fill with the canyon's side slopes. The angle of draw was calculated from the Hiawatha Seam horizon/elevation @ 15 degrees to the point of intersection on the surface. The stream buffer zone delineates the area restricted to full extraction mining. The referenced 15 degree angle of draw is an industry/agency accepted standard used for delineation of surface influence protection from mining areas considered for full extraction mining. Mining experience at Energy West's Deer Creek, Cottonwood, and Trail Mountain mines has provided a sound, scientific basis for using the 15° angle of draw mentioned above (refer to Annual Subsidence Reports of the Deer Creek MPR).

#### Subsidence Control

The operator will conduct the underground mining operations so as to prevent subsidence from causing material damage to the surface and to maintain the value and reasonable foreseeable use of that surface in accordance with the preceding subsidence control plan.

A 200 feet barrier will protect the northern mine permit boundary from mine-induced subsidence. The northern boundary projection of mine-induced subsidence is shown on Figure R645-301-500c.