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August 22, 2001

Chuck Semborski, Environmental Supervisor
Energy West Mining Company
P.O. Box 310
Huntington Utah 84528

Re: Conditional Approval of Volume 9 Hydrology, PacifiCorp, Deer Creek Mine, [redacted] AM00D, C[redacted] File [redacted]

Dear Mr. Semborski:

The above-referenced amendment is conditionally approved upon receipt of two copies of Appendix C, including attachments and map HM-12, and three copies of maps HM-2 and HM-3 for incorporation. Once we receive these copies, we will send a stamped incorporated copy to you for insertion into your copy of the Mining and Reclamation Plan. A copy of our Technical Analysis is enclosed for your information.

If you have any questions, please call me at (801) 538-5325 or Jim Smith at (801) 538-5262.

Sincerely,

Daron R. Haddock

Daron R. Haddock
Permit Supervisor

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Enclosure:
cc: Price Field Office
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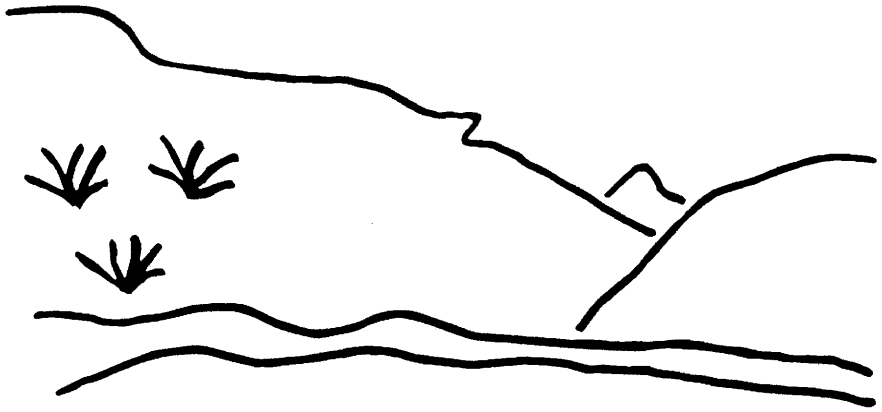
State of Utah



Utah Oil Gas and Mining

Coal Regulatory Program

Deer Creek Mine (also Cottonwood and Des-Bee-Dove Mines)
Revision of Volume 9 - Hydrologic Section
C/015/018 AM00D-2
Technical Analysis
August 20, 2001

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TECHNICAL ANALYSIS

INTRODUCTION

The revision of Volume 9 potentially affects the reclamation plans for all the PacifiCorp mines on East Mountain: Des-Bee-Dove, Cottonwood-Wilberg, and Deer Creek. The text in Volume 9 and the reclamation-monitoring plan in Appendix A have been revised to cover all four mines. (In the Revision of Reclamation Plan (C/015/018 - AM99C), Map HM-12 and the proposed changes to Appendix C deal mainly with the possible connection between the Deer Creek Mine and Cottonwood Spring in Cottonwood Canyon.)

AM00D, the first TA of the Volume 9 revision, was combined into AM99C-3. TA AM00D-2 is for Volume 9 only: comments and deficiencies on hydrology that were in AM99C-3 and that pertain to the revised reclamation plan rather than to Volume 9 specifically, such as soil loss, have not been addressed in this TA.

INTRODUCTION

RECLAMATION PLAN

HYDROLOGIC INFORMATION

Regulatory Reference: 30 CFR Sec. 784.14, 784.29, 817.41, 817.42, 817.43, 817.45, 817.49, 817.56, 817.57; R645-301-512, -301-513, -301-514, -301-515, -301-532, -301-533, -301-542, -301-723, -301-724, -301-725, -301-726, -301-728, -301-729, -301-731, -301-733, -301-742, -301-743, -301-750, -301-751, -301-760, -301-761.

Minimum Regulatory Requirements:

Hydrologic reclamation plan

The application shall include a plan, with maps and descriptions, indicating how the relevant regulatory requirements will be met. The plan shall be specific to the local hydrologic conditions. It shall contain the steps to be taken during mining and reclamation through bond release to minimize disturbance to the hydrologic balance within the permit and adjacent areas; to prevent material damage outside the permit area; and to meet applicable Federal and State water quality laws and regulations. The plan shall include the measures to be taken to: avoid acid or toxic drainage; prevent, to the extent possible using the best technology currently available, additional contributions of suspended solids to streamflow; provide water treatment facilities when needed; and control drainage. The plan shall specifically address any potential adverse hydrologic consequences identified in the PHC determination and shall include preventive and remedial measures.

Each application shall contain descriptions, including maps and cross sections, of stream channel diversions and other diversions to be constructed within the proposed permit area to achieve compliance with the performance standards for those structures.

Postmining rehabilitation of sedimentation ponds, diversions, impoundments, and treatment facilities

Before abandoning a permit area or seeking bond release, the operator shall ensure that all temporary structures are removed and reclaimed, and that all permanent sedimentation ponds, diversions, impoundments, and treatment facilities meet the requirements of this Chapter for permanent structures, have been maintained properly and meet the requirements of the approved reclamation plan for permanent structures and impoundments. The operator shall renovate such structures if necessary to meet the requirements of this Chapter and to conform to the approved reclamation plan.

Analysis:

Ground-water monitoring

Ground-water monitoring sites are described in Appendix A of Volume 9. Map HM-1 shows the location of all reclamation monitoring points.

Both baseline and operational ground-water monitoring parameters are listed in Table 2 - Groundwater Baseline, Operational, Postmining Water Quality Parameter List (Appendix A). This table is the same as Table 4 in the Division's Directive Tech 004 except that total alkalinity

is not included: although total alkalinity is not listed in the Permittee's tables, this parameter has nonetheless been included on most water-quality reports submitted by the Permittee. (Also, total alkalinity is used to determine carbonate and bicarbonate and, if the need arises, it can be back-calculated from the reported values for those two parameters.)

The field-monitoring schedule is outlined in Part II A of Appendix A. Field parameters are listed there and in Table 1 - Surface Water (UPDES monitoring) Baseline, Operational, Postmining Water Quality Parameter List and Table 2 - Groundwater Baseline, Operational, Postmining Water Quality Parameter List (Appendix A). Field parameters are to be measured in conjunction with each baseline and operational water quality sampling.

Baseline analysis of ground water samples was done in 1996 and will be repeated every five years thereafter as part of the operational monitoring program. No other schedule for periodic monitoring for baseline parameters in ground water is indicated (such as the reclamation schedule outlined for surface water).

For T-18 (Oliphant Mine discharge), TM-3 in Straight Canyon, the piezometric wells in Cottonwood and Rilda Canyons, and all springs, monitoring will be done until permit area reduction approval or otherwise approved by the Division (Appendix A: pages 11, 13, and 14 and Groundwater Hydrology - Reclamation Sampling - Table 2).

T-18 will be monitored quarterly for operational parameters. TM-3 and the piezometric wells in Cottonwood and Rilda Canyons will be monitored monthly, subject to access, for water level only (Groundwater Hydrology - Reclamation Sampling - Table 2).

The East Mountain and Trail Mountain springs will be monitored in July and October for operational and field parameters during reclamation (Appendix A: pages 10 and 14 and Groundwater Hydrology - Reclamation Sampling - Table 2). East Mountain - Rilda Canyon springs will be monitored quarterly for operational parameters. These springs will be monitored monthly, when accessible, for flow (Appendix A: pages 11 and 14 and Groundwater Hydrology - Reclamation Sampling - Table 2).

Well TM-1B at Trail Mountain and the Cottonwood and Deer Creek Waste Rock Wells will be sealed during Phase I Reclamation. Until they are sealed, one sample will be collected and analyzed quarterly for operational parameters (Appendix A: page 14 and Groundwater Hydrology - Reclamation Sampling - Table 2). Water levels will be measured monthly at TM-1B (the plan states on page 11 that levels in TM-1B will be measured quarterly, but Groundwater Hydrology - Reclamation Sampling - Table 2 clarifies that levels will be measured monthly.)

On pages 16 and 17 of Volume 9, it states that monitoring of a series of in-mine wells in the Deer Creek and Cottonwood/Wilberg Mine, shown on Plates HM-2 and HM-3, will continue and data collected will be utilized to document potential impacts related to ground-water dewatering and to determine the rate of recovery "once mining has been terminated." Page 14 in

Appendix A of the proposed amendment clarifies that quarterly monitoring will continue until the mine is sealed or the sites become inaccessible.

Where boundary faults were crossed by mining, a pre-existing hydrologic barrier may now transmit water. Maps HM-2 and HM-3 show mine floor elevations, in-mine water source locations, pertinent geologic controls, and other controls such as sealed mine sections. Interbasin diversion of flow between the Cottonwood and Huntington Creek drainages is discussed on pages 169 and 170; the conclusion is that interbasin water probably be less than 1 percent of the annual discharge in either drainage.

In Appendix C the permittee provides a hydrogeologic investigation, initially done in 1992 and updated in 2000, that was prepared in response to a citizen complaint (July 31, 1991) that mining at Deer Creek Mine had dried up flow from Cottonwood Spring (TM-23). Representatives for the complainant, the mine operator, the USFS, the Division of Water Rights, and the Division of Oil, Gas and Mining had an on-site meeting at the spring in August 1991. Questions were raised concerning the proximity of mining to the Roans Canyon Fault, in particular the 3rd North fault crossing and the longwall mining in 1st and 2nd Right off 4rd South, where it was suspected that the mine was intercepting water that had previously recharged Cottonwood Spring. The mine and its consultants have concluded that the hydrologic system in the lower Cottonwood Canyon and lower Blackhawk Formation were independent hydrologic systems. In a letter dated October 27, 1998, the Division concluded that no definitive connection between the mine and the spring had been cited or proven and stated that the Division had made findings to conclude the citizen complaint.

In response to three possible actions recommended by the USFS to resolve the Cottonwood Spring issue, the Permittee conducted gain/loss surveys along the Cottonwood drainage for two years, 1998 through 2000 (the USGS had used this method to measure the flow of Cottonwood Spring from 1978 through 1982, see Appendix C: page 9.) These measurements indicate that:

- During drought periods, flow in Cottonwood Canyon Creek is limited to the discharge from the alluvium at the mouth of Roans Canyon;
- The stretch downstream from Roans Canyon for several miles is a losing reach where water enters the alluvium;
- Flow data correlate with climatic trends and compare directly with USGS data collected in 1978 and 1979.

Flow at Cottonwood Spring has proven not to be directly measurable as discharge from a pipe or other identifiable point source, and the flow from the PVC pipe that was measured from 1985 to 1995 by JBR Consultants, Trail Mountain Coal Company, Mountain Coal Company, and by PacifiCorp (as TM-23 in the Trail Mountain Mine operational plan) was not representative of Cottonwood Spring. Cottonwood Spring (TM-23) will no longer be monitored. PacifiCorp will monitor flow in Cottonwood Creek and monitor water levels in the alluvium above Cottonwood

Spring with the monitoring wells installed in 1992 and 1993.

Based on the information referred to above and other information, the Permittee supports a conclusion that Cottonwood Spring (TM-23) flow has not been impaired by mining operations in their East Mountain mines.

- Geology and geomorphology indicate that:
  - Cottonwood Spring flows from alluvium at the bottom of a glacially-formed U-shaped valley, just above where the canyon transitions to a stream-cut V-shaped valley (the canyon drains from north to south).
  - In Cottonwood Canyon, the Roans Fault system consists of two or more fractures with little or no displacement;
  - Cottonwood Spring is on the north-dipping limb of the Straight Canyon Syncline;

- Drilling and well-completion data indicate that:
  - There is no connection between the lower Blackhawk Formation - Starpoint Sandstone and the upper Blackhawk - alluvium in Cottonwood Canyon;
  - Water elevations in the alluvium vary in direct response to precipitation;

- Resistivity and induced polarization surveys indicate that:
  - Depth of alluvium is fairly constant along the length of the canyon surveyed, from approximately 2 ½ miles north of Cottonwood Spring to approximately ½ mile south of the spring, but width of alluvial deposits increases from south to north to a point just north of Cottonwood Spring;
  - A possible extension of the Mill Fork Canyon fault system was detected a little over one mile upstream of Cottonwood Spring;
  - Fractures and faults cut lower Cottonwood Canyon (apparently just below Cottonwood Spring);
  - The faults and fractures dam the flow of water through the alluvium and the water level rises in the vicinity of Cottonwood Spring. (The narrowing of the valley and the transition from glacial to non-glacial alluvium probably contribute to this also);
  - Seeps and springs along the east side of Cottonwood Canyon also contribute water to the alluvium.

Monitoring of Cottonwood Spring and other springs and wells in Cottonwood Canyon will be continued during reclamation, although less frequently than during mine operation. The Division previously recommended that analyses be done for carbon-14, tritium, deuterium, and oxygen-18 for the Cottonwood Canyon wells to differentiate level changes due to climate from those due to ground water discharge. Although there may be some intermixing of alluvial water

and water from the Starpoint Sandstone, available information strongly indicate that ground-waters in the alluvium and consolidated rock are not related and there is little pertinent information to be gained from isotopic analyses.

Voids created by mine workings may redirect water and produce new discharge locations within or below the mined seam. PacifiCorp commits to conduct annual surveys, until bond release, to identify new discharge locations within and below sealed portals. If discharge occurs, one water sample will be collected and analyzed per location quarterly. Baseline analyses will be done during the 5th and 9th years (Appendix A: page 14 and Groundwater Hydrology - Reclamation Sampling - Table 2).

For final bond release, the Division will evaluate whether pollution of surface and subsurface water is occurring and the probability of future occurrence of such pollution, as well as, the estimated cost of abating such pollution (Directive Tech 006). There is to be a surface and groundwater quality and quantity impact analysis by the Permittee to assess hydrology data relative to the impact projections contained within the Probable Hydrologic Consequences (PHC) and Cumulative Hydrologic Impact Assessment (CHIA). This is to include analysis of trends of identified impacts and a demonstration that water quality is adequate for the post mining land use. For the bond to be released, the analysis must show that onsite impacts have been minimized and that offsite impacts have been prevented.

Surface-water monitoring

Both baseline and operational surface-water monitoring parameters are listed in Table 1 - Surface Water (UPDES monitoring) Baseline, Operational, Postmining Water Quality Parameter List of Appendix A: there is no separate list of reclamation parameters. This table is the same as Table 3 in the Division's Directive Tech 004 except that total alkalinity is not included: although total alkalinity is not listed in the Permittee's tables, this parameter has nonetheless been included on most water-quality reports submitted by the Permittee. (Also, total alkalinity is used to determine carbonate and bicarbonate and, if the need arises, it can be back-calculated from the reported values for those two parameters.)

During reclamation, water samples will be collected and analyzed quarterly for operational parameters at surface monitoring sites listed in Appendix A Part 1A and Surface Hydrology - Reclamation Sampling - Table 1. Quarterly monitoring will include one sample at high flow and one at low flow (Appendix A: page 13). Streams receiving discharges from UPDES sites will be monitored quarterly for operational parameters both upstream and downstream of reclaimed disturbed areas and UPDES discharge points in Grimes Wash and Deer Creek and Cottonwood Canyons. Monitoring will be done only downstream of the Meetinghouse Canyon portals. Following Phase I final reclamation backfilling and grading, monitoring will be done at points immediately above and below remaining sediment ponds (Appendix A: page 4).

Water monitoring information will be reported to the Division quarterly and summarized annually (Appendix A: page15). The Permittee proposes to report annually on sediment production information from points above and below the disturbed area of the Deer Creek Mine (Revised Reclamation Plan - August 2000, pages 3 - 7).

The field-monitoring schedule is outlined in Part II A of Appendix A. Field parameters are listed there and in Appendix A in Table 1 - Surface Water (UPDES monitoring) Baseline, Operational, Postmining Water Quality Parameter List. Field measurements are to be done in conjunction with each water quality sampling, except sites CCC01 in Cottonwood Canyon and RCLF1, RCLF2, and RCF2 in Rilda Canyon are to be monitored quarterly for field parameters only.

Baseline analysis was done in 1996 and will be repeated every five years. Baseline monitoring will be performed during the 5th and 9th year following final reclamation, but in no case will the time between baseline samples exceed five years (Appendix A: page 13). If any of the analyses results exceed water-quality criteria, additional sampling may be needed to establish that water quality-standards have been met before final bond release can be made.

The Division recommended that the macro-invertebrate study conducted in 1991 be repeated in Deer Creek and Huntington Creek, in the spring and fall during the year before reclamation and in the 5th and final year prior to bond release, to allow assessment as to whether impacts to fisheries occur or remain insignificant over the reclamation period. The Permittee indicated in the December 6, 1999 cover letter to the application that the results from monitoring conducted in 1990, 1991, 1992 and 1994 showed no differences in macro-invertebrate densities in Huntington Creek and that additional studies are not warranted. The Division concurs there is no immediate value in such a study at this time, but the Division may revisit this as part of the bond release conditions, especially if there are indications of or reasons to suspect impacts to macroinvertebrates in these creeks.

Gravity discharges

Voids created by mine workings may redirect water and produce new discharge locations within or below the mined seam. PacifiCorp commits to conduct annual surveys, until bond release, to identify new discharge locations within and below sealed portals. If discharge occurs, one water sample will be collected and analyzed per location quarterly. Baseline analyses will be done during the 5th and 9th years (page 172 and Appendix A: page 14 and Groundwater Hydrology - Reclamation Sampling - Table 2).

Currently, water samples collected for UPDES monitoring are analyzed monthly for both UPDES and operational parameters. Details on reclamation monitoring have been added to Appendix A, where it states that UPDES monitoring will continue as needed according to the UPDES permit stipulations. UPDES permit requirements are the federal and state water quality standards for discharge into surface waters; therefore, the proposal is adequate for the Division to

determine that the discharged waters meet all state and federal water quality criteria.

In Table 3-2 in Section R645-301-341 (Revised Reclamation Plan - August 2000, pages 3-2), the Permittee proposes to monitor post-mining flow from portals according to the UPDES permit until the end of the Phase III ten-year vegetation-monitoring responsibility period. The Division does not administer the UPDES permits, so has no control as to whether or not the Permittee will be required to continue UPDES monitoring beyond Phase III bond release.

For final bond release, the Division will evaluate whether pollution of surface and subsurface water is occurring and the probability of future occurrence of such pollution, as well as, the estimated cost of abating such pollution (Directive Tech 006). There is to be a surface and groundwater quality and quantity impact analysis by the Permittee to assess hydrology data relative to the impact projections contained within the Probable Hydrologic Consequences (PHC) and Cumulative Hydrologic Impact Assessment (CHIA). This is to include analysis of trends of identified impacts and a demonstration that water quality is adequate for the post mining land use. For the bond to be released, the analysis must show that onsite impacts have been minimized and that offsite impacts have been prevented.

There is a potential of post-mining discharge of up to 150 gpm from mine portals (page 169). The lowest-elevation portal is at the Trail Mountain Access portals in Cottonwood Canyon. Hydrologic seals will be installed at the Trail Mountain Access portals and in 7th West off 3rd South, which will prevent discharge from the Access portals and minimize discharge from the Miller Canyon portals (pages 170-171). The reason for sealing the Access portals rather than letting the water discharge isn't explained; it is likely the seals will leak.

UPDES discharge permit 22896-004 was obtained for the Miller Canyon portals in 1982 and monitoring began in February 1983 (Cottonwood/Wilberg MRP, Appendix XXII). The three portals were temporarily sealed in 1984 following the Wilberg Mine fire and permanently sealed in 1987, but French drains were installed to allow drainage from the mine. A pipe was installed in the seal of the eastern (#1) portal and extended at least 500 feet down the canyon to facilitate the collection of water samples. Initially there were only sporadic discharges: 25 gpm in both October and November 1986, 12.5 gpm in June 1987, and 4 and 12 gpm in, respectively, September and November 1988. Consistent water flow began in April 1989 and discharge jumped to 70 gpm. The highest discharge was 78 gpm in August 1989, after which flow-volume trended downward. There were some high flows in the spring of 1991, but flow-volumes decreased significantly in 1994 and there has been no reported discharge since July 1996.

In May 1999 it was discovered that the pipe had been pinched-off by caving of the portal openings and that water was flowing from the seals, over the rock ledge, and to the canyon floor where it was dissipating within a few hundred feet. There was minor seepage from portals #2 and #3, and flow from portal #1 was estimated at 3 gpm. Photos taken in June 1999 during backfilling of the Miller Canyon portals show water seeping from the top of the Starpoint Sandstone ledge just below the portals. In 1999, French drains were installed in the base of the

fill to prevent slope failure due to saturation. The water-sampling pipe was also removed at that time and the UPDES monitoring point is now in the streambed of Miller Canyon near the confluence with Cottonwood Creek. It is unknown how long the monitoring pipe had been pinched-off and what effect this had on the accuracy of flow measurements, but losing the monitoring pipe and moving the monitoring point farther from the portals probably account for the consistency of recent "no-flow" reports.

The Deer Creek Mine portals in Deer Creek and Meetinghouse Canyons could potentially discharge after mining operations cease. Current operational discharge from Deer Creek Canyon portals is under a UPDES permit, but there is no UPDES permit for the potential discharge to Meetinghouse Canyon. If post-mining discharge occurs in Meetinghouse Canyon, the Permittee will be required to obtain a UPDES permit and the Division will request such additional information, including water analyses, as deemed necessary to ensure compliance with R645-301and -302.

Deer Creek is a High Quality Water - Category 2, as defined in UAC R317-2. Some reference points provided in Table 5-2 (Revised Reclamation Plan - August 2000, pages 5-4) identify elevations that might act to control postmining ground-water flow gradients. Based on mine elevation contours and the placement of hydrologic seals in the Cottonwood Mine, the Deer Creek Mine intake portal in Deer Creek Canyon is projected to discharge after mining operations cease (page 171). The reclamation plan calls for a sand and gravel filter behind the seal and four 6-inch pipes to drain water through the seal and into a French drain system that will direct the water to the surface (Revised Reclamation Plan - August 2000, pages 5-4 and Drawing DS-1780-D - #5 of 5). The Permittee planned for multiple pipes to decrease the possibility that calcium carbonate precipitation from minewater could plug the discharge system. Water discharged at the surface, if any, will be monitored according to the specific UPDES permit conditions (Appendix A: page 14).

Water quality standards and effluent limitations

Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water-quality laws and regulations and with effluent limitations for coal mining promulgated by the EPA and set forth in 400CFR Part 434 (Section R645-301-751). The Permittee has provided a water-monitoring plan in Appendix A. UPDES information is in Appendix B.

Findings:

Information in the plan is adequate to meet the minimum reclamation plan Hydrologic Information requirements of the regulations.

MAPS, PLANS, AND CROSS SECTIONS OF RECLAMATION OPERATIONS

Regulatory Reference: 30 CFR Sec. 784.23; R645-301-323, -301-512, -301-521, -301-542, -301-632, -301-731.

Analysis:

Reclamation monitoring and sampling location maps

Quarterly monitoring of a series of in-mine wells in the Deer Creek and Cottonwood/Wilberg Mine, shown on Plates HM-2 and HM-3, will continue until the mine is sealed or the sites become inaccessible. Where boundary faults were crossed by mining, a pre-existing hydrologic barrier may now transmit water. Maps HM-2 and HM-3 show mine floor elevations, portals and portal elevations, in-mine water source locations, pertinent geologic controls, and other controls such as sealed mine sections.

Maps HM-2 and HM-3 are certified.

Findings:

Information in the plan is adequate to meet the Minimum Maps, Plans, and Cross Sections of Reclamation Operations requirements of the regulations.

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